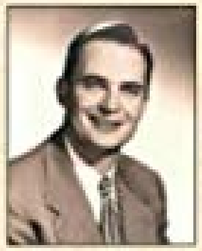
THE CARROLLTON PHASE ARCHAIC

A REDEFINITION OF THE CHRONOLOGY, COMPOSITION, AND AERIAL DISTRIBUTION OF THE EARLY ARCHAIC HORIZON ALONG THE TRINITY RIVER, TEXAS




WILSON W. CROOK, III

Houston Archeological Society
Report No. 35

2020

The Carrollton Phase Archaic

The
Carrollton Phase Archaic:

A Redefinition of the Chronology, Composition, and Aerial Distribution of the Early Archaic Horizon Along the Trinity River, Texas

by

Wilson W. Crook, III

Houston Archeological Society
Report No. 35

2020

ISBN 979-8627249483

Front Cover: The Lake Dallas Site (center top), Exposed Hearth at the Carrollton Dam site (center bottom); Type Carrollton dart point (upper left); Type Trinity dart point (upper right); Wilson W. "Bill" Crook, Jr. (lower left); R. King Harris (lower right).

Editor's Foreword

The ***Houston Archeological Society Report No. 35*** is a publication of the Society. Our Mission is to foster enthusiastic interest and active participation in the discovery, documentation, and preservation of cultural resources (prehistoric and historic properties) of the city of Houston, the Houston metropolitan area, and the Upper Texas Gulf Coast Region.

The Houston Archeological Society holds monthly membership meetings with invited lecturers who speak on various topics of archeology and history. All meetings are free and open to the public.

Membership is easy! As a nonprofit organization, membership in the Houston Archeological Society is open to all persons who are interested in the diverse cultural history of Houston and surrounding areas, as well as the unique cultural heritage of the Upper Texas Gulf Coast Region. To become a member, you must agree with the mission and ethics set forth by the Society, pay annual dues and sign a Code of Ethics agreement and Release and Waiver of Liability Form.

The Membership Form and the Code of Ethics agreement and Release and Waiver of Liability Form are available from the HAS website: http://www.txhas.org/membership.html

Current subscription rates are: Student $15, Individual $25, Family $30, Contributing $35+

Mail the completed and signed forms and a check for the appropriate amount to:

Houston Archeological Society
PO Box 130631
Houston, TX 77219-0631
Web Site: www.txhas.org

Contents

Editor's Foreword ……*5*

Abstract ……*9*

Introduction ……*11*

Physiography and Environment ……*13*

Resource Potential and Geology ……*19*

Previous Investigations ……*33*

Major Site Descriptions ……*37*

Carrollton Phase Archaic Artifacts ……*81*

Stratigraphic Proveneince Of Artifacts ……*116*

Radiocarbon Dates ……*123*

Subsistence Strategies ……*125*

Synthesis ……*131*

Conclusions ……*135*

References ……*139*

APPENDIX I: Artifact Descriptions ……*155*

Abstract

The Carrollton phase Archaic was originally described by Crook and Harris (1952, 1954) from a number of sites along the Elm Fork and the main stem of the Trinity River and their tributaries in Denton, Dallas, Tarrant, and Kaufman counties. The author subsequently described several additional occurrences along the East Fork and its tributaries in Collin County. Crook and Harris originally proposed that the range of the Carrollton phase Archaic might extend southwards along the Trinity River towards the Gulf Coast. Recently, I have had the opportunity to study the large Andy Kyle Archeological Collection which covers 95 sites in nine Southeast Texas counties. Diagnostic Carrollton phase material, almost identical in assemblage to that found in North Central Texas, has been identified in six sites in Liberty County and four additional sites in Southeast Texas. The discovery not only confirms the original supposition of Crook and Harris but provides for the possibility of additional discoveries between the Upper Trinity watershed and the Gulf Coast. Over the years, much misinformation has been published with regard to the age of the Carrollton phase Archaic, its aerial distribution, and its diagnostic artifacts. Excavation of stratigraphically intact Carrollton phase cultural material at several sites in Denton and Dallas counties shows that the Carrollton Archaic is not solely a Middle Archaic occupation but begins in the Early Archaic and extends into the lower part of the Middle Archaic. Based on data from 79 sites in the Upper Trinity watershed and another 10 from Southeast Texas, this monograph serves to redefine the chronology, composition, and distribution of the Early Archaic Horizon along the Trinity River in Texas.

Introduction

The Archaic Horizon within the Upper Trinity River watershed was originally defined by Crook and Harris in the early 1950's (Crook 1952; Crook and Harris 1952, 1953, 1954a, 1954b, 1955). Artifacts from two sites, Wheeler (41DL30) and Lake Dallas (41DN6), were primarily used to characterize the Carrollton phase Archaic. Crook and Harris' research also included observations from a number of additional Archaic sites in the region, mainly along the Elm Fork and the main stem of the Trinity River (see Crook and Harris, 1952, Figure 1). Several of these sites have subsequently been more fully described by the author (Crook 2007a, 2008a, 2008b, 2008c, 2012a, 2012b). In addition, similar assemblages of Carrollton phase material have been found at sites along the East Fork of the Trinity and its tributaries in Collin County (Crook 2007b, 2007c).

In the early 1950s, published information on the Archaic period in Texas was sparse and essentially non-existent for North Central Texas. Without any established datable chronology for the artifacts being recovered, Crook and Harris (1954) estimated that the Carrollton phase belonged to the Middle Archaic. Later, in 1959, a single radiocarbon date was obtained from the Wood Pit in southeastern Dallas County. The date was taken from shell material located near the boundary of the Pattillo sand and the underlying Albritton Formation (Crook 1959). Crook noted that the date came from the uppermost part of the Carrollton occupation with the majority of the material being found well below this level (Crook 1959). Prikryl (1990) relooked at some of the artifacts collected by Crook and Harris from the Elm Fork of the Trinity and also incorrectly assigned the material solely to the Middle Archaic. However, Crook's original excavation notes from the Lake Dallas, Wheeler, and Obshner sites clearly indicate that Carrollton phase material (Carrollton and Trinity points, Clear Fork gouges, Waco sinkers, etc.) were found coeval with split stem points (Gower) which are unambiguously Early Archaic in age. Based on excavations at intact stratigraphic parts of the Dowdy Ferry (41DL332) and Post Oak (41DL429) sites, the author observed that the Carrollton phase Archaic was probably mostly an Early Archaic occupation that spanned across into the lower parts of the Middle Archaic (Crook 2007a, 2008b). Despite these published observations, a number of researchers took both Crook and Harris' original chronology and Prikryl's assessment of Middle Archaic and assigned it to both the Carrollton phase and its diagnostic artifacts (Suhm and Jelks 1962; Turner and Hester 1985, 1993, 1999; Turner et al. 2011). Moreover, several consistent traits, including Calf Creek Horizon (CCH) points (Andice, Bell, and Calf Creek) plus the Wheeler Leaf projectile point were never described in any of the later artifact identification guides despite being prominently mentioned by Crook and Harris in their publications (1952, 1954).

During the 1980s and 1990s, members of the Houston Archeological Society (HAS) began finding components of the Carrollton Archaic outside of the Upper Trinity watershed. Patterson (1982, 1983, 1986, 1989, 1991, 1996, 1998), McClure and Patterson (1988), and Patterson and Hudgins (1987) described finding Carrollton, Trinity, and Bulverde dart points associated with bifacial cutting and scraping tools, gravers, hammerstones, and abundant clayballs from a number of sites in Southeast Texas in Harris (41HR185, 41HR290, 41HR571), Fort Bend (41FB37), Wharton, Austin, Gaines, and Washington Counties. In particular, Patterson noted that Carrollton points in Southeast Texas belonged to an Early Archaic occupation that extended into the Middle Archaic (Patterson 1991, 1996, 1998). A possible relationship between the Early to Middle Archaic in Southeast Texas and that in the Upper Trinity River watershed was noted but no extensive follow-up study was undertaken.

Also during the 1980s, HAS members did a cursory study of the large Andy Kyle Archeological Collection which had been donated to the Sam Houston Regional Library and Research Center in Liberty, Texas. They reported finding Carrollton points from sites in Liberty County (Kindall and Patterson 1986). They further noted that many of the points they had tentatively identified as Motley points might actually be Trinity points (Sheldon Kindall, personal communication, 2017). More recently, the author has conducted a detailed study of the Andy Kyle Collection and found that at least six sites contain most if not all of the Carrollton Archaic artifact assemblage as originally defined by Crook and Harris (1952, 1954) and redefined by Prikryl (1990) and Crook (2007a, 2018a, 2018b; 2018c) (Crook et al. 2017).

Given the confusion regarding the age, all the constituent components, and the aerial distribution of the Carrollton phase Archaic, I decided to conduct this comprehensive update. This study includes research on the original collections of both my late father, Wilson W. "Bill" Crook, Jr., and of R. King Harris, the latter currently curated at the Museum Support Center of the Smithsonian Institution in Suitland, Maryland. More importantly,

I had access to the original field notes and maps of Crook and Harris' work in Denton, Dallas, and Kaufman counties. Also studied were the extensive collections from Kaufman County of the late Dr. Fred Wendorf which are curated at the Texas Archeological Research Laboratory (TARL) in Austin. Other collections studied included those of my long-time archeological colleagues, Mark Hughston and Judge John McCraw, whose research centered primarily in Collin County. Another avenue of research was the extensive Rex Housewright-Lester Wilson-Bobby Vance collection (hereafter described as the "Housewright-Wilson-Vance" collection). These three Dallas Archeological Society members had made a pact to keep their archeological collections together for future research, so the Housewright collection passed upon his death to Lester Wilson, who passed the collection on his death to Bobby Vance (Harris and Vance 1989). With the passing of Mr. Vance, the entire collection plus all its vast research notes and maps, were purchased by the author and Mark Hughston in order to keep this valuable set of data intact. While the main focus of this collection was on the Late Prehistoric occupations along the East Fork of the Trinity, there were also Carrollton phase Archaic materials from both Kaufman and Dallas counties.

Lastly, but significantly, has been my study over the last two years of the Andy Kyle Archeological Collection currently curated at the Sam Houston Regional Library and Research Center in Liberty, Texas. The Kyle Collection consists of well over 30,000 artifacts from 95 sites in nine Southeast Texas counties. A total of 10 sites out of the 95 in the collection were found to contain at least some diagnostic Carrollton phase material. These include six sites in Liberty County (Wood Springs – 41LB15, Savoy – 41LB27, Knight's Bayou – 41LB61, Moss Hill – 41LB65, Clark – 41LB71, and Long King Creek – 41LB175), one site in Polk County (Mill Creek – 41PK172), one site in Jasper County (Sheffield Ferry – 41JP31), one site in San Augustine County (Ayish Bayou – 41SA151), and one site in Sabine County (Brookeland – 41SB73). Of these, Ayish Bayou had only two Bell points and the collection from the Brookeland site had only five Dallas points; Sheffield Ferry and Mill Creek had only Bulverde points. None of the other features of the Carrollton phase Archaic were present in the artifact assemblage from these four sites. Thus, only the sites in Liberty County had more complete suites of Carrollton phase materials.

This monograph has been constructed based on the above study and analysis. The objective of this study has been the re-evaluation, clarification, and, where necessary, the redefinition of cultural concepts that define the Early Archaic period (Carrollton phase) of the Trinity River and its major tributaries, both in the Upper Trinity watershed and in the Lower Trinity near the Gulf Coast. Much of the work included here is a synopsis of previous work combined with that published by the author as individual papers over the last two decades. The study area encompasses virtually all of Denton, Dallas, Collin, and Kaufman counties, as well as Liberty County in Southeast Texas. In all, the study area covers approximately 1,225,630 hectares (3,028,600 acres). The present analysis does not diminish the significance of any of the work previously done by any of the earlier researchers within the Upper Trinity watershed. In point of fact, it builds upon their findings that are invaluable now as so many of the original sites of the Carrollton phase Archaic have either been destroyed by the growth of the Dallas Metroplex area or have been inundated by either Lake Lewisville (Lake Dallas), Lake Ray Roberts, Lake Lavon, or Lake Ray Hubbard. Their work, along with that of other avocational and professional archeologists has provided the basis for this re-evaluation and the constructs that are proposed herein.

Physiography and Environment

Thus far, the Carrollton phase Archaic has been found in two distinctly different environments. The initial discovery was in the Upper Trinity watershed of eastern Denton, extreme eastern Tarrant, Dallas, and Kaufman counties. This was later expanded to include parts of Collin County as well. More recently, the Carrollton Archaic assemblage has been recognized in sites in Southeast Texas, mainly from Liberty County. While similarly located on terraces above the Trinity River and its major tributaries, Liberty County is significantly warmer and more wooded than the Upper Trinity watershed.

The Upper Trinity watershed, notably that of the Elm Fork, the East Fork, and the main stem of the Trinity River, lies mostly within the Blackland Prairie biotic province, which takes its name from the black, clay-rich soils derived from the Cretaceous limestones in the area. Denton County lies in a mixture of biotic zones including the Eastern Cross Timbers but the eastern part of the county where the Trinity River is located is in the Blackland Prairie (Blair 1950). The Blackland Prairie biotic province is a narrow north-south zone bounded by the Eastern Cross Timbers to the west and the Post Oak Belt to the east (Figure 1). These alternating bands of prairies and oak woodlands mark the transition from the deciduous forests of the Southeastern United States to the grassy Southern Great Plains. A photo of a typical Blackland Prairie exposure in central Collin County is shown in Figure 2. Elevations across the region reflect the less resistant bedrock shales and marls and range from 980 feet (299 meters) to 300 feet (91 meters), gradually decreasing from Denton County in the west to Kaufman County in the east. The region is situated in an area where the Fort Worth and East Texas basins merge. This topographic setting explains both the lower elevations and the increased bottomland terrain that occurs along the Upper Trinity River watershed.

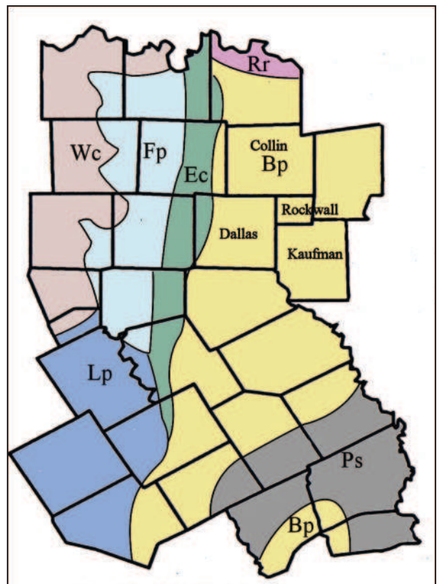


Figure 1. Biotic Provinces of North Central Texas. (Illustration by Lance K. Trask)

Soils of the Blackland Prairie are for the most part, organic-rich, calcareous clays of the Houston Black-Heiden, Ferris-Heiden and Trinity-Frio soil groups (Hanson and Wheeler 1969; Collins et al. 1975; Coffee et al. 1980). These soils are characterized by a low permeability that effectively inhibits the growth of trees except along major waterways. The result is an alternating terrain of open prairie uplands interlaced by a serpentine network of riparian woodlands. The topography is gently rolling with wooded draws and mottes. Microtopographies, namely gilgai, create localized differences in disturbance and hydric regimes that contribute to the plant and animal diversity (Eidson and Smeins 1999).

Vegetation of the Blackland Prairie consists of a number of grasses, the most common of which is little bluestream, although switch grass, Texas wintergrass, Indiangrass, silver bluestream, and others have been reported (Gould 1969; Collins et al. 1975). The riparian belts lining the streams and rivers typically contain cedar elm, bur oak, red oak, hackberry, pecan, walnut, bois d'arc, cottonwood, black willow, honey locust, and sugarberry. Underbrush is predominantly pepper-

Figure 2. Typical Blackland Prairie Field, Central Collin County Texas.

vine, trumpet creeper, greenbrier, hawthorne, honeysuckle, grapevine, Virginia wildrye, Indian currant, poison ivy, and various berry-bearing vines (Collins et al. 1975; Bureau of Economic Geology 2000; Texas Parks and Wildlife 2012).

The present day environment of the Upper Trinity River watershed is warm temperate, subtropical and humid, with hot summers and relatively mild winters. Average humidity for the region is about 65 percent. Annual average temperature for Dallas County (used as a surrogate for the region as the majority of Carrollton phase sites are present in the county) is 64°F (USA.com, accessed April 4, 2019). However, the region is characterized by wide swings in temperature extremes. The periods of extreme cold weather occur only occasionally and are short-lived. Likewise, extremely high temperatures (>100°F) that sometimes occur during the summer months (mainly August) typically do not last long. Sudden changes in temperatures and humidity most frequently occur in the winter months between December and February and take place when cold dry air from the north replaces warm tropical air. Known locally as "northers", drops in temperatures of 20°F or more within an hour are common. Extreme cold weather, including occasional ice storms and snow, are rare, usually short-lived, and are typically followed by periods of drier, milder weather. The freeze-free period for Dallas County is 240 days.

Rainfall is fairly evenly distributed throughout the year, with the maximum amount in May and the minimum amount in August. August is both the hottest and driest month of the year. A large part of the annual precipitation comes in the form of thunderstorms that are typically heavy for brief periods of time. Consequently, a part of the rainfall is usually lost to the soil because of rapid runoff. Snow seldom falls and is not an important source of moisture. Prevailing surface winds across the region are southerly. Strong winds from the north occur in the winter during storms but their duration is fairly short. Mean average evaporation is 56 percent, two-thirds of which occurs in the summer season between May and September. In general, summers tend to be prone to drought. There is a steep west-to-east precipitation gradient across North Central Texas with precipitation increasing about one inch for every 15 miles across the region. Mean annual precipitation varies between 35 and 43 inches from Denton to Kaufman County. Average annual rainfall is about 41 inches (USA.com, accessed April 4, 2019).

Southeast Texas generally lies in the West Gulf section of the Coastal Plain physiographic province (Fenneman 1938). The area consists of very low rolling hills of sandy to sandy-clay rich soils that gradually dip toward the Gulf of Mexico. The surface geology ranges from Eocene (members of the Claiborne and Jackson Groups) to Holocene in age and consists of sandstones, clays, and unconsolidated sandy clays and sands (Sellards et al. 1932).

Southeast Texas is located on the western edge of the Austroriparian Biotic Province which supports dense forests of pines and hardwoods, both in the river valleys as well as on the uplands (Blair 1950) (Figures 3-5). These woods are composed of several types of oak trees, various predominantly longleaf pines, pecans, and sweetgums. Common animals inhabiting the region today include whitetail deer, coyotes, raccoons, opossums, foxes, skunks, squirrels, rabbits, gophers, rats, and mice. Numerous species of birds (including wild turkey), reptiles, and fish also abound, especially in and near the Trinity River. The climate today is considered temperate and average rainfall over the region is between 45-50 inches per year, slightly higher in the southernmost counties (notably Liberty County) where annual rainfall is about 61 inches. Average annual temperatures in Liberty County are 68°F and the freeze-free period averages 270 days per year. The humidity is significantly higher in Southeast Texas as compared to the Upper Trinity watershed area, averaging 70-80 percent during the year and exceeding 90 percent for much of the period between May and October.

The paleo climate of both regions is difficult to determine with any degree of accuracy. Ferring and Yates (1998) believe that the early Holocene (ca. 11,000-7000 B.P.) was moister than today. More xeric conditions prevailed during the Middle Holocene (ca. 7500-4000 B.P.) but mesic conditions returned to North Central and Southeast Texas during the Late Holocene (ca. 4500 B.P. – Present) (Ferring and Yates 1998; Todd 2014). Oxygen isotope data on freshwater mussel shells from the area indicate warmer, drier conditions 3200-2600 years ago but wetter conditions after ca. 500 B.C. (Todd 2014). Conditions became drier again after A.D. 450 and were similar to those in the region today.

The author attempted to reconstruct the paleo-environment of the Upper Trinity watershed using the gastropod faunal assemblages collected from the terrace deposits along the river and its tributaries

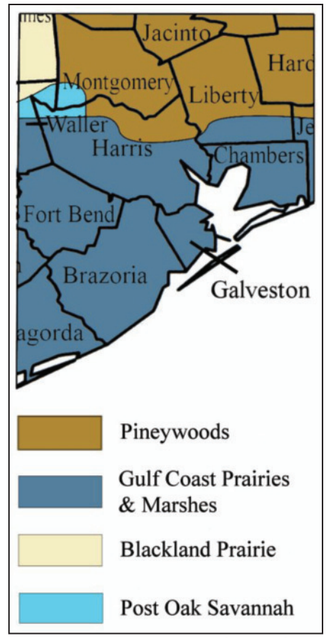


Figure 3. Biotic Provinces for Southeast Texas (Harris and Liberty counties). (Illustration by Lance K. Trask)

Figure 4. Typical heavily wooded area along the Wood Springs site (41LB15), Liberty County, Texas.

Figure 5. Typical densely wooded and swampy area along the Trinity River in Liberty County (Gum Slough Site – 41LB58).

(Crook 2005). Original deposition of the terrace sediments took place in an environment of greater rainfall and stream velocity than is present today. The Hill Member gravels at the base of the T-2 terrace (see following section on Geology) represent the maximal flow energy of the Trinity River followed by deposition of sand and thin clay particles of the overlying formations, each representing lower and lower stages of stream flow. The presence of abundant manganese and iron in the Hill Member gravels also suggests a region of more humidity than today.

This conclusion is further supported by the fossil gastropods collected in the Upper Shuler Formation from the T-2 terrace. Among the five species identified from the Lewisville (41DN72) site, it is significant that four of the species are not represented by a single member in the region today; and the fifth, *Polygyra texasiana*, can only be found with great difficulty (Slaughter et. al. 1962). The other four, *Stenotrema monodon*, *Stenotrema monodon aliciae*, *Anguispira alternata* and *Mesomphix sp*., are more typical today of climates that are more humid with a greater annual rainfall (Henderson 1935; Pilsbury 1940; 1948). *Stenotrema sp*. can be found today in and around the springs in San Marcos in South Central Texas. *Anguispira sp*. is found in the sub-tropical remnant of the "Big Thicket" of Southeast Texas (Slaughter et al. 1962). Both of these areas are warmer and have higher annual rainfall than that of the present Dallas County region. The one species that co-exists with the modern environment of the region (*Polygyra texasiana*) has an extremely variable habitat and can range from a water-rich woodland area to a grassy plain.

Pollen analysis (Slaughter et. al. 1962; Bryant 1975) suggests a heavily wooded region during the late Pleistocene, extending over the floodplain of the Upper Trinity watershed. Today, this same area is considered to be present on the border of the Mississippi timberlands and greater western prairies. This is a region of lower annual rainfall, suggested to be approximately four inches per year less than during the terminal Pleistocene (Slaughter et al. 1962). This change must have taken place after the end of deposition of the Upper Shuler Formation as the gastropod assemblage found in the Holocene Pattillo Formation (T-1 terrace) is representative of those species found living in the region today.

Evidence for varied temperature ranges within the late Pleistocene can be seen in the geologic strata of the Trinity terraces. In the Upper Shuler Formation there are linear beds of calcified hard nodules known as caliche. Occurring only in areas of very arid climate, they suggest that during the major interglacial period of the late Pleistocene (Olympia phase of the Wisconsin glacial epoch), there were distinct periods of alternating humid and dry climates. It is significant to note that no fossil evidence of gastropods was found in zones which were heavily calichified. Since dating of the majority of the Upper Shuler is not very precise, it is unknown how long these periods of drier climate may have lasted. It has been suggested that they may represent periods of significant glacial recession (Crook 2005). If true, this would reflect an interstadial condition and thus a more arid environment.

The two species of gastropods found in the Albritton Formation (T-1 terrace) could have significant implications for understanding the transitional environment from the terminal Pleistocene to the Holocene. Both *Polygyra texasiana* and *Stenotrema leai* are species found within the Upper Shuler of the higher T-2 terrace and not in the overlying Pattillo Formation (T-1 terrace) nor in the current floodplain of the Trinity River. Thus they are indicative of more humid conditions than are present in the region today. The Albritton is of unknown age, primarily because of its acidic nature and ergo lack of preserved datable material. The upper surface of the Albritton Formation is separated from the overlying Pattillo by a major erosional unconformity. The Albritton Formation is unlike any other component in the Trinity River terrace system; its red sandy clay represents a totally different erosional source from either the underlying Shuler or the overlying Pattillo. Such a change in chemical character is likely to represent a significant amount of time - both before and after its deposition. Person et al. (1986) have found that there was a significant environmental change in the Sabine trench from a riverine to an estuarine system starting at about 9400 B.P. This system persisted for about 2800 years, terminating at 6600 B.P. Their work indicates a similar change is likely present for the other Southeast Texas river drainages, including the Trinity River.

The change from riverine to estuarine deposition is postulated to correspond to a short change in the general post-Pleistocene environment of glacial melt and sea level rise (Person et al. 1986). The 9400 to 6600 B.P. date determined by Person et al. (1986) roughly corresponds to the last minor phase of continental glaciation, known as the Cochrane re-advance. This reversal has been variously dated but all dates fit within the range provided for in the observed Gulf Coast sea level fall. It also fits with the ca. 6000 B.P. radiocarbon age date for the base of the Pattillo and the presence of gastropods which reflect a more humid environment from that of the last 6000 years of deposition. While clearly not definitive, there is enough evidence to suggest an age date for the Albritton Formation in the 6000-12,000+ B.P. range.

Following the deposition of the Albritton, the climatic conditions in the Upper Trinity watershed have been fairly stable up to the present. This is borne out by the observation that the gastropod assemblages have been almost constant over the last 6000 years.

There is even less data on the paleoclimate for Southeast Texas. Pollen types are typically used as an indicator of climatic conditions but there is little preservation of pollen in sites in the region. The presence of caliche in some sites during the Early Archaic has been used as a possible indicator of drier, more arid conditions after ca. 9000 B.P. (Aten 1983; Patterson 1996). There has been some work on studying gastropods and fresh water mollusks at inland sites as indicators of climate change, but these studies are restricted to two Archaic sites in Fort Bend County and have not been extensively conducted across the region (Neck 1986, 1991; Patterson 1996). In general, researchers have used the broad periods of climatic change as stated by Aten (1983):

- Late Glacial (before 10,000 B.P.) – mild winters, cool summers, and high precipitation
- Boreal (ca. 10,000-8500 B.P.) – more divergent temperatures and less rainfall than in the Late Glacial period
- Atlantic (ca. 8500-5000 B.P.) – generally warmer temperatures and drier climate
- Sub-Boreal (ca. post-5000 B.P.) – oscillating climatic conditions but generally similar to modern climatic conditions.

Resource Potential and Geology

Resource Potential

The seeds of the dominant grasses present in the Blackland Prairie are typically small and were probably not a significant food source. Despite this, a substantial amount of food resources would have been available to the inhabitants of the Upper Trinity watershed, especially along the river bottoms and in the riparian woodlands. Acorns, pecans, hackberries, mustang grapes, and various wild berries are common even today. In addition, the bottomlands support a varied fauna including whitetail deer, Eastern cottontail, jackrabbit, striped skunk, opossum, raccoon, coyote, bobcat, beaver, turkey, and a large number of species of snakes, rats, mice, and shrews. The streams also produce various species of fish, turtles, frogs, mussels, and snails. Todd (2000, 2014) asserts that the area of the Blackland Prairie is known to support 49 species of mammals, two species of terrapins, nine species of lizards, 39 types of snakes, and 113 species of anuran fauna.

There is some disagreement regarding the presence of bison and antelope in the Blackland Prairie between 8000 B.P. and the Late Prehistoric period (Dillehay 1974; Lynott 1979). A few pronghorn antelope and bison bones have been found at several East Fork sites (Crook and Hughston 2015). Bison were present in Collin County as late as the 20th century as King Harris' father reportedly killed the last bison in the county in 1908 and often told his son that the local river bottoms had always been regarded as a "hunter's paradise" (R. King Harris, personal communication, 1973). Alternatively, as pointed out by Dickens and Wiederhold (2003), the lack of bison bones in campsite remains may simply reflect long distance hunting strategies that involve smoking/jerking of the meat at the kill site and transportation of deboned meat back to the campsite.

The most abundant plant resource available to the aboriginal inhabitants of the Upper Trinity watershed would have been the mast (nut) crop. Pecans and walnuts are available in the fall and winter. Acorns begin to fall in September and are plentiful over the fall and winter months. It is unknown if the Archaic inhabitants of the Upper Trinity watershed extensively exploited the local acorn mast crop. Lynott (1977) has stated his belief that the local acorns have such a high tannic-acid content as to be virtually inedible. The author has personally tried without much success to process and roast local acorns into an edible crop, removing the tannins being the most time-consuming and difficult part of the process. Therefore Lynott may be correct in his assertion that acorns did not play a major role in the local inhabitants' diet. However, even if not part of human diet, the presence of abundant acorns would have played a significant role in sustaining many of the species of animals hunted by the aboriginal inhabitants including whitetail deer, squirrel, raccoon, opossum, quail, and turkey. In addition to providing food resources, the trees of the riparian belts within the Blackland Prairie also would have provided wood for fuel, tools, housing, and potentially boats to move up and down the Trinity River (Crook 2018c).

Another resource present along the Trinity River that would have been critical for the indigenous inhabitants is the presence of fresh water, not only in the streams but as freshwater seep springs that are prevalent within the Upper Trinity watershed area. In particular, large seep springs are present at a number of archeological sites in the area and may be the key factor in the site’s original selection for habitation.

In terms of usable lithic materials, the Uvalde Gravels are the major source for raw material along the Trinity River. Several large upland gravel cobble fields occur throughout the study area (Crook 2007; Crook and Hughston 2015). The author spent considerable time in the summer of 1973 studying three such occurrences, one located on the south side of Lucas Road, three miles northwest of Wylie in Collin County; a second outcrop east of Lake Lavon and south of the town of Josephine in Collin County; and a third major upland cobble field located on the T-5 terrace near the old Buckner Road Orphan Home (now the Buckner Baptist Children’s Home) in East Dallas. In each of the three locations, a total of 500 cobbles were broken to determine their composition. The results, shown in aggregate below, were nearly identical for each location.

Quartzite	1,258 (83.9%)
Chert	177 (11.8%)
Silicified Wood	58 (3.9%)
Ferruginous Sandstone/Ironstone	7 (0.4%)
Total Cobbles	1,500 (100.0%)

Of those cobbles that were determined to be quartzite, 616 (49 percent) were of a grayish color, 403 (32 percent) were various shades of red to red-orange, 214 (17 percent) were yellow to brown, and 25 (2 percent) were either a green or purple color. These results were very similar from all three cobble field locations and thus appear to be fairly consistent across the entire North Central Texas region.

Menzer and Slaughter (1971) argued that the Trinity River gravels derived from the erosion of the Rocky Mountains and the pre-Pliocene Ogallala Formation. Over the last several million years, the Ogallala Formation has retreated some 425 kilometers west of the Dallas area leaving 5-135 cm upland gravels (known as "Uvalde Gravel") in isolated pockets on high terraces (Menzer and Slaughter 1971). In the Dallas area, these terraces correspond to the Buckner or "T-5" terrace that is exposed near the old Buckner Orphan Home (Buckner Baptist Children's Home) and around Love Field (Crook and Harris 1957). Similar exposures occur throughout Dallas, Tarrant, and Collin counties and as far south as northern Mexico (Byrd 1971). Along the East Fork of the Trinity River, the river terrace system is not as well-developed as is present on both the Elm Fork and the main stem of the Trinity River. In Collin County, large relict cobble fields are found on Pleistocene upland interfluves typically a considerable distance from the major rivers (Figure 6) (Thurmond 1967).

The chert that is present in the local cobble fields in the Upper Trinity watershed is of a very poor quality. It

Figure 6. Upland Cobble Field, Collin County, Texas.

is highly friable and does not readily lend itself to controlled flaking. The author has tried heat-treating such material in an attempt to improve its quality but there is no appreciable difference in the knapping quality between heated and non-treated chert. While there may indeed be artifacts in the Archaic sites that are made from this material, the majority of chert present within Carrollton phase Archaic sites is imported from outside the region. Most of the artifacts made from chert are of various shades of gray to white-cream color with many showing tinges of pink to red coloration from having been heat-treated. A high percentage of these artifacts also fluoresce a lemon-yellow to strong orange color under both short and long-wave UV radiation which is characteristic of cherts from the Edwards Plateau of Central Texas (Hofman et al. 1991; Hillsman 1992). Edwards chert was predominantly used by the peoples of the Carrollton phase Archaic in making projectile points and large bifaces/knives. Utilitarian tools (scrapers, gouges, etc.) are more typically made from local quartzite. Chert was also brought into the Upper Trinity watershed from East Texas (typically yellow-brown in color) and/or the Ouachita Mountains of eastern Oklahoma and southern Arkansas.

It is unknown if the Archaic inhabitants of the Upper Trinity watershed made periodic forays to the Edwards Plateau for high quality raw material or they traded for Edwards chert with Archaic groups from Central Texas. A few diagnostic Central Texas Early Archaic artifacts such as Gower (Split-Stem), Bulverde, and Calf Creek Horizon (Andice and Bell) projectile points are present in Carrollton phase sites and their presence may be an indication of periodic contact between the regions. The presence of Edwards chert in Upper Trinity Archaic sites

all but disappears by the Middle to Late Archaic indicating that as the Archaic groups became more sedentary, frequent contact between regions began to disappear.

Quartzite is the most common lithic material used by the Carrollton Archaic peoples for utilitarian tools and some projectile point types, notably Trinity and Dallas points. Local Uvalde Gravel quartzite is typically fine-grained, very hard, and frequently contains internal fractures. These characteristics make the stone difficult to flake in a controlled manner. As a result, much of the quartzite found in archeological sites has been heat-treated in order to facilitate controlled fracturing. Heat-treated quartzite typically has reddish to yellow-orange streaks or spots and a dull, waxy luster (Banks 1990; Chandler 1996). While local quartzite is a poor lithic source for some tools, its hardness and resistance to fracturing make it a highly desirable choice for hammerstones, choppers, Waco sinkers, and the diagnostic Carrollton double-bitted axe. All of these tools are made almost exclusively from quartzite.

In Southeast Texas, local gravel deposits are found within point bars and lag deposits of the Trinity River and some of its major tributaries. No upland lag gravel deposits such as those found in Dallas and Collin counties have been observed, at least not throughout Liberty County (Crook et al. 2017). However, as was observed in the Upper Trinity watershed, chert is not abundant in the Lower Trinity River and what chert is present is of poor quality. Patterson (1996) noted that Southeast Texas can be readily divided into two general lithic resource areas. At sites west of Houston, lithic artifacts are constructed primarily from chert with lesser amounts of silicified wood. The chert was obtained from gravels in the Brazos and Colorado River drainages and it was not unusual for the prehistoric inhabitants of the region to walk 40-80 km to obtain quality lithic materials (Patterson 1996). In sites located east of Houston, the predominant lithic material is silicified wood which tends to occur in thin slabs. Only the most silicified pieces were selected and the overwhelming majority of these were then intensely heat-treated in order to facilitate controlled fracture. As a result, many of the artifacts, especially the projectile points, in collections from Southeast Texas have prominent pink, orange, and reddish coloration (Crook et al. 2017).

As in the Upper Trinity watershed, quartzite is also present in the Lower Trinity gravels. This material is almost exclusively used for hammerstones, with a few exceptions in the Early Archaic where it is also used in making Waco sinkers and Carrollton double-bitted axes.

Similar to the Upper Trinity sites, the Early Archaic in Southeast Texas contains a number of artifacts made from high quality chert which is clearly not local to the region. Patterson (1996) attempted to separate and source these cherts by color but ultimately concluded that color was not a sufficient basis for determining source (Patterson 1974, 1979). He also used ultra-violet light to determine that some Edwards chert was present in Southeast Texas but he could not ascertain if that chert was obtained from river cobbles or had been collected during a long-distance foray (Patterson 1996).

Much of the chert that occurs in the Early Archaic sites in Liberty County also fluoresces a strong yellow to yellow-orange color under UV radiation (Crook et al. 2017). Trace element geochemical testing using X-ray fluorescence (XRF) at the laboratory of the Prehistory Project at Texas State University has shown that most of this chert is a direct match for Edwards chert, and more specifically, to chert that crops out on the eastern margins of the Edwards Plateau (Williams and Crook 2013; Crook et al. 2017). It is unknown if the Early Archaic peoples of Southeast Texas ventured over to the Edwards Plateau to obtain this chert, traded for it with other peoples located between the Edwards Plateau and Liberty County, or obtained it from people moving north-to-south from the Upper Trinity watershed (Crook 2018c).

Geology

Bedrock Geology

The Blackland Prairie in the Upper Trinity watershed is underlain by Late Cretaceous marine sediments of the Gulf Series. These Cretaceous age sediments overlie an ancient folded mountain belt formed by the Ouachita Orogeny roughly 300 million years ago. This old mountain range was reduced by erosion and subsequent rifting associated with the opening of the Gulf of Mexico in Jurassic time, and then buried beneath younger Cretaceous marine sediments (Martin et al. 2011). The Cretaceous sediments of the Gulf Series dip gently (approximately 1°) to the southeast toward the Gulf of Mexico.

In the Carrollton phase occupational area in the Upper Trinity watershed, four units of the Gulf Series are present: the Woodbine Sandstone, the Eagle Ford Shale, the Austin Chalk, and the Taylor Marl. These units crop out from west to east and are progressively younger in the same order, ranging from approximately 97 Ma to 66 Ma in age. The Woodbine Sandstone is only found on the westernmost margins of the Carrollton occupational area where it outcrops on the west side of Lake Lewisville. The unit predominantly consists of fine-grained

sandstones with thin interbedded shales and some minor low-grade lignite (Ferring and Yates 1998). The Eagle Ford Shale crops out in eastern Denton and Tarrant counties and western Dallas and Collin counties (Figure 7). The unit was deposited in a low energy, anoxic setting in water depths of about 100 meters (330 feet) some 20-50 kilometers from shore (McNulty 1966). Overall thickness of the Eagle Ford Shale varies from 60-90 meters (200-300 feet). The lowermost section of the Eagle Ford is an organic-rich shale that contains abundant fossils, notably shark's teeth. Shark's teeth have been found in several Late Prehistoric East Fork sites and their source is believed to be the Eagle Ford Shale (Crook and Hughston 2015).

Around 89-85 million years ago, a major transgressive event took place resulting in a rise in sea level. This

Figure 7. Typical outcrop of Cretaceous Eagle Ford Shale, western Dallas County.

facilitated the deposition of the Austin Chalk Formation. The Austin Chalk consists of a series of interbedded chalks and marls. Volcanic ash has been found within the Austin Chalk that has been correlated with the Laramide Orogeny approximately 86 million years ago (Halbouty and Halbouty 1982). This also coincides with the maximum extent of the Cretaceous Inland Seaway. As a result, the Austin Chalk is believed to have been deposited in water depths of approximately 250 meters (820 feet) (Martin et al. 2011). The Austin Chalk is exposed in stream drainages in the western part of the Upper Trinity watershed (Figure 8).

Figure 8. Highway outcrop of Cretaceous Austin Chalk, Dallas County. Note normal fault in the center of the photo.

Overlying the Austin Chalk is a series of units that are collectively known as the Taylor Marl. Lowermost and immediately on top of the Austin Chalk is the Ozan Marl. This is the most common bedrock unit exposed by the East Fork and its major tributaries, especially in central and eastern Collin County (Figure 9). The Ozan Marl consists of calcareous clay with silt and sand increasing toward the top of the unit. The depositional environment of the Ozan Marl was still relatively deep water marine conditions, but the Cretaceous seas were beginning to shallow and thus the amount of mud admixed with calcareous sediments increased (Martin et al. 2011). Maximum thickness of the Ozan Formation is about 150 meters (500 feet). The unit is known for its abundance of Late Cretaceous mega fossils, notably mosasaurs, plesiosaurs, and giant turtle (*Archelon sp*.) (Matthews 1960; Finsley 1999).

Figure 9. Outcrop of Cretaceous Ozan Formation (Taylor Marl) in Collin County.

Southeast Texas can be divided into two general regions (Oetking 1959). From the Gulf Coast to about 80 miles inland, the surface geology is of Quaternary age, consisting of recently deposited sands and clays. Underneath these sediments lie the Late Pleistocene-Holocene Beaumont Formation (sand and clays) and the Middle Pleistocene Lissie Formation (mixed sand, silt, clays, gravel) (Bernhard et al. 1970). Farther inland from about 80-120 miles from the Gulf Coast, the bedrock consists of Pliocene, Miocene, and Oligocene sediments (Fisher et al. 1972, 1973). Both the Beaumont and Lissie Formations typically occur as non-descript unconsolidated sands, clays, and silty mud and are frequently exposed in stream drainages throughout the county.

Soil Horizons

The entire upper Trinity River basin developed over the Cretaceous rocks described above. The weathering characteristics of these rocks are significant as they ultimately influenced the character and range of soil types that developed in the region. Geology, combined with climate and topography, then determined the range of possible vegetation. In North Central Texas the limestones and marls have predominantly produced prairie soils and vegetation.

The Upper Trinity River watershed is characterized by a well-developed river terrace system. The stratigraphy of the Upper Trinity River alluvial terraces was originally described by Shuler (1935) based on the terraces near downtown Dallas, Pattillo (1940) on the terrace system along the Elm Fork, and by Stovall and McAnulty (1950) on the Trinity River in Henderson County. This work was subsequently correlated by Taggart (1953), Crook and Harris (1957), Slaughter, et al. (1962), Willimon (1970), and Ferring (1986). Each of these investigators has unfortunately used a slightly different terminology in their geologic descriptions. For example, Taggart (1950) referred to the last terrace developed along the Trinity as the "T-5" terrace whereas Crook and Harris (1957) and Slaughter et al. (1962) used the exact opposite numbering system referring to the lowest terrace as "T-1" and the highest remnant upland terrace as "T-5". Moreover, each author also seems have used a different name for the respective terraces (Figure 10). The author has done extensive archeological work along the main stem of the

Trinity River in southeast Dallas County and has studied the T-1 terrace in the northwest part of the county as well. In addition, I have mapped the T-2 terrace between the Lewisville (41DN72) and Hickory Creek (41DN63) sites in Denton County as well as studied the T-4 terrace near Love Field and the T-5 terrace near the old Buckner Orphan Home (Buckner Baptist Children's Home) (Figure 11) (Crook 2015b). All my geologic education at Southern Methodist University in Dallas plus 35 years of industry experience first with Mobil and then later ExxonMobil, used the convention that the floodplain was designated T-0 and each succeeding terrace above a river is sequentially numbered starting with 1, 2, 3, etc. While in my opinion none of the proposed sequences is an ideal model for the entire Upper Trinity River watershed, the series as proposed in Slaughter et al. (1962) best fits both geologic convention and the author's personal observations in the vicinity of some of the more significant Carrollton phase sites (Wheeler, Carrollton Dam, Dowdy Ferry, Post Oak, Milton Pit, and Wood Pit). This terminology, which consists of a five-tier terrace system labeled for simplicity T-1 through T-5, has been adopted for use here (see Figure 10). Of these, human occupation has been found only within the T-1 and T-2 terraces, with the Early Archaic located in the lower parts of the T-1 terrace. As a result, only these two terrace systems will be discussed below. An idealized cross-section through the T-1 and T-2 terraces is presented in Figure 12.

Figure 10. Comparative Terminology for the Upper Trinity Terrace System.

River Terrace	Shuler (1935)	Pattillo (1940)	Taggart (1953)	Slaughter et al. (1962)[1]	Willimon (1970)	Ferring (1986)
Floodplain	Floodplain	Floodplain	Floodplain	Floodplain (T-0)	Floodplain	Floodplain
First Terrace			Carrollton (T-5)	Union Terminal / Carrollton (T-1)		Denton Creek
Second Terrace	Union Terminal	Carrollton	Union Terminal (T-4)	Pemberton Hill / Lewisville (T-2)	T-1	Hickory Creek
Third Terrace	Travis School	Farmers Branch	Travis School (T-3)	Travis School / Farmers Branch (T-3)	T-2	
Fourth Terrace	Love Field	Bethel	Love Field (T-2)	Love Field (T-4)	T-3	
Fifth Terrace		Leslie Hills	Marsalis (T-1)	Buckner Home (T-5)		
Uplands			Uvalde Gravels	Uvalde Gravels		

[1] *Adopted the terminology originally proposed by Crook and Harris (1957).*

The upper 5-10 cm of the T-1 terrace is composed of a fine-grained, carbon-rich black (7.5YR 4/1) topsoil known locally as the Carter alluvium. Only the latest components of the Late Prehistoric period are found within this zone (Perdiz and triangular arrow points (Fresno, Washita, etc.) and shell-tempered pottery). Underlying the Carter is the gray-brown (10YR 5/2), sandy loam of the Pattillo Formation. Along the Trinity system, the Pattillo varies widely in thickness but is typically 150 cm or more in thickness. However, at some sites such as the Dowdy Ferry site (41DL332) in southeastern Dallas County, the Pattillo rarely exceeds 35-40 cm, indicating a period of extensive channel cutting by the Trinity in the area. Artifacts of both the Middle and Late Archaic age occur in the Pattillo, with Late Archaic material (Elam phase) concentrated in the uppermost part of the Pattillo near the Pattillo-Carter contact.

Early Archaic artifacts are found at the base of the Pattillo, at the Pattillo-Albritton contact, and well into the underlying Albritton Formation. The Albritton consists of a yellow-red, iron-rich sandy clay. The unit changes color somewhat along the Trinity watershed, varying from a yellow-red (5YR 4/6) in the vicinity of the Dowdy Ferry site (41DL332) to a deeper reddish yellow-brown (7.5YR 6/8) in the area of Carrollton Dam in northwest

Figure 11. T-5 Terrace near the corner of Buckner and Samuel in East Dallas. The Buckner Baptist Children's Home is in the background. Upland gravels with cobbles can be seen in the foreground.

Dallas County. Thickness is also variable, the average being approximately 250 cm. A layer of pea-sized gravel marks the base of the Albritton. Late Paleoindian material, including Angostura and Scottsbluff projectile points, occurs midway or more in the Albritton, well below the Pattillo contact.

Contrary to the supposition put forward by Prikryl (1990), the Pattillo and Albritton Formations appear to be fluvial and not pedogenic in origin, at least in the area of the Dowdy Ferry and Post Oak sites along the main stem of the Trinity River. Faint bedding plains were observed in both formations, notably in fresh exposures along the southeast and southern walls of the original gravel pit at Dowdy Ferry. In addition, the Albritton and Pattillo Formations occur not only in the T-1 terrace, but also as thin veneers draped over the older Shuler Formation in many exposures of the T-2 (Pemberton Hill) terrace along the main stem of the Trinity River in southeast Dallas County. If the formations were purely pedogenic in origin, then they should also be present over the entire region, including the higher terraces (T-3 to T-5). Instead, they are only present along the Elm Fork and main Trinity channel as distinct terrace depositional units.

The upper surface of the Albritton Formation is separated from the overlying Pattillo by a major erosional unconformity. The Albritton is unlike any other component in the Trinity River terrace system. Its yellow-red sandy clay represents a totally different erosional source from either the overlying Pattillo or the underlying Shuler Formation. Such a change in chemical character is likely to represent a significant amount of time - both before and after deposition. Several specimens of gastropods were recovered from a small clay lens in the Albritton. One of these species, *Stenotrema leai*, is indicative of fresh water alluvial deposition in an environment which was considerably more hydric than present in the region today (Henderson 1935; Pilsbury 1940, 1948; Crook 2005). This potentially corresponds to a short change in the general post-Pleistocene environment of glacial melt and sea level rise. The last minor phase of North American continental glaciation is known as the Cochrane re-advance and has been generally dated to a period between 9000-6500 B.P. (Crook 2005). A pre-6000 B.P. date for the Albritton correlates with the one radiocarbon date for the region of ca.6000 years B.P. for the base of the Pattillo (Crook 1959).

Age of the T-1 terrace sediments is uncertain. Crook (1959) obtained a single radiocarbon date of ca. 6000 B.P. from the base of the Pattillo sand essentially at the Pattillo-Albritton contact. Willimon (1970, 1972) obtained three radiocarbon dates from carbonaceous material from his T-1 terrace, which corresponds to Slaughter et al.'s T-2 Pemberton Hill/Lewisville terrace. One date of 21,540 ± 3010 B.P. (Tx-890) was produced from wood; a

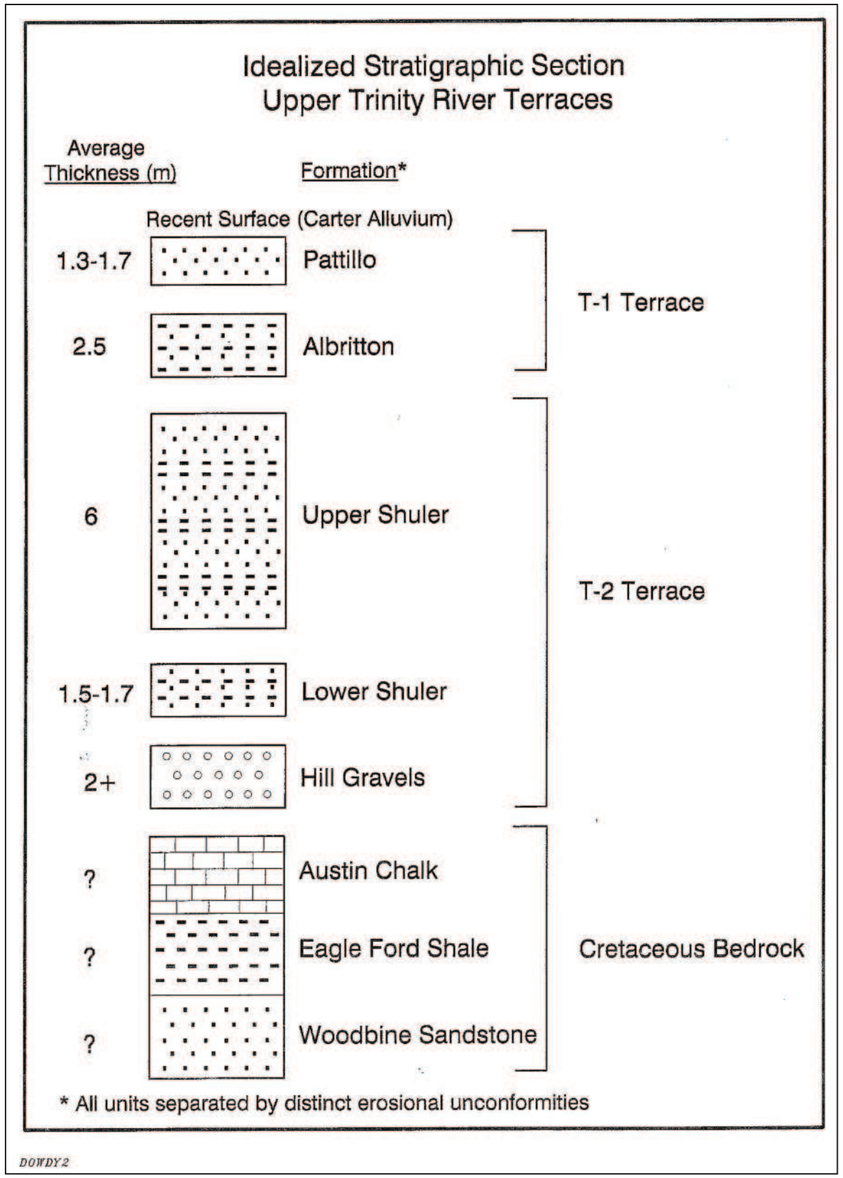


Figure 12. Idealized Stratigraphic Section, Upper Trinity River T-1 and T-2 Terraces. (Illustration by Lance K. Trask)

second date of 22,130 ± 350 B.P. (W-1719) was produced from plant material; and a third date of 20,660 ± 350 B.P. (Tx-889) was obtained from twig and root materials (Willimon 1972). Therefore the Albritton Formation is older than 6000 B.P. and younger than ca. 20,000 B.P., but how much younger remains unknown.

Underlying the Albritton is a thick section of Wisconsin Age sands known as the Shuler Formation. These sands are typically medium-grained, finely laminated (often with alternating white and yellow bands), and contain locally abundant Pleistocene faunal remains. Both Shuler (1935) and Taggart (1953) mapped this as the "Union Terminal" terrace; Crook named this the "Pemberton Hill - Lewisville" or "T-2" terrace (Crook and Harris, 1957); and Ferring (1990, 2001) redefined it as the "Hickory Creek" terrace.

In Ferring's description of the Hickory Creek terrace, he described the terrace fill as the "Coppell Alluvium", which included a series of fine-grained sandy-clays with a gravel layer at the base. The entire section is overlain by a dark gray soil of more recent origin. Crook (Crook and Harris, 1957; Slaughter et al. 1962) subdivided the terrace into four components based on major unconformities separating depositional units. Exposed at the surface is a dark gray (7.5YR 4/1) alluvium which contains small caliche nodules throughout. Crook called this unit the "Richards Formation", which is clearly younger than the rest of the underlying components of the terrace as it contains no fossil faunal remains. This unit varied from 100-170 cm in thickness across the Upper Trinity watershed (Crook 2013, 2014, 2015b).

Below the dark soil layer is a thick zone (5-6 meters in thickness) of medium to fine-grained yellow sandy-clay which Crook referred to as the "Upper Shuler Formation" (Crook and Harris, 1957). At least seven distinct depositional layers with temporary surfaces can be recognized, each representing major individual flooding periods over a considerable period of time. Both the Lewisville site (41DN72) hearth material as well as the worked flakes from the Hickory Creek site (41DN63), were found on the surface of one of the depositional units in the middle of the Upper Shuler sands (Crook 2015b).

Below these sandy-clay layers is a fairly uniform 150-170 cm zone of very fine-grained laminated yellow-brown sand which Crook termed the "Lower Shuler Formation" (Crook and Harris 1957; Slaughter et al. 1962). These sands differ from the overlying units in being much finer-grained and deposited in a number of thin, parallel layers. Manganese oxide staining is more prevalent toward the base of these sands. Below this unit is a layer of iron-cemented gravels of indeterminate depth. Crook (Crook and Harris 1957) referred to these gravels as the "Hill Member" or "Hill Formation" and they are the source material for much of the gravel operations in the Upper Trinity watershed area.

Fauna present in Hickory Creek/T-2 terrace support a prolonged period of deposition. Slaughter et al. (1962) originally believed the faunal assemblage to be Sangamon in age. However, later work in Denton County (Slaughter and Ritchie 1962) and downstream along the Trinity in the Moore pit near Dallas showed the assemblage to more likely be of mid to late Wisconsin age (Slaughter 1966). An age date of 28,840 ± 4740 years B.P. was obtained from the upper Coppell Alluvium (Upper Shuler sands) in Denton County (Ferring and Yates 1998). While this date may not be precise, Ferring and Yates (1998) state an age of 30,000-40,000 years B.P. for the terrace is not unreasonable.

Along the East Fork of the Trinity River, a terrace system is not as well-developed as is present on both the Elm Fork and the main stem of the Trinity River. East Fork soils are entirely composed of highly plastic Blackland Prairie soils. The character of the soils is interdependent upon the geological material, topography, the organic and biotic community, and the climate. Soils in the Blackland Prairie are composed Houston Black-Heiden, Ferris-Heiden and Trinity-Frio soil groups that consist of clay-rich soil formed over chalk and marl parent materials (Hanson and Wheeler 1969; Coffee et al. 1980). The primary differences between these soil units are found in the structural density of the clay, their susceptibility to erosion, and slope orientation.

Typically two soil horizons are present across the study area. Uppermost is a black, organic-rich topsoil of the Frio Series of the Trinity-Frio Association (Pringle 1977). This soil is classified as a vertisol due to the presence of abundant swelling clay, notably montmorillonite (Hausenbuiller 1972; USDA-NRCS 2010). The soil forms as a clay loam over calcareous silty clay alluvium deposited by the streams. The soil is a young soil with only the "A" and "C" horizons developed. In undisturbed sections, the "A" horizon is typically about 10 cm thick and has a high calcium carbonate concentration. Measured pH is about 6.0 (Lynott 1975). When wet, color of the "A" horizon soil is dark grayish-brown (10YR4/2); the dark color is due to its high organic content. Due to the soil's high concentration of swelling clay minerals, mainly montmorillonite, vertisol cracking is prevalent, especially in the drier summer period (Hanson and Wheeler 1969).

The "A" horizon soil is very fine-grained and mostly composed of clay minerals. Particle size of the matrix is less than two millimeters; 40 percent is smaller than 0.002 millimeters (Lynott 1975). Clay content in the "A" horizon exceeds 50 percent. The soil is very hard when dry and very plastic and sticky when wet (it is referred to

by local farmers as “black gumbo” due to this sticky nature). During dry periods, primarily July and August, cracks appear on the surface and extend downward to depths of 5-20 cm.

Below the “A” horizon is a “C” soil horizon. The “C” horizon varies in thickness based on erosion, but in the cuts of major streams such as Sister Grove Creek and Pilot Grove Creek in Collin County the unit is about 90 cm thick. Color of the “C” soil horizon when wet is a light grayish-brown (10YR5/2). The “C” soil horizon is also organic and clay-rich, but considerably less so than the “A” horizon. Clay content is estimated at 30-45 percent (Lynott 1975). Excavations at Upper Farmersville (41COL34), Branch (41COL9), and Enloe (41COL65) sites have shown that the vertical cracks seen during dry months in the “A” horizon typically do not extend into the “C” horizon. Ceramics have been found in archeological sites from the surface to the base of the “C” horizon. Based on the ceramic typology, age of the “A” and “C” soils is likely no more than about 1,000-1,500 years old (Crook and Hughston 2009; 2015).

Lying unconformably below the black topsoil is a yellow-tan sandy clay. Color of the unit varies but is typically a yellowish-brown (10YR5/6) to brownish-yellow (10YR6/6) to a yellow (10YR7/6). This unit does not correlate to any of the known mainstream Upper Trinity terrace deposits but appears to be a major depositional unit along its tributaries, particularly the East Fork system (Wilson W. Crook, Jr., personal communication, 1984). The yellow-tan sandy clay is a surface alteration of the Cretaceous bedrock, either the Austin Chalk or the Taylor Marl (Ozan Formation). Thickness of the yellow-tan sandy clay is as much as three meters. Occupational material is restricted to the surface or the upper few centimeters and is composed of non-ceramic Woodland period material. Only intrusive features (burials, trash pits) of Late Prehistoric age are present within the yellow-tan sandy clay. The unit predates the black topsoil by an undetermined age. A typical soil profile for the East Fork is shown in Figure 13.

Figure 13. Typical Soil Profile, Collin County Texas.

The Lower Trinity River in Liberty County does not have a well-developed terrace system. The floodplain (T-0) is highly asymmetric with a single large terrace developed on the east bank and a wide, flat plain on the west bank (Figure 14). The latter is susceptible to massive flooding with often much of the 9 km between Liberty and Dayton, Texas under water during large-scale floods (Figure 15). While there has been significant westward movement of the Trinity River since the Pleistocene (aerial photos clearly show filled-in oxbow cutoffs east of the current channel), the channels of smaller tributaries in the region seem to have been less subject to change. As

a result, many prehistoric sites in Southeast Texas have long occupational histories from the beginning of the Holocene through the Late Prehistoric period (Patterson 1996).

Figure 14. The Trinity River near Liberty, Texas. Note the high bank on the left (east) side of the river.

Figure 15. Flooded densely wooded floodplain (T-0) of the Trinity River between Liberty and Dayton, Texas.

Most archeological sites in Southeast Texas occur within the first meter of the surface in Pleistocene sediments that have been redeposited during the Holocene. Holocene soils in Southeast Texas are generally sandy with varying amounts of clay and organic materials. Extensive bioturbation, especially by gophers in sandy soils, complicates stratigraphic interpretation of sites. In addition, there is a major problem in interpreting the geology of many inland sites due to missing strata. In many areas, it is common to find late Pleistocene to early Holocene artifacts resting on the surface of the Beaumont Formation which is not supposed to date to later than 30,000 B.P. (Aronow 1971; Patterson 1996). At many locations, about 20,000 years of sedimentation appear to be missing from the geologic record, possibly due to a major erosional event resulting from heavy rainfall after 25,000 B.P. and before 9000 B.P. (Aten 1983).

After the end of the Pleistocene period, sea level on the Gulf of Mexico continued to rise. By 4500 years B.P., sea level is estimated to have been near present levels (Gagliano 1977; Paine and Morton 1986). Coastal margin archeological sites from the Paleoindian to Early Archaic period would now be underwater. Therefore, only inland sites have the possibility of having a full chronological record.

Implication of Vertisols on Archeological Provenience

The vertical provenience of artifacts is of critical importance to the archeologist. When a site is excavated, great care is taken to record data in stratigraphic context. Archeologists base their excavations on the principle of superposition; cultural materials are assumed to have been deposited with the youngest closest to the surface and get progressively older with depth. This relationship is also assumed to have remained constant through time. This basic principle is based on the assumption that the soil is a passive entity in an archeological site. With the presence of vertisols, this assumption is not always correct (Duffield 1970).

A vertisol is defined as any soil with a high enough content of swelling clays (typically >30 percent) to cause a high degree of volume change with variation in moisture content (Dudal and Eswaran 1988; USDA-NRCS 2010). Because they have high clay contents, vertisols have a low hydraulic conductivity and require extended periods of precipitation followed by long periods of aridity to fully swell and shrink. When vertisols contract during dry periods, vertical cracks form in the soil that allows material from the surface to potentially move downward in profile. As the soil moves, slickensides such as those seen in fault movements can develop on the soil surfaces within the cracks (Yalon and Kalmar 1978; Wilding and Tessier 1988; Lynn and Williams 1992; Dudal and Eswaran 1998). Rehydration during rainy periods causes re-expansion of the clays and the closing of the cracks. This action over time has the potential to disrupt and even destroy the stratigraphic context of a site, at least within the zone impacted by vertisol cracking (Lynne and Williams 1992; Keene 2011). The movement of archeological material by vertisols is known as “argilliturbation”.

Vertisols originate from base-rich materials including limestones, dolomite, and calcareous shales. Topographically, such soils are commonly found in lowlands and in areas that are gently rolling. Vertisol soils develop a characteristic microrelief pattern, known as gilgai topography that is associated with the movement of the soils (Williams et al. 1996; Wilding and Tessier 1998; Coulomb et al. 2000). In the United States, vertisols are particularly prevalent along the Gulf Coast in Texas, Louisiana, Mississippi and Alabama (Duffield 1970). Vertisols have major implications not just for archeologists but on plant growth. Due to the high degree of argilliturbation that can damage tree roots, vertisols are not favorable for tree growth. This phenomenon is clearly present in the Blackland Prairie of North Central Texas where trees typically only grow in well-watered areas such as along major streams and rivers (Kishue’ et al. 2009).

For a soil to be classified as a vertisol, it must meet five criteria: (1) it must have at least 50 cm (20 inches) of sediment before reaching any lithic horizon such as bedrock, (2) it must have a clay content of greater than 30 percent to a depth of 50 cm or greater, (3) the clay minerals making up the soil must be known “swelling clays”, usually the mineral montmorillonite, also known as “smectite”, (4) there must be open cracks at some point in the year that are at least one cm (0.4 inches) wide and extend for at least 50 cm below the surface, and (5) either gilgai relief or slickensides must be evident (Buol at al. 1973; Dudal and Eswaran 1988; Wilding and Tessier 1988; Kishue’ et al. 2009).

The soils of the Blackland Prairie, including those along the Upper Trinity watershed in Denton, Dallas, Kaufman, and Collin counties meet most of these criteria and therefore vertisol action is a potential issue for the archeologist (Hanson and Wheeler 1969; Coffee at al. 1980). However, it should be noted that for most Early Archaic sites along the Elm Fork and main stem of the Trinity River, the high percentage of clay and relative consolidation of the sands in the T-1 terrace Albritton Formation serve to limit the effects of vertisol cracking. In the Upper Trinity watershed, vertisol cracking is most prevalent in Collin County along the East Fork of the Trinity and its tributaries. At most East Fork archeological sites, observed cracking, even in the dry summer months, is

typically restricted to the “A” soil horizon and seldom if ever is observed to a depth of 50 cm. Moreover, sites that occur in heavily wooded contexts retain their soil moisture year round and thus are not impacted like sites that occur in open fields.

Vertisols are present in the surface soils of Liberty County but are restricted to lower, more clay-rich layers (Griffen 1996). Sand-rich upper zones are more impacted by bioturbation, especially gophers and tree roots, than by vertisol action. Pleistocene soils such as the clay-rich Beaumont and Lissie Formations where exposed on the surface are impacted by vertisol cracking. However, these formations pre-date any human occupation of the region and the presence of artifact at or within their upper surface is due to erosion and not by the action of vertisols.

An example of the type of local stratigraphy present in Liberty County that has a Carrollton phase Early Archaic component is the Wood Springs site (41LB15). Elton Prewitt conducted a series of shovel tests at the site in 1973 and the Houston Archeological Society dug a similar set of small test pits in 1986 (Elton R. Prewitt, personal communication, 2019; Kindall and Patterson 1986). More recently, the author has dug several test pits across the site to confirm the stratigraphy. Soils covering the area of the Wood Springs site belong to the Spurger-Bienville-Kennefick complex, specifically a mix of Spurger and Kennefick soils (Griffen 1996). The typical soil profile at the site consists of about 8 cm of a pale brown (10YR 7/3) to light gray (10YR7/2) loamy fine sand. This is underlain by a fine-grained brown sandy loam that in places has yellow to reddish mottles. This sand forms a small terrace that sits above Wood Springs Creek which is a minor tributary of the Trinity River. The Trinity River is presently located about 2 km to the west of the site. However, several prominent filled-in oxbow cutoffs can be seen on Google Earth immediately to the west of the site indicating that the Trinity River was significantly closer in prehistoric times. Arrow points and pottery can be found in the upper 30-45 cm; below that are both Woodland period and Archaic occupations. The artifact horizon extends to a depth of at least one meter (no test pits have been dug below this depth).

Previous Investigations

Archeological research on the Archaic period of the Upper Trinity watershed can be summarized into three distinct periods. The first phase began in the late 1930s with King Harris' report on five sites along the Elm Fork of the Trinity River in Denton County (Harris 1939, 1940). These site reports covered several Archaic sites including the Lake Dallas site (41DN6) and were published in the very first two issues of *The Record*, the archeological journal of the then newly formed Dallas Archeological Society. Robert (Bob) Stephenson investigated 27 sites along the Elm Fork as part of the River Basin Survey program for both the Lavon and Garza Little Elm Reservoirs (Stephenson 1949a). In particular, he studied in some detail a total of 11 non-pottery sites including the Lake Dallas site (41DN6) in Denton County which he determined was one of the larger Archaic occupations in the region. As part of this work, Stephenson noted that there were several hitherto undescribed projectile point types which occurred consistently in these Archaic sites. One of these points he described and named as the "Trinity Stemmed" point (Stephenson 1949a, 1949b).

Concurrent with the work being done by members of the Dallas Archeological Society (DAS), Wilson "Bill" Crook, Jr. had begun his own investigation of the terrace system of the Trinity River, both along the Elm Fork in northwestern Dallas County and along the main stem of the Trinity in southeastern Dallas County. This work led to the discovery of the Wheeler site (41DL30), which would turn out to be one of the largest Archaic sites in the entire Upper Trinity watershed. Crook published his initial work on the Wheeler site in 1952 noting that the Archaic occupation of the site appeared to contain two distinct components: an upper horizon of smaller projectile points mainly constructed from local quartzite, and a lower horizon which contained larger dart points that were made mostly from high quality chert which was not indigenous to the region (Crook 1952).

Publication of the Wheeler site discovery led to a meeting between Bill Crook and King Harris in the summer of 1952. This meeting took place in the dining room of the University Park home I grew up in. On one side of the dining room table, my father placed all the artifacts that he had collected from the Wheeler site. On the opposite side, King Harris placed his suite of artifacts from the Lake Dallas site plus several of the sites the DAS had investigated in southeast Dallas County and in Kaufman County. What the two men immediately began to see was that the artifact assemblages from all these different sites were virtually identical, both in artifact types and their lithic composition (Wilson W. Crook, Jr., personal communication, 1973). The next step was to look at the provenience of the different types of artifacts. Comparing field notes, Crook and Harris determined that there were two distinct non-ceramic Archaic occupations along the Trinity River. The first of these was restricted to the upper portions of the Pattillo sands on the first terrace (T-1) above the Trinity and was composed of small to medium-size dart points, most of which were constructed from local quartzite cobbles. The second Archaic horizon was located well below the upper occupation with some artifacts being found at the lowermost portions of the Pattillo Formation but the majority of the artifacts were found in the underlying Albritton sandy-clay, some as deep as 75 cm or more below the Pattillo-Albritton contact. A number of associated artifacts occurred with each Archaic horizon which had little or no overlap with the other occupation. Large bifaces, Clear Fork gouges, Waco sinkers, large double-bitted axes, gravers, and clayballs were diagnostic to the lower Archaic horizon and were completely absent in the upper occupation. Conversely, artifacts such as "turtleback" scrapers and drills were found in the upper zone but not in the lower one. Artifacts from the lower Archaic horizon were most abundant at two sites – Lake Dallas (41DN6) in Denton County and the Wheeler site (41DL30) in Dallas County. Artifacts from the upper Archaic occupation were found to be most abundant at two southeast Dallas County sites, the Wood Pit (41DL76) and the Milton Pit (41DL259). These initial observations were published in 1952 with the older horizon being named the "Carrollton Focus" (named for the closest town to the Wheeler site) and the upper horizon named the "Elam Focus" (named for the old Elam station which was located close to both the Wood Pit and Milton Pit sites) (Crook and Harris 1952).

Over the next several years, the two men refined their observations through a series of publications (Crook and Harris 1953, 1954a, 1954b, 1955). Eventually a total of 27 sites were found to have parts or all of the diagnostic artifact assemblage associated with the Carrollton focus. This included two sites in Denton County (Lake Dallas, Irish Farm), 19 sites in Dallas County (mainly located in the northwest and southeast portions of the county due to exposure in gravel pits), and six sites in Kaufman County. While the distribution of the Carrollton Archaic was primarily restricted to the Upper Trinity watershed, Crook and Harris did note that the occupation probably

extended northward into southern Oklahoma, laterally into North Central and East Texas, and probably southward along the Trinity River, perhaps even as far south as the Gulf Coast (Wilson W. Crook, Jr., personal communication, 1973). Later discoveries of Carrollton phase components at the Acton site in Hood County (Blaine et al. 1968) and the Gore Pit in southern Oklahoma (Hammatt 1976) partially confirmed this hypothesis.

Over the next three decades, other researchers in the area typically modeled their discoveries after either the Carrollton or Elam focus as defined by Crook and Harris (1952, 1954a). In the summer of 1973, the author was hired by the Heard Natural Science Museum of McKinney, Texas to conduct a complete archeological site survey and limited excavations across Collin County. As part of this survey, three additional sites were located which contained either single occupation Carrollton phase material (Frognot – 41COL165; Upper Farmersville North – 41COL166) or a Carrollton component in a multi-occupation site (Crump – no registered number) (Crook 2007b, 2007c). Material collected from these sites was used to construct a new exhibit on the prehistory of Collin County for the Heard Natural Science Museum (Crook 1973).

During the period between 1973-75, the author also conducted excavations at several of the smaller Carrollton component sites that previously had not been published by Crook and Harris other than their general locations on a county map (Crook and Harris 1952, Figure 1). These investigations were conducted at the Carrollton Dam site (41DL12), Bachman Dam (41DL23), the Milton Pit (41DL259), and the Dowdy Ferry site (41DL332). The most extensive of these excavations took place at the Dowdy Ferry site as active sand and gravel operations had ceased and the company controlling the pit granted full access to the site where intact stratigraphic deposits were discovered. This provided the author with a wealth of information regarding the in situ provenience of various Carrollton phase artifacts.

At the same time, the author discovered a hitherto unexplored small gravel pit in the same general vicinity as the Dowdy Ferry site which was about to be filled-in for future house construction. A quick inspection of the site showed the presence of diagnostic Carrollton phase artifacts in place in the pit walls. The construction company working on the site allowed the author two days to make a quick salvage excavation of the site which yielded a total of 47 artifacts, equally split between Carrollton and Elam phase material. The site was named Post Oak (41DL429) for the street that runs in front of the location. The pit was then filled-in and a house sits on top of it today (Crook 2008b).

In a symposium dedicated to the Texas Archaic held in San Antonio on November 2, 1975, Olin McCormack summarized the traits of the Carrollton and Elam foci and added Castroville, Martindale, and Edgewood projectile points to the diagnostic traits of the Carrollton Archaic (McCormick 1976). He hypothesized that the nomadic hunter-gatherers of the Carrollton Archaic migrated along the Eastern Cross Timbers – Blackland Prairie boundary from the Southern Great Plains moving south during the winter months and northward again in the spring. While an intriguing theory, no supporting evidence was given and the paper is marred by a number of errors including the addition of two well-documented Late Archaic to Woodland period points (Castroville and Edgewood) to the Early Archaic Carrollton phase. Again, no evidence as to site occurrence of these points or evidence of an Early Archaic provenience was given. Moreover, McCormick claimed the "hallmark" of the Carrollton focus was the double-bitted axe which he stated was made from ferruginous sandstone (McCormick 1976). The author is familiar with 51 known Carrollton axes from 23 sites in the Upper Trinity watershed and one additional axe from Liberty County. With the exception of one axe from the Dowdy Ferry site that is constructed from silicified sandstone, all of the remaining specimens are made from large cobbles of quartzite; no Carrollton axes are made of ferruginous sandstone which would not be able to stand up to the pounding from use as an axe or hammer.

The second period of investigation into the Carrollton Archaic took place in the late 1980s as part of a study on the prehistory of the Lower Elm Fork conducted by Dan Prikryl for the Texas Historical Commission (Prikryl 1990). Prikryl attempted to access both the collections of Wilson Crook, Jr. and King Harris along with others from members of the Dallas Archeological Society. In addition, he conducted an extensive survey of the Denton Creek area of northeast Tarrant and southern Denton counties. The scope of the study included all prehistoric occupations in the area from the earliest Paleoindian sites through the Late Prehistoric. As such, the Carrollton Archaic was a minor component of the study.

While Prikryl did an excellent job of summarizing all the known sites and what materials were made available to him, unfortunately he did not gain access to Crook's field notes from the Wheeler, Lake Dallas, Obshner, and other sites or to the collections, field notes, and maps made on other Carrollton Archaic sites by the author. It is unknown why Crook's notes and maps were not made available; perhaps they were not asked for or my father forgot to give them to him. As a result, some of Prikryl's conclusions regarding the projectile point types and their respective ages and associations, especially for the Early Archaic, are incorrect. Unfortunately, his summary chart showing the chronology of North Central Texas projectile points (Prikryl 1990:62) contains some of these errors. This chart has been propagated by later authors (Turner and Hester 1985, 1993, 1999; Turner et al. 2011) which

has served to compound misinformation. I personally know Dan Prikryl and he is a highly competent and respected archeologist who did the best job he could given the information made available to him. His concept of breaking the Late Prehistoric period in the Upper Trinity watershed into two distinct components has been confirmed by Mark Hughston's and my research on the East Fork (Crook and Hughston 2015). However, it is in part because of the age dates and information on the Carrollton Archaic given in his monograph that this volume has been written.

The last period of research on the Carrollton Archaic has been the work done by the author over the last 15 years. This includes the long overdue publishing of my excavations and research on malacology along the Trinity River (Crook 2005); the Dowdy Ferry (Crook 2007a), Frognot (Crook 2007b), and Upper Farmersville North sites (Crook 2007c); the Milton Pit (Crook 2008a), Post Oak (Crook 2008b), and Carrollton Dam (Crook 2008c), sites; the use of clayballs across the Upper Trinity watershed (Crook 2009b); the Bachman Dam (Crook 2012a) and Miklas (Crook 2012b) sites; and the occurrence of Calf Creek Horizon points (Crook 2018a) and a description of the Wheeler Leaf point (Crook 2018b). Virtually all of this work was conducted during the 1970s but was not put together into comprehensive site excavation papers until the past decade. More recently, the presence of Carrollton phase Archaic materials have been found in Southeast Texas, principally Liberty County (Crook et al. 2017; Crook 2018c). The last remaining piece to a comprehensive update of the Early Archaic is combining this later research with that conducted by previous investigators, which is the purpose of this monograph.

Major Site Descriptions

A total of 79 sites have been identified from the Upper Trinity watershed that have identifiable Carrollton phase Archaic components, typically distinct projectile point types, Waco Sinkers, Clear Fork gouges, or Carrollton double-bitted axes. Of these, 18 have been categorized as "Major" sites with the remaining 61 as "Minor" sites (Tables 1 and 2). The distinction between the two is somewhat subjective and was based solely on the amount of artifacts observed in collections from each site. Minor sites typically have less than 25 total artifacts, and usually 10 or less. The major sites have an artifact assemblage that exceeds 25 artifacts with most in excess of 50 total artifacts. Ten of the 18 major sites have artifact assemblages that exceed 100 total artifacts. Artifact totals were based on observation of Carrollton phase collections at the Texas Archeological Research Laboratory (TARL) in Austin, the collections of both Wilson W. Crook, Jr. and R. King Harris (the latter is curated at the Museum Support Center of the Smithsonian Institution), the Housewright-Wilson-Vance collection, and several other private collections in the North Central Texas area. As can be seen in Table 2, several of the sites in both Dallas and Kaufman counties (Hutchins – 41DL240, Broken Leg – 41DL313, and Blaine – 41KF12) have large numbers of Carrollton phase projectile points (Split Stemmed, Carrollton, Trinity, Bulverde, Dallas, Wheeler Leaf, Calf Creek Horizon) and would undoubtedly have enough other artifacts to make them "major" sites. However, I did not have access to any collections from those sites other than totals for Carrollton phase projectile points. The location of the major sites plus some of the minor sites that were originally used by Crook and Harris to originally delineate the Carrollton Archaic are shown in Figure 16. There are undoubtedly other sites in North Central Texas, East Texas, and possibly Southern Oklahoma that contain Carrollton phase material that have not been included here. Those included in this study are those that were studied by previous researchers and/or personally by me and have been reported in the literature.

In Southeast Texas, a total of 10 sites have been found in the Andy Kyle Archeological Collection that contain at least one element that characterizes the Carrollton phase Archaic. These include six sites in Liberty County (Wood Springs – 41LB15, Savoy – 41LB27, Knight's Bayou – 41LB61, Moss Hill – 41LB65, Clark – 41LB71, and Long King Creek – 41LB175), and one site each in Polk (Mill Creek – 41PK172), Jasper (Sheffield Ferry

Table 1. Major Carrollton Phase Archaic Sites – Upper Trinity Watershed

County - Site Number / Name	Total Carrollton Phase Artifacts
Denton County	
41DN6 – Lake Dallas	175
41DN62 – Irish Farm	129
Dallas County	
41DL12 – Carrollton Dam	109
41DL23 – Bachman Dam	32
41DL30 – Wheeler	332
41DL76 – Wood Pit	82
41DL116 – Obshner	176
41DL259 – Milton Pit	109
41DL332 – Dowdy Ferry	244
41DL429 – Post Oak	32
Kaufman County	
41KF23 – Kings Creek	31
41FK24 – City of Kaufman	205
41KF50 – Bachelor Creek	29
41KF57 – Edwards	94
41KF59 – Miklas	137
Collin County	
41COL165 – Frognot	119
41COL166 – Upper Farmersville North	66
Crump (Un-numbered)	50
TOTAL – 18 Sites	2,151

Table 2. Minor Carrollton Phase Archaic Sites – Upper Trinity Watershed.

County - Site Number / Name	Comments
Denton County	
41DN1	Possible Carrollton component – 1 Dallas point
41DN3	Possible Carrollton component – 1 Dallas point
41DN4	Possible Carrollton component – 1 Dallas point
41DN5 – Ledbetter	5 Carrollton phase points
41DN11 – Wells	10 Carrollton phase points
41DN28	1 Carrollton phase point – Split Stem
41DN36	9 Carrollton phase points
41DN40	4 Carrollton phase points
41DN49 – Frank	9 Carrollton phase points
41DN65	1 Carrollton phase point - Bell
41DN259	2 Carrollton phase points - Trinity
41DN293	Possible Carrollton component – 1 Dallas point
41DN308	1 Carrollton phase point – Split Stem
41DN353	Possible Carrollton component – 2 Dallas points
41DN354	8 Carrollton phase points
Dallas County	
41DL13	Possible Carrollton component – 1 Dallas point
41DL11 – Denton Tap Road	2 Carrollton phase points
41DL14	2 Carrollton phase points
41DL22	1 Carrollton phase point - Carrollton
41DL27 – Albritton	7 Carrollton phase points
41DL31 – Denton Creek	7 Carrollton phase points
41DL32	3 Carrollton phase points
41DL45 – Walnut Creek	4 Carrollton phase points
41DL48 – Garland Cemetery	5 Carrollton phase points
41DL50 – Field City	Possible Carrollton component – 1 Dallas point
41DL74	2 Carrollton phase points
41DL81	1 Carrollton phase point - Carrollton
41DL102	2 Carrollton phase points
41DL140 – Hutchins	10 Carrollton phase points
41DL157	4 Carrollton phase points
41DL172	2 Carrollton phase points
41DL175 – Kleberg	3 Carrollton phase points
41DL177 – Melaun	4 Carrollton phase points

Table 2. Minor Carrollton Phase Archaic Sites – Upper Trinity Watershed. (Continued)

County - Site Number / Name	Comments
41DL234	2 Carrollton phase points
41DL235 – Cottonwood	7 Carrollton phase points
41DL236	1 Carrollton phase point - Trinity
41DL240	2 Carrollton phase points
41DL242	5 Carrollton phase points
41DL252	1 Carrollton phase point - Carrollton
41DL281	4 Carrollton phase points
41DL296	1 Carrollton phase point – Carrollton
41DL297	2 Carrollton phase point – Carrollton, Trinity
41DL301	2 Carrollton phase point - Carrollton
41DL313 – Broken Leg	12 Carrollton phase points
41DL314	8 Carrollton phase points
41DL326	2 Carrollton phase points
41DL327 – Gifford Hill	7 Carrollton phase points
Binerri (Un-numbered)	6 Carrollton phase points
Kaufman County	
41FK12 – Blaine	14 Carrollton phase points
41KF53 – McLawn	7 Carrollton phase points
41KF53	4 Carrollton phase points
Harris – 27B5-4	2 Carrollton phase points
Tarrant County	
41TR14 – Rush Creek	1 Carrollton phase point - Carrollton
41TR21 – Hugh Simmons	1 Carrollton phase point – Carrollton
41TR56	4 Carrollton phase points
41TR71	1 Carrollton phase point - Carrollton
41TR95 – Pipes	3 Carrollton phase points
41TR98 – Daniel Cabin	1 Carrollton phase point – Split Stem
41TR149 – Leonard Brothers	3 Carrollton phase points
41TR150 – Forrester	1 Carrollton phase point - Carrollton
Collin County	
41COL175 – McKinney Airport	3 Carrollton phase points
TOTAL – 61 Sites	224 Carrollton phase artifacts

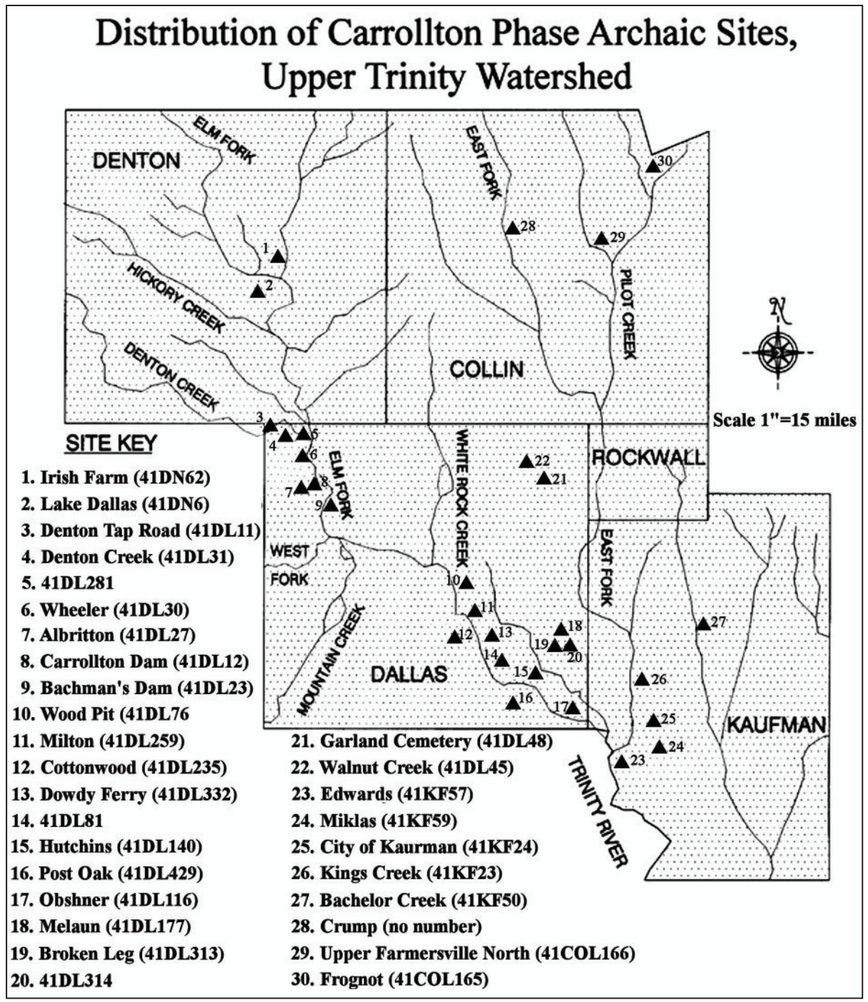


Figure 16. Distribution of the more diagnostic Carrollton phase Archaic Sites in the Upper Trinity Watershed. (Illustration by Lance K. Trask)

– 41JP31), San Augustine (Ayish Bayou – 41SA151), and Sabine (Brookeland – 41SB73) counties. Of these, only the sites in Liberty County contain more than a single trait of the Carrollton Archaic, and only Wood Springs and Moss Hill have significant numbers of Carrollton phase artifacts. The Carrollton Archaic sites in Southeast Texas are listed in Tables 3 and 4.

In addition to the above counties, Carrollton phase projectile points, primarily Carrollton and Trinity points, have been reported from sites in Harris (41HR185, 41HR290, 41HR343, 41HR354, 41HR571, 41HR730, 41HR731, 41HR732), Fort Bend (41FB37, 41FB42), Wharton (41WH19) and other counties in Southeast Texas

Table 3. Major Carrollton Phase Archaic Sites – Southeast Texas.

County - Site Number / Name	Total Carrollton Phase Artifacts
Liberty County	
41LB15 – Wood Springs	192
41LB65 – Moss Hill	116
TOTAL – 2 Sites	308

(Patterson 1980, 1982, 1983, 1991, 2001; Patterson et al. 1987; Patterson et al. 1992a, 1992b; Patterson et al. 1993). Typically, only a few Carrollton, Trinity, Bell, or Bulverde points are found in each site and never in abundance. The only other distinctive Carrollton artifact which has been found in Southeast Texas west of the Trinity River is clayballs, which have been found in overwhelming numbers, sometimes several thousand per site (Patterson 1983, 1986, 1989). No Waco sinkers, Clear Fork gouges, or Carrollton double-bitted axes have been reported from these sites.

A particularly strong Carrollton phase Archaic component was recorded recently at the Dimond Knoll site (41HR796) in western Harris County. Many of the key traits are present including a large number of Carrollton points (n=14), Trinity (n=4), as well as Calf Creek Horizon (Andice, Bell), Bulverde, and Dallas points. A single Clear Fork gouge was recovered as well as a number of clayballs (Jason W. Barrett, personal communication, 2020).

A brief description of each of the major Carrolton phase sites in both the Upper Trinity watershed and in Liberty County is included below. The sites are listed in order by county by trinomial site number. It should be noted that I have visited on more than one occasion all of the major sites described below with the exception of Irish Farm (41DN62). I have also conducted excavations at Carrollton Dam (41DL12), the Milton Pit (41DL259), Dowdy Ferry (41DL332), Post Oak (41DL429), Frognot (41COL165), and Upper Farmersville North (41COL166) site as well as geological investigations at most of the other sites.

Table 4. Minor Carrollton Phase Archaic Sites – Southeast Texas.

County - Site Number / Name	Comments
Liberty County	
41LB27 – Savoy	8 Carrollton phase points
41LB61 – Knight's Bayou	11 Carrollton phase points
41LB71 – Clark	3 Carrollton phase points
41LB175 – Long King Creek	2 Carrollton phase points
Polk County	
41PK172 – Mill Creek	2 Carrollton phase points
Jasper County	
41JP31 – Sheffield Ferry	4 Carrollton phase points – 4 Bulverde points
San Augustine County	
41SA151 – Ayish Bayou	2 Carrollton phase points – 2 Bell points
Sabine County	
41SB73 - Brookeland	Possible Carrollton component – 5 Dallas points
TOTAL – 8 Sites	37 Carrollton phase artifacts

Major Site Descriptions - Upper Trinity Watershed

Lake Dallas (41DN6)

The Lake Dallas site occurs in a relatively small (1 Ha) cut-off segment of the T-1 terrace that lies between an old abandoned channel and the present channel of the Elm Fork of the Trinity River in central Denton County. The site is located just below the dam of old Lake Dallas which gave rise to its name. The Lake Dallas site is now in the middle of Lake Lewisville and as such, the site is no longer available for archeological investigation.

The surface of the Lake Dallas site was extensively cultivated for peanuts which completely destroyed the stratigraphy of the Pattillo sands. In fact, so disturbed were the upper sands that it created a blowout situation in which large quantities of the upper part of the T-1 terrace were stripped away and shifted creating small dunes concentrated along fence lines. This resulted in exposing a large number of artifacts from the upper part of the Pattillo sand, including those from both Late Archaic and Late Prehistoric periods. The author remembers visiting the site in the early 1960s and finding both arrow points and pottery on the surface of these small dunes against a fence line that lined the west bank of Lake Dallas. Some of the arrow points were made from alligator gar scales, with both the lateral edges and the stem having been modified by pressure flaking.

Below the Pattillo, the lower portion of the T-1 terrace (Albritton Formation) remained stratigraphically undisturbed. This unit was exposed in a number of small gulleys that traversed the site from north-to-south paralleling the path of the Elm Fork (Figure 17). It is from these exposures of the Albritton that a large number of Carrollton phase artifacts were recovered (n=175) (Table 5). Every major component of the Carrollton Archaic lithic assemblage is present and in abundance. Most notably, 33 Waco sinkers were recovered from the site. The purpose of the Waco sinker remains problematical; the three most accepted theories being that they were weights used on fishing nets, as bola stones, or possibly as atlatl weights (Watt 1938; Boyd and Shafer 1997). If their function was indeed related to fishing and/or killing shore birds, the site's location immediately adjacent to a wide part of the Elm Fork might explain their abundance at the site.

Figure 17. The Lake Dallas site in the late 1950s. R. King Harris sits in the middle of the photo in a gulley that exposes the Albritton Formation. The loose Pattillo sands can be seen on the surface in both the foreground and on the rise behind the small gulley. (Wilson W. Crook, Jr. photo).

In their initial meeting in the summer of 1952, Crook and Harris noted that the artifact assemblages from their two primary Carrollton phase sites, Crook's Wheeler site and Harris' Lake Dallas site, were in fact, virtually identical in all aspects (Crook and Harris 1952). Subsequent visits to both sites confirmed that they both occurred in identical geologic context and were within a few feet of each other in terms of elevation. The sites were separated by about 16 km in an almost straight north-south line. As such, they rightfully concluded that they not only belonged to the same prehistoric culture but may have even been utilized seasonally by the same bands of people moving up and down the Trinity River. While later exploration along the Trinity River led to the discovery of a large number of similar Archaic sites, Lake Dallas and Wheeler remained two of the largest occupations. Therefore, these two sites were chosen as the "type" sites for the Carrollton phase Archaic (Wilson W. Crook, Jr., personal communication, 1973).

Table 5. Distribution of Artifacts by Tool Type and Lithic Material, Lake Dallas Site (41DN6), Denton County, Texas

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				88
Split Stem	10	2	0	
Carrollton	3	0	0	
Trinity	16	4	0	
Bulverde	1	0	0	
Dallas	4	4	0	
Wheeler Leaf	3	0	0	
Calf Creek Horizon	3[1]	0	0	
Unidentified/Other	33	5	0	
Biface/Knife				12
Ovoid Leaf	5	4	0	
Square Based	2	1	0	
Scrapers				20
Concavo-convex	10	6	0	
Flake Side	4	0	0	
Unidentified/Other	33	5	0	
Clear Fork Gouge	0	7	0	7
Waco Sinker	0	33	0	33
Carrollton Axe	0	3	0	3
Core	0	0	0	
Graver	4	0	0	4
Perforator	3	0	0	3
Burin	2	0	0	2
Hammerstone	0	3	0	3
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	0	
Total	103 (59%)	72 (41%)	0	175

[1] Bell (2), Calf Creek (1).

In order to accurately compare the stratigraphy between the Lake Dallas and Wheeler sites, Crook and his DAS colleague Jack Harkey excavated a total of 14 1.5 by 1.5 meter units across the top of the site in between the paleo channel and the current channel of the Elm Fork. The unit squares were arranged in a single north-south line of eight units, with two lines of three additional units at right angles moving east toward the Elm Fork. Each unit was taken down from the surface to a depth at least 60 cm into the upper part of the Albritton. The test units confirmed that (1) the Pattillo sand present on the surface had an average depth of about 20-25cm and was highly disturbed from farming activity and subsequent wind action. The only artifacts found within this zone were either

Late Archaic dart points (Gary, Kent) or arrow points and pottery, (2) the Albritton Formation appeared to be undisturbed below the plow zone and continued for at least 60 cm (the basal pea gravels were not encountered at that depth in any of the 14 units). A Dallas point was found on the surface of the Albritton essentially at the Albritton-Pattillo contact. A Trinity dart point was found 20 cm into the Albritton in one unit, a Carrollton point was found at a depth of 20 cm into the Albritton in another unit, and a second Carrollton point was found 50 cm in a third unit. A scraper made from a pinkish-colored chert was found at the base of another unit (60 cm into the Albritton). These findings corresponded to those found at the Wheeler site. None of this data was published but is present in Wilson W. Crook, Jr.'s field notes which are in the possession of the author.

Continued exploration of the Lake Dallas site before its eventual inundation led to the discovery of a large oval-shaped hearth structure completely contained within the Albritton Formation and with undisturbed later sediments on top (Figure 18). The hearth was composed mainly of discolored soil with a number of small charcoal flakes dispersed throughout. These small pieces of charcoal were meticulously collected and preserved in aluminum foil, but at the time did not represent a significant enough weight to be dated using conventional radiocarbon methods (Wilson W. Crook, personal communication, 1973). Unfortunately, the charcoal sample which could be dated using today's technology, could not be located in either the collections of Crook or Harris.

In addition to having a significant later Archaic and Late Prehistoric component, the Lake Dallas site also has one of the largest Paleoindian occupations in the Dallas metroplex area. King Harris collected two fluted Clovis points, one Plainview point, two Dalton points, and nine other broken or reworked Paleoindian points which could not be readily typed.

Irish Farm (41DN62)

The Irish Farm site, sometimes referred to as Old Irish Farm, is located 8.3 km north and slightly east of the Lake Dallas site at what is now the northern end of Lake Lewisville. The site lies immediately west of the Doe Branch peninsula at the northern end of the lake. Before inundation by Lake Lewisville, the Irish Farm site lay 80

Figure 18. R. King Harris beside the exposed oval-shaped hearth feature in a gulley at the Lake Dallas site. The contact between the upper Pattillo loose sand and the underlying Albritton is approximately at the level of Mr. Harris' hat brim, making the location of the hearth at a depth of over 60 cm into the Albritton sandy clay. (Wilson W. Crook, Jr. photo).

Table 6. Distribution of Artifacts by Tool Type and Lithic Material, Irish Farm Site (41DN62), Denton County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				57
Split Stem	2	0	0	
Carrollton	2	0	0	
Trinity	17	2	0	
Bulverde	16	0	0	
Dallas	9	3	0	
Wheeler Leaf	0	0	0	
Calf Creek Horizon	0	0	0	
Unidentified/Other	6	0	0	
Biface/Knife				5
Ovoid Leaf	4	0	0	
Square Based	1	0	0	
Scrapers				40
Concavo-convex	6	5	0	
Flake Side	29	0	0	
Clear Fork Gouge	0	24	0	24
Waco Sinker	0	1	0	1
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	1	0	0	1
Perforator	1	0	0	1
Burin	0	0	0	
Hammerstone	0	0	0	
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	0	
Total	94 (73%)	35 (27%)	0	129

meters east of Little Elm Creek, a tributary of the Elm Fork of the Trinity River. When the site was re-exposed due to drought conditions in 1973, researchers reported that it had been heavily eroded by wave action which had destroyed most of its stratigraphy (Prikryl 1990).

The only work on the site was conducted by Barber (1966) who reported an extensive collection found by him and his wife in the early 1960s whenever the site was partially exposed. Barber's collection included nearly 600 projectile points ranging from Late Paleoindian through Late Prehistoric. Of note, were 57 Carrollton phase Archaic points (Table 6). King Harris reportedly helped Barber separate his collection into Early, Middle, Late Archaic, and Late Prehistoric components and it is on this basis that the artifact totals presented in Table 6 are based. It should be noted that the author has never seen any of this material nor are there any artifacts or notes on this site in the collection of either Crook or Harris.

Carrollton Dam (41DL12)

One of the first Archaic sites to have been studied along the Trinity River and its tributaries was the Carrollton Dam site (41DL12), having been discovered by Claude Albritton of S.M.U. in the 1930's. The site's location was officially recorded by King Harris and L. P. McElroy on December 30, 1940 (Carolyn Spock, personal communication, 2007), making it one of the earliest reported archeological sites in Dallas County. The author's late father made repeated visits to the site in the 1950's and the author conducted a limited excavation on a small portion of the site in 1972-73 (Crook 2008c).

Table 7. Distribution of Artifacts by Tool Type and Lithic Material, Carrollton Dam Site (41DL12), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				41
Split Stem	2	1	0	
Carrollton	2	3	0	
Trinity	5	1	0	
Bulverde	3	0	0	
Dallas	1	0	0	
Wheeler Leaf	0	1	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	17	3	1[2]	
Biface/Knife				7
Ovoid Leaf	5	2	0	
Square Based	0	0	0	
Scrapers				25
Concavo-convex	7	3	0	
Flake Side	11	3	1[2]	
Clear Fork Gouge	0	4	1[2]	5
Waco Sinker	0	1	0	1
Carrollton Axe	0	1	0	1
Core	0	0	0	
Graver	2	0	0	2
Perforator	2	1	0	3
Burin	0	0	0	
Hammerstone	0	1	0	1
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	23	23
Total	58 (53%)	25 (23%)	26 (24%)	109

[1] *Bell (1).*

[2] *Silicified Wood (3).*

The Carrollton Dam site (41DL12) lies in northwest Dallas County, 0.15 km south of where East Sandy Lake Road crosses over the Elm Fork of the Trinity at Carrollton Dam, the proximity of which gives the site its name. The site was originally exposed both along the bank of the river and in a small commercial gravel operation. Total aerial extent of the site was approximately 0.4 Ha (1 acre). Houses have been built on top of much of the former gravel operations and what remained of the site has now been covered by a large concrete wall built to protect the houses from water flooding over Carrollton Dam. This location was the site of major flooding that caused much damage to local residents in 1908. The Carrollton Dam site is 2 km southeast of the Wheeler site (41DL30), one of the largest Early Archaic sites along the Trinity and is undoubtedly culturally related.

At the Carrollton Dam site, gravel operations exposed a typical, albeit thin, section of the T-1 terrace of the Trinity River, including 40 cm of the gray sand of the Pattillo Formation and a further 90 cm of the red sandy clay of the Albritton Formation. Along the Upper Trinity system, the interval of the Pattillo varies widely, but typically averages 150 cm or more in thickness. At the Carrollton Dam site however, the Pattillo averages only about 40 centimeters indicating a period of extensive channel cutting by the Trinity in the area. Artifacts of the Late Archaic occur in the upper 15-20 centimeters of the Pattillo at the site (Crook 2008c).

As was found at the Lake Dallas (41DN6), Wheeler (41DL30), Wood (41DL76), Dowdy Ferry (41DL332), and other Archaic sites along the Trinity, the Early Archaic horizon is present at the site in the base of the Pattillo and the upper 30 centimeters of the underlying Albritton Formation. No evidence of human occupation was found below the upper third of the Albritton. At Carrollton Dam, the Albritton Formation consists of a reddish-yellow (7.5YR 6/8) sandy clay. Thickness of the unit is variable, the average along the Trinity being approximately 250 cm. At Carrollton Dam, the Albritton sandy-clay averages about 90 cm.

A total of 109 artifacts were recovered from within the Albritton at the Carrollton Dam site (Table 7). This includes at least one or more artifact of virtually every diagnostic component of the Carrollton Archaic including Split Stem, Carrollton, Trinity, Bulverde, Dallas, and Calf Creek Horizon (Bell) projectile points, a single Carrollton double-bitted axe, five Clear Fork gouges, and a single Waco sinker. A small hearth area was uncovered by the author and a number of clayballs (n=23) were found within its boundary (Crook 2008c).

A larger hearth containing abundant fire-cracked rock and clayballs was exposed by Bill Crook at a depth of over 40 cm within the Albritton Formation (Figure 19). While the soil within the hearth was strongly discolored, most of the original charcoal had broken down to small flecks. These were meticulously collected by Crook but they did not represent enough volume to obtain a radiocarbon date based on the technology of the time (Wilson W. Crook, Jr. Field Notes). None of this charcoal could be located in Crook's collections.

In addition to the hearth feature, the remains of human skeletal material were found at the contact between the Pattillo sand and the Albritton Formation. The material included several teeth and numerous small bone fragments. The bone material was highly weathered and very friable. A substantial amount was collected and a radiocarbon date was attempted by the author through Beta Analytic but the material did not retain enough collagen for a viable date to be obtained.

Figure 19. Exposure of a large hearth feature in the Albritton Formation at the Carrollton Dam site (41DL12). The small pea gravels at the base of the Albritton can clearly be seen in the photo.(Wilson W. Crook, Jr. photo)

Bachman Dam (41DL23)

Another of the early Archaic sites to have been studied in the Upper Trinity watershed was the Bachman Dam site (41DL23), also having been discovered by Claude Albritton of S.M.U. in the 1930's. The author's father made repeated visits to the site in the early 1950's and the author in conjunction with his father conducted a limited excavation on a small portion of the site that remained in late 1960's and early 1970's.

The Bachman Dam site (41DL23) lies in northwest Dallas County, approximately 500 meters south of Bachman Lake dam, south of Shorecrest Drive in the section between Denton Drive and Harry Hines Blvd (see Figure 16). The site is on a steep slope below Love Field Airport where an old channel of Bachman's Branch has cut through the Union Terminal/Carrollton (T-1) terrace to reach the Trinity River. The proximity of the dam, which at the time of the site's discovery was the only major feature in the area, gave rise to the name. New industrial operations have been built over most of the area and virtually none of the site remains exposed today.

The Bachman Dam site is located on the south side of Bachman's Branch, a minor tributary of Trinity River. Bachman's Branch rises near Forest Lane east of the site and runs for approximately 15 kilometers south and then west into the Elm Fork of the Trinity River. The stream was originally named Browning's Branch in the 1840's but was later renamed after the John B. and William F. Bachman families settled there (Tarpley, 1969). The stream was dammed in 1903 to create a water supply for the City of Dallas (Bachman Lake) but it proved too small a volume for the growing city demand for water and was soon replaced with the construction of White Rock Lake in 1911.

Figure 20. Dallas Archeological Society member Jack Harkey, Jr. working in the small exposure of the Albritton Formation at the Bachman Dam site (41DL23) in 1952. Artifacts were recovered in place in the gulley wall and elsewhere to the left and right of the photo. (Wilson W. Crook, Jr. photo).

Site 41DL23 lies on a steep slope where an older channel of the stream has cut into the T-1 (Union Terminal/Carrollton) terrace. The site was originally exposed both along the bank of the former channel and in small borrow pits used for a nearby MKT railroad spur as well as local private roads. Total aerial extent of the site was estimated to be no more than approximately 0.2 Ha (0.5 acres).

Borrow pit operations and erosion exposed a typical, but very thin section of the T-1 Trinity terrace (high ground above a minor tributary creek hence less terrace deposition) including 20 cm of the gray, calcareous sand of the Pattillo Formation and a further 60 cm of the reddish-yellow (7.5YR 6/8) sandy clay of the Albritton Formation (Figure 20). These sediments are overlain on part of the T-2 (Pemberton Hill) terrace, including one meter of the yellow-white Shuler sands and an undetermined section of the basal Hill Member gravels.

Almost unique within Archaic sites along the Trinity, no artifacts were found within the upper Pattillo; all cultural material was located within the Albritton Formation ranging from 5 cm below the upper surface all the way to within 4 cm of its lowest exposure (Crook 2008c). A single broken base of a Dalton point and two other untyped Paleoindian projectile points (Angostura?) were found toward the base of the Albritton (Crook 2008c). Diagnostic Carrollton Archaic artifacts including Carrollton, Trinity, Dallas, Bulverde, and Wheeler Leaf points were recovered in situ in the gulley walls between 4 and 48 cm deep within the Albritton Formation, just above the Paleoindian artifacts. A relatively small number (n=32) of Carrollton phase Archaic artifacts were recovered from the site due to the limited exposures of T-1 terrace material and failure to obtain permission to conduct more extensive excavations (Table 8).

Table 8. Distribution of Artifacts by Tool Type and Lithic Material, Bachman Dam Site (41DL23), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				12
Split Stem	0	0	0	
Carrollton	3	1	0	
Trinity	2	1	0	
Bulverde	1	0	0	
Dallas	1	0	0	
Wheeler Leaf	0	1	0	
Calf Creek Horizon	0	0	0	
Unidentified/Other	0	2	0	
Biface/Knife				5
Ovoid Leaf	0	3	0	
Square Based	0	1	1[1]	
Scrapers				6
Concavo-convex	2	1	0	
Flake Side	1	2	0	
Clear Fork Gouge	0	0	0	
Waco Sinker	0	0	0	
Carrollton Axe	0	0	0	
Core	0	1	0	1
Graver	2	0	0	2
Perforator	0	0	0	
Burin	2	2	0	4
Hammerstone	0	0	0	
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	2	2
Total	14 (44%)	15 (47%)	3 (9%)	32

[1] *Silicified Wood (1).*

Wheeler (41DL30)

The Wheeler site is located in northwest Dallas County, 1.8 km south of the Dallas-Denton County line. The site lies at the edge of the T-1 terrace where it drops off to the floodplain of Denton Creek, 0.5 km to the east. Denton Creek is a tributary of the Elm Fork of the Trinity, which is located 1.5 km east of the Wheeler site. A large number of Carrollton phase Archaic sites are located in the immediate area: Carrollton Dam (41DL12) is 1.5 km to the east; Albritton (41DL27) is 0.5 km to the south; Denton Creek (41DL31) is 1.3 km to the north; Denton Tap Road (41DL11) is 3.4 km to the northwest; and Lake Dallas is 16 km to the north.

The site was exposed in the walls of a very large, multiple gravel pit operation that cut into the T-1 Union Terminal-Carrollton terrace on the property of Mr. D. L. Wheeler. At this location, the upper part of the T-1 terrace, the Pattillo sands, was very thick, averaging 125 cm in thickness (Crook 1952). Cultural materials were found in the lower 15 cm of the Pattillo, at the Pattillo-Albritton contact, and into the underlying Albritton Formation. A sterile overburden of some 100+ cm exists above the Carrollton phase occupation at the site (Crook 1952). A very minor occupation of well-made Washita and Harrell arrow points constructed from Alibates silicified dolomite was found in a few places on the surface around the margin of the gravel pits. Since the late 1970s, the pits have been filled-in and commercial and residential structures now cover the surface of the site.

Below the Pattillo, a full section of the Albritton Formation was exposed by gravel operations. Average thickness in most of the gravel pits was near 240 cm, with the lower 40-50 cm consisting of pea gravels which were the object of the mining operation (Crook 1952; Wilson W. Crook, Jr. Field Notes). Cultural materials were found in situ from the bottom 15 cm of the Pattillo sands to as deep as 50 cm into the Albritton Formation (175 cm below the surface) (Crook and Harris 1952). A number of artifacts were exposed by the gravel operation and subsequent rains washing them down into the pits. These artifacts were collected and noted in Crook's field notes but only those which were found in place in pit walls were used to make the cultural interpretations (Wilson W. Crook, Jr., personal communication, 1973). The care taken with the recovery of in situ artifacts, noting their precise position within the T-1 terrace, as well as excavations carried out into the pit walls was never fully communicated in any of Crook and Harris' publications, and as a consequence, by subsequent researchers.

Diagnostic Carrollton phase Archaic artifacts were found immediately above the Pattillo-Albritton contact to as deep as 50 cm below the contact. The deepest artifact found at the site was a reworked Plainview point (Crook and Harris 1952) (Figure 21). Carrollton phase artifacts were found above this level, ranging from 15 cm above the Albritton-Pattillo contact to as deep as 30 cm into the Albritton. It should be noted that Dallas and Bulverde points were found primarily within the Pattillo sand; Trinity and Calf Creek Horizon points (Andice, Bell) were

Figure 21. Reworked Plainview point in situ 50 cm below the Pattillo-Albritton contact (175 cm below the surface) in the pit wall of the Wheeler site (41DL30), Dallas County. (Wilson W. Crook, Jr. photo).

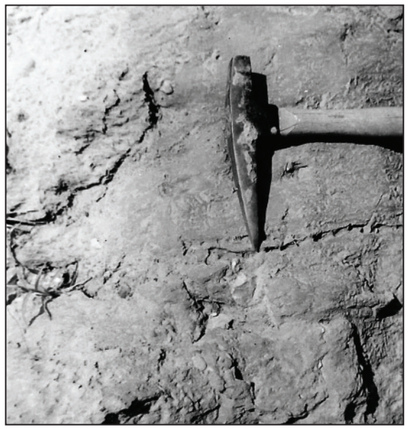


Figure 22. Side-scraper in situ 30 cm below the Pattillo-Albritton contact (155 cm below the surface) in the pit wall of the Wheeler site (41DL30), Dallas County. (Wilson W. Crook, Jr. photo).

found from just above the Pattillo-Albritton contact to as deep as 12 cm into the Albritton; and Carrollton and Split Stem points were found as deep as 27 cm in the Albritton (Wilson W. Crook, Jr. Field Notes). Other diagnostic Carrollton artifacts were found in situ at similar depths including a Carrollton axe at 8 cm into the Albritton Formation and a side-scraper at 30 cm (Figure 22).

A total of 332 Carrollton phase artifacts were recovered from the Wheeler site making it clearly the largest site both in aerial extent as well as artifact assemblage in the Upper Trinity watershed (Table 9). As was the case at the Lake Dallas site, every aspect of the Carrollton Archaic assemblage is present at Wheeler. The assemblage

Table 9. Distribution of Artifacts by Tool Type and Lithic Material, Wheeler Site (41DL30), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				140
Split Stem	4	0	0	
Carrollton	12	3	0	
Trinity	10	4	0	
Bulverde	8	0	0	
Dallas	8	10	0	
Wheeler Leaf	8	1	2[2,3]	
Calf Creek Horizon	12[1]	0	0	
Unidentified/Other	48	8	2[2]	
Biface/Knife				56
Ovoid Leaf	37	3	2[2,4]	
Square Based	10	3	1[5]	
Scrapers				71
Concavo-convex	32	24	6[2,4]	
Flake Side	9	0	0	
Clear Fork Gouge	0	8	0	8
Waco Sinker	0	4	0	4
Carrollton Axe	0	2	0	2
Core	0	0	0	
Graver	6	0	0	6
Perforator	4	0	0	4
Burin	0	0	0	
Hammerstone	0	6	0	6
Chopper	0	3	0	3
Ochre	0	0	4	4
Clayballs	0	0	28	28
Total	208 (62%)	79 (24%)	45 (14%)	332

[1] *Andice (5), Bell (5), Calf Creek (1), Unidentified (1).*

[2] *Silicified Wood (7).*

[3] *Novaculite (1).*

[4] *Quartz (4).*

[5] *Ironstone (1).*

is marked by a large number of projectile points (n=140) including some of the largest numbers of Carrollton, Trinity, and Dallas points. In addition, a total of 12 Calf Creek Horizon points were recovered including five Andice, five Bell, one Calf Creek and one undetermined (barbs present but the diagnostic stem was missing). Calf Creek Horizon points are a rare but consistent component of the Carrollton Archaic assemblage. Typically only one or two have been found at any one site. As the occurrence of this Central Texas point type (Andice, Bell) suggests some form of contact between Central Texas and the Upper Trinity watershed, the presence of 12 of these points at the Wheeler site coupled with the site's large artifact total might indicate that the site was a significant occupational locus for the region during the Early Archaic.

An oval-shaped hearth feature much like the ones discovered at Lake Dallas and Carrollton Dam was found in one of the pit walls at the Wheeler site. The hearth was located at 30 cm into the Albritton Formation and contained fire-cracked rock, clayballs, and small flecks of charcoal. Not enough charcoal was recovered to obtain a radiocarbon date and the material is not present in any of Crook's collections from the site.

The other feature present at the Wheeler site was the discovery of a partial human burial. About half of a human cranium and a few pieces of femur were found at a depth of 25 cm into the Albritton Formation (Figures 23 and 24). The skull fragment was in such poor condition that it crumbled to the touch. As a result, Crook excavated the entire block of sandy clay encasing the skull in an attempt to recover it intact (Crook 1952). He enlisted the help of Bob Slaughter, noted paleontologist at S.M.U., in an attempt to harden the skull for recovery and photography. However, despite the best efforts of both men, the cranium crumbled to small fragments and no measurements or photographs could be taken other than the in situ photos which appear below.

Figure 23. Human cranium in situ in the Albritton Formation at the Wheeler site, Dallas County. The contact between the overlying Pattillo sand and the Albritton sandy-clay can be seen in the middle of the photo. The cranium lies to the left of the geology pick. (Wilson W. Crook, Jr. photo).

Figure 24. Detail of the human cranium in the Albritton Formation at the Wheeler site, Dallas County. The curvature of the cranium can be seen as well as a large fragment which lies below. (Wilson W. Crook, Jr. photo).

Wood Pit (41DL76)

Roughly 40 km southeast of the Wheeler site lies another cluster of Carrollton phase Archaic sites in the southeast corner of Dallas County and to the east in western Kaufman County. Undoubtedly other sites are present along the Trinity River between the northwest and southeast Dallas County areas, but vast urban development, even back in the 1950s and 60s let alone today, destroyed any traces of these probable sites.

The first site in the southeast Dallas cluster is the Wood Pit (41DL76). The Wood Pit was located adjacent to Elam Creek where it cuts through the T-1 terrace to reach the Trinity River floodplain. A very large-scale gravel pit operation, known as "Wood's Pit", exposed the T-1 terrace stratigraphic sequence previously described above. The Pattillo sand overlies the Albritton Formation as usual but varies greatly in thickness from as much as 150 cm in the lower section of the pit that faces the Trinity River to as thin as 15 cm in the upper end of the pit. Contrary to the idea that the Pattillo sand is a purely pedogenic deposit (Prikryl 1990), the unit had well-developed bedding planes at the Wood Pit with individual lenses often distinguished by the presence and/or absence of small (10 mm)

Table 10. Distribution of Artifacts by Tool Type and Lithic Material, Wood Pit Site (41DL76), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				27
Split Stem	1	0	0	
Carrollton	3	3	0	
Trinity	1	1	0	
Bulverde	1	0	0	
Dallas	2	3	0	
Wheeler Leaf	0	2	0	
Calf Creek Horizon	0	0	0	
Unidentified/Other	10	0	0	
Biface/Knife				10
Ovoid Leaf	4	6	0	
Square Based	0	0	0	
Scrapers				34
Concavo-convex	9	21	0	
Flake Side	4	0	0	
Clear Fork Gouge	0	2	0	2
Waco Sinker	0	2	0	2
Carrollton Axe	0	3	0	3
Core	0	0	0	
Graver	1	0	0	1
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	2	0	2
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	1	1
Total	36 (44%)	45 (55%)	1 (1%)	82

caliche nodules. Crook and Harris (1952) postulated that the disparity in thickness across the pit was due to differential deposition determined by the maximum elevation attained by flooding during the Pattillo period. The author also observed that removal of the vegetation from the upper part of the pit aided erosion in the form of both wind and rainwater. During the late 1960s and early 1970s when the author explored the pit in detail, the Wood Pit had become a local dumping ground for all types of trash. The depth of the pit coupled with the steepness of the walls made it one of the more dangerous sites to explore as it was very easy to slip and fall 20-30 feet and land on broken glass and sharp metal. The Wood Pit today is no longer accessible as the area has been filled-in and is being prepared for future construction.

Three distinct occupational horizons are present at the site, giving a well-developed stratified sequence. The lowermost component occurs at the base of the Pattillo and into the uppermost part of the Albritton. A relatively thin Carrollton Archaic horizon is present including one Split Stem point, Carrollton, Trinity, Bulverde, Dallas, and Wheeler Leaf points, two Clear Fork gouges, two Waco sinkers, and three Carrollton double-bitted axes. A total of 82 artifacts that typologically or stratigraphically could be correlated with the Carrollton Archaic were recovered (Table 10).

Overlying the Carrollton Archaic was a sterile zone of some 50-60 cm. A second occupational horizon was observed between 35-75 cm below the surface. This zone is completely different from the lower Carrollton Archaic occupation in terms of virtually all of its diagnostic artifacts. Dart points present were largely made from local quartzite instead of chert. Edwards chert was virtually absent and what chert artifacts were present were made from material that had no UV fluorescence. The dart point assemblage in this upper horizon consisted primarily of Gary, Elam, Ensor, Edgewood, Yarbrough, and other Late Archaic types. Clear Fork gouges, Waco sinkers, and Carrollton axes were completely absent. A new form of scraper, the so-called “turtleback” type, was present in large numbers. Crook and Harris recognized this distinct change in assemblage and called it the Elam phase, named for the small creek that flows nearby the Wood Pit (Crook and Harris 1952, 1954). In fact, the Elam phase occupation was so large at the Wood Pit that it became one of the two type stations for defining the Elam phase Archaic (Elam phase artifacts at the Wood Pit outnumber Carrollton Archaic artifacts by around four-to-one).

The third occupational horizon at the Wood Pit is a very thin pottery and arrow point zone that is found on the surface around the margins of the pit. This occupation appears to be similar to Late Prehistoric sites along the East Fork and is characterized by Alba, Catahoula, and Scallorn arrow points and sandy-clay tempered plain ceramics.

Louis Obshner (41DL116)

Immediately south of Seagoville in the southeast corner of Dallas County lies the Louis Obshner site, named for its land owner who graciously allowed excavations by the Dallas Archeological Society to take place on his property. The site was discovered by Wilson Crook, Jr. and King Harris through the exploration of gulleys developed from a small gravel operation (Crook and Harris 1955). The gravel pits cut through the T-1 terrace at an elevation of about 12 meters above the Trinity floodplain (T-0). The site was unusual in that almost all of the overlying Pattillo sand had been eroded away so that virtually all the cultural material found was largely in situ within the Albritton Formation. In this respect, the Obshner site is very similar to Bachman Dam in that it is a single component Carrollton phase site. Due to the discovery of a sizable single component Carrollton Archaic site, the Dallas Archeological Society conducted its annual excavation at the site in 1954 and opened a total of 14 units (Crook and Harris 1955). Between exploration of the gravel pits and the excavation units, an extensive collection of Carrollton artifacts was made (n=167) plus the discovery of two, in situ Scottsbluff points which were found at 32 and 50 cm below the surface, respectively (Table 11) (Figures 25 and 26) (Crook and Harris 1955). In addition to these two late Paleoindian points, a Dalton point and a highly reworked Clovis point were also recovered from the site, but both were found in the bottom of a gulley after a large rain so no in situ information could be obtained (Crook and Harris 1955).

Through the excavation of the 14 units, a total of 35 Carrollton phase artifacts were found in undisturbed stratigraphic context at the site. This included a Split Stemmed point at 36 cm into the Albritton; a Carrollton point at 28 cm; four Trinity points at 23, 30, 61, and 61 cm, respectively; Clear Fork gouges at 3, 15, 20, 28, and 38 cm; bifaces at 18, 25, and 69 cm; a Carrollton axe at 6 cm; a flake side-scraper at 20 cm; a large concavo-convex side-scraper at 28 cm; a hearth containing numerous large stones at 60 cm; and nine cores varying between 23-69 cm. The remaining artifacts were fragmented projectile points which could not identified as to type (Crook and Harris 1955; Wilson W. Crook, Jr. Field Notes). The discovery of numerous diagnostic Carrollton phase Archaic artifacts in direct association (and even below) a Scottsbluff point changed Crook and Harris’ thinking that the Carrollton phase was solely of Middle Archaic age and was probably considerably older than had been originally proposed (Wilson W. Crook, Jr., personal communication, 1973; R. King Harris, personal communication, 1978).

Table 11. Distribution of Artifacts by Tool Type and Lithic Material, Louis Obshner Site (41DL116), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				62
Split Stem	1	0	0	
Carrollton	15	4	0	
Trinity	6	13	0	
Bulverde	1	0	0	
Dallas	2	0	0	
Wheeler Leaf	1	0	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	11	7	0	
Biface/Knife				19
Ovoid Leaf	7	8		
Square Based	3	1		
Scrapers				17
Concavo-convex	10	4	0	
Flake Side	3	0	0	
Clear Fork Gouge	0	10	0	10
Waco Sinker	0	2	0	2
Carrollton Axe	0	5	0	5
Core	2	7	0	9
Graver	2	0	0	2
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	4	0	4
Chopper	0	1	0	1
Ochre	0	0	0	
Clayballs	0	0	44	44
Quartz Crystal	0	0	1	1
Total	65 (37%)	66 (37%)	45 (26%)	176

[1] *Calf Creek (1).*

A large hearth feature was exposed in one of the test units at a depth of 50-60 cm into the Albritton Formation. Fire-cracked rocks and a number of clayballs were recovered from the hearth. As was the case at Lake Dallas, Carrollton Dam, and Wheeler, charcoal was abundant as very small flecks within the discolored earth in the center of the hearth. These were collected by members of the Dallas Archeological Society but no age date was obtained and their whereabouts is unknown today (the author attempted to locate the material within the King Harris Collection at the Smithsonian Institution and they are not present with any of the cultural material from the Obshner site).

One last note; there has been some confusion regarding the location and trinomial number associated with the Obshner site. After researching both Crook and Harris’ notes and consulting with Jonathan Jarvis at TARL in Austin, I have concluded that the trinomial number given here, 41DL116, is the correct designation for the site.

Figure 25. King Harris pointing to the location of an in situ Carrollton point within the upper part of the Albritton Formation at the Obshner site (41DL116), Dallas County. (Wilson W. Crook, Jr. photo).

Figure 26. Wilson "Bill" Crook, Jr. pointing to the location of an in situ Scottsbluff point within the upper part of the Albritton Formation at the Obshner site (41DL116), Dallas County. The small white flags to the right of Bill Crook mark the location for a new unit square based on the Scottsbluff find. (R. King Harris photo).

However, the locational plot of 41DL116 on the Texas Site Atlas places it far to the west of where the site should be located. The Obshner site should be located on the Atlas where site 41DL152 is currently plotted. This location is about 1.5 kilometers southwest of Seagoville near some abandoned and now water-filled gravel pits.

Milton Pit (41DL259)

The Milton Pit lies in the southeastern corner of Dallas County, Texas, approximately 16 km (10 miles) west of Seagoville. The site is on the northeast side of the main stem of the Trinity River within the first (T-1) terrace. The site is located approximately 300 meters from the present river channel and was originally exposed due to the actions of a commercial gravel operation known as "Milton's Pit". Cultural material was originally exposed in the walls of four small commercial gravel pits ranging in size from 12 x 18 meters to 45 x 45 meters (Crook and Harris 1952; Crook 2008a). Total aerial extent of the site was approximately 0.8 Ha (2 acres). A small local cemetery (the Lincoln Cemetery) is now located immediately east of the old gravel pits and access to the site is provided via a dirt road through the cemetery grounds. The pits have since been filled-in and reclaimed and the

Table 12. Distribution of Artifacts by Tool Type and Lithic Material, Milton Pit Site (41DL259), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				41
Split Stem	2	0	0	
Carrollton	6	0	0	
Trinity	0	3	0	
Bulverde	1	1	0	
Dallas	0	0	0	
Wheeler Leaf	0	3	1[2]	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	14	9	0	
Biface/Knife				37
Ovoid Leaf	16	12	0	
Square Based	3	6	0	
Scrapers				24
Concavo-convex	2	9	2[2]	
Flake Side	5	5	1[2]	
Clear Fork Gouge	0	0	0	
Waco Sinker	0	0	0	
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	1	0	0	1
Perforator	2	0	0	2
Burin	0	0	0	
Hammerstone	0	2	0	2
Chopper	0	2	0	2
Ochre	0	0	0	
Clayballs	0	0	0	
Total	53 (48%)	52 (48%)	4 (4%)	109

[1] *Calf Creek (1).*

[2] *Silicified Wood (4).*

cemetery has expanded westward to include virtually all of the area of the former gravel operation. In fact, the writer has recently noted lithic debitage and even a projectile point in the soil on top of freshly dug graves.

At the Milton Pit, gravel operations have exposed a typical section of the T-2 (Pemberton Hill) terrace of the Trinity River, including the basal Hill Member gravels of commercial exploitation, overlain by laminated sands of the Lower Shuler Member, and a partial segment of the Upper Shuler yellow sandy clay, complete with extinct Rancholabrean megafauna. This section is overlain by a thin veneer of about 60-90 cm of the red sandy clay of the Albritton Formation and a further 60 cm of the Pattillo Formation, together comprising the T-1 terrace (Crook 2008a).

The upper 5 cm of the terrace is composed of a fine-grained, carbon-rich dark gray (7.5YR 4/1) topsoil known locally as the Carter alluvium. This unit contains a minor Late Prehistoric component including arrow points (Alba, Catahoula) and pottery.

Underlying the Carter is the gray-brown (10YR 5/2) silty loam of the Pattillo Formation. Along the Upper Trinity system, the interval of the Pattillo varies widely, but is typically 150 cm or more in thickness. At the Milton Pit however, the Pattillo averages only about 60 centimeters indicating a period of extensive channel cutting by the Trinity River in the area (Crook and Harris 1952). Artifacts of the Late Archaic (Elam phase) occur in the upper 38 centimeters of the Pattillo (Crook 2008a).

As was found at the Wood Pit, a sterile zone separates the Elam phase occupation in the upper parts of the Pattillo from a lower horizon of Carrollton phase material. At the Milton Pit, artifacts from the Carrollton Archaic occur from the base of the Pattillo and into the upper 30 centimeters of the underlying Albritton Formation. Like the nearby Wood Pit site, the Early Archaic is a minor component of the Milton Pit occupation compared to the Elam phase (Elam phase artifacts from the site outnumber those from the Carrollton Archaic by about two to three-to-one). Consistent with this observation are the lack of Clear Fork gouges, Waco sinkers, and Carrollton axes in the Elam artifact assemblage (Crook 2008a) (Table 12).

At the Milton Pit site, the Albritton consists of a yellow-red (5YR 4/6) iron-rich sandy clay. The unit changes color somewhat along the Trinity watershed, varying from a yellow-red color in the vicinity of the Milton Pit to a deeper reddish-yellow (7.5YR 6/8) in the area of the Carrollton Dam in northwest Dallas County. Thickness is also variable, the average being approximately 250 cm. At the Milton Pit, the Albritton sandy-clay is only 60-90 centimeters thick. Although well-exposed as a result of gravel pit activity, no evidence of any human occupation was found below the middle part of the Albritton (Crook 2008a).

Beneath the Albritton is a thick section of Wisconsin Age sands known as the Shuler Formation. These sands are typically medium-grained, finely laminated (often with alternating 2 mm thick white and limonitic bands), and contain locally abundant Pleistocene faunal remains. The Milton Pit was always a particularly rich source of Pleistocene mega-fauna including mammoth (*Mammuthus columbi*), mastodon (*Mammut americanum*), bison (*Bison alleni*), camel (*Camelops huerfanensis*), horse (*Equus cabellus, E. midlandensis, E. fraternus, E. quinni*), tapir (*Tapirus sp.*), glyptodon (*Glyptodon sp.*), and many others (Slaughter, et al., 1962).

The Hill Member gravels underlie the Shuler Formation and constituted the bottom of the pits, their material comprising the source for the original commercial gravel operations.

Dowdy Ferry (41DL332)

The Dowdy Ferry site lies in the southeastern corner of Dallas County, Texas. It is located approximately 15 km west of Seagoville, Texas on the north side of the main stem of the Trinity River within the first (T-1) terrace. The site is approximately 700 meters from the present river channel and was originally exposed due to the actions of a commercial gravel operation. Several commercial gravel pits ultimately resulted in the formation of a single, large L-shaped pit, which, at one time, covered as much as 12 Ha (30 acres) (Crook 2007a). This extensive excavation clearly exposed the stratigraphy of the first terrace in detail. The pit has since been largely filled-in and reclaimed (Figure 27). Dowdy Ferry Road runs adjacent to the west side of the gravel pit and is the origin of the site's name.

At the Dowdy Ferry site, the upper 5-10 cm of the terrace is composed of a fine-grained, carbon-rich black topsoil known locally as the Carter alluvium. Underlying the Carter is the gray, sandy loam of the Pattillo Formation. The Pattillo at Dowdy Ferry rarely exceeds 35-40 cm, indicating a period of extensive channel cutting by the Trinity River in the area. Artifacts of the Late Archaic (Elam phase) occur in the upper Pattillo at the site (Crook 2007a). No Late Prehistoric artifacts were found at or near the surface anywhere around the edges of the pit.

A partial burial was found by the author and Mark Hughston in the early 1970s in the upper part, but wholly within, the Albritton Formation at the Dowdy Ferry site. Skeletal remains included a partial cranium and part of one humerus. A quartzite cobble chopper was found in direct association with the burial (Crook and Hughston 2007). Observations at the time of excavation were unable to determine conclusively if the burial was in situ or intrusive. Due to lack of available funds, the material was not dated at the time but carefully stored against contamination. In the fall of 2003, 200-300 grams of both humerus and cranial material were submitted to Beta Analytical for radiocarbon dating using Accelerator Mass Spectrometry (AMS) technology. Both samples yielded identical dates of 1240 $\pm$ 40 Years BP (calibrated) (Crook and Hughston 2007). Based on this date, it was concluded that the feature belonged to the Late Archaic and therefore was intrusive into the Albritton. The burial had been lined with an impermeable red-colored clay which allowed for the preservation of some of the bone material.

Figure 27. The reclaimed Dowdy Ferry site as of April, 2019. Parts of the terrace fill can still be seen in the foreground.

Carrollton phase Archaic artifacts are found at the base of the Pattillo and into the underlying Albritton Formation. The Albritton at the site consists of a yellow-red, iron-rich sandy clay. The unit changes color somewhat along the Trinity watershed, varying from a yellow-red in the vicinity of the Dowdy Ferry site to a deeper red-brown in the area of Carrollton Dam in northwest Dallas County. Thickness is also variable, the average being approximately 250 cm (Crook 2007a).

Contrary to the supposition put forward by Prikryl (1990), the Pattillo and Albritton Formations appear to be fluvial and not pedogenic in origin, at least in the area of the Dowdy Ferry site. Faint bedding plains were observed in both formations, notably in fresh exposures along the southeast and southern walls of the original gravel pit (Crook 2007a). In addition, the Albritton and Pattillo occur not only in the T-1 terrace, but also as thin veneers draped over the older Shuler Formation in many exposures of the T-2 (Pemberton Hill) terrace along the main stem of the Trinity in southeast Dallas County. If the formations were pedogenic in origin, then they should also be present over the entire region, including the higher terraces (T-3 to T-5). Instead, they are only present along the main Trinity River channel as distinct terrace depositional material.

Underlying the Albritton is a thick section of Wisconsin Age sands of the Shuler Formation. These sands are typically medium-grained, finely laminated (often with alternating white and yellow bands), and contain locally abundant Pleistocene faunal remains. Although well exposed as a result of gravel pit activity, no evidence of human occupation was found below the middle part of the Albritton at the Dowdy Ferry site. The Hill Member gravels underlie the Shuler Formation and constitute the bottom of the pit, their material comprising the source for the commercial gravel operations.

Initial observations at the site by Crook and Harris described the location as a very minor Carrollton and Elam Archaic component. This conclusion may have been due to the fact that commercial gravel operations were still underway and as such, access to the pit walls was limited. By the early 1970s, active gravel operations had ceased and the author was granted unlimited access to the entire pit. Initially, this work was purely geologic in nature.

Table 13. Distribution of Artifacts by Tool Type and Lithic Material, Dowdy Ferry Site (41DL332), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				122
Split Stem	10	0	0	
Carrollton	3	3	0	
Trinity	4	3	0	
Bulverde	3	2	0	
Dallas	4	1	0	
Wheeler Leaf	7	2	0	
Calf Creek Horizon	4[1]	0	0	
Unidentified/Other	60	14	2[2]	
Biface/Knife				
Ovoid Leaf	13	7	1[3]	31
Square Based	8	2	0	
Scrapers				58
Concavo-convex	17	16	1[2]	
Flake Side	16	7	1[2]	
Clear Fork Gouge	0	3	1[3]	4
Waco Sinker	0	3	1[3]	4
Carrollton Axe	0	1	1[4]	2
Core	0	0	0	
Graver	4	7	0	11
Perforator	3	2	0	5
Burin	0	0	0	
Hammerstone	0	5	0	5
Chopper	0	2	0	2
Ochre	0	0	0	
Clayballs	0	0	0	
Total	156 (64%)	80 (33%)	8 (3%)	244

[1] *Bell (3), Andice (1).*

[2] *Silicified Wood (4).*

[3] *Quartz (2).*

[4] *Silicified Sandstone (1).*

However, in cleaning parts of the pit walls for geologic profiles, a number of Carrollton phase artifacts were uncovered in situ. As a result, I conducted several excavations in various areas of the pit, eventually recovering a total of 240 Carrollton Archaic artifacts, with 38 in unambiguous stratigraphic context (Table 13).

As was the case at Lake Dallas and Wheeler, every diagnostic component of the Carrollton Archaic was found at the Dowdy Ferry site. This included a large number of Split Stem points (n=10) as well as other Carrollton phase projectile points, some of which were found in situ in the pit wall (Crook 2007a). An unusually large number of broken projectile points were recovered which, being only distal ends or mid-sections, could not be typed. They

are included in the site totals because they were either recovered from the Albritton Formation and/or were constructed of high quality chert which is highly unusual for Elam phase points. In addition to the Early Archaic points, a large number of Paleoindian points (n=20) were recovered. These include eight Dalton, six San Patrice, one Pelican, two Angostura, and three unidentified lanceolate points that had well-ground lateral edges (Crook 2007a). Unfortunately, only one of the Dalton points and one Angostura point were found in situ. The Dalton point was found 65 cm below the surface of the Albritton, well below any artifact that could be definitively typed as belonging to the Carrollton Archaic. The Angostura point was found at a depth of 37 cm below the surface of the Albritton – roughly the same level as several Split Stem points and one Carrollton point. More detail on the stratigraphic placement of Carrollton phase artifacts at the Dowdy Ferry site will be presented in the section on stratigraphic provenance later in this report.

Post Oak (41DL429)

In their original characterization of the Archaic Horizon of the Upper Trinity watershed, Crook and Harris (1952, 1954) identified a large number of component sites along both the Elm Fork and main stem of the Trinity River. While both sides of the Trinity were extensively explored, one of the more interesting observations stemming from their early research was an apparent preference for occupation on the northern bank of the Trinity as opposed to the south, especially for the Early Archaic. In fact, only one site, Cottonwood (41DL235), was definitively identified on the south side of the main stem of the Trinity.

To test this observation, the author extensively explored all the exposed gravel operations on the south bank of the Trinity in the early 1970's. In January 1973, occupational material was discovered in a small exploratory gravel pit near the corner of Fulghum and Post Oak roads in southeast Dallas County. Approximately half the pit had been backfilled when the site was discovered. An emergency salvage collection was begun when it was learned that the pit lay on the future building site of a residential home and was to be completely filled-in within 48 hours. A total of 32 Carrollton phase artifacts were collected, with some 27 (84 percent) being recovered in situ (Crook 2008b) (Table 14). The presence of so many artifacts in situ provided a unique opportunity to assess the stratigraphic context of Carrollton Archaic components.

The Post Oak site is located in southeastern Dallas County approximately halfway between Hutchins and Kleberg, Texas. It is named for Post Oak Road which passes nearby the discovery pit. The site is situated on the first terrace above the main channel of the Trinity River. This terrace (T-1) stands 6-8 meters above the present floodplain, which stretches about 700 meters to the river. The site was exposed in a small exploratory gravel pit approximately 10 meters in diameter. Half of the pit (north wall) had been backfilled at the time of discovery but offered one undisturbed wall for archeological excavation and geologic evaluation. Artifacts were exposed in the south wall as well as around the base of the pit toward the river side. Since the discovery was made on a Friday and the work crews would not begin again until the following Monday, the developer allowed the author to visit the site over the weekend. Work on the site was completed in two days. In situ depth and geologic information was collected on the exposed artifacts on the first day and a brief excavation of the intact south wall was completed on the second day. A return to the site on the following day (Monday) found construction crews completing the task of backfilling the pit. An unknown portion of the site undoubtedly still exists but now has been made inaccessible due to residential construction. Given how many artifacts were recovered in such a short time and in a relatively small area, the Post Oak site was probably considerably larger than the small exposure offered to the author and as such, has been included here as a major Carrollton phase site.

Gravel operations exposed a typical section of the T-1 terrace of the Trinity River, including 73-88 cm of the Pattillo sands and a further 112 cm of the red sandy-clay of the Albritton Formation (Crook 2008b). These sediments are overlain on a basal part of the T-2 (Pemberton Hill) terrace, including an undetermined thickness of the basal Hill Member gravels of commercial exploitation, observed in a gravel operation 150 meters to the northwest. Overlying the uppermost terrace stratum is a thin, carbon-rich soil horizon typical of topsoils in the area. No artifacts were found either in or on top of this soil zone.

The majority of the 32 Carrolton phase artifacts recovered from the salvage excavation were projectile points (n=26). In addition to Carrollton Archaic types (Split Stem, Trinity, Dallas, Wheeler Leaf), several rarer Early Archaic types were present including two Early Triangular points, two Early Stemmed (Wilson) points, and a Cossatot point (Crook 2008b). As was the case at several other Upper Trinity Carrollton sites, an Angostura point was found in situ in association with Carrollton phase cultural material. More detail on the stratigraphic context of the artifacts recovered is given in the later section on stratigraphic provenience in this report.

Table 14. Distribution of Artifacts by Tool Type and Lithic Material, Post Oak Site (41DL429), Dallas County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				26
Split Stem	1	0	0	
Carrollton	0	0	0	
Trinity	1	1	0	
Bulverde	0	0	0	
Dallas	1	0	0	
Wheeler Leaf	2	1	0	
Calf Creek Horizon	0	0	0	
Unidentified/Other	10	9	0	
Biface/Knife				
Ovoid Leaf	0	0	0	
Square Based	0	0	0	
Scrapers				4
Concavo-convex	3	1	0	
Flake Side	0	0	0	
Clear Fork Gouge	0	2	0	2
Waco Sinker	0	0	0	
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	0	0	0	
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	0	0	
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	0	
Total	18 (55%)	14 (44%)		32

Kings Creek (41KF23)

The Kings Creek site is located approximately two miles northwest of the city of Kaufman on a rise above Kings Creek. A terrace system is not developed at the site and the cultural occupation is situated on a small rise adjacent to the creek. The site is typical of the smaller upland sites along minor tributaries of the Trinity that are present in central and northern Kaufman County, northeast Dallas County, and Collin County. The site was originally discovered in the 1940s and extensively collected by Fred Wendorf, King Harris, Jay Blaine, and other members of the Dallas Archeological Society. Fred Wendorf's collections from the site are curated in the collections at the Texas Archeological Research Laboratory in Austin and King Harris' collections from the site are at the Museum Support Center of the Smithsonian Institution.

Table 15. Distribution of Artifacts by Tool Type and Lithic Material, Kings Creek Site (41KF23), Kaufman County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				19
Split Stem	1	0	0	
Carrollton	9	0	0	
Trinity	3	1	0	
Bulverde	0	0	0	
Dallas	1	0	0	
Wheeler Leaf	0	0	0	
Calf Creek Horizon	0	0	0	
Unidentified/Other	4	0	0	
Biface/Knife				
Ovoid Leaf	0	0	0	
Square Based	0	0	0	
Scrapers				1
Concavo-convex	0	1	0	
Flake Side	0	0	0	
Clear Fork Gouge	0	2	0	2
Waco Sinker	0	8	0	8
Carrollton Axe	0	1	0	1
Core	0	0	0	
Graver	0	0	0	
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	0	0	
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	0	
Total	18 (58%)	13 (42%)	(0%)	31

The Kings Creek site contains both Carrollton phase Archaic, Elam phase Archaic, and Late Prehistoric material. A total of at least 31 Carrollton phase artifacts are known from the site including Split Stem, Carrollton, Dallas, and Early Triangular dart points, Clear Fork gouges (n=2), Waco sinkers (n=8), and one Carrollton axe (Table 15). Undoubtedly there are considerably more artifacts from this site in other private collections but these were not available to the author to study.

City of Kaufman (41KF24)

The City of Kaufman site, as the name implies, is within the city limits of Kaufman in south-central Kaufman County. The site is on the northwest side of the town and is exposed in a small terrace above Kings Creek, a minor tributary of the Trinity River. The site lies approximately 0.2 km east of Kings Creek on a small rise. Unlike the Trinity, Kings Creek does not have a well-developed terrace system. The site is exposed largely at the surface without a significant depth component. A hospital has now been built on top of part of the site, covering up much of the original exposures.

The site was extensively collected by the late Fred Wendorf of the Department of Anthropology at S.M.U. when he was a boy. His collection from the site is currently curated at TARL in Austin. The other major assemblage from the site is in King Harris' collection curated at the Smithsonian Institution. A total of 143 artifacts have been identified including all of the diagnostic components of the Carrollton phase Archaic including Split Stem, Carrollton, Trinity, Wheeler Leaf, Calf Creek Horizon (Bell), Bulverde, and Dallas points, Clear Fork gouges, Carrollton axes, and Waco sinkers (Table 16). The site was known locally as the "sinker site" because of the unusually high number of Waco sinkers found there (N=73). Kings Creek is relatively narrow at the site location and if the artifacts are indeed net sinkers, it is unknown why so many would have been needed at the site.

A minor Elam phase Archaic occupation is present at the site and both arrow points and pottery have been recovered from the surface.

Table 16. Distribution of Artifacts by Tool Type and Lithic Material, City of Kaufman Site (41KF24), Kaufman County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				57
Split Stem	2	0	0	
Carrollton	8	2	0	
Trinity	3	3	0	
Bulverde	5	1	0	
Dallas	1	1	0	
Wheeler Leaf	1	1	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	18	10	0	
Biface/Knife				
Ovoid Leaf	12	6	0	21
Square Based	1	1	1[2]	
Scrapers				27
Concavo-convex	7	7	4[2]	
Flake Side	3	5	1[2]	
Clear Fork Gouge	0	7	1[2]	8
Waco Sinker	0	73	0	73
Carrollton Axe	0	2	0	2
Core	0	0	0	
Graver	2	0	0	2
Perforator	1	0	0	1
Burin	0	0	0	
Hammerstone	0	9	0	9
Chopper	0	2	0	2
Ochre	0	0	0	
Clayballs	0	0	3	3
Total	65 (32%)	130 (63%)	10 (5%)	205

[1] *Bell (1).*

[2] *Silicified Wood (7).*

Bachelor Creek (41KF50)

The Bachelor Creek site is located on the southwest side of the City of Terrell in northern Kaufman County. The site sometimes is also referred to as the Talty site. Bachelor Creek, like other small tributaries of the Trinity River, does not have a developed terrace system. The site is located on a small rise above and adjacent to Bachelor Creek. This site was discovered by members of the Dallas Archeological Society in the 1940s and was collected by Fred Wendorf, King Harris, Jay Blaine, and other members of the DAS. Wendorf's collections from the site are curated at TARL in Austin and Harris' collections are curated at the Museum Support Center of the Smithsonian in Suitland, Maryland. Collections from the site contain mainly Carrollton phase Archaic cultural material with a minor Late Archaic (Elam phase) component. A single Plainview point was also recovered from the site (R. King Harris, personal communication, 1973).

A total of 29 Carrollton phase artifacts have been studied by the author including 21 projectile points (Split Stem, Carrollton, Trinity, and Dallas) and two Clear Fork gouges (Table 17). Undoubtedly more artifacts were collected from the site by other members of the Dallas Archeological Society but none of these private collections were made available to the author to study.

Table 17. Distribution of Artifacts by Tool Type and Lithic Material, Bachelor Creek Site (41KF50), Kaufman County, Texas

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				21
Split Stem	1	0	0	
Carrollton	9	2	0	
Trinity	1	1	0	
Bulverde	0	0	0	
Dallas	0	1	0	
Wheeler Leaf	0	0	0	
Calf Creek Horizon	0	0	0	
Unidentified/Other	6	0	0	
Biface/Knife				
Ovoid Leaf	1	0	0	1
Square Based	0	0	0	
Scrapers				5
Concavo-convex	2	3	0	
Flake Side	0	0	0	
Clear Fork Gouge	0	0	0	0
Waco Sinker	0	2	0	2
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	0	0	0	
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	0	0	
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	0	
Total	20 (69%)	9 (31%)	0%	29

Edwards (41KF57)

The Edwards site is located two km south of the town of Rosser in southwestern Kaufman County. The site lies 2.1 km north of the Trinity River and is exposed in a series of gravel pits which are cut into the T-1 terrace. The Trinity River makes a major turn southwards at this point and the Edwards site is located immediately north of this turn. A very wide floodplain (T-0) is present which accounts for the distance between the river and the first terrace. A typical T-1 terrace stratigraphy is exposed and Carrollton phase artifacts have been recovered from the lower 30 cm of the Pattillo as well as into the upper part of the Albritton Formation. Most of the site is no longer exposed as the gravel pits have been abandoned and are filled-in with water.

Table 18. Distribution of Artifacts by Tool Type and Lithic Material, Edwards Site (41KF57), Kaufman County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				48
Split Stem	4	0	0	
Carrollton	3	1	0	
Trinity	4	3	0	
Bulverde	2	0	0	
Dallas	2	1	0	
Wheeler Leaf	1	0	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	18	8	0	
Biface/Knife				8
Ovoid Leaf	6	1	1[2]	
Square Based	0	0	0	
Scrapers				21
Concavo-convex	7	7	0	
Flake Side	3	4	0	
Clear Fork Gouge	0	0	0	
Waco Sinker	0	3	0	3
Carrollton Axe	0	3	0	3
Core	1	0	0	1
Graver	1	0	0	1
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	2	0	2
Chopper	0	0	0	
Ochre	0	0	0	
Clayballs	0	0	7	7
Total	53 (56%)	33 (35%)	8 (9%)	94

[1] *Bell (1).*

[2] *Silicified Wood (1).*

A total of 94 artifacts of Carrollton age have been recovered from the site (Table 18) including all of the diagnostic Carrollton Archaic assemblage with the exception of Clear Fork gouges. As with most Carrollton phase sites, projectile points made from non-local chert dominate the artifact assemblage. Almost all of the artifacts recovered from the site are in the King Harris Collection at the Smithsonian Institution. A minor Elam phase occupation occurs at the site and arrow points and pottery have been found on the surface.

Miklas (41KF59)

The Miklas site (41KF59) lies in southern Kaufman County, Texas, approximately 8 km south of Kaufman. The site is located on the east side of Kings Creek on a high rise midway between Kings Creek and Cottonwood Creek. Kings Creek feeds into Cedar Creek which is a tributary of the Trinity River. Lithic material is scattered over an area of roughly 1 Ha (2.4 acres), however the occupational midden is relatively thin (30-45 cm) (Crook 2012b). At the north end of the site, and completely separate from the pure Archaic southern portion of the site, is a Late Prehistoric (ceramic and arrow point) occupation. A terrace system is not developed at the site. The main occupational area is on a gentle topographic rise about 10 meters above the creek so as to have avoided inundation during periodic flooding.

Only two geologic strata are present at the site. Uppermost is a black, organic-rich topsoil of the Frio Series of the Trinity-Frio Association. It is classified as a vertisol due to the presence of abundant swelling clay, notably montmorillonite (Hausenbuiller, 1972). This topsoil layer is relatively thin, often no more than 15-30 cm. The unit is thinner on the rise where the Archaic site is located and thickens on the slopes leading to both Kings Creek to the west and Cottonwood Creek to the east. Archaic material on the surface has been admixed with this unit due to years of plowing. In situ Archaic cultural material is found only at the very base of the black soil. At the north end of the site, pottery is found from the surface to the base of the alluvium, post-dating the underlying strata. Based on ceramics and arrow point typology, age of the topsoil appears to be no more than 1,000 to 1,500 years old (Crook 2012b).

Lying unconformably below the black topsoil is a yellow-tan sandy clay. This unit does not correlate to any of the known mainstream Upper Trinity terrace deposits but appears to be a major depositional unit along its tributaries, particularly the East Fork system and many of the small Trinity tributaries in Kaufman County (Wilson W. Crook, Jr., personal communication, 1984). The yellow-tan sandy clay is a surface alteration of the Cretaceous bedrock, typically the Taylor Marl (Ozan Formation). Thickness of the yellow-tan sandy clay is as much as three meters. Occupational material is restricted to the upper few centimeters and is composed of non-ceramic Archaic material. The unit predates the black topsoil by an undetermined age.

A total of 137 artifacts of probable Carrollton age have been recovered at the site representing all the diagnostic traits of the phase (Table 19). Of particular note, a total of 10 Carrollton double-bitted axes have been found which is by far the most of any site in the Upper Trinity watershed and represents 20 percent of all the known Carrollton axes from the region (Crook 2012b). The Miklas site has a Late Archaic component that is roughly equal to that of the Elam phase. There is also a substantial Late Prehistoric occupation (n=350 artifacts) on the northern end of the site.

Table 19. Distribution of Artifacts by Tool Type and Lithic Material, iklas Site (41KF59), Kaufman County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				34
Split Stem	1	0	0	
Carrollton	6	2	0	
Trinity	2	5	0	
Bulverde	0	0	0	
Dallas	0	0	0	
Wheeler Leaf	0	5	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	9	3	0	
Biface/Knife				6
Ovoid Leaf	1	3	0	
Square Based	0	2	0	
Scrapers				58
Concavo-convex	12	28	0	
Flake Side	17	1	0	
Clear Fork Gouge	0	7	3[2]	10
Waco Sinker	0	7	0	7
Carrollton Axe	0	10	0	10
Core	0	3	0	3
Graver	1	1	0	2
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	3	0	3
Chopper	0	4	0	4
Ochre	0	0	0	
Clayballs	0	0	0	
Total	50 (37%)	84 (61%)	3 (2%)	137

[1] *Undetermined (1).*

[2] *Silicified Wood (3).*

Frognot Site (41COL165)

The character of the Archaic period along the East Fork of the Trinity River is generally poorly defined primarily because of the lack of single component sites. Where the Archaic is overlain by the Late Prehistoric, admixing from cultivation and/or the action of local vertisols makes isolating Archaic cultural traits difficult. Those single component Archaic sites that have been found are generally small in size and have been described as having cultural affinities with the LaHarpe phase of East Texas (Dawson and Sullivan, 1973; Lynott, 1977; Crook 2009a; Crook and Hughston 2015). These sites are generally characterized by a predominance of Gary, Yarbrough, Kent, and Ellis dart points and lack most of the features that characterize the Archaic sites along the main stem and Elm Fork of the Trinity (Crook and Harris 1954; 1954; Prikryl, 1990).

Table 20. Distribution of Artifacts by Tool Type and Lithic Material, Frognot Site (41COL165), Collin County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				67
Split Stem	1	0	0	
Carrollton	6	0	1[2]	
Trinity	3	2	0	
Bulverde	3	2	0	
Dallas	2	0	0	
Wheeler Leaf	3	5	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	31	7	0	
Biface/Knife				11
Ovoid Leaf	3	6	1[2]	
Square Based	1	0	0	
Scrapers				25
Concavo-convex	12	7	1[2]	
Flake Side	5	0	0	
Clear Fork Gouge	1	3	0	4
Waco Sinker	0	1	0	1
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	6	1	0	7
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	2	0	2
Chopper	0	2	0	2
Ochre	0	0	0	
Clayballs	0	0	0	
Total	78 (66%)	38 (32%)	3 (2%)	119

[1] *Andice (1).*

[2] *Silicified Wood (3).*

During the 1970's the writer was engaged by the Heard Natural Science Museum to conduct an extensive archeological survey of Collin County. As part of that work, the Archaic site at Frognot was discovered. Subsequent test excavation determined the site to be a near surface occupation with essentially no depth component. Excavation during 1973-74 recovered a number of Late Paleoindian to Middle Archaic artifacts, all of which show a close affinity to the Archaic along the Trinity River near Dallas. As such, the Frognot site represents one of only a few known such examples of a Carrollton phase site from Collin County.

The Frognot site (41COL165) is located in extreme northeastern Collin County, about 17 km northwest of the town of Farmersville. The site lies on the west side of Indian Creek, about 1.5 km north of the small community for which it is named. The site covers approximately 3.5 Ha (8.6 acres) on top of a high terrace and within some steep erosional gulleys leading down toward Indian Creek (Crook 2007b).

The Frognot site is located 500 meters west of Indian Creek in northeastern Collin County. Indian Creek is a tributary of Pilot Grove Creek, which in turn is a major tributary of the East Fork of the Trinity River. A single terrace system is developed at the site, which is expressed today as a bluff centered on the 600' contour some 12 meters above the current river bed. Due to extreme erosion, most of the original floodplain and terrace deposits of the area have been stripped away leaving the artifact assemblage exposed on the surface (Crook 2007b). Cultural material now lies on top of the heavily eroded Cretaceous Ozan Formation (Lower Taylor Marl). Further erosion had washed some of the artifacts into deep (5-10 meter) gullies cut within the weathered Cretaceous. As a result, none of the artifacts recovered from the Frognot site were in situ. Extreme erosion of all Quaternary Age sediments exposing the underlying Cretaceous is typical of high ground minor tributaries within the Trinity River watershed (Wilson W. Crook, Jr. and R. King Harris, personal communication, 1976). A series of seep springs crop out all along the bluff overlooking Indian Creek both north and south of the Frognot site. The presence of these springs undoubtedly played a role in the site's location and periodic occupation.

A total of 119 artifacts of Carrollton Archaic affinity were recovered from the Frognot site (Table 20). These included at least one of every projectile point type associated with the phase as well as Clear Fork gouges and Waco sinkers. The only diagnostic trait item not found at the site was a Carrollton axe. Of particular note, 75 percent of the projectile points were made from chert and almost all of this chert strongly fluoresced under both short and long-wave UV radiation suggesting that it was likely sourced from the Edwards Plateau of Central Texas (Crook 2007b).

Upper Farmersville North (41COL166)

The Upper Farmersville North site is located in north-central Collin County, about 8 km northwest of the town of Farmersville. The site lies on the west side of Pilot Grove Creek, about 400 meters north of Farm Road 2756. The site covers approximately 0.2 Ha (0.5 acres) on the floodplain 50-100 meters west of Pilot Grove Creek.

Enlargement of the Lavon Reservoir in 1979 resulted in the raising of the East Fork of the Trinity and its major tributaries including Pilot Grove Creek, Indian Creek and Sister Grove Creek. The Federal Government purchased a large amount of acreage upstream of the expanded lake in anticipation of both back-ups from periodic seasonal flooding as well as a potential further expansion of the lake. The land containing the Upper Farmersville North site was part of this acquisition. Since Lake Lavon has not been expanded further, the site was not inundated and the land has been leased for periodic cultivation. The site is currently not available for further investigation without specific permission from the U.S. Government (U.S. Army Corps of Engineers).

The Upper Farmersville North site lies 50-100 meters west of Pilot Grove Creek in north-central Collin County. Pilot Grove Creek is a tributary of the East Fork of the Trinity River, the two joining at what is now the upper end of Lake Lavon Reservoir 12 km south of the site. A terrace system is not developed at the site, but the occupational area is on a gentle rise far enough above the creek so as to have largely avoided inundation during periodic flooding. Enlargement of Lake Lavon has altered the original water system and Pilot Grove Creek has backed up today and covers areas which historically were above water.

Only two geologic strata are present at the site. Uppermost is a black, organic-rich topsoil of the Frio Series of the Trinity-Frio Association. It is classified as a vertisol due to the presence of abundant swelling clay, notably montmorillonite (Hausenbuiller, 1972). In undisturbed sections of the site, this topsoil is approximately 80 cm thick. Thickness of the topsoil layer is slightly greater within the cut of Pilot Grove Creek; maximum thickness observed in the creek is 102 cm (Crook 2007c).

Lying below the black topsoil is an unnamed yellow-tan sandy clay. This unit does not correlate to any of the known mainstream Upper Trinity terrace deposits but appears to be a major depositional unit along its tributaries, particularly the East Fork system (Wilson W. Crook, Jr., personal communication, 1984). The yellow-tan sandy

clay is a surface alteration of the Cretaceous bedrock, either the Austin Chalk or the Taylor Marl (Ozan Formation). Thickness of the yellow-tan sandy clay is as much as three meters.

Occupational material was recovered from the surface to the top of the underlying yellow sandy clay. However, extensive cultivation and erosion by Pilot Grove Creek has destroyed most of the original stratigraphy of the site. Tests pits near an undisturbed, wooded section along the eastern margin of the site revealed a near sterile profile until the last few centimeters above the yellow sandy clay. Archaic material was concentrated along the surface of the yellow sandy clay and into its first few centimeters (Crook 2007c).

A total of 66 Carrollton phase Archaic artifacts was recovered from the site including Split Stem, Carrollton, Trinity, Bulverde, Wheeler Leaf, and a single Bell point (Table 21). Of the suite of Carrollton phase projectile point types, only Dallas points were absent. Two Clear Fork gouges and one Waco sinker were also recovered; no Carrollton double-bitted axes were found at any of the Collin County sites.

Table 21. Distribution of Artifacts by Tool Type and Lithic Material, Upper Farmersville North Site (41COL166), Collin County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				29
Split Stem	2	0	0	
Carrollton	3	1	0	
Trinity	3	0	0	
Bulverde	5	2	0	
Dallas	0	0	0	
Wheeler Leaf	4	0	0	
Calf Creek Horizon	1[1]	0	0	
Unidentified/Other	6	2	0	
Biface/Knife				12
Ovoid Leaf	6	3	0	
Square Based	2	1	0	
Scrapers				15
Concavo-convex	6	5	0	
Flake Side	4	0	0	
Clear Fork Gouge	0	2	0	2
Waco Sinker	0	3	0	3
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	1	0	0	1
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	0	0	
Chopper	0	1	0	1
Ochre	0	0	0	
Clayballs	0	0	3	3
Total	43 (65%)	20 (30%)	3 (5%)	66

[1] *Bell (1).*

Crump (Un-numbered)

The Crump site is located in central Collin County, approximately 5 km north of McKinney and 4.7 km southwest of Melissa. The site lies 0.3 km east of Trinity Falls Parkway opposite Crump's Garden Supply for which the site has been named. The Crump site has not yet been registered with the Texas Archeological Research Laboratory in Austin and therefore has no trinomial designation as of this writing. The site lies on a low terrace adjacent the East Fork of the Trinity River. As with other locations along the East Fork and its tributaries, there is no well-developed terrace system at the site. A black, organic-rich topsoil of the Frio Series of the Trinity-Frio Association is present on the surface and extends to a depth of about 80 cm. Below this is a yellow-tan sandy clay which is an erosional by-product of the Cretaceous bedrock (Ozan Formation or Austin Chalk) below. The

Table 22. Distribution of Artifacts by Tool Type and Lithic Material, Crump Site (Un-numbered), Collin County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				28
Split Stem	1	1	0	
Carrollton	3	1	1[2]	
Trinity	3	0	0	
Bulverde	0	0	0	
Dallas	1	0	0	
Wheeler Leaf	3	2	1[2]	
Calf Creek Horizon	2[1]	0	0	
Unidentified/Other	7	2	0	
Biface/Knife				6
Ovoid Leaf	4	2	0	
Square Based	0	0	0	
Scrapers				6
Concavo-convex	3	2	0	
Flake Side	1	0	0	
Clear Fork Gouge	0	3	0	3
Waco Sinker	0	1	0	1
Carrollton Axe	0	0	0	
Core	1	0	0	1
Graver	2	0	0	2
Perforator	1	0	0	1
Burin	0	0	0	
Hammerstone	0	1	0	1
Chopper	0	0	0	
Ochre	1	0	0	1
Clayballs	0	0	0	
Total	33 (66%)	15 (30%)	2 (4%)	50

[1] *Bell (1), Calf Creek (1).*

[2] *Silicified Wood (1).*

occupational horizon appears to be restricted to the upper part of the black topsoil although intact stratigraphy is not present due to years of cultivation. In addition, the site is subject to severe erosion every time the East Fork floods.

Artifacts can be found in a north-south line parallel to the river and cover an area as much as 2 Ha (5 acres) or more. Lithic artifacts are the predominant artifact present at the site; a very minor Late Prehistoric component is present (arrow points and pottery) which occurs on the surface near to the banks of the East Fork. The artifact assemblage ranges from Paleoindian (Dalton, San Patrice, Angostura) to Late Archaic with 50 artifacts have been recovered which can be ascribed to the Carrollton Archaic (Table 22). These include Split Stem, Carrollton, Trinity, Dallas, Wheeler Leaf, and Calf Creek Horizon projectile points, Clear Fork gouges, and a single Waco sinker. No features have been identified at the site; however, given the amount of disturbance by years of both erosion and cultivation, the lack of obvious features is not unexpected.

Notable Minor Sites – Upper Trinity Watershed

Of the minor sites in the Upper Trinity watershed, the most notable are the Albritton (41DL27), Hutchins (41DL240), Broken Leg (41DL313), and Blaine (41KF12) sites. The Albritton site is located less than 0.5 km south of the Wheeler site in northwest Dallas County. The site is significant for the accidental discovery and subsequent recovery of a human skeleton that was buried in the upper part of the Albritton Formation (Albritton et al. 1940). In early 1940, workers at a small gravel pit operation dug into the Albritton Formation in an effort to get to the pea gravel zone at the base of the unit. A partial human skeleton was discovered which was later turned over to researchers at S.M.U. Claude Albritton and L. Gray Pattillo of S.M.U. visited the site and determined its geology and the fact that it appeared that the skeleton had been originally interred in the Albritton and was subsequently covered by deposition of the Pattillo sand as opposed to it being a later burial that was intrusive into the Albritton (Claude Albritton, personal communication, 1974). Marcus Goldstein of the University of Texas conducted the forensic examination of the remains. The skeletal remains consisted of a highly fragmented cranium with lower mandible, the femora, tibia, three lumbar, two cervical, and one thoracic vertebrae, an ulna and fibula, and the talus, calcaneum, and one phalange from one foot. Goldstein concluded that the skeleton belonged to a very aged female, approximately 60 years of age who was about four foot eleven inches in height (Albritton et al. 1940). The woman had numerous arthritic lesions and signs of friction on all the articular surfaces due to the loss of synovial fluid at the joints. There was loss of many teeth and those that remained were worn almost to the line of the gums. Measurement of the skull showed it to be mesocranic and somewhat slab-sided (Albritton et al. 1940)

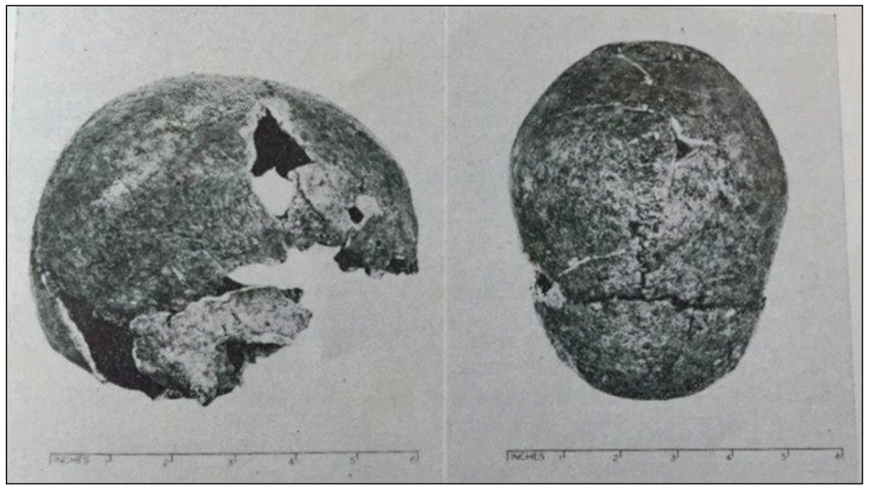


Figure 28. Two views of the human cranium recovered from the Albritton site (41DL27) in northwest Dallas County, Texas. (from Albritton et al. 1940).

(Figure 28). This is typical of many Archaic skulls that have been recovered across Texas and confirms the geological observations that the skeleton was interred at the time of Albritton deposition (Collins 2004).

Several sites in Dallas and Kaufman counties including the Hutchins (41DL240), Broken Leg (41DL313), and Blaine (41KF12) sites all have between 10 and 20 reported Carrollton phase artifacts including Carrollton, Trinity, Wheeler Leaf, and Dallas type projectile points, Clear Fork gouges, and Waco sinkers. Undoubtedly, there are other associated artifacts from these sites which would make their assemblage well in excess of 25 total artifacts. However, the author has not had access to collections from these sites and they therefore remain as "minor" Carrollton Archaic sites for the purposes of this monograph. Other work on minor Carrollton phase sites, primarily along Denton Creek in northwestern Dallas County, can be found in Cobb and Lorrain (1982), Lorrain (1984, 1985a, 1985b, 1988), and Lorrain and Lorrain (2001).

Major Site Descriptions – Liberty County (Southeast Texas)

Recently, the entire suite of Carrollton phase Archaic artifacts have been found in the Andy Kyle Archeological Collection currently curated at the Sam Houston Regional Library and Research Center in Liberty, Texas (Crook et al. 2017; Crook 2018c). While elements of the Carrollton Archaic occur in 10 sites over five Southeast Texas counties, only the six sites in Liberty County adjacent to the Trinity River have more than one element. Of these, only two sites, Wood Springs (41LB15) and Moss Hill (41LB65), have more than 25 artifacts and are classified as major Carrollton phase sites.

Wood Springs (41LB15)

The Wood Springs site is located approximately three kilometers northwest of Liberty, Texas on the west side of a small stream known as Wood Springs Creek or Atascosito Springs (Figure 29). This stream is fed by several perennial springs and is a minor tributary of the Trinity River 2.0 km to the west. The site lies on either side of a small road within a sandy terrace on the northwest side of the creek (Figure 30). A natural gas pipeline right-of-way crossing bisects the site with the intersection of the road and the pipeline marking the approximate middle of the occupation (Elton R. Prewitt, personal communication, 2018). The site was one of the many sites from which the late Mr. Andy Kyle collected artifacts between 1946-1986. The site's location was originally described and registered by Elton R. Prewitt in 1973 as part of the Louisiana Loop Survey. Wood Springs was subsequently investigated by Sheldon Kindall and other members of the Houston Archeological Society (HAS) during their research on the Andy Kyle Archeological Collection during the mid-1980s (Kindall and Patterson 1986). A small elevated bridge has been constructed across Wood Springs Creek. The site occurs on either side of Wood Springs Creek and while artifacts have been found on both sides, the northern bank has produced significantly more than the southern side of the creek (Figure 31).

Figure 29. Wood Springs Creek, Liberty County, Texas.

Occupational material at Wood Springs covers at least 0.5 acres and possibly as much as 5 acres or more (Sheldon Kindall, personal communication, 2017; Houston Daniel, personal communication, 2018). While Mr. Kyle largely collected artifacts on the surface, several shovel tests were conducted by Elton Prewitt in 1973, by the HAS in 1986, as well as more recently by the author. Soils covering the area of the Wood Springs site belong to the Spurger-Bienville-Kennefick complex, specifically a mix of Spurger and Kennefick soils (Griffen 1996). The typical soil profile at the site consists of an upper 8 cm of a pale brown (10YR 7/3) to light gray (10YR7/2) loamy fine sand.

Figure 30. (left) Sandune Road which bisects the Wood Springs site from north-to-south. The small bridge over Wood Springs Creek is in the center of the photo.

Figure 31. (below) Small terrace above Wood Springs Creek. The majority of the artifacts recovered from the site have come from this northern side of the site.

This is underlain by a fine-grained brown sandy loam that in places has yellow to reddish mottles. The artifact horizon extends to a depth of at least one meter (no test pits have been dug below this depth). Based on artifacts collected by Mr. Kyle and more recently by members of the HAS, the Wood Springs site represents a long-term occupation that extends from the earliest part of the Paleoindian period (Clovis) through the Late Prehistoric. Construction of the natural gas pipeline has disturbed much of the site such that Paleoindian, Archaic, Woodland

Table 23. Distribution of Artifacts by Tool Type and Lithic Material, Wood Springs Site (41LB15), Liberty County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				67
Split Stem	3	0	0	
Carrollton	15	3	1[2]	
Trinity	3	3	4[2]	
Bulverde	2	0	0	
Dallas	6	1	1[2]	
Wheeler Leaf	9	0	2[2,3]	
Calf Creek Horizon	3[1]	0	0	
Unidentified/Other	10	0	1[4]	
Biface/Knife				10
Ovoid Leaf	6	4	0	
Square Based	0	0	0	
Scrapers				84
Concavo-convex	16	4	0	
Flake Side	23	0	0	
Worked Flake	41	0	0	
Clear Fork Gouge	7	0	0	7
Waco Sinker	0	5	0	5
Carrollton Axe	0	1	0	1
Core	0	0	0	
Graver	0	0	0	
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	5	0	5
Chopper	0	0	0	
Ochre	0	0	1	1
Clayballs	0	0	12	12
Total	144 (75%)	26 (14%)	22 (11%)	192

[1] *Andice (2), Bell (1).*
[2] *Silicified Wood (7).*
[3] *Novaculite (1).*
[4] *Silicified Coral Hash (1).*

and Late Prehistoric materials are now found alongside each other on the surface. While cultural material from Clovis to the Late Prehistoric occurs at the site, Wood Springs is notable for an abundance of artifacts from the Early to Middle Archaic – 8000-5000 BP (Crook 2018c) and from the Woodland – 2000-1400 BP (marked by Gary and Kent points and plain ceramics) (Patterson 1991), and Late Prehistoric - 1400-500 BP (marked by Alba, Catahoula, Friley, and Perdiz points, and both locally manufactured and imported Caddo ceramics) periods (Suhm and Krieger 1954; Suhm and Jelks 1962; Kindall and Patterson 1986; Patterson 1991; Aten and Bollich 2002).

A total of 191 artifacts of probable Carrollton Archaic affinity have been recovered from the site both by Andy Kyle and more recently by members of the HAS (Table 23). As all of the artifacts have been recovered from the surface of the site and not in situ, their association with the Carrollton Archaic has been determined by either artifact type or by lithic composition, notably high quality cherts which are not local to the area. Most of the chert in these artifacts fluoresces a strong yellow to yellow-orange color under UV radiation and has been assumed to be Edwards chert from Central Texas (Hofmann et al. 1991; Hillsman 1992; Crook et al. 2017). The origin of the chert from a number of the artifacts suspected to be constructed from Edwards chert has been confirmed through their trace element geochemistry using X-ray fluorescence analysis (Crook et al. 2017; Crook 2018c). Every diagnostic trait of the Carrollton Archaic has been found at Wood Springs including Split Stemmed, Carrollton, Trinity, Wheeler Leaf, Calf Creek Horizon (Andice, Bell), Bulverde, and Dallas points, Waco sinkers, Clear Fork gouges, a single Carrollton double-bitted axe, and clayballs (Crook 2108c). The only real difference between the Wood Springs Carrollton phase assemblage and that of sites in the Upper Trinity watershed is that the Clear Fork gouges are made from chert and not quartzite, and there is a small increase in the use of silicified wood which is locally abundant in Liberty County.

Moss Hill (41LB65)

The Moss Hill site is located 1.8 km northwest of the community of Moss Hill in north-central Liberty County. The site is located adjacent to a small stream which is a tributary of the Trinity River three kilometers to the west. Occupational material covers an area of several hectares and the site is one of the largest prehistoric occupations in Liberty County along with the Savoy (41LB27) and Wood Springs sites (Kindall and Patterson 1986; Crook et al. 2017). Soils covering the area of the Moss Hill site belong to the Spurger-Bienville-Kennefick complex, specifically a mix of Bienville and Kennefick soils (Griffen 1996). The typical soil profile at the site consists of about 13 cm of a dark brown loamy fine sand underlain by 200+ cm of a very fine-grained dark yellowish-brown loamy sand (Griffen 1996). The artifact horizon extends to at least one meter or more in depth.

Artifacts from the site represent the archeological periods from Late Paleoindian to Late Prehistoric with the Late Archaic (marked by Ellis, Yarbrough, Kent, Ellis, Ensor and Gary points), Woodland phase – 2000-1400 BP (marked by Gary and Kent points and both plain and decorated ceramics), and Late Prehistoric 1400-500 BP (marked by Alba, Catahoula, Friley, and Perdiz points, and both locally manufactured and imported Caddo ceramics) being the most abundant (Crook et al. 2017; Suhm et al. 1954; Suhm and Jelks 1962; Turner and Hester 1985, 1993, 1999; Turner et al. 2011). A total of 116 artifacts of probable Carrollton Archaic affinity have been recognized from the site (Table 24). These include Carrollton, Trinity, Bulverde, Wheeler Leaf, and Dallas points plus Clear Fork gouges and Waco sinkers. Fifty percent of the projectile points are made from high quality, non-local chert with the remaining 50 percent constructed from local materials, mainly silicified wood. All the silicified wood artifacts display reddish and orange coloration from having been extensively heat-treated (Crook et al. 2017). A large number of clayballs (n=68) were also recovered from the site.

Notable Minor Sites – Southeast Texas

As noted above, four other sites in Liberty County (Savoy – 41LB27), Knight's Bayou (41LB61), Clark (41LB71), and Long King Creek (41LB175)) contain small amounts of Carrollton Archaic material, usually consisting of Carrollton, Trinity, Wheeler Leaf and/or Dallas points plus Clear Fork gouges or Waco sinkers. Other sites across Southeast Texas that have Carrollton phase material are typically restricted to a single element. For example, the Sheffield Ferry (41JP31) site in Jasper County only had four Bulverde points; Ayish Bayou (41SA151) had two Bell points; and Brookeland (41SB73) in Sabine County only had five Dallas points.

Table 24. Distribution of Artifacts by Tool Type and Lithic Material, Moss Hill Site (41LB65), Liberty County, Texas.

Tool Type	Chert	Quartzite	Other	Total
Projectile Points				
Dart Points				24
Split Stem	0	0	0	
Carrollton	4	0	0	
Trinity	2	0	0	
Bulverde	1	0	0	
Dallas	1	0	4[1]	
Wheeler Leaf	1	0	5[1,2]	
Calf Creek Horizon	0	0	0	
Unidentified/Other	6	0	0	
Biface/Knife				
Ovoid Leaf	0	0	0	
Square Based	0	0	0	
Scrapers				14
Concavo-convex	0	0	0	
Flake Side	3	0	0	
Worked Flake	11	0	0	
Clear Fork Gouge	2	0	0	2
Waco Sinker	0	2	0	2
Carrollton Axe	0	0	0	
Core	0	0	0	
Graver	1	0	0	1
Perforator	0	0	0	
Burin	0	0	0	
Hammerstone	0	1	0	1
Chopper	0	0	0	
Ochre	0	0	4	4
Clayballs	0	0	68	68
Total	32 (27%)	3 (3%)	81 (70%)	116

[1] *Silicified Wood (8).*

[2] *Novaculite (1).*

Carrollton Phase Archaic Artifacts

Table 25 lists all the known artifacts from the 18 major Carrollton Archaic sites from the Upper Trinity watershed (n=2,151). As can be seen, 95 percent of the artifacts are lithic tools with the remainder being clayballs and a few pieces of red ochre. Dart points comprise the largest component of the total artifact assemblage with 919 representing 43 percent of the artifact assemblage and 45 percent of all lithic artifacts. Bifaces and scrapers of all types represent another 33 percent (n=704). Clear Fork gouges (n=91) represent four percent of the total assemblage; Waco sinkers (n=145) another seven percent; and Carrollton axes (n=32) one percent. Other lithics (n=144) include all other stone tools including cores, gravers, perforators, burins, hammerstones, choppers, and a single quartz crystal. These artifacts represent seven percent of the total artifact assemblage from the Upper Trinity watershed. It should be noted that small, one-hand grinding stones (manos) were found at the Lake Dallas, Wheeler, Dowdy Ferry, and Frognot sites. Crook and Harris (1952, 1954) included these artifacts as part of the overall Carrollton phase assemblage. However, none of the grinding stones were ever found in situ and, as there are later Archaic components at each of these sites, it could not be ascertained with any degree of certainty that these tools were directly associated with the Carrollton Archaic. As such, they have been omitted from the site totals. Lastly, the remaining five percent are non-lithic artifacts, mainly clayballs. The number of clayballs in the

Table 25. Upper Trinity Watershed Carrollton Phase Artifact Totals by Lithic Material.

Tool Type	Chert	Quartzite	Silicified Wood	Other[1]	Total
Projectile Points	685	223	10	1	919
Biface/Knife	156	84	4	3	247
Scrapers	262	177	14	4	457
Clear Fork Gouge	1	84	5	1	91
Waco Sinker	0	144	0	1	145
Carrollton Axe	0	31	0	1	32
Core	7	7	0	0	14
Graver	36	9	0	1	46
Perforator	17	3	0	0	20
Burin	4	2	0	0	6
Hammerstone	0	40	0	0	40
Chopper	0	17	0	0	17
Quartz Crystal	0	0	0	1	1
Total Lithic Artifacts	1168 (57%)	821 (40%)	33 (2%)	13 (1%)	2,035
Ochre	0	0	0	5	5
Clayballs	0	0	0	111	111
Total Non-Lithic Artifacts	0	0	0	116	116
Total Artifacts					2,151

[1] *Includes quartz, novaculite, Tecovas jasper, ironstone.*

assemblage is undoubtedly low as Crook and Harris only collected representative examples calling them “clay blobs” of an unknown function (Crook and Harris 1952, 1954; Wilson W. Crook, Jr., personal communication, 1973).

Chert is the predominant lithic material comprising 57 percent of the lithic artifacts followed by quartzite (40 percent) and then silicified wood and other materials (novaculite, quartz, Tecovas jasper, ironstone). Chert is particularly preferred for the making of projectile points as nearly three-quarters of all points are made from the material. This same observation was made by Crook and Harris (1952, 1954) who noted that two-thirds or more of the dart points present at Carrollton phase sites were made from chert Crook and Harris 1954). As stated above, almost all of the chert used in making lithic artifacts in the Upper Trinity watershed comes from outside the region and was not sourced from the local gravels.

Table 26 lists the Carrollton phase artifacts from the Wood Springs and Moss Hill sites in Liberty County. Projectile points (n=91) and bifaces/scrapers (n=108) again are the predominant artifact types, representing 30 and 35 percent of the total artifact assemblage, respectively. Other lithics including Clear Fork gouges, Waco sinkers, Carrollton axes, gravers, and hammerstones (n=24) represent 8 percent of the total artifact assemblage. Non-lithic artifacts, mainly clayballs, comprise the remaining 27 percent of the assemblage.

The section below describes the major lithic tools found in the Carrollton phase Archaic along the Trinity River and its tributaries in both North Central and Southeast Texas.

Table 26. Southeast Texas (Liberty County) Carrollton Phase Artifact Totals by Lithic Material.

Tool Type	Chert	Quartzite	Silicified Wood	Other[1]	Total
Projectile Points	66	7	15	3	91
Biface/Knife	6	4	0	0	10
Scrapers	94	4	0	0	98
Clear Fork Gouge	9	0	0	0	9
Waco Sinker	0	7	0	0	7
Carrollton Axe	0	1	0	0	1
Core	0	0	0	0	0
Graver	1	0	0	0	1
Perforator	0	0	0	0	0
Burin	0	0	0	0	0
Hammerstone	0	6	0	0	6
Chopper	0	0	0	0	0
Total Lithic Artifacts	176 (79%)	29 (13%)	15 (7%)	3 (1%)	223
Ochre	0	0	0	5	5
Clayballs	0	0	0	80	80
Total Non-Lithic Artifacts	0	0	0	85	85

[1] Includes novaculite, silicified coral hash.

Dart Points

Dart points are the single most plentiful type of lithic artifact found in Carrollton phase Archaic sites. They comprise 43 percent of the total artifact assemblage and 45 percent of all lithic artifacts. Table 27 lists all the dart points that could be typed from the major Carrollton Archaic sites in both the Upper Trinity watershed and from Liberty County Unidentifiable points, mainly broken distal ends and mid-sections, as well as other points which could not be readily typed, are excluded. Based on studying all the dart points from the 20 major sites, the Carrollton phase projectile point assemblage can be defined as consisting of Split Stem (Gower), Carrollton, Trinity, Wheeler Leaf, Bulverde, Calf Creek Horizon (Andice, Bell, and minor Calf Creek), and Dallas types, with minor occurrences of Early Stemmed (Wilson), Early Triangular, Big Sandy, Hoxie, Cossatot, and other types. Typologies used follow those defined in Crook and Harris (1954), Suhm and Krieger (1954), Suhm and Jelks (1962), as well as Turner and Hester (1985, 1993, 1999) and Turner et al. (2011). Each of these major point types will be discussed in detail below.

Table 27. Total Early Archaic Point Data – Upper Trinity Watershed and Liberty County Sites.

Point Type	Chert	Quartzite	Silicified Wood/Other	Total
Split-Stem (Gower)	65	5	0	70
Carrollton	230	42	3	275
Trinity	111	54	4	169
Wheeler Leaf	43	22	7	72
Bulverde	54	8	0	62
Dallas	56	34	4	94
Calf Creek Horizon	38	0	0	38
Other[1]	35	3	0	38
Total	632 (77%)	168 (21%)	18 (2%)	818

[1] Includes Early Stemmed (Wilson) (n=7), Early Triangular (n=12), Big Sandy (n=9), Hoxie (n=4), and Cossatot (n=6).

Split Stem (Gower)

Crook and Harris (1952, 1954) did not mention the occurrence of Split Stemmed points in their original description of the Carrollton Archaic but this may be due to the fact that the point type was not described until a number of years later (Coffman and Prewitt 1985; Dial et al. 1998; Decker et al. 2000; Quigg et al. 2008). However, a number of Split Stemmed points are in the collections of Crook and Harris, especially from the Lake Dallas (n=12) and Wheeler (n=4) type sites. Examples are further illustrated in Crook and Harris’ field notes but are not depicted in their discussion of trait characteristics probably due to lack of published descriptions (Crook and Harris 1952, 1954). Prikryl (1990) was the first to note their occurrence and largely based his interpretation of the Early Archaic in the Upper Trinity watershed on the presence of these points which he generically termed as “Split Stemmed” or “Early Split Stemmed”. I have adopted that term here as while most seem to fit the general description associated with Gower points, there may be some examples that overlap with other related points (ie. Martindale). A re-examination of the collections from all the major Carrollton phase sites from the Upper Trinity watershed has in fact now shown the presence of a total of 67 Split Stem points from the major sites plus from sites 41DN28, 41DN308, and 41TR98 (Daniel Cabin) (Table 28). An additional three Split Stemmed points have been recovered from the Wood Springs site in Liberty County.

Of these 70 plus Split Stem points, 93 percent are made from chert with the remaining seven percent constructed from heat-treated quartzite. Almost all of the chert specimens fluoresce a strong yellow-orange to orange color under UV light suggesting that they are made from Central Texas Edwards chert. In addition to their characteristic Split Stem, almost all show a high degree of smoothing (grinding) on the stem and basal edges. Examples from

Table 28. Split Stem Point Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood	Total
Denton County				
41DN5	1	0	0	1
Lake Dallas (41DN6)	10	2	0	12
Wells (41DN11)	1	0	0	1
41DN28	1	0	0	1
41DN36	1	1	0	2
41DN40	1	0	0	1
Frank (41DN49)	3	1	0	4
Irish Farm (41DN62)	2	0	0	2
41DN308	1	0	0	1
41DN354	1	0	0	1
Dallas County				
Denton Tap Road (41DL11)	1	0	0	1
Carrollton Dam (41DL12)	2	1	0	3
Wheeler (41DL30)	4	0	0	4
41DL32	1	0	0	1
Wood Pit (41DL76)	1	0	0	1
Obshner (41DL116)	1	0	0	1
Milton (41DL259)	2	0	0	2
Dowdy Ferry (41DL332)	10	0	0	10
Post Oak (41DL429)	1	0	0	1
Kaufman County				
Kings Creek (41KF23)	1	0	0	1
City of Kaufman (41FK24)	2	0	0	2
Bachelor Creek (41KF50)	1	0	0	1
McLawn (41KF53)	1	0	0	1
Edwards (41KF57)	4	0	0	4
Miklas (41KF59)	1	0	0	1
Collin County				
Frognot (41COL165)	1	0	0	1
Upper Farmersville North (41COL166)	2	0	0	2
Crump (un-numbered)	2	0	0	2
Tarrant County				
Daniel Cabin (41TR98)	2	0	0	2
Total: 29 sites	62 (92%)	5 (8%)	0 (0%)	67

Figure 32. Split Stem projectile points from the Upper Trinity watershed.
Top Row L-to-R: Upper Farmersville North, Carrollton Dam, Wheeler, Dowdy Ferry.
Bottom Row L-to-R: Dowdy Ferry (n=2), Edwards, Dowdy Ferry (n=2).

Figure 33. Split Stem projectile points from the Wood Springs site, Liberty County, Texas.

both Gower or collectively called here Split Stem points are characterized by a triangular-shaped blade and a short parallel edged stem with a diagnostic concave base. Gower points have been dated from the Wilson-Leonard site 7430 ± 230 B.P. (calibrated) (Dial et al. 1998). Recently, an Optically Stimulated Luminescence (OSL) date of 6600 ± 300 B.P. was obtained for the Gower-Martindale (Split Stem) interval at Area 15 of the Gault site (41BL323) in Bell County (Rodrigues et al. 2016). At the Dowdy Ferry site, Split Stem points have been found with Carrollton points at 20-40 cm into the Albritton Formation and in association with an Angostura point at 40-50 cm (Crook 2007a). At the Obshner site, a Split Stem point was found with a Trinity point at 30-40 cm into the Albritton. Crook (1959) obtained a single radiocarbon date from the Wood Pit (41DL76) from near the Pattillo-Albritton contact of ca. 6000 B. P. Thus the occurrence of Split Stemmed points below the Pattillo-Albritton contact correlates well with the dates obtained from Central Texas.

Carrollton

The single most abundant dart point type in the Carrollton phase assemblage is the Carrollton point with some 252 specimens from major and minor sites in the Upper Trinity watershed and an additional 23 Carrollton points from the Wood Springs and Moss Hill sites in Liberty County (Table 29). Eighty four percent of these points are made from high quality chert with the remainder from heat-treated quartzite, novaculite, or silicified wood.

There has been considerable confusion in the literature as to what characterizes a true Carrollton point. For example, many of the illustrations in Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) show points with rounded stems or shoulders that are not at right angles to the stem. Due to this confusion, a complete description of the point type is included in the Appendix at the end of this monograph. Type Carrollton points are "Christmas tree" shaped with a triangular blade and rectangular stems with the stem at sharp right angles to the blade. Barbs, such as are seen on Bulverde points, are generally absent. Edge grinding to facilitate hafting can be found on the lateral edges of the stem on all true Carrollton points. This is a key diagnostic feature and distinguishes Carrollton points from other similar shaped dart points such as Bulverde and Dawson. Crook's original illustration of the type Carrollton points is shown in Figure 34.

Blades on non-resharpened points are broad, much more so than seen on Dawson or other triangular-shaped point types. This broad outline diminishes with use and resharpening. Crook and Harris (1954) found that most Carrollton phase dart points from the Upper Trinity watershed were in excess of 50 mm in length and some were

Table 29. Carrollton Point Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood	Total
Denton County				
Lake Dallas (41DN6)	3	0	0	3
Wells (41DN11)	1	0	0	1
41DN36	1	0	0	1
Frank (41DN49)	1	0	0	0
Irish Farm (41DN62)	2	0	0	2
Dallas County				
Denton Tap Road (41DL11)	1	0	0	1
Carrollton Dam (41DL12)	2	3	0	5
41DL14	2	0	0	2
41DL22	1	0	0	1
Bachman Dam (41DL23)	3	1	0	4
Albritton (41DL27)	3	0	0	3
Wheeler (41DL30)	12	3	0	15
Denton Creek (41DL31)	5	1	0	6
Walnut Creek (41DL45)	4	0	0	4
Garland Cemetery (41DL48)	4	1	0	5
Field City (41DL50)	1	0	0	1
41DL74	2	0	0	2
Wood Pit (41DL76)	3	3	0	6
41Dl81	1	0	0	1
41DL102	2	0	0	2
Obshner (41DL116)	15	4	0	19
Hutchins (41DL140)	5	0	0	5
41DL157	3	1	0	4
41DL172	2	0	0	2
Kleberg (41DL175)	3	0	0	3
Melaun (41DL177)	4	0	0	4
41DL234	1	0	0	1
Cottonwood (41DL235)	5	1	0	6
41DL240	1	0	0	1
41DL252	1	0	0	1
Milton (41DL259)	6	0	0	6
41DL281	3	1	0	4
41DL296	1	0	0	1
41DL297	1	0	0	0
41DL301	2	0	0	2
Broken Leg (41DL313)	10	2	0	12
41DL313	6	2	0	8
41DL326	2	0	0	2

Table 29. Carrollton Point Distribution – Upper Trinity Watershed. (Continued)

County / Site	Chert	Quartzite	Silicified Wood	Total
Dallas County (continued)				
Gifford Hill (41DL327)	6	1	0	7
Dowdy Ferry (41DL332)	3	3	0	6
Binnerri (un-numbered)	4	0	0	4
Kaufman County				
Harris Site (27B5-4)	1	1	0	2
Blaine (41KF12)	6	1	0	7
Kings Creek (41KF23)	9	0	0	9
City of Kaufman (41FK24)	8	2	0	10
Bachelor Creek (41KF50)	9	2	0	11
McLawn (41KF53)	3	1	0	4
41KF55	2	0	0	2
Edwards (41KF57)	3	1	0	4
Miklas (41KF59)	6	2	0	8
Collin County				
Frognot (41COL165)	6	0	1	7
Upper Farmersville North (41COL166)	3	1	0	4
Crump	3	1	1	5
Tarrant County				
Rush Creek (41TR14)	1	0	0	1
Hugh Simmons (41TR21)	1	0	0	1
Site T-5 (41TR56)	4	0	0	4
41TR71	1	0	0	1
Pipes (41TR95)	3	0	0	3
Leonard Brothers (41TR149)	3	0	0	3
Forrester (41TR150)	1	0	0	1
Total: 60 sites	211 (84%)	39 (15%)	2 (1%)	252

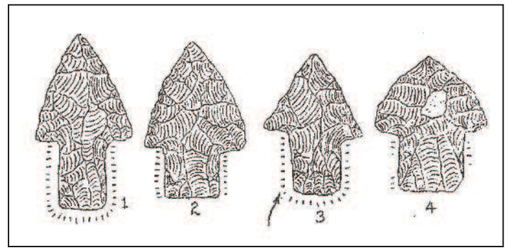


Figure 34. Original illustration of the type Carrollton points from the Wheeler site, Dallas County, Texas. (Wilson W. Crook, Jr. illustration).

60-70 mm in length. The Carrollton points studied in the collections made available to the author from the Upper Trinity watershed average 56.4 mm in length and generally retain their broad triangular blade (Figure 35). Carrollton points from Southeast Texas, however, are smaller (average length – 42.8 mm), having been extensively resharpened with use (Figure 36). This appears to be a common characteristic of all Southeast Texas points where high quality cherts are not abundant and the original aboriginal inhabitants wished to extend the life of the artifact (Crook 2018c). Another feature present in these reworked Southeast Texas Carrollton points is the continued reduction in blade size relative to the stem. Figure 37 shows six Carrollton points from the Wood Springs (41LB15) site which illustrates the complete trend from original dimensions on the right to gradually decreasing blade size to the left. A more detailed description of type Carrollton points is in Appendix I.

Figure 35. Carrollton points from type sites in Dallas, Denton and Collin Counties. Left to Right: Wheeler (n=3), Upper Farmersville North, Lake Dallas, Dowdy Ferry.

Figure 36. Carrollton points from Liberty County, Texas. L-to-R: Moss Hill (n=4), Wood Springs (n=2).

Figure 37. Six Carrollton points from the Wood Springs site, Liberty County, Texas. Note the reduction in blade size from right to left as a result of use and resharpening.

Carrollton points have been characterized as Middle Archaic artifacts (Turner and Hester 1985, 1993, 1999; Turner et al. 2011). However, Carrollton points have been found in situ associated with Split Stem (Gower) points at the Dowdy Ferry site (20-40 cm into the Albritton Formation) and in the pit walls at the Wheeler site (Crook 2007a; Wilson W. Crook, Jr. Field Notes). It is true that Carrollton points are found in the lower part of the Pattillo sand which is above the zone that Crook (1959) obtained a ca. 6000 B.P. radiocarbon date. However, Carrollton points are not associated with the overlying Elam phase. Therefore, they should be correctly placed in the Early Archaic and extend into the lower part of the Middle Archaic. Based on dated associations in sites in Harris County, Patterson (1991) placed an initial date of ca. 7000 B.P. for Carrollton points. This study would confirm that early date as a probable starting point for the Carrollton point type.

Trinity

Another diagnostic projectile point of the Carrollton phase Archaic is the Trinity Point. Like the Carrollton point, there has been considerable misinformation propagated in the literature as to what constitutes a Trinity point as well as its age association. The Trinity point is a medium-sized dart point that is generally sub-triangular in outline. The blade is triangular with weak shoulders forming shallow notches. In all true Trinity points, the notches have been ground smooth to facilitate hafting. The base is prominently convex and can also be occasionally ground although usually to a lesser degree than the notches. The edge grinding in the notches is one of the features which distinguishes this point from other similar dart point types such as Motley, Godley, and Ellis. Trinity points are relatively thick and crudely chipped and are substantially larger than similarly-shaped Elam points. The size of the point is usually well in excess of 50 mm in length (Upper Trinity collections average 56.5 mm; Andy Kyle Collection average is 51.7 mm) but does decrease with use and resharpening. A complete physical description of the point type is included in the Appendix. Figure 38 shows Crook's original illustration of type Trinity points from the Wheeler and Lake Dallas sites. Examples from sites in the Upper Trinity watershed and from Liberty County are shown in Figures 39 and 40.

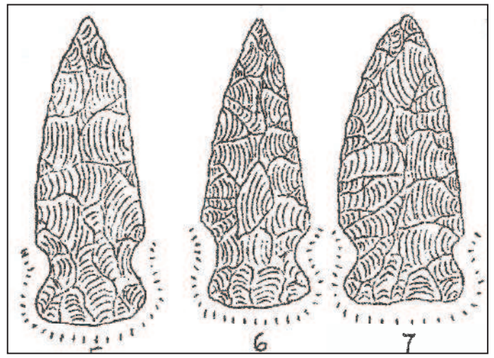


Figure 38. Original illustration of the type Trinity points from the Wheeler and Lake Dallas sites. (Wilson W. Crook, Jr. illustration).

A total of 157 Trinity points were observed in collections from the major sites in the Upper Trinity watershed and another 12 from the Wood Springs and Moss Hill sites in Liberty County. Chert is the predominant lithic material used to make these points accounting for 65 percent of the total assemblage. The remaining points are made from heat-treated quartzite (32 percent) and/or silicified wood (3 percent) (Table 30).

Trinity points have been found in situ with Carrollton and Wheeler Leaf points in the lower Pattillo at Dowdy Ferry, with Dallas and Wheeler Leaf points in the lower Pattillo at Post Oak, with a Bell point in the upper 10 cm of the Albritton Formation at Dowdy Ferry, and with Carrollton and Split Stem points in the upper 20-40 cm of the Albritton at Obshner. Trinity points have also been found in the pit walls with Carrollton points at Carrollton Dam, Wheeler, and the Wood Pit. Their direct association with both Split Stem and Carrollton points would indicate that like Carrollton points, they too are a late Early Archaic point that extends in time into the lower part of the Middle Archaic.

Figure 39. Type Trinity points from type sites in Dallas, Denton and Collin Counties. Top Row, Left to Right: Wheeler, Lake Dallas, Carrollton Dam, Wheeler. Bottom Row, Left to Right: Dowdy Ferry, Upper Farmersville North, Wheeler (n=2).

Figure 40. Trinity points from Liberty County, Texas.L-to-R: Moss Hill (n=2), Wood Springs (n=2), Knight's Bayou (n=3).

Table 30. Trinity Point Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood	Total
Denton County				
Lake Dallas (41DN6)	16	4	0	20
Wells (41DN11)	2	1	0	3
Irish Farm (41DN62)	17	2	0	19
41DN259	2	0	0	2
Dallas County				
Carrollton Dam (41DL12)	5	1	0	6
Bachman Dam (41DL23)	2	1	0	3
Albritton (41DL27)	1	0	0	1
Wheeler (41DL30)	10	4	0	14
Wood Pit (41DL76)	1	1	0	2
Obshner (41DL116)	6	13	0	19
Hutchins (41DL140)	5	0	0	5
41DL234	1	0	0	1
41DL236	1	0	0	1
41DL242	3	2	0	5
Milton (41DL259)	0	3	0	3
41DL297	1	0	0	1
Dowdy Ferry (41DL332)	4	3	0	7
Post Oak (41DL429)	1	1	0	2
Binnerri (un-numbered)	2	0	0	2
Kaufman County				
Kings Creek (41KF23)	3	1	0	4
City of Kaufman (41FK24)	3	3	0	6
Bachelor Creek (41KF50)	1	1	0	2
McLawn (41KF53)	2	0	0	2
41KF55	2	0	0	2
Edwards (41KF57)	4	3	0	7
Miklas (41KF59)	2	5	0	7
Collin County				
Frognot (41COL165)	3	2	0	5
Upper Farmersville North (41COL166)	3	0	0	3
Crump	3	0	0	3
Total: 29 sites	106 (68%)	51 (32%)	0 (0%)	157

Wheeler Leaf

Another component of the Carrollton phase projectile point assemblage is an ovoid-shaped point that Crook and Harris called the "Wheeler Leaf" point, named for the both the site of its original discovery and its characteristic ovoid, leaf shape (Crook 1952; Crook and Harris 1952, 1954; Wilson W. Crook, Jr., personal communication, 1973). Wheeler Leaf points have now been recognized from at least 15 sites across four counties in the Upper Trinity River watershed (Table 31). While other point types described by Crook and Harris, such as the Carrollton, Trinity, Dallas, and Elam points, were subsequently recognized as valid point types and have been further characterized over the years (Suhm and Jelks 1962; Suhm and Krieger 1954; Turner and Hester 1985, 1993, 1999; Turner et al. 2011), no complete description of the Wheeler Leaf point was ever made. As a result, the author recently published a formal description of the point type (Crook 2018b). The dual name of Wheeler Leaf was retained so as to avoid confusion with the Wheeler Paleoindian point type from the Southeastern U.S.

Blaine et al. (1968) described the point at the Acton site in Hood County where it was found in association with other Carrollton phase Archaic materials including Carrollton, Trinity, Dallas, and Bulverde points. Subsequently, the author identified an additional 17 Wheeler Leaf points at two Carrollton phase sites in Liberty County (Wood Springs, Moss Hill).

Wheeler Leaf points are medium-sized dart points that are leaf-shaped (ovoid) in general outline. The blade is prominently triangular with an ovoid, contracting stem. A few specimens have a squarer stem but close examination shows that most of these are the result of breakage and resharpening. Shoulders and barbs are completely absent. No edge grinding on the stem is present. The point is typically thick and relatively crudely

Table 31. Wheeler Leaf Point Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood	Total
Denton County				
Lake Dallas (41DN6)	3	0	0	3
Dallas County				
Carrollton Dam (41DL12)	0	1	0	1
Bachman Dam (41DL23)	0	1	0	1
Wheeler (41DL30)	8	1	212	11
Wood Pit (41Dl76)	0	2	0	2
Obshner (41DL116)	1	0	0	1
Milton Pit (41DL259)	0	3	11	4
Dowdy Ferry (41DL332)	7	2	0	9
Post Oak (41DL429)	2	1	0	3
Kaufman County				
City of Kaufman (41KF24)	1	0	0	1
Edwards (41KF57)	1	0	0	1
Miklas (41KF59)	0	5	0	5
Collin County				
Frognot (41COL165)	3	5	0	8
Upper Farmersville North (41COL166)	4	0	0	4
Crump (Un-numbered)	3	1	2	6
Total	33 (55%)	22 (37%)	5 (8%)	60

made, but some thinner, better-made examples are known. No evidence of edge retouch is present on any of the observed specimens with the points apparently constructed solely from hard hammer percussion. Beveling, either two or four edged, is completely absent. Examples of typical Wheeler Leaf points from the type localities in the Upper Trinity River watershed are shown in Figure 41.

Figure 41. Wheeler Leaf points from the Upper Trinity Watershed.
Top Row, Left to Right: Wheeler, Dowdy Ferry (n=2), Lake Dallas (n=2).
Bottom Row, Left to Right: Dowdy Ferry (n=2), Wheeler, Miklas, Wheeler.

Wheeler Leaf points are predominantly constructed from chert and/or novaculite (60 percent), however, a substantial amount have been made from Ogallala quartzite (30 percent) or silicified wood (10 percent). Almost all of the Wheeler Leaf points made from chert fluoresce a strong lemon-yellow to yellow-orange color under both short and long-wave ultra-violet radiation. This suggests that the source material is Edwards chert from Central Texas as the cherts present in the Trinity River gravels typically do not fluoresce under UV light (Hillsman 1992; Hoffman et al. 1991). Few of the points made from chert show evidence of heat-treating prior to construction. However, two points made from novaculite (see Figure 41, Top Row, fourth point from the left) clearly have a dull luster and areas of strong reddish coloration, which are indicative of heat treating prior to construction. Conversely, almost all of the points made from either quartzite or petrified wood show some yellow to reddish coloration indicating that the raw toolstone material was extensively heat-treated prior to knapping.

The same general observation can be made on the 17 Wheeler Leaf points from sites across Liberty County. Most have some form of yellow to orange to reddish coloration which is probably due to the lithic material having been heat-treated. This is especially true of all points made from silicified wood (Figure 42).

Point lengths range from 39-65 mm with the average being slightly greater than 51 mm. This is consistent with the observation made by Crook and Harris (1952, 1954) that dart points from the Carrollton phase typically average greater than 50 mm in length. Point widths range from 15-27 mm with the average being approximately 21 mm. Length-to-Width ratios cluster around 2.4-2.5:1. Point thicknesses range from 6-12 mm with an average of 9 mm. A complete physical description of the point type is included in the Appendix.

Figure 42. Wheeler Leaf points from the Moss Hill (n=3) and Wood Springs (n=3) sites, Liberty County, Texas.

Wheeler Leaf points resemble many forms of ovoid to leaf-shaped bifacial cutting tools including knives. As a result, an extensive examination of the type specimens was undertaken using both a traditional binocular microscope (20x) and a high power Dino-Lite AM-4111-T digital microscope (20-200x). This study focused on examining the lateral edges of the artifacts under high power for use wear as well as both the dorsal and ventral surfaces for signs of hafting polish. Despite repeated observations at high magnification (80-200x), the study failed to reveal any wear patterns on the lateral edges consistent with the artifact's use as knives. Conversely, eight of the artifacts observed in this study have prominent distal end impact fractures which are consistent with their use as projectile points (see Figure 41, Bottom Row, far right). Several of the artifacts also showed a slight sheen (polish) on both the dorsal and ventral surfaces towards the proximal end. This polish suggests that the contracting part of the base of the artifacts was hafted during use, which is also consistent with use as a dart point. Both the impact fractures and the basal surface polish further indicate that the biface represents a completed artifact and not a preform for another artifact.

Wheeler Leaf points generally have contracting, rounded stems which distinguishes them from the more bi-pointed Lerma points. They are also longer and considerably narrower than Absolo points, having a length-to-width ratio typically close to 2.5:1, whereas the length-to-width ratio for Absolo points is considerably less than 2:1 (Bell 1958; Davis 1991). Wheeler Leaf points are similar in shape to Refugio points but are significantly older having been found in situ in direct association with Early and Middle Archaic artifacts of the Carrollton phase at the Wheeler, Dowdy Ferry, Post Oak, and other sites. As Refugio points are generally a later South and South-Central Texas Archaic artifact, it remains unclear what, if any, association there is between the two point types (Davis 1991).

In the Upper Trinity watershed, Wheeler Leaf points have been found in situ at the Dowdy Ferry site in the lower 10 cm of the Pattillo sand in association with Carrollton and Trinity points (Crook 2007a). They have also been found in the same geologic context with Trinity points at the Post Oak site (Crook 2008b). Wheeler Leaf points were found in the pit walls at Carrollton Dam and at Wheeler in both the lower Pattillo and the in upper 10 cm of the Albritton Formation. Therefore, based on strategic context, they appear to be slightly younger than Carrollton and Trinity points but still appear in the uppermost part of the Early Archaic and extend into the base of the Middle Archaic.

Bulverde

A total of 62 Bulverde points have been recognized from Carrollton phase sites, 59 from the Upper Trinity watershed and 3 from sites in Liberty County (Table 32). Bulverde points are typically a Central Texas point but do occur in small numbers (eight percent of the total projectile point assemblage) in Carrollton Archaic sites. They are predominantly made from chert (87 percent) with a few specimens constructed from heat-treated quartzite. Bulverde points are similarly "Christmas-tree" shaped like Carrollton points with a large triangular blade and a rectangular stem. Bulverde points differ from Carrollton points in that they contain weak to prominent barbs and the angle between the stem and the blade is often slightly concave rather than at right angles. The stem on Bulverde points is also seldom ground which further serves to distinguish them from Carrollton points.

Only one Bulverde point has been found in situ in the Upper Trinity watershed. It was found in the lower 10cm of the Pattillo sand in association with a Dallas point at the Dowdy Ferry site (Crook 2007a). As this is above the point where Crook (1959) obtained the ca. 6000 B.P. date, it would suggest that the Bulverde point is restricted to the Middle Archaic component of the Carrollton phase Archaic.

Table 32. Bulverde Point Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood	Total
Denton County				
Lake Dallas (41DN6)	1	0	0	1
Irish Farm (41DN62)	16	0	0	16
Dallas County				
Carrollton Dam (41DL12)	3	0	0	3
Bachman Dam (41DL23)	1	0	0	1
Wheeler (41DL30)	6	0	0	6
Wood Pit (41Dl76)	1	0	0	1
Obshner (41DL116)	1	0	0	1
Milton Pit (41DL259)	1	1	0	2
Dowdy Ferry (41DL332)	3	2	0	5
Kaufman County				
City of Kaufman (41KF24)	5	1	0	6
Edwards (41KF57)	2	0	0	2
Tarrant County				
41TR14	1	0	0	1
Collin County				
Frognot (41COL165)	3	2	0	5
Upper Farmersville North (41COL166)	5	2	0	7
Total	51 (86%)	8 (14%)	0	59

Dallas

Dallas points are small to medium-sized dart points that are generally pentagonal in outline. They were originally described by Crook and Harris (1952, 1954) as "Dallas Pentagonal" points but the name was shortened to Dallas by Suhm and Krieger (1954) and Suhm and Jelks (1962). The blade is triangular with weak shoulders. The stem tapers slightly to a straight to slightly concave base thus creating an overall pentagonal shape. Edge grinding to facilitate hafting is present on the stems of some but not all specimens. Dallas points are relatively thick and crudely chipped (Figure 43). Like Carrollton and Trinity points, there has been some confusion in the literature with regards to both the description and association of Dallas points. As a result, a full physical description is included in the Appendix of this report.

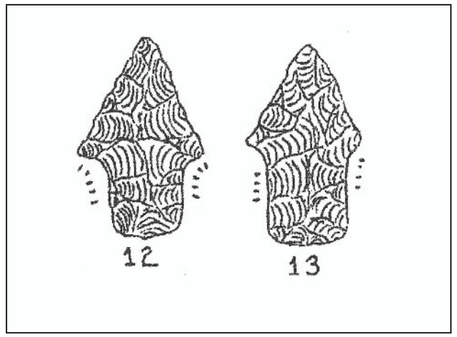


Figure 43. Original type illustration of Dallas points from the Wheeler site, Dallas County. (Wilson W. Crook, Jr. illustration).

A total of 94 Dallas points have been studied in the collections made available to the author, 81 from sites in the Upper Trinity watershed and 13 from the Wood Springs and Moss Hill sites in Liberty County (Table 33). Sixty percent of the specimens were made from chert, another 36 percent from heat-treated quartzite with the remainder (four percent) constructed from silicified wood. Examples from sites in the Upper Trinity watershed are shown in Figure 44. Dallas points from the Wood Springs site in Liberty County are illustrated in Figure 45. As was the case for Carrollton points from Southeast Texas, many of the Dallas points from Liberty County are considerably smaller than their Upper Trinity counterparts, the reduction in length due to continual resharpening with extended use.

Figure 44. Dallas points from type sites in Dallas, Denton and Hunt Counties.
Top Row, Left to Right: Bachman Dam, Wheeler (n=2), Hess.
Bottom Row, Left to Right: Wheeler (n=2), Lake Dallas (n=2).

Figure 45. Dallas points from the Wood Springs site, Liberty County.

Like Bulverde points, Dallas points have only been found in situ in the Upper Trinity watershed in the lower 20 cm of the Pattillo sands. They occur with Bulverde points at the Dowdy Ferry site (Crook 2007a) and with Trinity and Wheeler Leaf points at the Post Oak site (Crook 2008b). Crook (1952) only found them in the Pattillo sand and never in the lower Albritton at the Wheeler site. As such, they probably do not occur in the Early Archaic component of the Carrollton phase but are restricted to the basal part of the Middle Archaic.

Table 33. Dallas Point Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood	Total
Denton County				
41DN1	0	1	0	1
41DN3	0	1	0	1
41DN4	1	0	0	1
Lake Dallas (41DN6)	4	4	0	8
Wells (41DN11)	1	1	0	2
Irish Far, (41DN62)	9	3	0	12
41DN293	1	0	0	1
41DN353	1	1	0	2
41DN354	3	3	0	6
Dallas County				
Carrollton Dam (41DL12)	1	0	0	1
41DL13	1	0	0	1
Bachman Dam (41DL23)	1	0	0	1
Albritton (41DL27)	1	0	0	1
Wheeler (41DL30)	8	10	0	18
41DL32	0	1	0	1
Field City (41DL50)	0	1	0	1
Wood Pit (41DL76)	2	3	0	5
Obshner (41DL116)	2	0	0	2
Dowdy Ferry (41DL332)	4	1	0	5
Post Oak (41DL429)	1	0	0	1
Kaufman County				
Kings Creek (41KF23)	1	0	0	1
City of Kaufman (41FK24)	1	1	0	2
Bachelor Creek (41KF50)	0	1	0	1
Edwards (41KF57)	2	1	0	3
Collin County				
Frognot (41COL165)	2	0	0	2
Total: 23 sites	48 (59%)	33 (41%)	0 (0%)	81

Calf Creek Horizon

Another diagnostic component of the Carrollton phase Archaic is the presence of Calf Creek Horizon projectile points including Andice, Bell and Calf Creek types. Though a relatively rare artifact in terms of the total dart point assemblage (n=35), most larger Carrollton phase sites contain one or more of these barbed points.

Andice points were originally described by Prewitt (1983) as a component of the Early Archaic Jarrell Phase in Central Texas (Prewitt 1981). They were noted to occur along the Balcones Escarpment in eastern Central Texas extending across the Gulf Coastal Plain to Victoria and Corpus Christi (Suhm 1955; Flinn and Flinn 1968; Hester 1971; Solberger and Hester 1972; Fox and Hester 1976; Luke 1980; Fox et al. 2001). Andice points were described as having broad, subtriangular blades with convex lateral edges. The stems are long and rectangular with no basal grinding. The point was characterized by the presence of two long barbs formed by basal notching from large, triangular preforms (Weber and Patterson 1985; Weber 1991). The barbs are narrowest at the juncture with the blade which tends to result in frequent breakage as seen in most archeological specimens which lack one or both barbs (Prewitt 1983; Weber 1991). Both the blade and the barbs are frequently resharpened after breakage making the points considerably shorter than their original form. Andice points with both barbs broken and resharpened are often mistaken for Bulverde points (Prewitt 1983; Patterson and Weber 1985). Based on measurement of over 50 specimens, Prewitt (1983) gave the following measurements for Andice points:

- Length: 42-106 mm (average 69.9)
- Width: 27-52 mm (average 43.8)
- Thickness: 6-10 mm (average 7.6)
- Stem Length: 16-32 mm (average 22.7)
- Stem Width: 15-21 mm (average 17.9)
- Average Stem Length:Width Ration: 1.27

Bell points are also barbed points with triangular blades and rectangular to slightly expanding stems. Johnson (1964) originally called them “Early Barbed” points from the Devil’s Mouth site in Val Verde County. Sorrow et al. (1967) was the first to use the term “Bell” from the Stillhouse Hollow reservoir in Central Texas. Since then, they have been described from a number of sites across the Edwards Plateau down to the Gulf Coastal Plain (Wesolowsky et al. 1976; Jelks 1978; Parker and Mitchell 1979; Chandler 1983; Turner and Hester 1985, 1993, 1999; Turner et al. 2011). Bell points were observed to be coeval with Andice points. Based on a number of complete specimens from San Patricio County, Chandler (1983) gave the following dimensions:

- Length: 35-52 mm (average 42.0)
- Width: 37-45 mm (average 39.0)
- Thickness: 5-7 mm (average 6.0)
- Stem Length: 11-15 mm (average 13.0)
- Stem Width: 16-24 mm (average 20.0)
- Average Stem Length:Width Ratio: 0.65

Consequently, Bell points were observed to be slightly smaller than Andice points with shorter stem lengths that seldom exceeded 15-16 mm (Chandler 1983; Weber and Patterson 1985). Moreover, Bell points were noted to have a more open triangular shape whereas Andice points tended to have more convex lateral edges (Turner and Hester 1985, 1993, 1999).

Calf Creek points have a related general form. However, the stem length-to-width ratio is about 1:1, midway between that for Andice and Bell (Don Wyckoff, personal communication 2017). Calf Creek points are also much more prevalent in the Southern Great Plains of Oklahoma and seldom occur south of the Red River (Ayala 2014).

The above work, coupled with the tendency for the barbed points of the Calf Creek Horizon to change shape over time with breakage and resharpening, has caused much confusion as to what diagnostic features actually separate the three point types. Recently, Sergio Ayala (2014) has conducted an intensive study of over 1,000 Andice, Bell, and Calf Creek points (191 complete) from Central, South, and North Central Texas, as well as across Oklahoma, in an effort to determine if the three points are indeed valid types and if so, what characterizes each point’s typology. His work has determined that there are five key distinguishing traits: (1) maximum length, (2) maximum width, (3) maximum thickness and its location on the point, (4) stem length, and (5) stem width. Ayala found that Andice stems average about 22 mm in length and the stem length-to-width ratio averages approximately 1.25:1. Bell points have much smaller stem lengths, seldom exceeding 16 mm with an average stem length-to-width ratio of approximately 0.77:1. Calf Creek points have average stem length-to-width ratios of approximately 1:1 with an average stem length of about 17 mm. In addition, Ayala (2014) discovered that for all three types, width-to-thickness ratios for late stage productions (not preforms) ranged from 5:1 to 7:1 with the average being about 5.5:1. Moreover, 90 percent of the specimens examined had their point of maximum thickness just above the juncture of the stem with the blade.

In general, Andice points push basal notching to the limit of knapping technology, requiring extensive skill and application of special techniques in order to replicate consistent success. Bell points, on the other hand, emphasize a greater combination of pressure flaking and indirect percussion with as little as three notching flakes to produce the barbs (Sergio Ayala, personal communication 2017). Calf Creek points generally fall in between the two in terms of difficulty to make.

Ayala (2014) also determined that both Andice and Calf Creek points show extensive heat-treating prior to completion of the point. This results in increased luster and a darkening of color of the lithic material used. If iron is present in the chert, Andice and Calf Creek points also commonly show red and pinkish colors. To date, no Bell preforms have been reported so it is uncertain if Bell point preforms were similarly heat-treated.

Table 34. Calf Creek Horizon (Andice – Bell – Calf Creek)

County / Site	Chert	Quartzite	Silicified Wood	Point Type	Total
Denton County					
Lake Dallas (41DN6)	3	0	0	Bell (2), Calf Creek	3
41DN36	1	0	0	Bell	1
41DN65	1	0	0	Bell	1
Dallas County					
Carrollton Dam (41DL12)	1	0	0	Bell	1
Wheeler (41DL30)	12	0	0	Andice (5), Bell (5), Calf Creek (1), Unidentified (1)	12
Denton Creek (41DL31)	1	0	0	Andice	1
41DL32	1	0	0	Andice	1
Obshner (41DL116)	1	0	0	Calf Creek	1
Cottonwood (41D235)	1	0	0	Calf Creek	1
41DL240	1	0	0	Bell	1
Milton Pit (41DL259)	1	0	0	Calf Creek	1
Dowdy Ferry (41DL332)	4	0	0	Bell (3), Calf Creek	4
Kaufman County					
City of Kaufman (41KF24)	1	0	0	Bell	1
Edwards (41KF57)	1	0	0	Bell	1
Miklas (41KF59)	1	0	0	Unidentified	1
Collin County					
Frognot (41COL165)	1	0	0	Andice	1
Upper Farmersville North (41COL166)	1	0	0	Bell	1
Crump (Un-numbered)	2	0	0	Bell, Calf Creek	
Total	35 (100%)	0 (0%)	0 (0%)	8 Andice, 18 Bell, 7 Calf Creek, 2 Unidentified	35

All three point types typically show evidence of breakage and resharpening. The most common forms of breakage include (1) impact fracture to the distal end of the point which results in a shortening of the overall length with resharpening, (2) transverse or bending fractures which breaks one or both of the barbs, and (3) transverse fracture where the momentum of the shaft continues forward resulting in breakage of the stem, usually at the juncture with the blade (Ayala 2014). The latter is virtually impossible to repair and often results in the point being discarded.

The importance of the differences in the stem length-to-width ratios in terms of demonstrating that Andice, Bell and Calf Creek points are indeed three distinct point types cannot be overstated. The marked difference in stem construction clearly shows that while production of the points shares a similar technology, they were clearly made using three separate methods. Thus, by measuring both the stem length-to-width ratio and the ratio of the blade width-to-thickness, the typology of the point can be determined (Ayala 2014).

A total of 35 Calf Creek Horizon points were located in the collections of Carrollton phase Archaic material from the Upper Trinity Watershed (Table 34). In addition, three Calf Creek Horizon points have been recovered from the Wood Springs site in Liberty County.

Of the 38 barbed points that were studied as part of this monograph, two points are missing their entire stems, having been broken flush with the juncture of the blade. Accordingly no stem measurements could be made and their original type remains unknown. Four of the specimens are represented by single barbs with none of the other part of the point present. Clearly, no stem measurements could be made on these artifacts, however, from the length of the barbs (all greater than 19.9 mm in length), it is likely that they came from Andice points and have been assumed to be such. The remaining 32 points were measured based on the methodology developed by Ayala (2014). Nineteen had stem length-to-width ratios between 0.73 and 0.87 with the average being 0.80. These were determined to be Bell points. Seven points had stem length-to-width ratios of 0.97 to 1.06 with the average being 1.00; these were determined to be Calf Creek points. Lastly, six points had stem length-to-width ratios in excess of 1.15 with the average being 1.21. These points were determined to be Andice points (see Table 34).

All 38 of the Calf Creek Horizon points studied herein were constructed from high quality, non-local chert. No other material such as quartzite, petrified, or local Trinity gravel chert was used (see Table 34). Various shades of gray-colored chert is the most common lithic material, represented in 20 (53 percent) of the points. Next most common is a distinctive cream-colored chert (10 points – 26 percent). Another two points were made from a honey brown-colored chert (2 points – 5 percent). The gray, cream-colored, and honey-brown chert fluoresce a weak to strong yellow-orange color under short and long-wave UV radiation. As a result, the chert is thought to have originated from the Edwards Plateau in Central Texas. UV fluorescence, both short-wave and long-wave, has long been used to make some preliminary source determinations for chert. This is especially true for Edwards chert, which has traditionally been identified by its strong lemon-yellow to yellow-orange fluorescence under short-wave, and particularly long-wave, UV radiation (Hofman et al. 1991; Hillsman 1992). Other cherts present include three points made from a white chert and three points constructed from a black chert. Neither the white nor the black

Figure 46. Andice points from the Upper Trinity Watershed

L-to-R: Wheeler, Dowdy Ferry, Wheeler.

Figure 47. Bell points from the Upper Trinity Watershed. Top Row, L-to-R: Carrollton Dam, Dowdy Ferry, Edwards. Bottom Row, L-to-R: Lake Dallas (n=3), Wheeler.

chert fluoresces under UV radiation and thus is believed to have come from a source other than the Edwards Plateau, possibly from southern Oklahoma.

Typical examples of Andice, Bell and Calf Creek points from the Upper Trinity Watershed are shown in Figures 46-48. As can be seen in the photographs, all of the points have suffered major damage, either from a distal end impact fracture or a bending fracture to one or both barbs. In most cases, this fracture has been catastrophic and the point was discarded. However, some of the points have been re-tipped resulting in both a shorter and narrower blade (see Figure 46, right point; Figure 48, left point). Loss of one or both barbs is also a common form of point damage. As mentioned above, four lone barbs have been observed from the collections, three of which are shown in Figure 49. The length of these barbs, ranging from roughly 20 to 32 mm, indicates that they likely came from Andice points which have the deepest notching of all the Calf Creek Horizon points and thus the longest barbs. The last form of point damage observed was the loss of the stem while retaining the two barbs (Figure 50). This fracture occurs when the point strikes an object and the momentum of the shaft continues forward resulting in a bending fracture which snaps the stem from the remainder of the point at its juncture point with the blade.

As was observed by Ayala (2014), from both across Central Texas and throughout the Southern Great Plains in Oklahoma, almost all of the Calf Creek Horizon points from the Upper Trinity watershed area show some sign of the chert having been heat-treated before completion of the point. This has resulted in the creation of a dull, waxy luster, a darkening of the gray-colored chert, or the presence of faint red and pink colors in the cream and white-colored cherts (see Figures 46-48).

Five Calf Creek Horizon points have been found in Carrollton Archaic sites in Southeast Texas. This includes three points from the Wood Springs site in Liberty County (Andice (n=2), Bell) and two Bell points from Ayish Bayou (41SA151) in San Augustine County (Crook et al. 2017). These are some of the furthest southeast of any recorded Calf Creek Horizon points in Texas (Sergio Ayala, personal communication, 2018). All of the points show extreme wear from impact fractures and resharpening. One of the Andice points from Wood Springs has

Figure 48. Calf Creek points from the Upper Trinity Watershed, L-to-R: Milton Pit, Lake Dallas, Wheeler.

Figure 49. Probable Andice broken barbs, L-to-R: Wheeler (n=3).

Figure 50. Probable Bell points with completely broken stem, L-to-R: Miklas, Wheeler.

been resharpened so much that the distal end was converted into a hafted end-scraper. An Andice point from the Wood Springs site is shown in Figure 51.

Patterson (1991) reported that Bell points were a part of the Early Archaic point assemblage in the Southeast Texas region west of the Trinity River, notably in Harris, Fort Bend, and Wharton counties. He noted six Bell points in association with Carrollton, Trinity, and Early Stemmed points from site 41HR334 (Patterson et al. 1992b). In every instance, Bell points from these counties were made from non-local Edwards chert. This observation matches that for Calf Creek Horizon points in both the Upper Trinity watershed and from Liberty County. Andice points from the Debra Friedkin (41BL1239) site in Bell County have been dated to 7,030 ± 470 B.P. (Waters 2019). At the Gault site in Bell County, three new OSL dates recently have been obtained from the Andice-Bell horizon in Area 15 (Rodrigues et al. 2016). The dates range from 5700 ± 300 B.P. to 5900 ± 300 B.P. to 6100 ± 300 B.P. (Rodrigues et al. 2016). These dates from Central Texas correspond well with the occurrence of Andice and Bell points both slightly above and below the Pattillo-Albritton contact in the Upper Trinity watershed which has been dated to ca. 6000 B.P. (Crook 1959).

Figure 51. Broken Andice point from the Wood Springs site, Liberty County.Both barbs have been lost due to major impact fractures.

Other Projectile Point Types

Other Archaic projectile point types found in Carrollton Archaic sites in the Upper Trinity watershed include Early Stemmed (Wilson) (n=3), Early Triangular (n=12), Big Sandy (n=4), Hoxie (n=4), and Cossatot (n=6). Twenty six of these points (90 percent) are made from probable Edwards chert. Wells and Morrill points have been reported from several sites but none have been found in situ in association with known Carrollton phase artifacts. Some of those points reported as Morrills may in fact be Carrollton points that have undergone extensive resharpening of the blade and thus have a slimmer, less broad Christmas tree shape. Of all these other point types, only Early Triangular points have been found in situ in the upper part of the Albritton Formation at the Post Oak site (Crook 2008b).

Early Stemmed (Wilson) (n=4), Big Sandy (n=5), and a single Palmer point have been found at the Wood Springs site. However, none of these points were found in situ. All of the points are made from chert, most of which fluoresces a strong yellow-orange color under UV light. Examples of the Wilson and Big Sandy points from the Wood Springs site are shown in Figures 52 and 53.

Figure 52. Early Stemmed or Wilson points from the Wood Springs site, Liberty County.

Other Lithic Artifacts

Other artifacts observed in the Carrollton Archaic lithic assemblage include ovoid to square-based bifaces, some of which were probably used as knives, large concavo-convex side-scrapers and small side-scrapers made mostly from chert flakes, Clear Fork type unifacial gouges, Waco sinkers, Carrollton double-bitted axes, perforators made from reworked projectile points, multi-point

Figure 53. Big Sandy points from the Wood Springs site, Liberty County.

gravers made from chert flakes, burins, cores, hammerstones and choppers made from quartzite cobbles, and fired clayballs.

A total of 247 bifaces were present in the Carrollton phase collections from the Upper Trinity watershed. Seventy nine percent of these are leaf-shaped with rounded bases; the remaining 21 percent have square bases. Most of the bifaces are quite large, often exceeding 75 mm in length. They range from well-made and thin (<10 mm) to sometimes quite crude and thick. Chert is the preferred lithic material accounting for 63 percent of all the large bifaces with quartzite (34 percent) comprising most of the remainder. Examination under a high power digital microscope failed to reveal significant wear patterns that could determine their use as cutting tools but a number did show a sheen-like polish on one or more lateral edge which indicates use against something relatively soft, such as meat or silica-rich grass (Keeley 1980). Examples of these large bifaces are shown in Figures 54 and 55.

Figure 54. Large ovoid and square-based bifaces from various Carrollton phase sites in the Upper Trinity watershed. Top Row L-to-R: Lake Dallas (n=2), Wheeler (n=2), Dowdy Ferry. Bottom Row L-to-R: Frognot (n=2), Wheeler (n=2), Dowdy Ferry.

A large number of scraping tools (n=457) were observed in the Upper Trinity Carrollton Archaic collections. These can generally be divided into side-scrapers made on large flakes or from cobbles and small side-scrapers made from thin flakes. The former comprise about 70 percent of the overall scraper assemblage with flake side-scrapers the remaining 30 percent. Overall, 57 percent of all scrapers are made from chert but this total is heavily affected by the smaller flake side-scrapers which are almost completely made from chert (83 percent). In fact, it is difficult to find a flake of high quality chert in a Carrollton phase site that has not been subsequently reworked and utilized as a cutting/scraping tool, graver, or some other expedient tool. This observation is supported even more by artifacts from Southeast Texas. A total of 63 flake side-scrapers and worked flakes have been recovered from the Wood Springs site, all of which are made from non-local chert. Figure 56 illustrates examples of various types of scrapers from the Upper Trinity watershed.

Another diagnostic component of the Carrollton phase lithic assemblage are Clear Fork gouges. A total of 91 are present in the collections from the Upper Trinity watershed and another 9 from the Wood Springs and Moss Hill sites. Clear Fork tools or "gouges" were originally described by Ray (1941) from the Clear Fork area of the Brazos River in North Texas. They have been found associated with Paleoindian and Early Archaic sites across much of Central and South Texas. Clear Fork tools are sub-triangular in shape and plano-convex in cross-section. The wide end of the tool is the bit edge. The edge angle of the bit is often very steep, typically in the range of 60-75 degrees. Microscopic examination of the bit edge under high power (60-80x) typically shows edge crushing and striations perpendicular to the bit edge, both of which are indicators of the tool having been used to scrape hard substances such as bone or wood (Keeley 1980). Hudler (1997) conducted an in-depth study of the

Figure 55. Large bifaces from Long King Creek, Liberty County.

Figure 56. Scrapers of various types from Carrollton phase sites in the Upper Trinity watershed. Top Row L-to-R: Wheeler, Dowdy Ferry (n=2), Wheeler, Carrollton Dam, Frognot. Bottom Row L-to-R: Wheeler, Wood Pit, Lake Dallas, Wheeler.

wear patterns on a large number of Clear Fork tools and concluded that they were indeed used as a woodworking tool in the form of an adze. Therefore, they should probably be referred to as Clear Fork adzes to better describe their true function (Elton R. Prewitt, personal communication, 2019).

A total of 91 Clear Fork gouges were recorded from Carrollton Archaic sites in the Upper Trinity watershed (Table 35). An additional 9 tools are in the collections from the Wood Springs and Moss Hill sites in Liberty County. Clear Fork gouges vary in dimensions based on use and reworking; however they tend to maintain a fairly consistent maximum length-to-width ratio of about 1.50-1.75 to 1. All of the gouges are unifacial (plano-convex) with a bit edge angle of between 60-75 degrees (average 67 degrees). The preferred lithic material used to construct these tools in the Upper Trinity watershed is overwhelmingly quartzite (92 percent), with only one gouge made from chert, five from silicified wood, and one from bull quartz. However, in Southeast Texas, while all nine Clear Fork gouges are unifacial, all are made from Edwards chert and not from local quartzite or silicified wood. Tools from both areas show edge crushing and striations perpendicular to the bit edge indicating that they were both likely used in woodworking. It is unknown why the Clear Fork tools in the Upper Trinity are almost exclusively made from local quartzite while those from Southeast Texas are constructed from chert. Examples from Carrollton phase sites from both areas are shown in Figures 57 and 58.

Waco sinkers were originally described by Watt (1938) from a site near Waco, Texas, thereby giving the name to these enigmatic artifacts. Over the years, a number of uses have been proposed for these tools with the most popular being as net sinkers, bolas stones, or atlatl weights. They are almost universally constructed from ovoid quartzite river cobbles, some of which only have two simple "v"-shaped notches cut into each end. Others have clearly undergone extensive preparation with most, if not all, of the outer cobble cortex pecked away before constructing the two v-shaped end notches.

Table 35. Clear Fork Gouge Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood/ Other	Total
Denton County				
Lake Dallas (41DN6)	0	7	0	7
Irish Farm (41DN62)	0	24	0	24
Dallas County				
Carrollton Dam (41DL12)	0	4	1[2]	5
Wheeler (41DL30)	0	8	0	8
Wood Pit (41Dl76)	0	2	0	2
Obshner (41DL116)	0	10	0	10
Dowdy Ferry (41DL332)	0	3	1[1]	4
Post Oak (41DL429)	0	2	0	2
Kaufman County				
Kings Creek	0	2	0	2
City of Kaufman (41KF24)	0	7	1[1]	8
Miklas (41KF59)	0	7	3[1]	10
Collin County				
Frognot (41COL165)	1	3	0	4
Upper Farmersville North (41COL166)	0	2	0	2
Crump (Un-numbered)	0	3	0	3
Total	1 (1%)	84 (92%)	6 (7%)	91

[1] *Silicified Wood (5).*

[2] *Quartz (1).*

Figure 57. Clear Fork gouges from Carrollton phase sites in the Upper Trinity watershed.
Top Row L-to-R: Frognot, Dowdy Ferry, Wheeler, Upper Farmersville North.
Bottom Row L-to-R: Lake Dallas, Wheeler (n=3).

Figure 58. Clear Fork gouges from the Wood Springs site, Liberty County.

A total of 144 Waco sinkers have been reported from the 18 major sites in the Upper Trinity watershed with an additional 97 from lesser sites (Table 36). Five Waco sinkers have been recovered from the Wood Springs site and another two from Moss Hill in Liberty County. Most sites feature a handful of these tools but a few locations, notably Lake Dallas (41DN6) in Denton County (n=33), Terrell (41KF11) (n=28) and City of Kaufman (41KF24) (n=73) in Kaufman County, have very high totals; so much so that these three sites represent almost 60 percent of all the Waco sinkers found in the Upper Trinity. Moreover, with the exception of Lake Dallas, which is located on a main part of the Elm Fork, the other two sites are adjacent to very minor tributaries of the Trinity River. Waco sinkers are present at virtually every Carrollton Archaic site, regardless of location and regardless of the size of the nearest body of water. Thus their use as "net sinkers" remains extremely problematical and their use as some type of bolas stone is probably supported. It should be noted that Waco sinkers are restricted to the Early Archaic. No Elam phase site in the region has ever reported a single Waco sinker in direct association with Late Archaic

material. Examples of Waco sinkers from both the Upper Trinity watershed and from Liberty County are shown in Figures 56 and 57.

Another distinctive Carrollton phase lithic artifact is the so-called "Carrollton double-bitted axe" (Harris 1941; Crook and Harris 1953, 1954b). The artifacts are almost exclusively made from large ovoid quartzite cobbles (98 percent); only one example from the Dowdy Ferry site was made of a different material (heavily silicified sandstone). Crook and Harris (1954) noted that they were typically made from gray-colored quartzite but the author has observed that an equally high percentage are made from a yellow-orange to yellow-brown quartzite

Table 36. Waco Sinker Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Petrified Wood	Total
Denton County				
Lake Dallas (41DN6)	0	33	0	33
Irish Farm (41DN62)	0	1	0	1
Dallas County				
Carrollton Dam (41DL12)	0	1	0	1
Wheeler (41DL30)	0	4	0	4
41DL57	0	1	0	1
Wood Pit (41DL76)	0	2	0	2
Obshner (41DL116)	0	2	0	2
Broken Leg (41DL313)	0	3	0	3
41DL314	0	4	0	4
41DL327	0	1	0	1
Dowdy Ferry (41DL332)	0	3	1[1]	1
Kaufman County				
Boyt Kidd (41KF5)	0	1	0	1
Terrell (41KF11)	0	28	0	28
Blaine (41KF12)	0	5	0	5
41KF15	0	4	0	4
41KF16	0	2	0	2
41KF17	0	2	0	2
41KF18	0	1	0	1
41KF20	0	4	0	4
41KF21	0	1	0	1
41KF22	0	3	0	3
Kings Creek (41KF23)	0	8	0	8
City of Kaufman (41FK24)	0	73	0	73
41KF30	0	2	0	2
41KF33	0	2	0	2
41KF37	0	2	0	2
West Bachelor Creek (41KF48)	0	1	0	1
Bachelor Creek (41KF50)	0	2	0	2
McLawn (41KF53)	0	13	0	13
41KF55	0	3	0	3
41KF56	0	2	0	2

Table 36. Waco Sinker Distribution – Upper Trinity Watershed. (continued)

County / Site	Chert	Quartzite	Petrified Wood	Total
Kaufman County (continued)	0	2	0	2
Edwards (41KF57)	0	3	0	3
Miklas (41KF59)	0	7	0	7
41KF92	0	1	0	1
41KF100	0	1	0	1
41KF110	0	2	0	2
Harris 27B5-4	0	3	0	3
Collin County				
Frognot (41COL165)	0	1	0	1
Upper Farmersville North (41COL166)	0	3	0	3
Crump (Un-numbered)	0	1	0	1
Tarrant County				
Sinker Site (41TR30)	0	3	0	3
41TR56	0	2	0	2
Total: 38 sites	0	240 (99%)	1 (1%)	241

[1] *Quartz (1).*

Figure 59. Waco sinkers from Carrollton Archaic sites in the Upper Trinity watershed.
Top Row L-to-R: Upper Farmersville North, Carrollton Dam, Wheeler.
Bottom Row L-to-R: Lake Dallas, Frognot, Upper Farmersville North, Wheeler.

Figure 60. Waco sinkers from the Wood Springs site, Liberty County.

which might indicate that the cobble had been heat-treated prior to knapping. The cobbles are crudely shaped by percussion flaking to create a chopper/axe-like bit on one end and a blunter hammer-like bit on the opposite end. Two notches are then made near the middle of the artifact presumably for hafting. Frequently the outer cortex of the original cobble is left on one or more faces of the artifact. Size ranges from about 90-120 mm in length by 65-75 mm maximum width and 40-55 mm in width at the notches. The dimensions are probably limited more by the size of available river cobbles than by functional requirements. Examination of both the bit and hammer ends under high power (40-80x) shows extensive edge crushing and step fractures, both indicative of use on hard substances such as bone or wood (Keeley 1980). There has been some confusion in the literature as to the age of the Carrollton axe. As such, a complete artifact description appears in the Appendix.

A total of 51 Carrollton axes have been recorded from the Upper Trinity watershed and a single axe from the Wood Springs site in Liberty County (Table 37). With the exception of the Miklas site in Kaufman County which had 10 specimens, Carrollton axes tend to be found mostly in the larger Carrollton Archaic sites and then only one to three artifacts per site. Examples of the artifact are shown in Figures 61-65.

Other lithic artifacts in Carrollton phase sites include cores (n=14), gravers (n=46), perforators (n=20), burins (n=6), hammerstones (n=40), choppers (n=17), and a single quartz crystal found during the excavation of the Obshner site. Of these, cores, burins, hammerstones, and choppers are probably undercounted as many early researchers in the area probably failed to recognize them as artifacts and simply did not recover or record them. Those hammerstones present in the collections are exclusively made from fist-size, ovoid cobbles of quartzite.

Figure 61. Carrollton axe from the Lake Dallas site, Denton County. (Wilson W. Crook, Jr. photo).

Figure 62. Carrollton axe from the Cottonwood (41DL235) site, Dallas County. (Wilson W. Crook, Jr. photo).

Table 37. Carrollton Axe Distribution – Upper Trinity Watershed.

County / Site	Chert	Quartzite	Silicified Wood/ Other	Total
Denton County				
Lake Dallas (41DN6)	0	3	0	3
Dallas County				
Denton Tap Road (41DL11)	0	1	0	1
Carrollton Dam (41DL12)	0	1	0	1
41DL14	0	1	0	1
41DL22	0	1	0	1
Wheeler (41DL30)	0	2	0	2
41DL74	0	1	0	1
Wood Pit (41DL76)	0	3	0	3
41DL81	0	1	0	1
Obshner (41DL116)	0	5	0	5
Hutchins (41DL140)	0	2	0	2
41DL172	0	1	0	1
Melaun (41DL177)	0	1	0	1
Cottonwood (41DL235)	0	4	0	4
Dowdy Ferry (41DL332)	0	1	1[1]	2
Kaufman County				
Blaine (41KF12)	0	1	0	1
Kings Creek (41KF23)	0	1	0	1
City of Kaufman (41FK24)	0	2	0	2
McLawn (41KF53)	0	1	0	1
41KF55	0	2	0	2
Edwards (41KF57)	0	3	0	3
Miklas (41KF59)	0	10	0	10
Harris 27B5-4	0	2	0	2
Total: 23 sites	0 (0%)	50 (98%)	1 (2%)	51

[1] *Silicified sandstone (1).*

Figure 63. Carrollton axe from the Miklas site, Kaufman County.(Wilson W. Crook, Jr. photo).

Figure 64. Obverse face of the Carrollton axe from the Wood Springs site, Liberty County.

Figure 65. Reverse face of the Carrollton axe from the Wood Springs site, Liberty County. Note the presence of original cobble cortex on this face.

They typically display significant battering, usually at both ends of the cobble (Figure 66). Choppers are similarly made exclusively from quartzite cobbles and typically retain the exterior cobble cortex on one end with a crude chopping bit formed by percussion flaking on the opposite end (Figure 67).

Two types of gravers have been observed, both predominantly made on chert flakes. One type has a simple point or multiple points made on one or more edges of a flake (Figure 68). As mentioned above, it is rare to find a flake of high quality chert that has not been further purposed into a tool, the most common being gravers and flake side-scrapers. The other type of graver found in Carrollton phase sites is what Crook and Harris (1954) described as a “beaked” graver. These artifacts are made from thicker, curved flakes that typically have a triangular or pyramidal cross-section. The additional thickness coupled with the observed wear seen on many of the graver

Figure 66. Carrollton phase hammerstones from the Upper Trinity watershed. L-to-R: Lake Dallas, Wheeler, Dowdy Ferry.

Figure 67. Crude chopper made from a quartzite cobble, Dowdy Ferry site, Dallas County.

points suggest these beaked gravers were used for deeper incising than could be accomplished using a pointed flake graver.

Purposefully made perforators (“drills”) do not occur in Carrollton Archaic sites as they do in later Archaic and Late Prehistoric sites in the Upper Trinity watershed. However, broken projectile points were sometimes re-purposed into hafted perforators (Figure 69). This observation is borne out by the high percentage of perforators being made from chert (85 percent) which corresponds to the high percentage of projectile points (74 percent) which are also made from chert. It also underscores the observation that all tools and flakes of high quality chert were used and re-used until the point of exhaustion and final discard.

The most prolific non-lithic artifact found in Carrollton Archaic sites, both in the Upper Trinity watershed and in Southeast Texas, is clayballs. Fired clayballs have long been recognized as a consistent cultural trait item in sites ranging from Paleoamerican to Late Prehistoric age in Texas (Patterson, 1996). Some of these sites have produced such large numbers that clayballs are by far the single most abundant artifact, even more plentiful that all types of lithic debitage. Aten (1967) recovered approximately 11,000 clayballs at the Jamison site (41LB2) in Liberty County. Patterson (1980) noted 1,144 clayballs at the Owen site (41HR315) in Harris County. A total of 4,397 clayballs were recovered from excavations at site 41WH19 in Wharton County (Patterson and Hudgins, 1983) and nearly 29,000 were recovered from the partial excavation of the Joe Davis site (41FB223) in Fort Bend County (Patterson et al. 1994). In fact, Patterson estimated that the Joe Davis site probably contained as much as several hundred thousand fired clayballs.

In their original characterization of the Carrollton phase Archaic, Crook and Harris (1952, 1954) observed that sites which contained a Late Paleoindian to Middle Archaic component along the Upper Trinity River watershed consistently produced what they termed as "clay blobs". They further noted that these artifacts were stratigraphically

Figure 68. Multi-point flake graver from the Moss Hill site, Liberty County.

Figure 69. Perforator repurposed from a projectile point, Lake Dallas site, Denton County.

restricted, being completely absent in all sites (or horizons in the case of multi-component occupations) containing Late Archaic to Late Prehistoric material.

Fired clayballs in the Upper Trinity watershed occur as apparently purposefully made, spheroid to oval-shaped objects. Size ranges from 15-20 mm to as much as 100 mm in diameter, with the overwhelming majority being in excess of 40 mm (Crook 2009b). No evidence has been found of wattle or finger impressions. They are universally composed of a reddish sandy clay which is compositionally indistinguishable from the sandy clays of the Albritton Formation of the T-1 terrace along the main stem and Elm and West Forks of the Trinity River. The only discernable difference between the clayballs and the Albritton is that the clayballs typically have turned a slightly darker red-brown from apparent exposure to heat (Crook 2009b).

Cross-sections of the clayballs from multiple sites show a similar pattern, with reddish-brown exterior surfaces and dark gray to black cores. In fact, many of the centermost part of the balls are such a vitreous black color that they have the visible characteristics of charcoal (Crook 2009b). The firing process appears to have acted as a consolidating and preserving agent, hardening the clayballs in much the same manner as crudely made pottery.

As mentioned above, Patterson (1986, 1989) has recorded the presence of abundant clayballs in a number of Late Paleoindian to Early Archaic sites in Southeast Texas. He postulated that they were used for seasonal specialized food processing and/or heat-treating siliceous lithic material. Hudgins (1993) has demonstrated experimentally that clayballs retain heat significantly longer than wood coals and can be effectively used to roast plant food materials or meat without the need for ceramics.

Burned rock middens have been reported from Late Archaic sites in the region (Lorrain 1984; Lorrain and Lorrain, 2001) but they are not common. Likewise, hearths or extensive accumulations of clay balls are also not reported from the Upper Trinity watershed. Again this may be because so many Archaic sites along the Trinity River have been discovered due to commercial gravel operations, which by their very nature destroys subtle features such as hearths and middens. However, were clayballs to have been as extensively used as in those sites reported by Patterson (1986; 1989) from Southeast Texas, their abundance would likely have been reported by previous researchers. It is without a doubt that the numbers of clayballs present in Upper Trinity watershed sites are greater than those shown here (see Table 25) as Crook and Harris and other members of the Dallas Archeological Society only collected representative examples of these artifacts (Wilson W. Crook, Jr., personal communication, 1994). However, they were never found to be as abundant as in those sites in Southeast Texas excavated by Patterson and members of the Houston Archeological Society.

It is significant to note that every known location for clayballs in the Upper Trinity watershed is not only an Archaic site, but one which has a predominant Early to Middle Archaic (Carrollton phase) component. Sites which are primarily Late Archaic in age, such as the upper parts of the Wood Pit (41DL76) and Milton Pit (41Dl259), do not contain clayballs. Likewise, the Late Archaic sites to the East of the Trinity drainage in eastern Kaufman, Collin, and Hunt counties also do not contain clayballs. Late Prehistoric sites along the East Fork have abundant hearths and fire-cracked rock but no clayballs (Crook and Hughston 2015). In fact, the only sites along the East Fork where clayballs have been found are those which are limited to an Early to Middle Archaic Carrollton phase component (Crook, 2007b, 2007c).

Moreover, sites in the region which are known to be exclusively Early Paleoindian in age, such as Aubrey (41DN479), Brushy Creek (41HU74), and Lewisville (41DN72), also do not contain clayballs. This is especially noteworthy for Lewisville where a number of well-defined hearths were thoroughly excavated by the same researchers making the observations for clayballs in later Archaic sites (Crook and Harris 1957). Thus clayball use in the Upper Trinity watershed appears to be restricted to the Late Paleoindian to Early-Middle Archaic. Prikryl (1990) postulated dates of 8500-6000 B.P. for the Early Archaic of the Upper Trinity and 6000-3000 B.P. for the Middle Archaic. Crook (1959) obtained one age date for the upper part of the Carrollton phase Archaic at the Wood Pit (41DL76) of 5945 ± 200 B.P. supporting this chronology. Thus clayball technology in the Upper Trinity would generally represent the period of 8500 to about 5000 B.P.

It is unknown why this time restriction appears to occur. Generally, Early to Middle Archaic populations are believed to have been more mobile with later peoples becoming more sedentary with time as populations increased (Prikryl 1990). The time required to collect, gather and construct stone hearths is considerably greater than that required to make clayballs. Perhaps as Archaic populations in the Upper Trinity region increased and became less mobile, a shift toward burned rock hearths/middens occurred. This would explain the abandonment of clayball technology as well as its use by earlier Archaic people.

Clayballs have also been found at the Wood Springs (n=12) and Moss Hill (n=68) sites in Liberty County. It is unknown if the late Andy Kyle collected every clayball present at the sites or only a representative example. Figures 70 and 71 show clayballs from the Upper Trinity watershed and from the Wood Springs site in Liberty County.

Due to the acidic nature of the soils, especially the sandy clays of the Albritton Formation, no bone or wood tools have ever been recovered from any Carrollton phase site in the Upper Trinity watershed. Likewise, bone preservation is very poor in Southeast Texas and the only bone tools found have been associated with recent (Late Prehistoric) age sites.

Figure 70. Clayballs from the Carrollton Dam site, Dallas County.

Figure 71. Clayballs from the Wood Springs site, Liberty County.

Stratigraphic Provenience of Artifacts

A limited number of controlled excavations have taken place on Carrollton phase Archaic sites in the Upper Trinity watershed. These include an excavation at Lake Dallas (41DN6) conducted by Wilson Crook, Jr. and Jack Harkey in 1952, the excavation at the Obshner (41DL116) site conducted in 1954 by members of the Dallas Archeological Society, and two limited excavations conducted by the author at the Dowdy Ferry (41DL332) and Post Oak (41DL429) sites in 1973-74. In addition, limited stratigraphic work was conducted at Carrollton Dam (41DL12) by both Wilson Crook, Jr. and the author, and at the Wheeler (41DL30) site by Wilson Crook, Jr. The results of these excavations were either not published and/or were summarized in later publications (Crook and Harris 1952, 1954, 1955; Crook 2007a, 2008b). This section collates all the known stratigraphic information by site in table form and demonstrates a remarkable consistency of results across the entire Upper Trinity watershed that has hitherto never been collectively presented.

Lake Dallas (41DN6)

After their initial meeting in 1952 to compare the Archaic artifact assemblages between the Lake Dallas and Wheeler sites, Crook decided to visit the Lake Dallas site to observe its stratigraphy and determine if correlations could be made between the two sites. After looking at the stratigraphy exposed in the north-south gulleys that traversed the site, Crook, along with fellow Dallas Archeological Society member Jack Harkey, laid out a 14

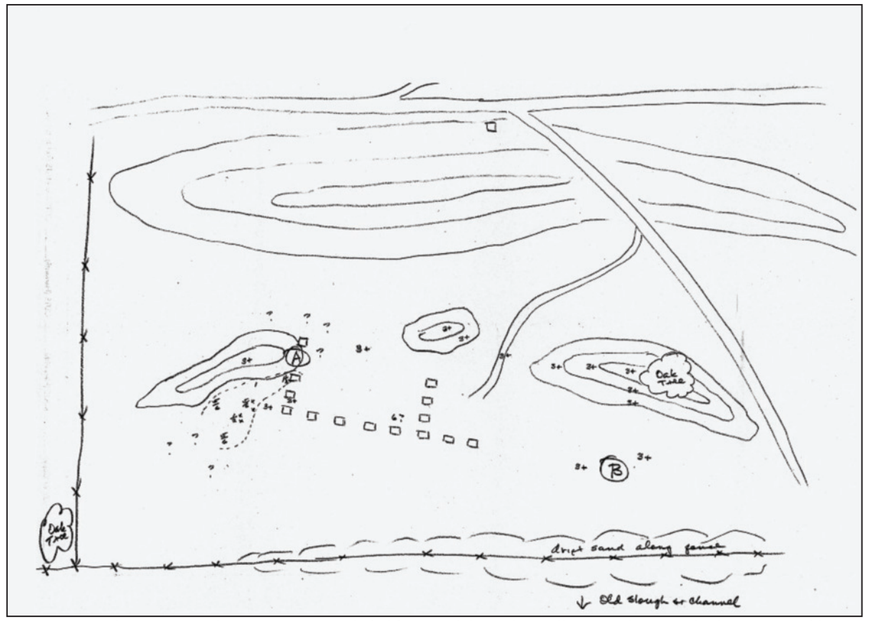


Figure 72. Wilson W. Crook, Jr.'s 1952 rough field map of the Lake Dallas site showing the location and layout of his 14 unit square excavation grid. The old channel of the Trinity is to the bottom and the current Elm Fork channel is above the top of the figure. (Wilson W. Crook, Jr. Field Notes).

square grid of 1.5 by 1.5 meter units across the site. The units were arranged in a single north-south line of eight squares with two lines of three additional squares each at right angles to the main line in the direction of the Elm Fork (Figure 72). Each unit was taken down from the surface to a depth of approximately 60 cm into the underlying Albritton Formation. The objectives of the excavation were (1) to confirm that the overlying Pattillo sand had indeed been disturbed by cultivation and intact stratigraphy was no longer present, at least to the depth of the plow zone, (2) to see if Carrollton artifacts occurred at the contact between the Pattillo and Albritton as had been seen at the Wheeler site, and (3) to test if there was any cultural material within the Albritton Formation, as again had been observed at the Wheeler site 16 km to the south.

The collective results of these excavations showed that the Pattillo had an average depth of 20-25 cm across the site and had been highly disturbed due to the action of both cultivation of peanuts on the property as well as bioturbation through the action of gophers. The only artifacts found in the Pattillo were either Late Archaic dart points (Gary, Kent) or Late Prehistoric arrow points and pottery.

The underlying Albritton Formation appeared to be undisturbed by the action of either cultivation or bioturbation. A single Dallas point was found in one unit essentially at the contact between the Pattillo and the Albritton. The Albritton continued to at least a depth of 60 cm in all units; none of the units contained any of the pea gravel that characterizes the base of the formation. A Trinity dart point was found at a depth of 20 cm in one unit and a Carrollton point was found at the same depth in another square. A second Carrollton point was found at 50 cm into the Albritton in a different unit. A broken scraper made from a pink-colored chert was found at the base (60 cm) in one unit. These findings are summarized in Table 38 and correspond almost exactly with similar finds made by Crook at the Wheeler site. None of this data was published but is present in Wilson W. Crook, Jr.'s field notes which are in the possession of the author. Only the major artifacts were recorded; Crook's notes mention finding debitage but specific numbers and depths were not recorded.

Table 38. Artifact recovery by stratigraphic level, Lake Dallas (41DN6) site, Denton County, Texas (1952). Excavation Levels in 10 cm Intervals

Depth (cm)	Dart Point	Biface	Scraper	Clear Fork Gouge	Waco Sinker	Other	Total
Surface Pattillo 0-10	3[1]	0	0	0	0	4[2]	7
10-20	1[3]	0	0	0	0	2[2]	3
Pattillo-Albritton Contact	1[4]	0	0	0	0	0	1
0-10	0	0	0	0	0	0	0
10-20	0	0	0	0	0	0	0
20-30	2[5]	0	0	0	0	0	2
30-40	1[6]	0	0	0	0	0	1
40-50	0	0	0	0	0	0	0
50-60	0	0	1[7]	0	0	0	1
Total	8	0	1	0	0	6	15

[1] *Arrow points (Alba, Catahoula), Kent dart point.*

[2] *Pottery (plain shell-tempered).*

[3] *Gary point.*

[4] *Dallas point.*

[5] *Carrolton, Trinity points.*

[6] *Carrollton point.*

[7] *Scraper made from pink-colored chert.*

Carrollton Dam (41DL12)

Crook carried out a limited excavation of a hearth structure exposed in the bank of the Elm Fork at the Carrollton Dam site in 1952 (see Figure 19). The hearth consisted mainly of cobbles, fire-cracked rock, and small flecks of charcoal. The Albritton Formation in which the hearth occurred was darkened by the fire. Crook's field notes mention that a Trinity point was found at 15 cm into the Albritton above the hearth, a broken Carrollton point was found near the hearth at a depth of 38 cm within the Albritton, and a single broken biface was found below the hearth at a depth of approximately 76 cm.

Wheeler (41DL30)

The only excavations conducted at the Wheeler site were to remove the human cranium described above and a few units cut back into the walls of the gravel pits. While limited in scope, Crook was meticulous in his field notes to record the occurrence of every artifact, including whether it had been found in situ in the pit wall, on the slopes of a gulley having washed down from above, or at the base of the pit completely out of place stratigraphically. Moreover, artifacts that had been found out of place but still retained remnants of soil, notably the Albritton sandy clay, were also recorded in his notes.

Crook found that artifacts belonging to the Late Archaic, which were considerably less in number at the Wheeler site, were found in the upper 10-20 cm of the Pattillo. Below this, a sterile zone existed for 100+ cm. No artifacts from any time period occurred in this horizon. Artifacts from the Carrollton phase Archaic occurred in the lower 15 cm of the Pattillo and then well into the underlying Albritton Formation. Dallas and Bulverde points were restricted to the lower Pattillo; Carrollton, Trinity, Wheeler Leaf, and Calf Creek Horizon points (Andice, Bell) occurred in the lower Pattillo, at the Pattillo-Albritton contact, as well as deep within the Albritton. Split Stem points and Paleoindian points occurred in the lowermost part of the artifact horizon although Carrollton points were occasionally found in association with Split Stem points. The deepest artifact recovered from the site was a reworked Plainview point at 175 cm below the surface, well below any of the Archaic artifacts. No artifacts were found below a depth of 175 cm below the surface (the base of the Albritton at Wheeler averaged about 240 cm below the surface at the Wheeler site). Other associated artifacts in the lower Pattillo to Upper Albritton Carrolton phase zone included ovoid and square-based bifaces, scrapers of several types, Clear Fork gouges, Waco sinkers, Carrolton axes, gravers, perforators made from projectile points, hammerstones, choppers, and clayballs (Wilson W. Crook, Jr. Field Notes).

Obshner (41DL116)

The discovery of the Obshner site and the realization that it was a single component Carrollton phase site, led to its excavation by members of the Dallas Archeological Society in the summer of 1954. Crook and Harris summarized the results of this work in their publication on the site in 1955. Unfortunately, the author could not locate any of the field notes from these excavations except those recorded in Crook's field notes which only contain a collective summary of the results from all 14 units and not a specific unit by unit, level by level tabulation. This summation is shown in Table 39 below.

According to Crook's notes, a total of 63 artifacts were recovered during the time the Dallas Archeological Society was working at the site, 28 of these were found out of stratigraphic context in the gulleys exposed by gravel operations at the site but 35 artifacts were found in situ through controlled excavation. This constitutes one of the best pieces of stratigraphic data for the Upper Trinity watershed because the unit squares did not have to go through but a token amount of the Pattillo sand before entering the Albritton Formation. While most of the Pattillo was absent at Obshner, the lower few centimeters was still in place as the base of this unit commonly contains small nodules of caliche which helped to consolidate the sand.

As can be seen in Table 39, artifacts were found starting at 2 cm below the surface (essentially at the Pattillo-Albritton contact) down to a depth of nearly 70 cm. The Albritton terminated variably between 70-90 cm across the site. Carrollton and Trinity points were found at a depth of 20 cm into the Albritton; Split Stem and Trinity points were found at 30-40 cm; and a Trinity point as well as a Scottsbluff point were recovered at a depth of 50-60 cm. Associated lithic artifacts found throughout the section included ovoid bifaces, scrapers, Clear Fork gouges, Waco sinkers, a single Carrollton axe, and cores. A hearth feature with fire-cracked rock and small pieces of charcoal was found at 50-60 cm. These results are identical to those seen at Lake Dallas, Carrolton Dam, and Wheeler described above.

Table 39. Artifact recovery by stratigraphic level, Obshner (41DL116) site, Dallas County, Texas (1954). Excavation Levels in 10 cm Intervals

Depth into Albritton (cm)	Dart Point	Biface	Scraper	Clear Fork Gouge	Waco Sinker	Other	Total
Surface	0	0	0	0	0	0	0
10/1/2000	0	0	0	1	0	1[3]	2
10/20/2020	0	1	1	2	0	2[1]	6
20-30	2*	1	1	1	1	2[1]	8
30-40	6*	0	0	1	0	2[1]	9
40-50	1*	0	0	1	0	1[1]	3
50-60	3*	0	0	0	0	2[1,2]	5
60-70	0	1	0	0	0	1[2]	2
70-90	0	0	0	0	0	0	0
Total	12	3	2	6	1	11	35

[1] *Core.*

[2] *Hearth with fire-cracked rocks.*

[3] *Carrollton axe.*

** Projectile points types; 20-30 cm (Carrollton, Trinity), 30-40 cm (Split Stem, Trinity, Unidentified-4), 40-50 cm (Unidentified), 50-60 cm (Scottsbluff, Trinity-2).*

Dowdy Ferry (41DL332)

As recounted above, the author found the Dowdy Ferry site in southeastern Dallas County to have been largely abandoned by the early 1970s. The gravel operations had greatly expanded since the 1950s resulting in connecting a number of small pits into a single, large L-shaped pit. Sharp walls were present on the southeastern side of the pit which provided an excellent area to map the stratigraphy of the T-1 terrace present at the site. The author gained permission to map the stratigraphy exposed in the pit and to conduct a limited excavation back into the pit walls. In this regard, three areas were selected in the southeast corner of the pit. Excavations were not conducted vertically from the surface down as in a conventional excavation but laterally into the exposed wall cut. The focus was to obtain as many artifacts as possible that were clearly seen as being in situ in the area of the Carrollton Archaic occupation. As a result, the excavation concentrated on the lower 20 cm of the Pattillo sand, the contact between the Pattillo and the Albritton, and the Albritton from its surface until no further artifacts were observed. A summary of the three units is presented in Table 40 below.

As can be seen in Table 40, a total of 38 artifacts were found in situ starting at 15 cm above the base of the Pattillo through a depth of 66 cm into the Albritton. No cultural material was found below 66 cm in the Albritton Formation. Artifacts recovered from the base of the Pattillo included Carrollton, Trinity, Wheeler Leaf, a broken Bell point, Bulverde, and Dallas points as well as an ovoid biface, five scrapers, a Clear Fork gouge, and a heavily used hammerstone. At the level of the Pattillo-Albritton contact, a Carrollton point and a Wheeler leaf point were recovered. Beginning at the top of the Albritton to a depth of 50 cm, a number of diagnostic Carrollton phase artifacts were recovered including Split Stem, Carrollton, Trinity, and Bell points, bifaces (n=2), scrapers (n=3), a single Waco sinker, gravers (n=3), and hammerstones (n=2). At 45-50 cm, a single Split Stem point was found in near association with a broken Angostura point. Below 50 cm, only Paleoindian artifacts were found including two San Patrice and a Pelican point at 50-60 cm, and a single reworked Dalton point at 66 cm.

The results of the excavations conducted at the Dowdy Ferry site reinforce the observations made at other Carrollton Archaic sites. Carrollton phase material is found from the base of the Pattillo to a considerable depth within the Albritton Formation. The projectile point assemblage consists of Split Stem, Carrollton, Trinity, Wheeler Leaf, Calf Creek Horizon (Bell), Bulverde, and Dallas points – the latter two only found above the top of the Albritton sandy clay. Associated lithic artifacts consisting of ovoid bifaces, large scrapers, Clear Fork gouges, Waco sinkers, gravers, and hammerstones are consistent with all other Carrollton Archaic sites in the Upper Trinity

watershed. The occurrence of late Paleoindian projectile points (Angostura) with Early Archaic points is also consistent with observations made at Lake Dallas, Wheeler, Obshner, Post Oak, and other sites. An earlier Paleoindian horizon containing San Patrice, Pelican, and Dalton points predates the Early Archaic. This matches the occurrence of the reworked Plainview point at Wheeler which was found below all other cultural materials at the site.

Table 40. Artifact recovery by stratigraphic level, Dowdy Ferry (41DL332) site, Dallas County, Texas (1973-74). Excavation Levels in 10 cm Intervals

Depth (cm)	Dart Point	Biface	Scraper	Clear Fork Gouge	Waco Sinker	Other	Total
Lower Pattillo 20-10	3*	0	3	0	0	0	6
10-0	3*	1	2	1	0	1[1]	8
Pattillo-Albritton Contact	2*	0	0	0	0	0	2
0-10	3*	1	1	0	1	2[2]	8
10-20	0	1	0	0	0	1[2]	2
20-30	1*	0	1	0	0	1[1]	3
30-40	1*	0	0	0	0	0	1
40-50	2*	0	1	0	0	0	3
50-60	3*	0	0	0	0	1[1]	4
60-70	1*	0	0	0	0	0	1
70-80	0	0	0	0	0	0	0
Total	19	3	8	1	1	6	38

[1] *Hammerstone.*

[2] *Graver.*

** Projectile points types; 20-10 cm Lower Pattillo (Andice, Dallas, Bulverde), 10-0 cm Lower Pattillo (Carrollton, Trinity, Wheeler Leaf), Pattillo-Albritton Contact (Carrollton, Wheeler Leaf), 0-10 cm (Trinity, Bell, Unidentified), 20-30 cm (Split Stem), 30-40 cm (Carrollton), 40-50 cm (Split Stem, Angostura), 50-60 cm (San Patrice, San Patrice, Pelican), 60-70 cm (Dalton).*

Post Oak (41DL429)

The excavation carried out at the Post Oak site was both ad hoc and limited in scope due to the nature of the discovery. During January, 1973, the author was exploring gravel pit exposures on the southern side of the Trinity River in southeastern Dallas County. At the corner of Post Oak and Fulghum Roads, a work crew was in the process of backfilling a small gravel pit. I stopped my car and asked the workers if I could take a look at the stratigraphy exposed in the pit. The foreman told me they would be quitting soon for the weekend and I could have Saturday and Sunday to explore the pit. After that, it would be filled-in, levelled, and a new house constructed on top of it. A quick look at the pit walls showed several Archaic projectile points exposed plus other artifacts loose on the pit floor. I collected the loose artifacts from the pit floor and returned to the site at sunrise the next morning and worked feverishly over the next two days to conduct a hurried salvage excavation of the site. As was the case at Dowdy Ferry described above, I did not open traditional vertical units but rather worked back into the pit walls, again focusing on the Carrollton phase artifact horizon. The results of this work are tabulated in Table 41.

Of the 32 Carrollton phase artifacts recovered from the Post Oak site, 27 were found in situ in the pit walls. At Post Oak, almost all of the artifacts were concentrated in the lower 10 cm of the Pattillo sand and at the Pattillo-Albritton contact. Artifacts recovered included Split Stem, Early Triangular, Trinity, and Wheeler Leaf points plus a large number of broken points (n=10) (mainly distal ends and mid-sections) which could not be

Table 41. Artifact recovery by stratigraphic level, Post Oak (41DL429) site, Dallas County, Texas (1973). Excavation Levels in 10 cm Intervals

Depth (cm)	Dart Point	Biface	Scraper	Clear Fork Gouge	Waco Sinker	Other	Total
Lower Pattillo 10-0	17[1]	0	4	2	0	0	23
Pattillo-Albritton Contact	1[2]	0	0	0	0	0	1
0-10	1[2]	0	0	0	0	0	1
10-20	2[3]	0	0	0	0	0	2
Total	21	0	4	2	0	0	27

[1] *Split Stem (1), Trinity (2), Dallas (1), Wheeler Leaf (3), Unidentified (10).*

[2] *Early Triangular (2).*

[3] *Angostura (12 cm), Early Stemmed (20 cm).*

typed. Associated artifacts included scrapers (n=4) and Clear Fork gouges (n=2). Only three artifacts were found below the Pattillo-Albritton contact which included an Early Triangular point at 8 cm, an Angostura point at 12 cm, and an Early Stemmed (Wilson) point at 20 cm.

The results were a little different that those observed elsewhere in the Upper Trinity watershed in that no Carrollton points were recovered from the Post Oak site coupled with the fact that none of the diagnostic Carrollton phase projectile point types were found below the base of the Pattillo. However, this is more likely the result of the very limited (and hurried) excavations which took place as only two sides of the pit remained exposed and not covered with fill material. Moreover, the overall size of the pit was relatively small (10 x 10 meters) which offered a limited subsurface exposure. A more detailed and lengthy excavation would likely have uncovered many more artifacts and gained additional stratigraphic information. A return visit to the site during the summer of 1973 showed the workmen had been good on their information; the pit was completely filled-in and levelled and new house construction was underway almost on top of where the site had been located.

In looking at the excavation results from the above sites, several patterns emerge. First, despite some sites having been in areas of gravel pit operation and/or cultivation, a number of undisturbed sections were excavated, notably within the Albritton Formation. These include the work conducted at the Lake Dallas, Obshner, Dowdy Ferry, and Post Oak sites. Vertisol cracking was noted at nearly all of the sites but was only observed in the upper 10-20 cm of the Pattillo sand which is considerably above the area where the first Carrollton phase artifacts are found. Based on the consistency of the artifact provenience by stratigraphy over the entire Upper Trinity watershed, it is my observation that the overall impact from vertisols is minor and virtually zero within the Carrollton Archaic-bearing artifact horizon.

Second, there is a remarkable consistency in the stratigraphic context of the Carrollton phase artifacts. Carrollton phase lithic material is found in the lower 10-20 cm of the Pattillo sand, at the Pattillo-Albritton contact, and into the Albritton Formation, sometimes as deep as 60-70 cm or more. The Carrollton phase assemblage is characterized by a diagnostic suite of artifacts which includes primarily Split Stem, Carrollton, Trinity, Wheeler Leaf, Bulverde, Calf Creek Horizon (Andice, Bell, and Calf Creek), and Dallas projectile points, both round leaf-shaped and square-based bifaces, large scrapers and worked flakes, Clear Fork gouges, Waco sinkers, Carrollton axes, gravers, perforators made from reworked projectile points, hammerstones, choppers, and clayballs. Rare but associated artifacts include Early Stemmed (Wilson) and Early Triangular points. At the deeper levels, late Paleoindian projectile points including Angostura and Scottsbluff are found in direct association with Carrollton phase material. Other earlier Paleoindian points (San Patrice, Pelican, Dalton) appear to pre-date the Carrollton phase by an undetermined amount of years. While Split Stem points have been found at the lowest levels of the Carrollton Archaic occupation, they have also been found in association with other Carrollton phase projectile points including Carrollton and Trinity types. Carrollton, Trinity, Wheeler Leaf, and Calf Creek Horizon points appear to extend beyond the end of the Early Archaic into the lower parts of the Middle Archaic. Bulverde and Dallas points are only found in this lower Middle Archaic section and have not been found in situ within the Albritton Formation.

Radiocarbon Dates

As is the case with many Archaic projectile point types across Texas, the Carrollton phase Archaic and its associated artifacts are poorly dated. The lack of datable material can be directly attributed to the highly acidic nature of the Trinity terrace soils, especially in the reddish sandy clays of the Albritton Formation. While small flecks of charcoal were collected from the hearths found at the Lake Dallas, Carrollton Dam, Wheeler, and Obshner sites, this material was too small for a conventional radiocarbon date using the technology of the day. An age date could be generated today using AMS technology; unfortunately none of the hearth material could be located in any of the collections made available to the author.

Crook (1959) reported a single radiocarbon date (calibrated) of 5945 ± 200 calendar years B.P. (no sample number recorded) taken from a small cluster of mussel shells from the base of the Pattillo Formation just above the Pattillo-Albritton contact at the Wood Pit (41DL76). The sample was composed of shells of *Lamsillis anadontoides*, *Amblema perplicata* (Conrad), *Tritigonia verrucosa* (Rafinesque), and *Obovaria subrotunda* (Rafinesque) (Crook 1959). While carbon dates from shell material can be suspect due to potential groundwater contamination, the shell cluster in question was encased in a clay lens which helped to shield it from groundwater and the date was made on material meticulously separated from the internal components of the shell (Wilson W. Crook, Jr., personal communication, 1988). Moreover, the material was re-dated several times by the Mobil Oil Research Lab which was known at the time for producing some of the most accurate age dates. The ca. 6000 B.P. date was replicated in each of the three analyses (Wilson W. Crook, Jr. personal communication, 1988). Two Clear Fork gouges were found in direct association with the shell lens (Crook 1959).

At the Gore pit (34CM131) near Lawton, Oklahoma, Hammatt (1976) excavated a hearth with associated Trinity points, Clear Fork gouges, and scrapers. Geologically, the unit containing the artifacts was almost identical in nature to the base of the Pattillo sands overlying a reddish-brown colored sandy clay (Wilson W. Crook, Jr., personal communication, 1988). The hearth material yielded two radiocarbon dates of 6030 ± 300 B.P. (Bastian 1984) and 6145 ± 130 B.P. (GX1558) (Hammatt 1976). While the Gore pit is roughly 300 km north of the Upper Trinity watershed, the almost identical dates of ca. 6000 B.P. on a level with similar lithic material (Trinity point, Clear Fork gouge) strongly supports Crook's date from the Wood Pit.

Lastly, Patterson (1998) obtained a radiocarbon date on material associated with a Carrollton point at 41FB37 in Fort Bend County at a level that he determined was "near the top of the Early Archaic". The material yielded a very similar calibrated date of 6490 ± 120 B.P. (I-15333). Based on this date and observations that most of the Early Archaic including Carrollton points occurred below this level, he estimated an age for Carrollton points at ca. 7000 B.P. for Southeast Texas (Patterson 1996).

Similar to what Patterson observed for Harris and Fort Bend counties, the majority of the Carrollton phase Archaic, including Split Stem, Carrollton, Trinity, Wheeler Leaf, and Calf Creek Horizon points, are found as much as 60-70 cm below the level where the radiocarbon date from the Wood Pit was obtained. Thus, the 6000 B.P. date should be seen as an absolute minimum date for these points with their origins being significantly older, possibly as old as 7000-8000 B.P. In this regard, the proposed projectile point sequence for the Upper Trinity watershed as proposed by Prikryl (1990:62) should be modified to reflect this significantly older occurrence.

Subsistence Strategies

A number of previous investigators have referred to the region of the Upper Trinity watershed as a "marginal" environment for human settlement (Lynott 1977; Prikryl 1990; Story 1990). However, other researchers have labeled the grassland, riverine, and transitional ecotone settings present across the study area as "highly opportune" for prehistoric occupation (Dawson and Sullivan 1973; Williams 2004).

Subsistence strategies consist of a selection of one resource over another which involves a complex decision-making process. These include such parameters as the labor needed to obtain the resource, nutrition, taste, and cultural and environmental factors (Wing and Brown 1979; Joachim 1981; Bettinger 1991). Ethnographic observations show that human decisions on food gathering are made to maximize the net amount of energy gained. As such, energy resources (food) would have been ranked in terms of desirability, maximizing energy gained with respect to energy expended. The breadth of diet also would have been affected by environmental factors such as the weather, seasonal availability, etc. (Bruseth 1987; Rush 2013).

Within the grasslands of the Blackland Prairie, a variety of vegetation and faunal resources were accessible. Riverine environments with their associated riparian woodland belts would have provided a substantial amount of protein associated with hunting, fishing, and gathering activities. As such, the aboriginal inhabitants of the area likely would have utilized a generalized and wide array of food resources. Each of these potential resources is discussed below.

Floral Resources

The predominantly clay-rich soils of the Blackland Prairie support tall to mid-size grasses with clusters of oak trees on chalk uplands and riparian communities that follow the waterways (Collins et al. 1975; Ferring and Yates 1998). The clay-rich soils that are characteristic of this biotic province make it difficult for vegetation to develop. The area drains quickly due to the clay-rich soils promoting runoff that causes frequent flooding and deposition of sediment on the floodplains (Mahler 1972). As a result, the main vegetal resources for food, medicine, and supplemental products are contained in the riparian environments. It is therefore not unexpected that human site occupation follows this pattern closely.

The dominant grass species of the Blackland Prairie in the study area is little bluestream, although switch grass, Texas wintergrass, Indiangrass, silver bluestream, and others have been reported (Gould 1969; Collins et al. 1975). The riparian belts lining the streams and rivers provided fresh water as well as nutritional and medicinal trees and plants. Trees such as bur oak, red oak, hackberry, pecan, and walnut are abundant along the waterways. Undergrowth including honeysuckle, grapevine, Virginia wildrye, Indian currant, and various berry-bearing vines would also have provided subsistence value. Moreover, the areas associated with bottomland hardwoods would have also provided excellent habitats for wildlife. It should be noted that because floral material is almost completely unpreserved in Carrollton phase archeological sites, the complete diet of the aboriginal inhabitants of the Upper Trinity watershed cannot be fully determined.

To the author's knowledge, only a single flotation study has been conducted on Carrollton Archaic sites for the purpose of identifying floral materials. A limited analysis was carried out by the author on material collected from the Pattillo sand at the Dowdy Ferry site in 1974 with the help of Dr. Harold Laughlin, then Director of the Heard Natural Science Museum, and a noted biologist. Sadly, no floral remains either were preserved and/or could be identified. Based on Dr. Laughlin's advice, no attempt was made to conduct flotation on the Albritton Formation.

Acorn, hackberry, walnut, and pecan trees have been in the near vicinity of many of the Carrollton Archaic sites along the Elm Fork and main stem of the Trinity River. Nuts are referred to as a "limited window" resource, in that they are available for only a limited period of time (Todd 2000). In North Central Texas, trees begin to bear nuts beginning in September and ending in November-December. Acorns can be plentiful through February (Prikryl 1990). Nuts were probably a major food resource although the paucity of remains in archeological sites does not in itself indicate their extensive use. Nuts are a short-term, high-return food source for relatively little energy output. Moreover, they are storable as well. Crook noted in his field notes that several burned hackberry seeds were present in the hearth he excavated at the Carrollton Dam site.

Acorns are believed to have been the most abundant variety of nuts found along the Trinity River, however there is extensive disagreement regarding the extent of their usage (Lynott 1975a; Prikryl 1990; Todd 2000;

Williams 2004). Lynott (1977) has stated his belief that the local acorns have such a high tannic-acid content as to be virtually inedible. As stated earlier, the author has personally tried without much success to process and roast local acorns into an edible crop. However, it is well known from historical records that acorns were an important food resource for many Texas Indians including the Tonkawa (Newcomb 1969), the Karankawa (Ricklis 1992) and the Caddo (Swanton 1946). The widespread distribution of various types of oak trees along the Trinity River makes it likely that they were exploited as a food resource.

Acorns would have been an important food source for the aboriginal inhabitants of the Upper Trinity watershed as they contain high amounts of lysine, an essential amino acid (Todd 2000). Patterson (1993) has conducted extensive experimental research on acorn use. His experiments show that members of the White Oak Group including White Oak (*Quercus alba*), Post Oak (*Quercus stellate*), Swamp White Oak (*Quercus bicolor*), and Live Oak (*Quercus virginiana*) contain significantly less tannin that trees of the Black Oak Group and as such, require little to no treatment prior to food preparation (Patterson 1993). The Black Oak Group, which encompasses most of the oak trees along the East Fork of the Trinity River, however contains significant amounts of tannin that can be poisonous to humans if not removed or at least diluted prior to consumption (White Oak Group trees are distinguished by their rounded leaf lobes whereas Black Oak Group trees have pointed lobes).

Tannin, in the form of tannic acid, can be extracted by boiling whole acorns or using slow, cold water leaching of ground acorn meal. The latter involves cracking and grinding the acorns to a meal, then placing them in a pit and repeatedly pouring cold water over them until the meal is "sweet" (Patterson 1993). Patterson's experiments showed that whole Red Oak acorns (*Quercus rubra*), a typical Black Oak Group nut, needed to be boiled for two hours in order to make them edible. The acorns then were roasted for 30 minutes; longer roasting times tended to make them too difficult to chew (Patterson 1993). Acorns could be prepared by roasting, boiling, or using the meal as a soup/porridge base. The meal could also be mixed with water and then used as a flour to make a type of bread (Todd 2000). Acorn gathering and cracking is a labor-intensive but not difficult activity. In terms of food value, 100 grams of acorns yields 28 percent of a daily calorie value (based on a 2,500 daily calorie intake) and provides 60 grams of protein, about 33 percent of a daily adult requirement.

In addition to being consumed by humans, acorn crop yields are also heavily used as a food source by deer, raccoon, opossum, squirrel, wild turkey, and quail. Nuts, in fact, can constitute as much as 75 percent of the diet of squirrels (Prikryl 1990). In areas where they are abundant, acorns are also known to make-up as much as 50 percent of the diet of whitetail deer (DeYoung and Miller 2011).

Other nuts available along the Trinity River include walnut and pecan. These are considered "Group One" nuts because of their very high-calorie value (600 calories per 100 grams of edible meat) (Todd 2000). Nuts were cracked, eaten raw, ground into a meal, or stored for later consumption.

The fruit of the lowland hackberry tree (*Celtis laevigata*) could be eaten raw, roasted or dried. Hackberry seeds contain an inordinately large seed relative to its "meat". However, they are plentiful in the Upper Trinity watershed, especially in the area of the Elm Fork and provide a caloric value of about 200 calories per pound of fruit. The Comanche were known to eat hackberry fruit mixed with animal fat (Newcomb 1969).

In prehistoric times, five major groups of plants were collected and eaten by Native Americans: (1) nuts, (2) fruits, (3) roots, (4) seeds, and (5) greens (Ferring and Yates 1999; Williams 2004). Examples of edible fruits that occur along the Trinity River include plums (*Prunus americana*), blackberries (*Rubus fruticosus*), dewberries (*Rubus trivialis*), persimmons (*Diospyros sp*.), and grapes (*Vitis sp*.) (Mahler 1972; Hatch et al. 1990). Grapes, in particular, could be eaten raw or dried. The Caddo were particularly fond of grapes (Swanton 1946). The Comanche were known to eat dried grapes (raisins) and store them for future use (Todd 2000). Grapes were also known to be stored in cane baskets and submerged in water to preserve them through the winter (Swanton 1946). Both berries and grapes are typically available in the late spring to summer months.

Lamb's Quarter (*Chenopodium sp*.) has been found along the Elm Fork of the Trinity River at Cobb-Pool (41DL148 and 41DL270) sites (Fritz 1993; Derring 1994). Lamb's Quarter, also known as Goosefoot, is known to have been a significant dietary component in a number of prehistoric diets across North America (Moerman 1998, 2010). Chenopods produce small black seeds that when ground make a fine-grained meal. Moreover, the leaves were cooked like spinach by the Indians of the Southeastern U.S. (Moerman 2010). Chenopods grow best on a drained floodplain setting and are commonly found in disturbed habitats similar to those in and around a prehistoric campsite (Todd 2000). Amaranth seeds were recovered from sites at Lake Ray Roberts along the Elm Fork (Winchell 1985) and are known to have been exploited widely by aboriginal populations in woodland environments (Moerman 2010). Undoubtedly, sunflower was also exploited for both its seeds as well as its roots.

Faunal Resources

Due to the extremely acidic nature of the soils along the Upper Trinity, faunal remains are relatively scarce in Carrollton Archaic sites. Vertebrate animals are the predominant part of the faunal material that has been recovered from both Upper Trinity and Liberty County sites. These include medium to large mammals (whitetail deer size and larger), small mammals (<5 kilograms), and reptiles.

Medium to large-sized mammals, notably whitetail deer constitute not only the majority of the vertebrate animal remains found in Carrollton Archaic sites but also was most likely the major component of the aboriginal inhabitants' diet. A mature Texas whitetail deer (*Odocoileus virginianus texanus*) buck will weigh 125-175 pounds (57-80 kilograms) undressed, less for a female; fifty percent of this mass is edible (DeYoung and Miller 2011). The meat from a mature deer will yield approximately 100,000 calories as well as 249 milligrams of phosphorus, 0.23 milligrams of thiamine, 0.48 milligrams of riboflavin, and 6.3 milligrams of niacin per 100 grams of meat (Todd 2000). It takes six raccoons, 12 opossums, 12 turkeys, or 57 cottontail rabbits to equal the food value of one average size whitetail deer. Moreover, deer were important for more than just food. The hide, sinew, bone and antler were used for both clothing and tools.

Whitetail deer prefer edge environments where there is an abundance of low forage, including fallen acorns (DeYoung and Miller 2011). The riparian belts along the Trinity River provided a perfect environment for whitetail deer, and they are still present in the region today despite the extensive encroachment of civilization. Even in the early parts of the 20th century, the bottomlands along the Trinity River were renowned for being a "hunter's paradise" (R. King Harris, personal communication, 1973). While deer can be hunted year round, the best time to hunt them is in the fall to early winter because (1) they are at their maximum weight with meat, hide and fat quality being high; (2) deer will concentrate around high yield food sources, notably acorn trees in preparation for winter; and (3) bucks are in the rutting season and are considerably less cautious allowing for closer stalks (DeYoung and Miller 2011). Most of the faunal remains that have been found in Upper Trinity Archaic sites clearly show the preference for hunting whitetail deer by the aboriginal inhabitants of the area.

Other medium to large mammal remains found in Carrollton phase sites include bison. Bison (*Bison bison*) bones, while not abundant in any site, have been reported from Lake Dallas, Wheeler, Carrollton Dam, and Dowdy Ferry. There is considerable disagreement among researchers whether bison were ever a plentiful resource and if so, when. Dillehay (1974) suggested there were two periods in the past, ca. 8000-7000 B.P. to ca. 4500 B.P. and ca. 1500 to 800-700 B.P. when bison were essentially absent from the Southern Great Plains. He further proposed that bison were present in the Southern Great Plains before 8000 B.P. and between ca. 4500 and 1500 B.P.

Lynott (1979) reviewed the Holocene faunal evidence from all known North Central Texas sites and concluded that bison were never common in the tall grass prairie of the Southern Great Plains until after ca. A.D. 1200 when their numbers did increase and were exploited by the Late Prehistoric inhabitants of the region.

Recently, Lohse et al. (2014) directly dated 61 bison bones from sites all across Texas. Their results show a clustering of radiocarbon dates on four general temporal periods that include: (1) a 140 year interval between 5955-5815 B.P. known as the Calf Creek phase, (2) bison are then absent for about 2,000 years making a return for a 165 year interval between 3295-3130 B.P., (3) this was followed by a 400 year hiatus before a 550 year interval of bison in the Late Archaic period between 2700-2150 B.P., and (4) an absence of another 1,500 years with a return for about 120 years during 650-530 B.P. (A.D. 1300-1420) (Lohse et al. 2014; Lohse et al. 2014). The first interval, the only one that takes place near the end of the Early Archaic, is of major interest as this could help explain the appearance of Calf Creek Horizon points in the Upper Trinity watershed. Calf Creek Horizon points are mainly known from Central Texas (Andice, Bell) and/or from the plains of Oklahoma (Ayala 2014). Their occurrence in Carrollton age sites could indicate movement of peoples into the region following herds of bison.

The usable weight of a mature bison is a minimum of approximately 800 pounds (364 kilograms) which yields over 992,000 calories (Ferring and Yates 1999; Todd 2000) (the author took a bison bull in South Dakota in 1983 that was officially weighed at over 3,200 pounds on the hoof and produced almost 900 pounds of processed meat). In addition to the meat, bison marrow was eaten as were the liver and other offal (Todd 2000). Perhaps even more prized were bison robes (hides) that became valued exchange items (Creel 1991).

In addition to the action of acidic soils, the paucity of bison bones in Upper Trinity watershed sites could also indicate that much of the meat was deboned and air dried ("biltong") due to the high cost of transportation back to the Trinity after a hunting foray. The lack of bones in archeological sites, especially for large mammals such as bison, does not necessarily indicate the animal did not make up a portion of the diet. The absence of evidence is not necessarily evidence of absence (Mauldin et al. 2012).

Mid-size mammals present in Carrollton Archaic sites include raccoon (*Procyon lotor*) and opossum (*Didelphis virginiana*). Raccoons were caught in deadfalls by Native Americans of the Southeastern United States (Swanton 1946). Both opossum and raccoons hunt at night along creeks and could have been trapped or snared.

Beaver (*Castor canadensis*) is not reported from any Upper Trinity watershed Archaic site but may have been a part of the aboriginal inhabitants' diet as beaver were known to live in the region up to and into the 20th century (R.K. Harris, personal communication, 1973). The author has explored remote portions of the Trinity in southeast Dallas County during the early 1970s and has heard the loud "slap" typically made by a beaver's tail as he signals danger. Beavers would have been a major source of high quality fat as well as providing a prized pelt. Beavers are largely nocturnal but they do move from a body of water during the day to secure wood for their den. Beavers can be trapped out of the water, underwater, or caught within their dens. Summer would have been the best time to trap beaver in the water as water plants constitute the majority of the animal's diet during that season (Swanton 1946).

A number of smaller game animals likely supplemented the aboriginal inhabitants' main diet of whitetail deer. These consisted primarily of rabbits and turtles. Small mammals present in the Upper Trinity watershed include Jack Rabbit (*Lepus californicus*), Cottontail Rabbit (*Sylvilagus sp.*), Cotton Rat (*Sigmodon hispidus*), Wood Rat (Pack Rat) (*Neotoma sp.*), Pocket Gopher (*Geomys bursarius*), Vole (*Microtus sp.*), and Ground Squirrel (*Citellus sp.*). While small mammals do not individually contribute a large amount of meat, they are generally readily available year-round. Most of these animals thrive in wooded margins with cover, such as brush piles and thickets. Jack Rabbits prefer grasslands and thickets (Todd 2000).

Wild Turkey (*Meleagris gallopavo*) remains have been found in Late Prehistoric period sites along the East Fork and were probably available in the area during Archaic times as well (Crook and Hughston 2015). Turkeys could easily have fed off the grasses in the Blackland Prairie during the months of May through October. In the fall and winter months, the mast crops as well as seasonal fruit would have provided food. Turkeys are most easily hunted in the fall when they gather in larger flocks. Turkeys have exceptional eyesight and are fleet runners making them a challenging game animal. However, they can be lured into ambushes using calls that make the distinctive "kelp-kelp-kelp" sound of the females. The author has heard turkey calls while investigating sites in southeastern Dallas County as well as at sites in Collin County.

Fish are a subsistence resource that is available at a relatively low energy cost (Todd 2000, 2014). Moreover, fish provide high nutritional value, notably protein and iodine. Fish, such as catfish, provide 0.4 milligrams of iron, 330 milligrams of potassium, 0.04 milligrams of thiamine, 0.03 milligrams of riboflavin, and 1.7 milligrams of niacin per 100 grams of edible meat (Todd 2000). Fish species identified from archeological sites along the Trinity River include Alligator Gar (*Atractosteus spatula*), catfish (*Siluriformes sp.*), and drum (*Aplodinotus grunniens*).

Several species of amphibians including Bullfrog (*Rana sp.*) and Cricket Frog (*Acris sp.*) have been reported from archeological sites in the Dallas County area. Frogs abound in almost any freshwater environment. Bull frogs are known to prefer quiet pools (Don Wyckoff, personal communication, 2013).

Reptiles are typically active from the early spring to late fall. Turtles, in particular, are abundantly represented in Carrollton Archaic sites. Species present in the Upper Trinity watershed include Box Turtle (*Pseudemys sp.*), Pond Slider (*Trachemys scripta*), Soft Shell Turtle (*Apalone spinifera*), and Mud Turtle (*Kinosternon sp.*). Turtles can be gathered when they are on the banks sunning or in the early summer when they leave the water to lay eggs. Large numbers of turtles hibernate together in the winter and can be harvested during this time. The aboriginal inhabitants of the Upper Trinity watershed ate a lot of turtle as turtle bones are the second most common animal bone found in sites, second only to whitetail deer. Many of the turtle bones have been burned, indicating that the turtles may have been cooked in their shells. The Florida Seminole were known to have removed the plastron and set the turtle on the fire to essentially roast in its own self-contained pot (Swanton 1946).

A large number of snake species (39) are known from North Central Texas (Todd 2014) and also would have been available as potential food items. Although boney, snake meat is very edible.

Lastly, freshwater mollusks and gastropods (snails) have been recovered from Trinity Archaic sites. Of these, *Amblema picata* and *Lampsilis hydiana* are the most abundant (Evans 1972; Lynott 1979; Todd 2000, 2014). According to Anthony (1994), mussel shells were probably collected from July to August, based on growth line patterns of shells recovered from Elm Fork sites. It is also possible that shellfish could have been collected in the fall when water levels are lower and the shells easier to find and procure (Todd 2014). Still other researchers suggest shellfish could have been a year-round source of food for hunting and gathering people. Globally, ethnographic studies show that women and children are the principal gatherers of shellfish (Bettinger 1991).

In general, mollusks provide less protein, few calories, and more calcium per unit weight than meat of vertebrates (Todd 2000). Mussels were eaten raw as well as cooked. If cooked, they were either boiled or steamed

in earth ovens. Experimental evidence has demonstrated that mussels can be cooked in as little as 20 seconds to as much as seven minutes based on the heat of the oven (Todd 2009).

Large numbers of gastropods (snails) have been found in a few Upper Trinity watershed sites, notably from Carrollton Dam, Wheeler, Wood Pit, Milton Pit, and Dowdy Ferry. While a number of species of gastropods have been recognized, by far the most common are *Helicina orbiculata* and *Rabdotus dealbatus*. Gastropods (snails) are characteristically low in calories and fat and thus their presence in large numbers in archeological sites has traditionally been used to indicate a near starvation diet (Rush 2013). However, snails are very high in carbohydrates and calcium, both of which are important to pregnant women (Evans 1972). Therefore their use in large numbers could indicate an almost medicinal use by one segment of the population (Andrew F. Malouf, personal communication, 2006). Snails are most plentiful during the wet seasons, in the spring and the fall.

Analysis of bone remains from Upper Trinity watershed sites indicates a relatively uniform diet across the district, one that is heavily based on whitetail deer and turtle supplemented by small mammals, turkey, fish, shellfish, and locally available plant material (nuts, berries and greens/bulbs). This diet is indicative of a generalized hunting and gathering diet based on the full exploitation of both the prairie grassland and riparian environments present along the Trinity River. The only significant change over time appears to have been the addition of Southern Great Plains large mammals (bison) when they became available post-6000 B.P. (Lohse et al. 2014).

During times of environmental stress when fewer food resources are available, hunter-gathers turn to what is known as "starvation foods" (Joachim 1981; Bettinger 1991). These foods typically require more labor intensive activities to access the energy but are more reliable under many environmental conditions. One example of such a practice is the extraction of animal fat contained in the interior of bones (Rush 2013). Fat is a key nutrient that performs essential functions for the human body. Human consumption of fat enables fat-soluble vitamins to be absorbed. Fats are also carriers of vitamins including Vitamins A, D, K, and E. Fat can be stored in the body in almost unlimited amounts (Mead et al. 1986).

Bone grease can be extracted by crushing the bone into small fragments and then boiling them (Church and Lyman 2003). Archeologically, bone grease rendering can be detected by assessing how intensely the bones of animals have been processed (Outram 2000; Karr and Outram 2012). Rush (2013) demonstrated at the Rowe Valley site (41WM437) in Central Texas that by measuring the fracture angle on bones one can determine man-made purposeful fracturing when the bone is green. Her studies show that high percentages of acute (helical) fractures are characteristic of bone grease processing.

Much like the Upper Trinity, a complete picture of the subsistence of the Carrollton phase Archaic people in Southeast Texas cannot be accurately portrayed owing to the lack of preservation of floral and faunal materials. However, from the data available, it appears that the Early Archaic inhabitants of the region practiced a similar broad-based subsistence pattern. Deer and turtle were the two most important animals utilized as seen in the faunal remains at a number of sites in Liberty, Harris, and Fort Bend counties (Crook et al. 2017; Patterson 1996; Baker et al. 1991). Bison bones are rare but present in some Southeast Texas sites. A large bison long bone exhibiting a spiral fracture is present in the Andy Kyle Collections from the Wood Springs site (Figure 73).

Figure 73. Spiral fractured bison bone from the Wood Springs site (41LB15), Liberty County.

Antelope remains have been identified from a few sites but are rare (Patterson 1996). Black Bear is present in the region and several Black Bear canine teeth have been identified from sites in both Liberty and Tyler counties (Crook et al. 2017). However, even though Black Bear would have provided a substantial amount of calories, it does not appear to have been a major food source in the region. Larsen (1980) states that bear was not a major food source because the weapons available to the aboriginal hunters would have made it very dangerous to attempt to hunt and kill a free-ranging bear. The author has hunted Black Bear in Arizona and British Columbia, both in heavily wooded terrains with a considerable amount of undergrowth. If not killed with the first projectile, bears head for the thickest brush they can find, then turn and face

their pursuer. Clearly this would have presented a great danger to Archaic hunters armed with atlatls and darts that do not have much stopping power.

Aside from larger mammals, bones from raccoon, opossum, rabbit, and rat have been identified from Early Archaic sites (Patterson 1996). Freshwater mussels would have been important to those sites along major rivers such as the Trinity and its tributaries as would have been alligator gar, catfish, drum, bass, bowfin, and sunfish (Patterson 1996). Alligator was likely also present. The author found a large fossil alligator scute at the Wood Springs site in Liberty County and while exploring the site one day in the fall, surprised a medium-sized alligator that immediately slid into Wood Springs Creek (Figure 74).

Figure 74. Large alligator scute from the Wood Springs site (41LB15), Liberty County.

Even though not well-preserved, fruits such as mustang grapes, persimmons, and berries as well as nuts were probably an important component of the diet of the Early Archaic inhabitants of Southeast Texas. Of these, acorns would have been one of the most widely available food sources. Goodchild (1984) states that the white oak group (oak trees with rounded lobes to the leaves), which is common to Southeast Texas, contains significantly less tannin that those of the black oak group (oak trees with pointed leaf lobes). Larsen (1980) notes that acorns from white oak species could have been eaten directly with no preparation and little to no ill effects. Goodchild (1984) states that most acorns were probably roasted or boiled and then crushed into a flour to make a bread-like substance.

Overall, the diet of the early Archaic inhabitants of the Upper Trinity watershed and Southeast Texas would have been very similar with a few exceptions (such as alligator). Huebner and Boulton (1992) have conducted a stable carbon isotope analysis of human skeletal remains from 41AU36 on the western side of Southeast Texas. The results show that C3 food sources, mainly deer, turtle, and nuts, was the principal dietary components of the inhabitants at this site. C4 grass species, such as bison, were a very minor component of the diet. This is consistent with the floral and faunal observations made at sites in both the Upper Trinity watershed and in Liberty County.

Synthesis

Crook and Harris (1952, 1954) originally proposed that the Carrollton phase Archaic was a unique Middle Archaic occupation located in the Upper Trinity watershed along the Elm Fork and main stem of the Trinity River, primarily in Denton, Dallas and Kaufman counties. They further stated that the culture probably extended northwards into Cooke County and possibly into southern Oklahoma as well as southwards along the Trinity to at least Ellis and Henderson counties (Crook and Harris 1952). Later, as more reports were published of discoveries of Carrollton Archaic components elsewhere in North Central and East Texas, they expanded this distribution to an unknown distance east and west of the Trinity River (Blaine et al. 1968). Lastly, as discoveries were made by Patterson and others in Southeast Texas (Patterson 1983, 1991), Crook and Harris privately stated that there was the distinct possibility that Carrollton phase material might be found along the entire length of the Trinity from the Dallas area to near the Gulf Coast (Wilson W. Crook, Jr. personal communication, 1992).

As for the age of occupation, obtaining the radiocarbon date from the Wood Pit coupled with a similar date from the Gore Pit (Hammatt 1976) in southern Oklahoma, caused Crook and Harris to rethink their positioning of the Carrollton phase Archaic as solely a Middle Archaic culture. Unfortunately, they did not publish any of these new conclusions as King Harris passed away in 1980 and Crook suffered a major stroke shortly thereafter and continued to suffer from physical ailments until his death in 1995. When Prikryl (1990) did his re-evaluation of the archeological resources along the Elm Fork, Crook and Harris' field notes were apparently not made available to him which would have shown the stratigraphic context of many of the projectile points. In addition, I was living in Richmond, Virginia at the time and none of my artifacts, field notes, and observations were made available (I did not even know about the study until after it was published in 1990). By this time, the Middle Archaic age date for the Carrollton phase Archaic was well-entrenched in the literature (Turner and Hester 1985) and the mistakes made in Prikryl's chronology were propagated by others.

It should also be noted that when Crook and Harris formulated their initial ideas for the Carrollton phase Archaic in the early 1950s, many of the projectile point types that we are familiar with today, such as Split Stem (Gower) and Calf Creek Horizon (Andice, Bell, Calf Creek) types, were either unknown or not yet fully described. There are drawings of these points in Crook's field notes but they are left undescribed. Crook and Harris also focused on the more numerous points from the sites which were also undescribed at the time in the literature. This resulted in the first naming and type description of the Carrollton, Trinity, Wheeler Leaf, and Dallas point types.

The author has now concluded the most extensive research on the Carrollton phase Archaic for both the Upper Trinity watershed and in Southeast Texas. This has included direct excavation and artifact analysis on 19 major Carrollton Archaic occupations (Lake Dallas, Carrolton Dam, Bachman Dam, Wheeler, Wood Pit, Obshner, Milton Pit, Dowdy Ferry, Post Oak, Kings Creek, City of Kaufman, Bachelor Creek, Edwards, Miklas, Frognot, Upper Farmersville North, Crump, Wood Springs, and Moss Hill) and the study of the collections made by previous researchers from 19 smaller campsites in Dallas, Kaufman, Collin, Liberty, Jasper, San Augustine, Polk, and Sabine counties. In addition, I have conducted trace element geochemical analyses utilizing X-ray fluorescence (XRF) on a number of chert artifacts from both the Upper Trinity and Liberty County to determine their provenance. Moreover, I have had access to a large number of unpublished field notes, maps, and period photographs from both the archives of my late father and King Harris. As a result, I believe I am in a unique position among all previous researchers to now provide the first comprehensive synthesis of cultural constructs for the Early Archaic in the Upper Trinity watershed and Southeast Texas.

Following their initial paper describing the Carrollton phase Archaic in 1952, Crook and Harris revised their assessment and published an expanded list of "trait items" in 1954. This list compiled the observations made on aerial distribution, stratigraphy, and artifacts from 10 Carrollton sites in Denton, Dallas, and Kaufman counties. The author has expanded on this initial list by looking at nearly 80 sites in the Upper Trinity watershed as well as cultural material from 10 sites in Southeast Texas. While individual sites may or may not contain all the elements associated with the Carrollton phase Archaic, when taken collectively, such as studying a large region like the Upper Trinity watershed or Southeast Texas, a composite cultural pattern can clearly be delineated. The following comprises an expanded list of diagnostic features ("traits") which characterize the Carrollton phase Archaic:

1. Carrollton phase Archaic sites are found in the first (T-1) terrace of the Elm Fork and main stem of the Trinity River in the Upper Trinity watershed (Denton, Dallas, Kaufman, and Tarrant counties). Along minor tributaries in central and northern Kaufman, northeast Dallas, and Collin counties where a well-developed terrace system is not present, Carrollton Archaic sites occur on the first significant rise adjacent to the source of water. A similar geologic occurrence holds for sites in Southeast Texas, especially along the Trinity River and its major tributaries such as Wood Springs Creek and Knight's Bayou.

2. Within the T-1 terrace system in the Upper Trinity watershed, Carrollton cultural material is found in the basal 10-20 cm of the Pattillo sand, at the Pattillo-Albritton contact, and within the Albritton Formation to a depth of 50-70 cm or more. Carrollton phase material does not extend to the basal pea gravels of the Albritton and Paleoindian points such as Dalton, San Patrice, and Pelican have been shown stratigraphically to pre-date the Carrollton Archaic by an undetermined number of years.

3. The precise age of the Carrollton phase Archaic is poorly dated, largely because of the lack of datable materials due to the acid nature of the host soils. A single age date from a lens of mussel shells at the Pattillo-Albritton contact from the Wood Pit (41DL76) yielded a calibrated calendar year date of 5945 ± 200 B.P. (Crook 1959). The shell material used to obtain this date was encased in clay which protected it from contamination by groundwater. Moreover, the laboratory which conducted the radiocarbon analysis (Mobil Oil Research Laboratory) repeated the test three times with nearly identical results. Carrollton and Trinity points were found in situ at the Wood Pit below the level where the age date was obtained. Patterson (1998) obtained a calibrated radiocarbon date of 6490 ± 120 B.P. (I-15333) on material associated with a Carrollton point at 41FB37 in Fort Bend County at a level that he determined was "near the top of the Early Archaic". Hammat (1976) obtained a date of 6145 ± 130 B.P. (GX1558) on hearth material associated with Trinity points and Clear Fork gouges at the Gore site in southern Oklahoma in a geologic context similar to the base of the Pattillo. As much of the Carrollton phase cultural material occurs ***well below*** this level, the starting point for the Carrollton Archaic has to be considerably earlier than ca. 6000 B.P., which places its beginnings into the Early Archaic. Carrollton points have been recovered in situ associated with Split Stem points (Gower) at the Dowdy Ferry site. Split Stem (Gower) points have been dated at 7430 ± 230 B.P. at the Wilson-Leonard site (Dial et al. 1998) which would correlate with their stratigraphic location within the T-1 terrace along the Upper Trinity River. Similarly, Carrollton and Trinity points have been found in association with Calf Creek Horizon points (Andice, Bell) at the Wheeler site. Waters (2019) reported a date of 7,030 ± 470 B.P. for Andice points at the Debra L. Friedkin site in Bell County. At the Gault site in Bell County, three new OSL dates for the Andice-Bell horizon range from 5700 ± 300 to 5900 ± 300 to 6100 ± 300 calendar years B.P. (Rodrigues et al. 2016). These dates correspond well with the occurrence of Andice and Bell points in the Upper trinity watershed both above and below the Pattillo-Albritton contact which also supports the ca. 6000 B.P. date obtained by Crook (1959).

4. Carrollton phase material, including Carrollton, Trinity, Wheeler Leaf, Bulverde, Calf Creek Horizon (Andice, Bell, Calf Creek), and Dallas points have been recovered in situ in the base of the Pattillo which is ***above*** the ca. 6000 B.P. date. Therefore, while the Carrollton phase Archaic begins in the Early Archaic, most of its associated constituents extend into the lower part of the Middle Archaic (ie. post 6000 B.P.).

5. There is a considerable time gap between the end of the Carrollton Archaic and the beginning of the Late Archaic, currently designated in the Upper Trinity watershed as the Elam phase (Crook and Harris 1952, 1954). This can be seen by a significant gap represented by as much as 100 cm of sterile material above the top of the Carrollton Archaic. Where both components are present at sites in the Upper Trinity watershed, this sterile gap is present. It is uncertain why the remainder of the Middle Archaic is missing but the interval between occupations is indisputable.

6. The Carrollton phase Archaic is defined by a number of specific artifacts that occur at most of the major occupational sites in the Upper Trinity watershed and have now been found in at least six sites in Liberty County (Crook 2018c). This artifact assemblage includes:

- Stemmed dart points (Split Stem (Gower), Carrollton, Trinity, Wheeler Leaf, Calf Creek Horizon (Andice, Bell, and Calf Creek), Bulverde, and Dallas point types. Occasional types found in Carrollton sites include Early Stemmed (Wilson), Early Triangular, Big Sandy, Hoxie, Wells, Morrill, and Cossatot)
- Large ovoid and square-based bifaces/knives
- Large concavo-convex side-scrapers and small flake side-scrapers
- Unifacial Clear Fork gouges
- Waco sinkers
- Carrollton double-bitted axes
- Gravers, typically made on chert flakes
- Perforators made from reworked projectile points
- Burins (rare)
- Hammerstones
- Choppers
- Cores
- Fired clayballs
- Red ochre

7. Projectile points are the most abundant artifact in the Carrollton assemblage representing nearly 45 percent of all lithic artifacts. There is a distinct preference for constructing projectile points out of high quality chert as opposed to local chert, quartzite, or silicified wood. Nearly seventy five percent of the 919 Carrollton phase projectile points observed in this study are made from chert with quartzite (24 percent) and silicified wood/other comprising the remainder. The majority of this chert comes from non-local sources, much of it from the Edwards Plateau. This observation has been confirmed by trace element geochemical analysis of selected chert artifacts whose chemistry matches Edwards chert, typically from the eastern side of the Edwards Plateau. It is unknown if the Carrollton Archaic inhabitants of the Upper Trinity traveled to the Edwards Plateau to obtain this material or it was obtained through a network of trade. Central Texas projectile points such as Gower, Bulverde, Andice, Bell, Wilson, Hoxie, etc. clearly indicate contact between Central Texas and the Upper Trinity during the Early Archaic period.

The same observation holds for Southeast Texas where 73 percent of all projectile points are made from chert with the remainder constructed from local silicified wood (19 percent) or quartzite (8 percent). Trace element geochemical tests on selected chert artifacts matches an eastern Edwards Plateau source.

Carrollton phase projectile points are considerably larger than those present in the later Elam phase. Average length is in excess of 50 mm and frequently 60 mm or more. The exception to this are Dallas points which tend to be slightly smaller. However, in Southeast Texas, point size tends to be less than or near 50 mm (average 43 mm). This is apparently due to constant resharpening in an attempt to prolong the life of the tool. While resharpening and continued use of projectile points is present in the Upper Trinity watershed, it does not occur to the extremes seen in Southeast Texas. This would suggest that obtaining high quality chert was more difficult for Carrollton folks east of the Trinity in Liberty County than it was for those living in the Upper Trinity region.

Lastly, Split Stem, Carrollton, and Trinity phase points all exhibit extensive smoothing (grinding) of the lateral edges of the stem. Other Carrollton phase points, such as Wheeler Leaf, Calf Creek Horizon points, and Bulverde never display any lateral edge grinding of the stem. Dallas points can be found both with the stems ground or unground. Patterson (1996) observed that stem edge smoothing was a trait restricted to the Early Archaic in Southeast Texas and perhaps was a hold-over vestige from Paleoindian times. In Southeast Texas, lateral edge grinding of the stem disappears in the Middle Archaic as it does in the Upper Trinity watershed.

8. A similar preference for chert applies to the large cutting tools (bifaces) found in Carrollton phase sites. Sixty three percent of all large bifaces are made from chert with the remainder from quartzite (34 percent) and other lithic material.

9. Scrapers show a dichotomy of lithic materials with large scraping tools made predominantly from local quartzite while virtually every flake of high quality chert has been repurposed into either a side-scraper or graver. Much of the quartzite used in making lithic tools shows tinges of yellow, red, or orange coloration indicating that it was heat-treated prior to knapping.

10. Quartzite is the material of choice for many of the other utilitarian tools such Clear Fork gouges (93 percent), Waco Sinkers (99 percent), Carrollton axes (98 percent), hammerstones (100 percent), and choppers (100 percent). Clear Fork gouges in the Carrollton Archaic are exclusively unifacial. Clear Fork gouges, Waco sinkers, and Carrollton axes are ***only*** found in the Carrollton phase Archaic sites and are not found in any later Archaic horizons in either the Upper Trinity watershed or in Southeast Texas. Specifically, Carrollton axes have been recovered in

situ ***only*** within the Albritton Formation and do not occur in the Late Archaic of the Trinity watershed. This observation contradicts the assertion made by Turner and Hester (1985, 1993, 1995) and Galm (1978) that Carrollton axes are a Late Archaic artifact. The double-bitted form may continue in time to the Late Archaic elsewhere (southern Oklahoma) but Carrollton axes are an Early Archaic to basal Middle Archaic tool along the Trinity River in Texas.

11. The major non-lithic artifact associated with Carrollton phase Archaic sites are clayballs. While not found in the same abundance as reported by Patterson (1996) for Early Archaic sites in Harris, Fort Bend, and Wharton counties, they are nonetheless present in virtually every major site in both the Upper Trinity watershed and in Liberty County. Moreover, their use is restricted to the Carrollton phase Archaic; clayballs do not occur in any later culture present in either the Upper Trinity or in its southern extension. This is consistent with what Patterson (1996) and others reported for the Early Archaic in Southeast Texas west of the Trinity River. Clayballs were exclusively used in the preparation of food acting as coals for roasting meat and/or vegetal matter.

12. The subsistence pattern of the Carrollton phase Archaic would have been one of broad-based hunting and gathering. Whitetail deer and turtle, supplemented by other small game, shellfish, nuts, and wild plants constituted the diet for the aboriginal inhabitants of the Upper Trinity watershed. Bison, after ca. 6000 B.P., would likely have been a seasonal addition to the diet.

Conclusions

In his reassessment of the cultural horizons present in the drainage of the Elm Fork of the Trinity River, Prikryl (1990) established a proposed timeline sequence for projectile point types found in North Central Texas (Prikryl (1990:62). After two comprehensive studies of Upper Trinity watershed including Archaic sites found along the Elm Fork, main stem, and East Fork of the Trinity River coupled with a study of the Late Prehistoric inhabitants of the East Fork, I am in general agreement with his sequence with a few modifications (Figure 75). The earliest inhabitants of the Upper Trinity watershed appear to be Clovis hunters as evidenced by the Aubrey (41DN479) and Lewisville (41DN72) sites in Denton County, the occurrence of Clovis points at Obshner (41DL116), Melaun (41DL177), Broken Leg (41DL313), and other sites in Dallas County, and at Sonya Howard (41COL257), Blue Ridge, and Brushy Creek (41HU74) in Collin and Hunt counties (Crook and Harris 1957, 1968; Ferring 2001; Crook and Hughston 2008; Crook et al. 2009; Crook 2015a). Older-than-Clovis sites have not yet been undeniably confirmed, although there are anomalies in both the artifacts and dates at Lewisville and Hickory Creek (41DN63) which remain unresolved (Crook 2015b). Clovis age occupations have now been well dated from about 13,500-12,700 calendar years B.P. (Michael B. Collins, personal communication, 2013; Michael R. Waters, personal communication, 2019).

Following Clovis, Folsom points have been reported from the region of the Upper Trinity watershed but to the author's knowledge, none have been found unambiguously in situ. Later Paleoindian projectile points such as Plainview, Dalton, San Patrice, and Pelican have been found in the region (Crook and Harris 1952; Crook 2007a) but are sparsely represented. These points post-date Clovis and Folsom but pre-date late Paleoindian projectile points such as Angostura and Scottsbluff. An age of 11,500-10,000 B.P. would be reasonable for this period.

Late Paleoindian projectile points (Angostura, Scottsbluff) and transitional Archaic points (Wilson) have been found in conjunction with Carrollton Archaic artifacts at the Obshner, Dowdy Ferry, and Post Oak sites as well as at the Wood Springs site in Liberty County. These artifacts have been variously dated at sites across Texas between 10,000-8000 B.P. and perhaps extend earlier (Turner et al. 2011). Based on the occurrence of Split Stem points in Carrolton Archaic sites along with Angostura points, it would seem that there is some overlap between these late Paleoindian points and the beginning of the Early Archaic in North Central Texas. The remainder

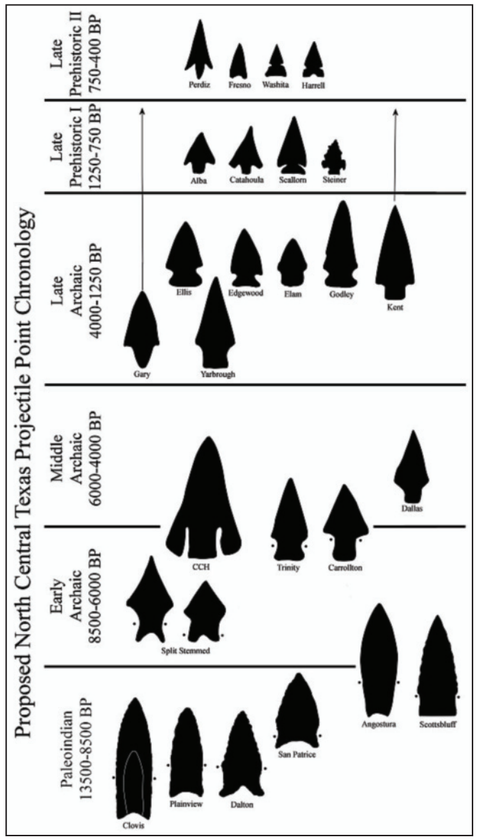


Figure 75. Proposed projectile point sequence for North Central Texas including the Upper Trinity watershed. (Illustration by Lance K. Trask)

of the Carrollton phase cultural material, including Carrollton, Trinity, Wheeler Leaf, and Calf Creek Horizon points would date to the latter part of the Early Archaic, perhaps as old as 7000 B.P. or more based on stratigraphic provenience found at the Wheeler, Obshner, Dowdy Ferry, and the Post Oak sites as well as in situ material at the Wood Pit which was observed well below the level where the calibrated radiocarbon date of 5945 ± 200 calendar years B.P. was obtained. This would significantly change the sequence shown by Prikryl (1990:62) with Carrollton, Trinity, and Calf Creek Horizon points plus the addition of Wheeler Leaf points spanning the latter part of the Early Archaic and extending into the bottom part of the Middle Archaic (see Figure 75). Bulverde and Dallas points would also be placed in the Middle Archaic but not as early as the Early Archaic as none have been found in situ below the Pattillo-Albritton contact. Recent dates obtained for Split Stem (Gower) and Calf Creek Horizon points at the Debra Friedkin and Gault sites in Central Texas further support this conclusion and the date obtained by Crook (1959) from the Wood Pit.

By the same stratigraphic evidence, Carrollton axes are also an Early to Middle Archaic artifact found along the Trinity River. They are not found in later (Elam phase) sites. Thus the age of this tool should also reflect this Early Archaic to basal Middle Archaic context.

A significant time lapse occurs between the end of the Carrollton phase Archaic and the re-emergence of the Archaic in the Elam phase in the Upper Trinity watershed. The Elam phase appears to be restricted to the Late Archaic with at least some of the Middle Archaic apparently missing. It should be noted that this interpretation is based solely on stratigraphic context for the time being and age dates are needed to better place the Elam phase Archaic chronologically.

A Woodland period is present in the eastern part of the Upper Trinity basin which is best represented in sites in Collin, northern Kaufman, and Hunt counties (Crook and Hughston 2015). This occupation appears to have moved into the North Central Texas region from the east sometime around 2500-1500 B.P. (Crook and Hughston 2015). The same Woodland period assemblage is not seen in sites along the main stem of the Trinity or the Elm and West Forks.

Prikryl (1990) proposed two distinct periods of Lake Prehistoric occupation along the Elm Fork and Crook and Hughston (2015) demonstrated a very similar two-phase Late Prehistoric occupation along the East Fork of the Trinity River and its tributaries. The first phase appears to have developed in place from the terminal Archaic and/or Woodland phase and is represented by the appearance of arrow points (Alba, Catahoula, Scallorn) and grog and sandy-clay paste ceramics. This phase lasts to about 750 B.P. when it is replaced by a second Late Prehistoric occupation characterized by Perdiz and triangular (Fresno, Washita, Harrell) arrow points and shell-tempered pottery (Crook and Hughston 2015).

The Early Archaic is sparsely represented in Southeast Texas, especially compared to later Middle Archaic, Late Archaic, and Woodland periods. Where present, the Early Archaic assemblage, especially at sites near the Trinity River in Liberty County, is almost identical in every aspect to the Carrollton phase Archaic as described herein. This includes Split Stem, Carrollton, Trinity, Wheeler Leaf, Calf Creek Horizon, Bulverde, and Dallas projectile points plus Clear Fork gouges, Waco sinkers, and Carrollton axes (Crook 2018c). The artifact assemblages are so similar that they could represent Carrollton people moving seasonally up and down the Trinity River, either by foot or perhaps by dugout canoe. Crook and Harris postulated that the Carrollton phase probably extended both down the Trinity River drainage system as well as laterally east and west of the Trinity to some unknown extent (Wilson W. Crook, Jr. and R. K. Harris, personal communication 1973).

The presence of all the elements of the Carrollton phase Archaic in Southeast Texas demonstrates possible contact with North Central Texas along the Trinity River as postulated by Crook and Harris (Wilson W. Crook, Jr. and R. K. Harris, personal communication 1973) and by Patterson (1983, 1991, 1998). The discoveries described herein thus extend the known range of the Carrollton phase Archaic from North Central to Southeast Texas along the Trinity River drainage and opens up the possibility that additional sites may be found between Dallas and Kaufman counties in the north and Liberty County to the south.

A few elements of the Carrollton phase Archaic (Carrollton, Dallas, and Wheeler Leaf points; Clear Fork gouges; Waco sinkers) have been found as far west as Hood County at the Acton site (Blaine et al. 1968). Similarly, Carrollton phase dart points have been reported from numerous sites in Harris, Fort Bend, Wharton, Gaines, and Washington counties along the Gulf Coastal Plain (McClure and Patterson 1988; Patterson 1982, 1983, 1991, 1996, 1998; Patterson and Hudgins 1987). None of these reported occurrences contains the full suite of the lithic traits found in the Upper Trinity River watershed. Similarly, the sites in counties east of Liberty County in Southeast Texas also contain only a few random Carrollton phase elements but not the full assemblage.

Acknowledgments

A study of the magnitude and scope of this monograph does not happen without the assistance of a large number of people who all contributed to its successful completion. First and foremost, I want to thank my late father, Wilson W. “Bill” Crook, Jr. and R. King Harris, both of whom were my mentors in geology and archeology. From my first field trips as a small boy to later education as a young archeologist, these pioneers of North Central Texas archeology patiently instructed me in dart point typology, the types of other lithic tools and their uses, the geology of the Trinity River terrace system (and elsewhere across the U.S.), how to lay out and excavate a unit square, how to take comprehensive field notes, and how to carefully clean and analyze artifacts in the laboratory. I also want to thank my long-time archeological colleague, Mark Hughston, who accompanied me on some of the initial trips to these sites, including the Wood and Milton Pits, Obshner, Dowdy Ferry, City of Kaufman, and Edwards. Of special note, I also want to thank Judge John McCraw of McKinney who helped me locate and visit Archaic sites in Collin County. Other people who assisted variously along the way include Alan Skinner, Joel Shiner, and Sunday Eiselt at my alma mater, Southern Methodist University; J. B. Solberger, Lester Wilson, and other members of the Dallas Archeological Society; Elton Prewitt; and Tom Williams and Sergio Ayala of the Prehistory Project at Texas State University (now relocated to TARL in Austin). Sergio in particular taught me the latest methodology on how to differentiate between the three types of Calf Creek Horizon points and Tom helped me conduct X-ray fluorescence provenance studies on some of the chert artifacts from both the Upper Trinity watershed and Southeast Texas. I also want to thank the staff at the Texas Archeological Research Laboratory in Austin who always dropped whatever they were doing to assist me in my research. This includes former TARL Director, Darrell Creel, who made me a Research Fellow so I could have access to both the collections and historical site records; Carolyn Spock and Jonathan Jarvis who assisted with site locations; and Laura Nightengale and Marybeth Tomka who patiently located site materials in the collections for me to study. I would also like to thank James Krakker of the Museum Support Center of the Smithsonian Institution who granted me access to King Harris’ collection for study. I am grateful, as always, for the superb illustrations included in this monograph which were done for me by Mr. Lance Trask. When it comes to archeological maps and artifact illustrations, there is none better. I would like to thank my wife, Ginny, who scanned many of the vintage photographs and took most of the excellent artifact photographs that appear in this monograph. Ginny also painstakingly reviewed this monograph making numerous changes to my grammar and writing which vastly improved the final product.

Lastly, I am extremely grateful to Ms. Alana Inman, Manager of the Sam Houston Regional Library and Research Center in Liberty, Texas for inviting me to participate in the development of the new prehistory exhibit at the Center and thus affording me the opportunity to study in detail all the artifacts contained in the Andy Kyle Archeological Collection. Alana not only provided open access for me to study the collection but also allowed for the study of artifacts outside the library using both microscopic geochemical analysis techniques.

References

Albritton, Claude C., L. Gray Pattillo, Jr., and Marcus S. Goldstein
1940 A Human Skeleton Found Near Carrollton, Texas. *Field and Laboratory* 8(2):59-64.

Anthony, Dana
1994 Mussel Shell Procurement in North-Central Texas. In *Archeological Investigations in the Denton Creek Floodplain: Data Recovery Excavation at 41DL270, Denton and Dallas Counties, Texas*. D. Anthony and D. Brown, editors, pp. 265-295, Archeology Series 37, Hicks and Company, Austin, Texas.

Aten, Lawrence E.
1967 *Excavations at the Jamison Site (41LB2), Liberty County, Texas*. Houston Archeological Society Report 1. Houston Archeological Society, Houston.

1983 *Indians of the Upper Texas Coast*. Academic Press, New York.

Aten, Lawrence E. and Charles N. Bollich
2002 *Late Holocene Settlement in the Taylor Bayou Drainage Basin: Test Excavations at the Gaulding Site (41JF27), Jefferson County, Texas*. Studies in Archeology 40, Texas Archeological Research Laboratory, The University of Texas at Austin, and Special Publication 4, Texas Archeological Society, Austin.

Aronow, Saul
1971 Quaternary Geology. In *Groundwater Resources of Chambers and Jefferson Counties*, Texas, edited by J. B. Wesselman. Texas Water Development Board Report 133:34-53. Austin.

Ayala, Sergio J.
2014 *Technology and Typology of the Calf Creek Horizon*. Presentation at the 79th Annual Meeting of the Society of American Archeology, April 23-27, 2014, Austin, Texas.

Baker, Barry W., Brian S. Shafer, Kristen D. Sobolik, and D. Gentry Steele
1991 Faunal Analysis, In *The Cinco Ranch Site, Barker Reservoir, Fort Bend County*, *Texas*, edited by H. Blaine Ensor. Report of Investigations No. 3, Archeological Research Laboratory, Texas A&M University, College Station.

Banks, Larry
1990 From Mountain Peaks to Alligator Stomachs: A Review of Lithic Resources in the Trans-Mississippian South, the Southern Plains, and Adjacent Southwest. *Memoir No. 4*, Oklahoma Anthropological Society, Norman.

Barber, Byron L.
1966 The Irish Farm Site, 18C4-2. *The Record* 22(2):9-14. Dallas Archeological Society, Dallas.

Bastian, Tyler
1964 Radiocarbon Date for an Archaic Site in Southwestern Oklahoma. Oklahoma Anthropological Society Newsletter 12(9):1-4.

Bell, Robert E.
1958 Guide to the Identification of Certain American Indian Projectile Points. *Special Bulletin of the Oklahoma Anthropological Society, No. 1*.

Bernard, Hugh A., C. F. Major, Benjamin S. Parrott, and Rufus J. LeBlanc
1970 *Recent Sediments of Southeast Texas*. Bureau of Economic Geology Guidebook 11. University of Texas, Austin.

Bettinger, Robert L.
1991 *Hunter-Gatherers: Archeological and Evolutionary Theory*. Plenum Press, New York.

Blaine, Jay C., R. King Harris, Wilson W. Crook, Jr., and Joel L. Shiner
1968 The Acton Site: Hood County, Texas. *Bulletin of the Texas Archeological Society* 39:45-94.

Blair, W. Frank
1950 The Biotic Provinces of Texas. *The Texas Journal of Science* 2(1):93-117.

Bruseth, James E.
1987 *Late Holocene Environmental and Human Adaptive Strategies in Northeast Texas*. Unpublished PhD. Dissertation. Department of Anthropology, Southern Methodist University, Dallas.

Bryant, Vaughn M. Jr.
1975 A 16,000 Year Pollen Record of Vegetational Change in Central Texas. *Palynology* 1:143-156.

Buol, Stanley W., Francis D. Hole, and Ralph J. McCracken
1973 *Soil Genesis and Classification*. The Iowa State University Press, Ames.

Bureau of Economic Geology
2000 *Vegetation/Cover Types of Texas*. University of Texas at Austin.

Byrd, Clifford Leon
1971 Origin and History of the Uvalde Gravel of Central Texas. *Baylor Geological Studies*, *Bulletin No. 20*, Baylor University, Waco.

Boyd, Charles L. and Harry J. Shafer
1997 Another Look at the Distribution, Age, and Function of "Waco Sinkers". *Bulletin of the Texas Archeological Society* 68:263-272.

Chandler, Charles K.
1983 Notes on Some Bell Points from San Patricio County, Texas. *La Tierra* 10(3):7- 10.

1996 Quartzite Cobbles Altered from Use. *La Tierra* 24:13-17.

Church, Robert R. and R. Lee Lyman
2003 Small Differences When Rendering Grease from Fractured Artiodactyl Bone by Boiling. *Journal of Archeological Science* 30(8):1077-1084.

Cobb, Hershel and Paul Lorrain
1982 The Wolters Site in Denton County, Texas 41DN-WBM. *The Record* 38(1):3-16. Dallas Archeological Society, Dallas.

Coffee, Donald R., Ralph H. Hill, and Dennis D. Ressel
1980 *Soil Survey of Dallas County, Texas*. U.S. Department of Agriculture, Soil Conservation Service in Cooperation with Texas Agricultural Experiment Station.

Coffman, Robert and Elton R. Prewitt
1985 *Phase 2 Cultural Resource Investigations in Portions of the Buttercup Creek Subdivision, Williamson County, Texas*. Reports of Investigations 36, Prewitt and Associates, Austin.

Collins, Michael B.
2004 Archeology in Central Texas. In *The Prehistory of Texas,* edited by Timothy K. Perttula, pp. 101-126. Texas A&M University Press.

Collins, O. Brown, Frederick E. Smeins, and David H. Riskind
1975 Plant Communities of the Blackland Prairie of Texas. In *The Prairie: A Multiple View*, edited by Mohan K. Wali. The University of North Dakota Press, Grand Forks.

Coulombe, Clement E., Larry Wilding, and Joe Dixon
2000 Chapter 6.7: Vertisols. In *Handbook of Soil Science*, edited by Malcom E. Sumner, pp. E269-E286. CRC Press, Boca Raton.

Creel, Darrel G.
1991 Bison Hides in Late Prehistoric Exchange in the Southern Plains. *American Antiquity* 56(1):40-49.

Crook, Wilson W., Jr.
1952 The Wheeler Site: A 3,500 Year Old Culture in Dallas County, Texas. *Field and Laboratory* 20(2):43-60. Southern Methodist University, Dallas.

1959 C-14 Date for Late Carrollton Focus Archaic Level: 6,000 Years B.P. *Oklahoma Anthropological Society Newsletter* 8(3):1-2.

Crook, Wilson W., III
1973 The Archeological History of Collin County. *Heard Natural Science Museum Special Publication No. 1.* McKinney, Texas, 8 pp.

1987 More Thoughts on Quartzite. *Texas Archeology* 31(1):8-9. Newsletter of the Texas Archeological Society.

2005 Use of Malacology to Reconstruct the Paleo-Environment of the Upper Trinity River Terrace System, Dallas County, Texas. *The Journal* 128:10-19. Houston Archeological Society, Houston.

2007a The Dowdy Ferry Site: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Journal* 131:9-25. Houston Archeological Society, Houston.

2007b The Frognot Site (41COL165): A Late Paleoindian to Middle Archaic Occupation in Collin County, Texas. *The Record* 55(2):1-10. Dallas Archeological Society, Dallas.

2007c The Upper Farmersville North Site (41COL166): A Pure Archaic Occupation in Collin County, Texas. *The Record* 55(2):11-18. Dallas Archeological Society, Dallas.

2008a The Milton Pit: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Record* 56(1):1-11. Dallas Archeological Society, Dallas.

2008b The Post Oak Site (41DL429): A Unique *In Situ* Archaic Campsite in Southeastern Dallas County, Texas. *The Record* 56(1):12-21. Dallas Archeological Society, Dallas.

2008c The Carrollton Dam Site (41DL12): A Small Archaic Campsite in Northwestern Dallas County, Texas. *The Record* 56(1):22-30. Dallas Archeological Society, Dallas.

2009a The Hess Site: A Late Archaic Campsite in Hunt County, Texas. *The Record* 56(1):19-24. Dallas Archeological Society, Dallas.

2009b Fired Clay Balls from the Upper Trinity Watershed. *The Record* 56(1):99-104. Dallas Archeological Society, Dallas.

2012a The Bachman's Dam Site (41DL23): A Small Early Archaic Campsite in Northwestern Dallas County, Texas. *Archeological Journal of the Texas Prairie-Savannah* 2(1):16-23.

2012b The Miklas Site (41KF59): A Large Multi-Component Archaic Campsite in Southwestern Kaufman County, Texas. *Archeological Journal of the Texas Prairie-Savannah* 2(1):24-31.

2013 An Association of Worked Flakes with Pleistocene Mammal Bones in Denton County, Texas. *Archeological Journal of the Texas Prairie Savannah* 3(1):3-7.

2014 Two Unique New Quartzite Artifacts from the Lewisville Site (41DN72), Denton County, Texas. *The Journal* 133:29-34. Houston Archeological Society, Houston.

2015a Discovery of a Clovis Point at the Sonya Howard Mammoth Site, Collin County, Texas. *Archeological Journal of the Texas Prairie Savannah* 5(1):1-6.

2015b A Problematic Radiocarbon Date from the Hickory Creek Site (41DN63) in Denton County, Texas. *The Journal* 134:53-58. Houston Archeological Society, Houston.

2018a The Occurrence of Calf Creek Horizon Barbed Points in the Upper Trinity River Archaic. *The Journal* 139:27-37. Houston Archeological Society, Houston.

2018b The Wheeler Leaf Point: A Diagnostic Component of the Carrollton Phase of the Trinity River Archaic. *The Journal* 139:39-48. Houston Archeological Society, Houston.

2018c The Occurrence of Carrollton Phase Archaic Materials in Southeast Texas. In, *Neither Snow, Nor Rain, Nor Heat, Nor Dark of Night, Shall Stay These Couriers: Essays Honoring Jay C. Blaine*, edited by S. Alan Skinner and Molly A. Hall, pp. 87-96. Texas Archeological Society.

Crook, Wilson W., Jr. and R. King Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society* 23:7-38.

1953 Some Recent Finds at the Wheeler Site Near Carrollton, Texas. *The Record* 11(5):21. Dallas Archeological Society, Dallas.

1954a Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. *The Record* 12(1):1-16. Dallas Archeological Society, Dallas.

1954b Another Distinctive Artifact: the Carrollton Axe. *The Record* 13(2):10-18. Dallas Archeological Society, Dallas.

1955 Scottsbluff Points in the Obshner Site Near Dallas, Texas. *Bulletin of the Texas Archeological Society* 26:75-100.

1957 Hearths and Artifacts of Early Man near Lewisville, Texas, and Associated Faunal Material. *Bulletin of the Texas Archeological Society* 28:7-97.

1958 A Pleistocene Campsite near Lewisville, Texas. *American Antiquity* 23(3):233-246.

Crook, Wilson W. III and Mark D. Hughston
2007 A Terminal Archaic Intrusive Burial from the Dowdy Ferry Site, Dallas County, Texas. *The Journal* 131:27-33. Houston Archeological Society, Houston.

2008 The Brushy Creek Clovis Site: A Paleoamerican Occupation in Hunt County, Texas. *Current Research in the Pleistocene* 25:72-74.

2009 The Upper Farmersville Site (41COL34): A Large Diagnostic Late Prehistoric Occupation in Collin County, Texas. *The Record* 56(1):25-46, Dallas Archeological Society, Dallas.

2015 *The East Fork Late Prehistoric: A Redefinition of Cultural Concepts Along the East Fork of the Trinity River, North Central Texas*. CreateSpace, a DBA of On-Demand Publishing, LLC (an Amazon Company), Charleston, South Carolina.

Crook, Wilson W. III, Mark D. Hughston, and John L. McCraw, Jr.
2009 The Brushy Creek Clovis Site (41HU74): An Early Paleoindian Occupation in Hunt County, Texas. *The Record* 56(1):1-18. Dallas Archeological Society, Dallas.

Crook, Wilson W., III, Robert J. Sewell, Linda C. Gorski, and Louis F. Aulbach
2017 *The Andy Kyle Archeological Collection*. Report of the Houston Archeological Society No. 29:13-56, Houston.

Davis, Dan R., Jr.
1991 *Prehistoric Artifacts of the Texas Indians*. Pecos Publishing Company, San Antonio.

Dawson, Gerald L. and Timothy L. Sullivan
1973 *Excavations at Lake Lavon: 1969 Report to the National Park Service by the Archeological Research Program.* Department of Anthropology, Southern Methodist University, Dallas.

Decker, Susan, Stephen L. Black, and Thomas Gustavson
2000 *The Woodrow Heard Site, 41UV88, A Holocene Terrace Site in the Western Balcones Canyonlands of Southwestern Texas*. Studies in Archeology 33, Texas Archeological Research Laboratory, Austin.

Derring, J. Phillip
1994 Archeobotanical Remains from 41DL270. In *Archeological Investigations in the Denton Creek Floodplain: Data Recovery Excavation at 41DL270, Denton and Dallas Counties, Texas*. D. Anthony and D. Brown, editors, pp. 237-240, Archeology Series 37, Hicks and Company, Austin, Texas.

DeYoung, Randy W. and Karl V. Miller
2011 White-Tailed Deer Behavior. In *Biology and Management of White-Tailed Deer*, edited by David G. Hewitt, pp. 324-331. CRC Press, Boca Raton.

Dial, Susan W. Anne C. Kerr, and Michael B. Collins
1998 Projectile Points. In *Wilson-Leonard: An 11,000-year Archeological Record of Hunter-Gatherers in Central Texas. Volume 2, Chipped Stone Artifacts*, edited by Michael B. Collins, pp. 313-445. Studies in Archeology 31, Texas Archeological Research Laboratory, Austin.

Dickens, William A. and James E. Wiederhold
2003 Some Notes on Bison, the Texas Post Oak Savanna, and the Late Prehistoric Period of Texas. *Bulletin of the Texas Archeological Society* 74:31-54.

Dillehay, Tom D.
1974 *Late* Quaternary Bison Populations Changes on the Southern Plains. *Plains Anthropologist* 19(65):180-196.

Dudal, Robert and Hari Eswaran
1998 Distribution, Properties and Classification of Vertisols. In *Vertisols: Their Distribution, Properties, Classification and Management*. Edited by Larry P. Wilding and Ruben Puentes, pp. 1-22. Texas A&M University, College Station.

Duffield, Lathel F.
1970 Vertisols and Their Implications for Archeological Research. *American Anthropologist* 72(5):1055-1062.

Eidson, James A. and Frederick E. Smeins
1999 Texas Blackland Prairies. In *Terrestrial Ecoregions of North America: A Conservation Assessment*, edited by Taylor H. Ricketts, Eric Dinnerstein, David M. Olson and Colby J. Louks. World Wildlife Fund, Inland Press, Washington, D. C.

Evans, John G.
1972 *Land Snails in Archeology*. Seminar Press, London.

Fenneman, Nevin M.
1938 *Physiography of Eastern United States*. McGraw-Hill Book Company, New York.

Ferring, C. Reid
1986 Late Quaternary Geology and Environments of the Upper Trinity Basin. In: *An Assessment of the Cultural Resources in the Trinity Basin, Dallas*, *Tarrant and Denton Counties, Texas*, edited by Bonnie C. Yates and C. Reid Ferring, pp. 32-112. Institute of Applied Sciences, North Texas State University, Denton.

1990 Upper Trinity River Drainage Basin, Texas. In *South Central Lowland- Ozark-Ouachita Area*, *Chapter 16*, *Quaternary Non-Glacial Geology: Conterminous United States*, edited by R. Morrison, Denver, Geological Society of America Decade of North American Geology, Vol. K-2.

2001 *The Archeology and Paleoecology of the Aubrey Clovis Site (41DN79) Denton County, Texas*. Center for Environmental Archeology, Department of Geography, University of North Texas, Denton.

Ferring, C. Reid and Bonnie C. Yates
1998 *Archeological Investigations at Five Sites on Lake Lewisville, Denton County, Texas*. Edited by Kenneth L. and Marie E. Brown, Center for Environmental Studies, University of North Texas, Denton.

Finsley, Charles E.
1999 *A Field Guide to Fossils of Texas*. Gulf Publishing, Houston.

Fisher, William L., James H. McGowen, L. Frank Brown, and Charles G. Groat
1972 *Environmental Geologic Atlas of the Texas Coastal Zone: Galveston-Houston Area*. Bureau of Economic Geology, University of Texas, Austin.

1973 *Environmental Geologic Atlas of the Texas Coastal Zone: Beaumont-Port Arthur Area*. Bureau of Economic Geology, University of Texas, Austin.

Flinn, Richard and Judy Flinn
1968 The High Bluff Site on the Clear Fork of the Brazos River. *Bulletin of the Texas Archeological Society* 38:93-125.

Fox, Anne A. and Thomas R. Hester
1976 An Archeological Survey of Coleto Creek, Victoria and Goliad Counties, Texas. *Center for Archeological Research, Survey Report No. 1*8. The University of Texas, Austin.

Fox, Anne A., Edgar H. "Smitty" Schmiedlin, and Jimmy L. Mitchell
2001 Preliminary Report on the J-2 Ranch Site (41VT6), Victoria County, Texas. *La Tierra* 28(1):17-29.

Fritz, Gayle J.
1993 Archeobotanical Evidence from Cobb-Pool Site: A Late Prehistoric Farmstead in Dallas County, Texas. *Bulletin of the Texas Archeological Society* 64:227-246.

Gagliano, Sherwood M.
1977 *Cultural Resources Evaluation of the North Gulf of Mexico Continental Shelf*. Coastal Environments, Inc., Cultural Resource Management Studies, Interagency Archeological Services, Washington, D. C.

Galm, Jerry R.
1978 *The Archeology of the Curtis Lake Site (41Lf-5A), LeFlore County, Oklahoma*. Research Series No. 2, Archeological Research and Management Center, The University of Oklahoma, Norman.

Goodchild, Peter
1984 *Survival Skills of the North American Indians*. Chicago Review Press, Chicago.

Gould, Frank W.
1969 *Texas Plants - A Checklist and Ecological Summary*. Texas Agricultural Experiment Station.

Griffen, Kirby L.
1996 *Soil Survey of Liberty County, Texas*. United States Department of Agriculture, Soil Conservation Service, in Cooperation with the Texas Agricultural and Experiment Station and the Harris County Flood Control District, Washington D.C.

Halbouty, Michael and James J. Halbouty
1982 Relationship Between East Texas Field Region and Sabine Uplift in Texas. *The American Association of Petroleum Geologists Bulletin* 66(8):1042-1054.

Hammatt, Hallett H.
1976 The Gore Pit: An Archaic Occupation in Southwestern Oklahoma and a Review of the Archaic Stage in the Southern Plains. *Plains Anthropologist* 21(74):245-277.

Hanson, Arthur and Frankie F. Wheeler
1969 *Soil Survey of Collin County, Texas*. USDA, Soil Conservation Service in Cooperation with the Texas Agricultural Experiment Station.

Harris, Inus Marie and Bobby D. Vance
1989 Lester L. Wilson and Collin County Archeology. *The Record* 43(1):1-9, Dallas Archeological Society, Dallas.

Harris, R. King
1939 A Survey of Three Denton County Indian Village Sites. *The Record* 1(2):6-8. Dallas Archeological Society, Dallas.

1940 Two Indian Village Sites Near the City of Denton. *The Record* 2(1):5-6. Dallas Archeological Society, Dallas.

1941 Additional Information about Dallas County Axes. *The Record* 3(1):3. Dallas Archeological Society, Dallas.

Hatch, Stephen L., Kancheepuram N. Gandhi and Larry E. Brown
1990 *Checklist of Vascular Plants of Texas*. Texas Agricultural Experimental Station, Texas A&M University System, College Station.

Hausenbuiller, Robert L.
1972 *Soil Science*. William C. Brown Company, Iowa.

Henderson, Junius
1935 *Fossil Non-Marine Mollusca of North America*. Geologic Society of America, Special Paper 3, Washington, D.C.

Hester, Thomas R.
1971 Archeological Investigations at the La Jita Site, Uvalde County, Texas. *Bulletin of the Texas Archeological Society* 42:51-148.

Hillsman, Mathew J.
1992 *Evaluation of Visible and Ultraviolet Excited Attributes of Some Texas and Macroscopically Similar New Mexico Cherts*. Unpublished Masters' Thesis. Department of Anthropology, Eastern New Mexico University, Portales.

Hofman, Jack L., Lawrence C. Todd, and Michael B. Collins
1991 Identification of Central Texas Edwards Chert at the Folsom and Lindenmeier Sites. *Plains Anthropologist* 36(137):281-395.

Hudgins, Joe D.
1993 Cooking with Clay Balls. *The Cache* 1:47-52.

Hudler, Dale B.
1997 *Determining Clear Fork Tool Function Through Use-Wear Analysis: A Discussion of Use-Wear Methods and Clear Fork Tools*. Studies in Archeology 25. Texas Archeological Research Laboratory, Austin.

Huebner, Jeffrey A. and Thomas W. Boulton
1992 The Isotopic Composition of Human Diets in Prehistoric Southeast Texas. Texas Journal of Science 44(1):43-51.

Keeley, Lawrence H.
1980 *Experimental Determination of Stone Tools Uses: A Microwear Analysis*. University of Chicago Press, Chicago.

Jelks, Edward B.
1978 Diablo Range. In *Chronologies in New World Archeology*, edited by Robert E. Taylor and Clement W. Meighan, pp. 71-111. Academic Press, New York.

Joachim, Michael A.
1981 *Strategies for Survival: Cultural Behavior in an Ecological Context*. Academic Press, New York.

Johnson, LeRoy
1964 The Devil's Mouth Site: A Stratified Campsite at Amistad Reservoir, Val Vere County, Texas. *Archeology Series, No. 6*. Department of Anthropology, The University of Texas, Austin.

Karr, Landon P. and Alan K. Outram
2012 Tracking Changes in Bone Fracture Morphology Over Time: Environment, Taphonomy and the Archeological Record. *Journal of Archeological Science* 39:555-559.

Keene, Joshua Lake
2009 *Site Formation Processes at the Buttermilk Creek Site*. Unpublished Master's Thesis, Department of Anthropology, Texas A&M University, College Station.

Kindall, Sheldon and Leland W. Patterson
1986 The Andy Kyle Archeological Collection, Southeast Texas. *The Journal* 86:14-21. Houston Archeological Society, Houston.

Kirkland, Forrest
1942 A Series of Nonpottery Sites in Dallas County, Texas. *The Record* 3(6):32-38. Dallas Archeological Society, Dallas.

Kishue', Andrea Szi, Christine L. S. Morgan, and Wesley L. Miller
2009 Vertisol Crack Extent Associated with Gilgai and Soil Moisture in the Texas Gulf Coast Prairie. *Soil Science Society of America Journal* 73:1221-1230.

Larsen, Lewis H.
1980 *Aboriginal Subsistence Technology on the Southeastern Coastal Plain during the Late Prehistoric Period.* University Press, University of Florida, Gainesville.

Lohse, Jon C., Brendam J. Culleton, Stephen L. Black, and Douglas J. Kennett
2014 A Precise Chronology of Middle to Late Holocene Bison Exploitation in the Far Southern Great Plains. *Journal of Texas Archeology and History* 1:94-126.

Lohse, Jon C., David B. Madsen, Brendan J. Culleton, and Douglas J. Kennett
2014 Isotope Paleoecology of Episodic Mid-to-Late Holocene Bison Population Expansion in the Southern Plains, U.S.A. *Quaternary Science Reviews* 102:14-26.

Lorrain, Paul
1984 A Hearth Near the Wolters Site. *The Record* 40(1):4-5. Dallas Archeological Society, Dallas.

1985a Excavation at Site 2 on the Elm Fork. The Record 41(1):3-13. Dallas Archeological Society, Dallas.

1985b Site 41DL252 on Denton Creek. *The Record* 41(1):18-21. Dallas Archeological Society, Dallas.

1988 Recent Finds at the Denton Tap Site. *The Record* 42(3):95-96. Dallas Archeological Society, Dallas.

Lorrain, Paul and Jan Lorrain
2001 Prehistoric Occupation of Lower Denton Creek. *The Record* 50:61-77., Dallas Archeological Society, Dallas.

Luke, Clive J.
1980 Continuing Archeology of State Highway 16 in Kerr County, Texas: the Excavations of the Shep Site (41KR109) and the Wounded Eye Site (41KR107). *Publications in Archeology 16*, Texas State Department of Highways and Public Transportation, Austin.

Lynn, Warren and Dewayne Williams
1992 The Making of a Vertisol. *Soil Survey Horizons* 33:45-50.

Lynott, Mark J.
1975 *Archeological Investigations at Lake Lavon, 1974*. Archeology Research Program, Contributions in Anthropology 16, Southern Methodist University, Dallas.

1977 *A Regional Model for Archeological Research in Northcentral Texas*. Unpublished Ph.D. Dissertation, Southern Methodist University, Dallas.

1979 Prehistoric Bison Populations in Northcentral Texas. *Bulletin of the Texas Archeological Society* 50:89-101.

Mahler, William F.
1972 Botanical Literature Survey of the Trinity River. In *Environmental and Cultural Resources within the Trinity River Basin*. James V. Sciscenti, Assembler, pp. 58-129, Institute for the Study of Earth and Man, Southern Methodist University, Dallas, Texas.

Martin, Ron, Jason Barkley, Raj Malpani, Garrett Lindsay, and W. Keith Atwood
2011 Understanding Production from Eagle Ford and Austin Chalk Systems. Paper Presented at the SPG Annual Technical Conference, Denver, Colorado, October 30-November 2, 2011.

Matthews, William H.
1960 *Texas Fossils, Guidebook 2*. Bureau of Economic Geology, The University of Texas, Austin.

Mauldin, Raymond, Jennifer Thompson, and Leonard Kemp
2012 Reconsidering the Role of Bison in the Terminal Late Prehistoric (Toyah) Period in Texas. In *The Toyah Phase of Central Texas: Late Prehistoric Economic and Social Processes*, edited by Nancy A. Kenmotsu and Douglas K. Boyd, pp. 90-110, Texas A&M University Press, College Station.

Menzer, Fred J., Jr. and Bob H. Slaughter
1971 Upland Gravels in Dallas County and Their Bearing on the Former Extent of the High Plains Physiographic Province. *Journal of Science* 22(2-3):217-222.

McClure, William L. and Leland W. Patterson
1988 Early Projectile Points from 41HR290, Harris County, Texas. *The Journal* 92:15-16. Houston Archeological Society, Houston.

McCormick, Olin F.
1976 The Archaic Period in Northcentral Texas. In *The Texas Archaic: A Symposium*, edited by Thomas R. Hester, pp. 39-45. Center for Archeological Research, Special Report 2. The University of Texas at San Antonio, San Antonio.

McNulty, Charles L.
1966 Nomenclature of Uppermost Eagle Ford Formation in Northeastern Texas. *Bulletin of the American Association of Petroleum Geologists* 50(23):375-396.

Mead, James F., Roslyn B. Alfin-Slater, David R. Howton and George Popjak
1986 *Lipids: Chemistry, Biochemistry and Nutrition*. Plenum Press, New York.

Moerman, Daniel E.
1998 *Native American Ethnobotany*. Timber Press, Portland.

Neck, Raymond W.
1986 Analysis of Molluscan Remains from 41FB34, For Bend Co., Texas. *The Journal* 86:8-10. Houston Archeological Society, Houston.

1991 Molluscan Shells from 41FB32: Environmental, Cultural, and Taphonomic Observations. The Journal 101:15-21. Houston Archeological Society, Houston.

Newcomb, William W. Jr.
1969 *The Indians of Southeast Texas: From Prehistoric to Modern Times.* University of Texas Press, Austin.

Oetking, Philip F.
1959 Geologic Highway Map of Texas. Dallas Geological Survey, Dallas.

Outram, Alan K.
2000 A New Approach to Identifying Bone Marrow and Grease Exploitation: Why the "Indeterminate" Fragments Should Not Be Ignored. *Journal of Archeological Science* 44(28):401-410.

Paine, Jeffrey G. and Robert A. Morton
1986 *Historical Shoreline Changes in Trinity, Galveston, West and East Bays, Texas Gulf Coast*. Bureau of Economic Geology, Geologic Circular 86-3, University of Texas, Austin.

Parker, Wayne and Jim L. Mitchell
1979 Notes on Some Bell Points from a Site in Crosby County, Texas. *La Tierra* 6(2):26-27.

Patterson, Leland W.
1974 Harris County Flint Sources. *Houston Archeological Society Newsletter* 46:3-4.

1979 Lithic Procurement Strategies in Harris Co., Texas. *Houston Archeological Society Newsletter* 64:3-5.

1980 *The Owen Site, 41HR315: A Long Occupation Sequence in Harris County, Texas*. Houston Archeological Society Report No. 3. Houston.

1982 A Restudy of Site 41HR185, Harris County, Texas. *The Journal* 73:3-7. Houston Archeological Society, Houston.

1983 Prehistoric Settlement and Technological Patterns in Southeast Texas. *Bulletin of the Texas Archeological Society* 54:253-269.

1986 Fired Clayballs in Southeast Texas. *La Tierra* 13(4): 20-22.

1988 Radiocarbon Dates from 41FB37, Fort Bend County, Texas. *The Journal* 91:20-21. Houston Archeological Society, Houston.

1989 Additional Comments on Fired Clayballs. *The Journal* 94:24-26. Houston Archeological Society, Houston.

1991 Dart Point Chronologies of Southeast Texas. *The Journal* 101:1-5. Houston Archeological Society, Houston.

1996 *Southeast Texas Archeology*. Report of the Houston Archeological Society No. 12, Houston.

1998 Early Archaic Projectile Points in Southeast Texas. *The Journal* 121:1-13. Houston Archeological Society, Houston.

Patterson, Leland W. and Joe D. Hudgins
1983 Preliminary Summary of excavations at Site 41WH19, Wharton County, Texas. *The Journal* 77:10-18. Houston Archeological Society, Houston.

1987 Test Excavations at Site 41FB37, Fort Bend County, Texas. *The Journal* 88:1-8. Houston Archeological Society, Houston.

Patterson, Leland W., Joe D. Hudgins, Richard L. Gregg, and William L. McClure
1987 *Excavations at Site 41WH19, Wharton County, Texas*. Houston Archeological Society Report No. 4, Houston.

Patterson, Leland W., Joe D. Hudgins, Richard L. Gregg, Sheldon M. Kindall, William L. McClure, and Raymond W. Neck
1993 *Excavations at the Ferguson Site, 41FB42, Fort Bend County, Texas.* Houston Archeological Society Report No. 10, Houston.

Patterson, Leland W., Joe D. Hudgins, William L. McClure, Sheldon M. Kindall, and Richard L. Gregg
1994 Excavations at the Joe Davis Site, 41FB223, Fort Bend County, Texas. *Houston Archeological Society, Report 11*.

Patterson, Leland W., James D. Lockwood, Richard L. Gregg, and Sheldon M. Kindall
1992a The Lockwood Collection (41HR343), Harris Co., Texas. *The Journal* 104:16-24. Houston Archeological Society, Houston.

1992b Prehistoric Sites 41HR354, 730, 731, 732, Harris Co., Texas. *The Journal* 104:25-30. Houston Archeological Society, Houston.

Pattillo, L. Gray
1940 River Terraces in the Carrollton Area, Dallas County, Texas. *Field and Laboratory* 8(1):27-32.

Person, Charles E., David B. Kelly, Richard A. Weinstein, and Sherwood M. Gagliano
1986 *Archeological Investigations on the Outer Continental Shelf: A Study Within the Sabine River Valley, Offshore Louisiana and Texas*. OCS Study MMS 86-0119.

Pilsbury, Henry A.
1940 Land Mollusca of North America. *Academy of Natural Science*, *Philadelphia Mon*. 3(2):521-1113.

1948 Land Mollusca of North America. *Academy of Natural Science*, *Philadelphia Mon*. 3(3):575-994.

Prewitt, Elton R.
1981 Cultural Chronology in Central Texas. *Bulletin of the Texas Archeological Society* 52:65-89.

1983 Andice: An Early Archaic Dart Point Type. *La Tierra* 10(3):1-6.

Prikryl, Daniel J.
1990 *Lower Elm Fork Prehistory*. Office of the State Archeologist Report 37. Texas Historical Commission, Austin.

Pringle, Fred
1977 *Soil Survey of Kaufman and Rockwall Counties, Texas*. USDA Soil Conservation Service in Cooperation with the Texas Agricultural Experiment Station.

Quigg, J. Michael, Jeffrey D. Owens, Paul M. Matchen, Grant D. Smith, Robert Ricklis, Mercedes C. Cody, and Charles D. Frederich
2008 *Varga Site: A Multicomponent Stratified Campsite in the Canyonlands of Edwards County, Texas, Volume 1*. Archeological Studies Program report 110 Environmental Affairs Division, Texas Department of Transportation, Austin.

Ray, Cyrus E.
1941 The Various Types of the Clear Fork Gouge. *Bulletin of the Texas Archeological Society* 12:223-237.

Ricklis, Robert A.
1992 Aboriginal Karankawa Adaptation and Cultural Period Acculturation: Archeological and Ethnological Evidence. *Bulletin of the Texas Archeological Society* 63:211-243.

Rodrigues, Kathleen, W. Jack Rink, Michael B. Collins, Thomas J. Williams, Amanda Keen-Zebert, and Gloria I. Lopez
2016 OSL Ages of the Clovis, Late Paleoindian, and Archaic Components at Area 15 of the Gault Site, Central Texas, U.S.A. *Journal of Archeological Science: Reports* 7:94-103.

Rush, Haley E.
2013 *The Rowe Valley Site (41WM437): A Study of Toyah Period Subsistence Strategies in Central Texas*. Unpublished Master's Thesis. Texas State University, San Marcos.

Sellards, Elias H., Walter S. Adkins, and Frederick B. Plummer
1932 *The Geology of Texas, Vol. 1, Stratigraphy*. The University of Texas Bulletin No. 3232, University of Texas at Austin.

Shuler, Ellis W.
1935 Terraces of the Trinity River, Dallas County, Texas. *Field and Laboratory* 3:44-53.

Slaughter, Bob H.
1966 The Moore Pit Local Fauna: Pleistocene of Texas. *Journal of Paleontology*, 40(1): 78-91.

Slaughter, Bob H., Wilson W. Crook, Jr., R. King Harris, Donald C. Allen, and Martin Seifert
1962 *The Hill-Shuler Local Faunas of the Upper Trinity River, Dallas and Denton Counties, Texas*. Report of Investigations No. 48, Bureau of Economic Geology, University of Texas, Austin.

Slaughter, Bob H. and Ronald Ritchie
1963 Pleistocene Mammals of the Clear Creek Local Fauna, Denton County, Texas. *Journal of the Graduate Research Center*, 31(3):117-131.

Solberger, J. B. and Thomas R. Hester
1972 The Strohacker Site: A Review of Pre-Archaic Manifestations in Texas. *Plains Archeologist* 17(58):326-344.

Sorrow, William M., Harry J. Shafer, and Richard E. Ross
1967 Excavations at Stillhouse Hollow Reservoir. *Papers of the Texas Archeological Salvage Project, No. 11.* The University of Texas, Austin.

Stephenson, Robert L.
1949a Archeological Survey of Lavon and Garza-Little Elm Reservoirs: A Preliminary Report. *Bulletin of the Texas Archeological and Paleontological Society* 20:21-62.

1949b *Records of Sites 41DN5, 41DN6, and 41DN12, Denton County Files*. Texas Archeological Research Laboratory, The University of Texas, Austin.

Story, Dee Ann
1990 Culture History of the Native Americans. In *The Archeology and Bioarcheology of the Gulf Coastal Plains*, by Dee Ann Story, Janice A. Guy, Barbara A. Barnett, Martha D. Freeman, Jerome C. Rose, D. Gentry Steele, Ben W. Olive and Kevin J. Reinhard, pp. 163-165. Research Series No. 38, Arkansas Archeological Survey, Fayetteville.

Stovall, J. Willis and William N. McAnulty
1950 The Vertebrate Fauna and Geologic Age of Trinity River Terraces in Henderson County, Texas. *American Midland Naturalist* 44(1):211-250.

Suhm, Dee Ann
1955 Excavations at the Collins Site, Travis County, Texas. *Bulletin of the Texas Archeological Society* 26:7-54.

Suhm, Dee Ann and Alex D. Krieger, with the collaboration of Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25:1-562.

Suhm, Dee Ann and Edward B. Jelks (editors)
1962 *Handbook of Texas Archeology: Type Descriptions.* Special Publication No. 1, Texas Archeological Society and Bulletin No. 4, Texas Memorial Museum.

Swanton, John R.
1946 *The Indians of the Southeastern United States*. Smithsonian Institution, Bureau of American Ethnology, Bulletin 137.

Taggart, James N.
1953 *Problems in Correlation of Terraces Along the Trinity River in Dallas County, Texas*. Unpublished Master's Thesis. Department of Geology, Southern Methodist University, Dallas.

Tarpley, Fred
1969 *Place Names of Northeast Texas*. East Texas State University, Commerce.

Texas Parks and Wildlife
2012 Biotic Provinces of Texas. www.tpwd.tx.us, modified from Frank Blair, 1950.

Thurmond, John T.
1967 *Quaternary Deposits of the East Fork of the Trinity River, North Central Texas*. Unpublished Master's Thesis. Department of Geology, Southern Methodist University, Dallas.

Todd, Jesse
2000 *Subsistence Strategies of the Late Prehistoric Inhabitants of the Upper Trinity River Basin*. Unpublished Master's Thesis, Department of Anthropology, University of Texas at Arlington.

2014 The Prehistoric Archeology of the Upper Trinity River, Eastern and North Central Texas. *Archeological Journal of the Texas Prairie Savannah* 4(1):1-43.

Turner, Ellen Sue and Thomas R. Hester
1985 *A Field Guide to Stone Artifacts of Texas Indians.* Gulf Publishing, Lanham, Maryland.

1993 *A Field Guide to Stone Artifacts of Texas Indians.* 2nd Edition. Gulf Publishing, Lanham, Maryland.

1999 *A Field Guide to Stone Artifacts of Texas Indians.* 3rd Edition. Gulf Publishing, Lanham, Maryland.

Turner, Ellen Sue, Thomas R. Hester, and Richard L. McReynolds
2011 *Stone Artifacts of Texas Indians.* Taylor Trade Publishing, Lanham, Maryland.

Waters, Michael R.
2019 Forging a New Understanding of the Late Pleistocene Peopling of the Americas. Paper presented at the 26th East Texas Archeological Society Conference, February 23, 2019, Tyler.

Watt, Frank H.
1938 The Waco Sinker. *Central Texas Archeologist* 4:21-70.

Weber, Carey D.
1991 Andice/Bell Projectile Point Notching Failures. *La Tier*ra 18(4):23-38.

Weber, Carey D. and Leland W. Patterson
1985 A Quantitative Analysis of Andice and Bell Points. *La Tierra* 12(2):21-27.

Wesolowsky, Al B., Thomas R. Hester, and Douglas R. Brown
1976 Archeological Investigations at the Jetta Court Site (41TV151), Travis County, Texas. *Bulletin of the Texas Archeological Society* 47:25-87.

Wilding, Larry P. and Daniel Tessier
1988 Chapter 4: Genesis of Vertisols: Shrink-Swell Phenomena. In *Vertisols: Their Distribution, Properties, Classification and Management*, edited by Larry P. Wilding and Ruben Puentes, pp. 55-81. Texas A&M University, College Station.

Williams, Dewayne, Terry Cook, Warren Lynn, and Hari Eswaran
1996 Evaluating the Field Morphology of Vertisols. *Soil Survey Horizons* 37(4):123-131.

Williams, Marikka Lin
2004 *Interpreting Prehistoric Patterns: Site Catchment Analysis in the Upper Trinity River Basin of North Central Texas*. Unpublished Master's Thesis. Department of Applied Geography, University of North Texas, Denton.

Williams, Thomas J. and Wilson W. Crook, III
2013 Geochemical Analysis of Primary Chert Outcrops from the Edwards Plateau: A Methodological Approach for the Use of pXRF in Material Sourcing. Paper presented at the 84th Annual Meeting of the Texas Archeological Society, October 25-27, Del Rio.

Willimon, Edward L.
1970 *Quaternary Gastropods and Paleoecology of the Trinity River Floodplain of Dallas County, Texas*. Unpublished Master's Thesis. Department of Geology, Southern Methodist University, Dallas.

1972 New Local Faunas and Paleoecology (Pleistocene) of North Central Texas. *Texas Journal of Science* 23(4):449-469.

Winchell, Frank W.
1985 Macrobotanical Remains (Fine Screen). In *The Archeology and History of Lake Ray Roberts: "Settlement in a Marginal Zone"*. Volume III, S. Alan Skinner and Linda Baird, assemblers, pp. A3-1-A.3-4, AR Consultants, Inc., Dallas, Texas.

Wing, Elizabeth S. and Antoinette B. Brown
1979 *Paleonutrition: Method and Theory in Prehistoric Foodways*. Academic Press, New York.

Yaalon, Dolev H. and Dov Kalmar
1978 Dynamics of Cracking and Swelling Clay Soils: Displacement of Skeletal Grains, Optimum Depth of Slickenslides, and Rate of Intra-Pedonic Turbation. *Earth Science Processes* 3:31-42.

APPENDIX I: Artifact Descriptions

Carrollton

General Description: A medium-sized dart point that is "Christmas tree" shaped in general outline. The blade is prominently triangular with a rectangular stem. Barbs, such as are seen on Bulverde points, are generally absent. Blades on non-resharpened points are broad, much more so than seen on Dawson or other triangular-shaped point types. This broad outline diminishes with use and resharpening while the stem generally retains its original size. The lateral edges of the stem are typically straight but can be slightly contracting based on lithic material. The base is typically straight but again can be slightly convex based on lithic material. Edge grinding to facilitate hafting can be found on the lateral edges of the stem on all true Carrollton points. This is a key diagnostic feature and distinguishes Carrollton points from other similar shaped dart points such as Bulverde and Dawson types. The edge grinding can also extend to the base in some specimens.

Carrollton points from the Upper Trinity watershed (n=252) average 56.4 mm in length and generally retain their broad, triangular blade. Maximum blade width averages 28.8 mm; maximum thickness averages 9.1 mm. Stems (hafting element) average 18.2 mm in length and 16.1 mm in width. The hafting element averages 32 percent of the total length of the point. In Southeast Texas (Liberty County), Carrollton points are typically smaller (average length - 42.8 mm) having been extensively resharpened with use. Blade widths are narrower, averaging 27.2 mm. Maximum thickness for Liberty County Carrollton points is 8.0 mm. Hafting element lengths average 15.1 mm in length and 15.7 mm in width. The hafting element averages 35 percent of the length of the point.

This point was originally described from the Wheeler site (41DL30) near the town of Carrollton in Dallas County and from similar Early to Middle Archaic sites in the Upper Trinity watershed (see major Texas Carrollton sites below). Carrollton points are almost always constructed from chert, typically Edwards chert. A few are known to have been made from Ogallala quartzite but these are in the definite minority compared to Carrollton points made from high quality chert.

Original Recorder: Wilson W. Crook, Jr. (1952) and later Wilson W. Crook, Jr. with R. King Harris (1952, 1954) were the first to describe this point. Crook and Harris named it "Carrollton Stemmed" for examples found along the Elm Fork near the town of Carrollton, Texas in northwest Dallas County. Type examples were found at a number of sites along the Elm Fork and the main stem of the Trinity River in Denton, Dallas, and Kaufman counties. Suhm and Krieger (1954) and Suhm and Jelks (1962) shortened the name to just "Carrollton". Wilson W. Crook, III (2007a, 2007b) found the point type in Early to Middle Archaic sites along the East Fork of the Trinity River in Collin County. Patterson (1982, 1983, 1991, 2001) and others have described the point from a number of Archaic sites (41HR185, 41HR290, 41HR571, 41FB37, and others) along the Trinity River drainage and elsewhere in southeast Texas (Harris, Fort Bend, Wharton, Austin, Gaines, Washington, Liberty, Polk, and Tyler Counties). The point has now also been found in a number of sites in Southeast Texas, primarily east of the Trinity River and its tributaries in Liberty County (Crook et al. 2017; Crook 2018c).

Type Carrollton points from sites in Dallas, Denton, and Collin Counties. Left to Right: Wheeler (41DL30) (n=3), Upper Farmersville North (41COL166), Lake Dallas (41DN6), Dowdy Ferry (41DL332)

Other names: Carrollton Stemmed

Age: Early Archaic to basal Middle Archaic; like many dart points in Texas, the Carrollton point has not been precisely dated. Crook (1959) reported an age for the upper part of the Carrollton phase occupation as ca. 6000 B.P. based on a single radiocarbon date from the Wood Pit (41DL76) in Dallas County. The majority of the Carrollton Phase including Carrollton points were found as much as 50-70 cm below the level where the radiocarbon date was obtained. Thus the 6000 B.P. date should be seen as an absolute minimum date for the point with its origins being significantly older, possibly as old as 7000-8000 B.P. In Southeast Texas, Patterson (1991) estimated the age of Carrollton points to be 7000 B.P. as it occurred well below a level dated to 6490 ± 120 B.P. at site 41FB37 in Fort Bend County. In this regard, the proposed projectile point sequence of Prikryl (1990:62) should be modified to reflect this significantly older occurrence.

Cultural Affiliation: Early Archaic to lower part of the Middle Archaic; Carrollton points are found with other Early Archaic point types including Gower, Trinity, Wheeler Leaf, Calf Creek Horizon (Andice/Bell/Calf Creek), Bulverde, and Dallas. Other diagnostic artifacts found with Carrollton points include Clear Fork gouges, Waco sinkers, and Carrollton double-bitted axes.

Carrollton points from the Wood Springs site (41LB15) in Liberty County. Note the decrease in the size of the blade from right-to-left with resharpening while the stem remains generally close to its original size.

Texas Distribution: Found throughout the Upper Trinity watershed in North Central Texas including Denton, Dallas, eastern Tarrant, Collin, and Kaufman counties. The point has been found in sites along the Trinity River and its tributaries in Southeast Texas, especially Liberty County. Carrollton points have also been reported from Early Archaic sites in Harris, Fort Bend, Wharton, Austin, Gaines, Washington, Polk, and Tyler Counties. Its distribution significantly to the east and west of the Trinity Watershed is unknown but appears to be limited.

Major Texas Carrollton Sites: Wheeler (41DL30) (Crook 1952; Crook and Harris 1952, 1953, 1954), Lake Dallas (41DN6), Obshner (41DL116) (Crook and Harris, 1955), Dowdy Ferry (41DL332) (Crook 2007c), Milton Pit (41DL259) (Crook 2008a), Carrollton Dam (41DL12) (Crook 2008b), Frognot (41COL165) and Upper Farmersville North (41COL166) along the East Fork of the Trinity (Crook 2007a, 2007b). Outside of the Upper Trinity Watershed, specimens have been found at the Wood Springs (41LB15) and Moss Hill (41LB65) sites in Liberty County (Crook et al. 2017; Crook 2018). Also at sites throughout Southeast Texas west of the Trinity River including Harris (41HR185, 41HR290, 41HR571 and others), Fort Bend (41FB37), Wharton, and other counties (Patterson 1982, 1983, 1991, 2001; McClure and Patterson 1988; Patterson and Huggins 1987; Kindall and Patterson 1986).

Sources for Illustrations and Descriptions: Crook (1952), Crook and Harris (1952, 1954), Crook (2007b, 2007c, 2008a, 2008b, 2018), Suhm and Krieger (1954), Suhm and Jelks (1962); Crook et al. 2017; Crook 2018. Some of the depictions in Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) do not depict Carrollton points as originally described by Crook and Harris from the Upper Trinity watershed. Many of these illustrations show points with either significant barbs and/or rounded stems which are not present in any of the type material.

Comments: There is some confusion regarding the distribution and form of this point type, especially in Texas archeological contexts outside of the Trinity River watershed. Depictions in Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) show points which do not match those present in the type collections of either Wilson W. Crook, Jr. or R. King Harris. Moreover, these publications list the point type as Middle Archaic in age whereas in situ excavation provenience from the Upper Trinity watershed unambiguously shows the point to be Early Archaic extending into the basal part of the Middle Archaic. Much of the original type material referenced below is stored in the Museum Support Center of the Smithsonian Institution and is available to the public for research.

Selected References:

Crook, Wilson W., Jr.
1952 The Wheeler Site: A 3,500 Year Old Culture in Dallas County, Texas. *Field and Laboratory* 20(2):43-60. Southern Methodist University, Dallas, Texas.

1959 C-14 Date for Late Carrollton Focus Archaic Level: 6,000 Years B.P. *Oklahoma Anthropological Society Newsletter* 8(3):1-2. Oklahoma Anthropological Society, Norman.

Crook, Wilson W., Jr. and R. K. Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society* 23:7-38.

1953 Some Recent Finds at the Wheeler Site Near Carrollton, Texas. *The Record* 11(5):1-3. Dallas Archeological Society, Dallas.

1954 Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. *The Record* 12(1):1-16. Dallas Archeological Society, Dallas.

1955 Scottsbluff Points in the Obshner Site Near Dallas, Texas. *Bulletin of the Texas Archeological Society* 26:75-100.

Crook, Wilson W., III
2007a The Frognot Site (41COL165): A Late Paleoindian to Middle Archaic Occupation in Collin County, Texas. *The Record* 55(2):1-10. Dallas Archeological Society, Dallas.

2007b The Upper Farmersville North Site (41COL166): A Pure Archaic Occupation in Collin County, Texas. *The Record* 55(2):11-18. Dallas Archeological Society, Dallas.

2007c The Dowdy Ferry Site: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Journal* 131:9-25. Houston Archeological Society, Houston.

2008a The Milton Pit: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Record* 56(1):1-11. Dallas Archeological Society, Dallas.

2008b The Carrollton Dam Site (41DL12): A Small Archaic Campsite in Northwestern Dallas County, Texas. *The Record* 56(1):22-30. Dallas Archeological Society, Dallas.

2018 The Occurrence of Carrollton Phase Archaic Materials in Southeast Texas. In, *Neither Snow, Nor Rain, Nor Heat, Nor Dark of Night, Shall Stay These Couriers: Essays Honoring Jay C. Blaine*, edited by S. Alan Skinner and Molly A. Hall, pp. 87-96. Texas Archeological Society.

Crook, Wilson W., III, Robert J. Sewell, Linda C. Gorski and Louis F. Aulbach
2017 *The Andy Kyle Archeological Collection*. Report of the Houston Archeological Society No. 29:13-56, Houston.

Kindall, Sheldon and Leland W. Patterson
1986 The Andy Kyle Archeological Collection, Southeast Texas. *The Journal* 86:14-21. Houston Archeological Society, Houston.

McClure, W. L. and L. W. Patterson
1988 Early Projectile Points from 41HR290, Harris County, Texas. *The Journal* 92:15-16. Houston Archeological Society, Houston.

Patterson, L. W.
1982 A Restudy of Site 41HR185, Harris County, Texas. *The Journal* 73:3-7. Houston Archeological Society, Houston.

1983 Prehistoric Settlement and Technological Patterns in Southeast Texas. *Bulletin of the Texas Archeological Society* 54:253-269. Texas Archeological Society, Austin.

1991 Dart Point Chronologies of Southeast Texas. *The Journal* 101:1-5. Houston Archeological Society, Houston.

1998 Early Archaic Projectile Points in Southeast Texas. *The Journal* 121:1-13. Houston Archeological Society, Houston.

Patterson, L. W. and J. D. Huggins
1987 Test Excavations at Site 41FB37, Fort Bend County, Texas. *The Journal* 88:1-8. Houston Archeological Society, Houston.

Prikryl, Daniel J.
1990 *Lower Elm Fork Prehistory*. Office of the State Archeologist Report 37. Texas Historical Commission, Austin.

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Suhm, Dee Ann, and Edward B. Jelks
1962 *Handbook of Texas Archeology: Type Descriptions.* Published by the Texas Archeological Society, Special Publication Number One and the Texas Memorial Museum, Bulletin Number 4.

Turner, Ellen Sue, and Thomas R. Hester
1985 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1993 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1999 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

Turner, Ellen Sue, Thomas R. Hester, and Richard L. McReynolds
2011 *Stone Artifacts of Texas Indians.* Taylor Trade Publishing.

Trinity

General Description: A medium-sized to small (with use and resharpening) dart point that is generally sub-triangular in outline. The blade is triangular with weak shoulders forming shallow notches. In all true Trinity points the notches have been ground smooth to facilitate hafting. The base is prominently convex and can also occasionally be ground. The edge grinding in the notches is what distinguishes this point from other similar dart point types such as Godley and Ellis. Trinity points are relatively thick and crudely flaked and are considerably larger than similarly-shaped Elam points. Size of the point does decrease with use and resharpening (see figure below). Type examples are typically made from chert but points made from quartzite and silicified wood are known.

This point was originally described by Robert L. Stephenson (1949) from his initial surveys of the Garza-Little Elm Reservoir along the Elm Fork of the Trinity River in Denton and Dallas Counties. Crook and Harris further defined the point from occurrences at the Lake Dallas (41DN6) and Wheeler (41DL30) sites in Denton and Dallas counties and from similar Early to Middle Archaic sites in the Upper Trinity watershed (Crook 1952; Crook and Harris 1952, 1953, 1954, 1955). Trinity points are constructed from either chert or local quartzite and are found in association with other Early Archaic to Middle Archaic dart points such as Gower, Carrollton, Wheeler Leaf, Calf Creek Horizon (Andice/Bell/Calf Creek), Bulverde, and Dallas types. Other associated diagnostic lithic material includes Clear Fork gouges, Waco sinkers, and Carrollton double-bitted axes.

Type Trinity points from sites in Dallas, Denton, and Collin Counties.
Top Row, Left to Right: Wheeler (41DL30), Lake Dallas (41DN6), Carrollton Dam (41DL12), Wheeler (41DL30)
Bottom Row, Left to Right: Dowdy Ferry (41DL332), Upper Farmersville North (41COL166), Wheeler (41DL30) (n=2)

Original Recorder: Robert L. Stephenson (1949) and later Wilson W. Crook, Jr. (1952) and Wilson W. Crook, Jr. with R. King Harris (1952, 1954) were the first to describe this point. Stephenson and Crook and Harris named the point "Trinity Stemmed" for examples found along the Elm Fork and the main stem of the Trinity River in Denton, Dallas, and Kaufman counties. Suhm and Krieger (1954) and Suhm and Jelks (1962) shortened the name to just "Trinity". Wilson W. Crook, III found the point type in other sites along the main stem of the Trinity River as well as in Early Archaic to Middle Archaic contexts along the East Fork of the Trinity in Collin County (Crook 2007a, 2007b, 2007c, 2008a, 2008b). More recently, Trinity points have been found in Carrollton phase Archaic sites in Liberty County (Crook et al. 2017; Crook 2018). Patterson (1991, 2001) and others have described the point from a number of Archaic sites (41HR290, 41HR571, 41FB37, and others) west of the Trinity in Harris, Fort Bend, and Wharton counties.

Other names: Trinity Stemmed

Age: Early Archaic to the lower part of the Middle Archaic. Like many dart points in Texas, the Trinity point has not been precisely dated. Crook (1959) reported a date for the upper part of the Carrollton phase occupation as ca. 6,000 B.P. based on a single radiocarbon date from the Wood Pit (41DL76) in Dallas County. The majority of the Carrollton phase including Trinity points have been found as much as 50-70 cm below the level where the radiocarbon date was obtained. Trinity points have been found both below and above the level of this date thus the 6000 B.P. date should be seen as bracketing the date for the point with its origins being older than 6000 B.P.

Cultural Affiliation: Early Archaic to basal Middle Archaic; Trinity points are found with other Archaic point types including Gower, Carrollton, Wheeler Leaf, Andice/Bell/Calf Creek, Bulverde, and Dallas points. Other associated diagnostic lithic artifacts include Clear Fork gouges, Waco sinkers, and Carrollton double-bitted axes.

Texas Distribution: Found throughout the Upper Trinity watershed in North Central Texas including Denton, Dallas, eastern Tarrant, Collin, and Kaufman counties. Recently, the point has been found in sites east of the Trinity River in Liberty County (Kindall and Patterson 1986; Crook et al. 2017; Crook 2018). Trinity points have been noted in sites west of the Trinity in southeast Texas including Harris and Fort Bend Counties. Its distribution significantly to the east and west of the Trinity Watershed appears to be limited.

Major Texas Trinity Sites: Wheeler (41DL30) (Crook 1952; Crook and Harris 1952, 1953, 1954), Lake Dallas (41DN6), Obshner (41DL116) (Crook and Harris, 1955), Dowdy Ferry (41DL332) (Crook 2007c), Milton Pit (41DL259) (Crook 2008a), Carrollton Dam (41DL12) (Crook 2008b), Frognot (41COL165) and Upper Farmersville North (41COL166) along the East Fork of the Trinity (Crook 2007a, 2007b). Outside of the Upper Trinity watershed, specimens have been found at the Wood Springs (41LB15) and Moss Hill (41LB65) sites in Liberty County (Crook 2018) and in sites west of the Trinity River in Southeast Texas including Harris (41HR290, 41HR571, and others) and Fort Bend (41FB37) counties (Patterson 1991, 2001; McClure and Patterson 1988; Patterson and Huggins 1987).

Sources for Illustrations and Descriptions: Crook (1952), Crook and Harris (1952, 1954), Crook (2007b, 2007c, 2008a, 2008b), Suhm and Krieger (1954), Suhm and Jelks (1962), Crook et al. (2017); Crook (2018). Some of the depictions in Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) do not depict Trinity points as originally described by Stephenson and Crook and Harris from the Upper Trinity watershed as they show points with straight bases which are not present in any of the type material (see figure above).

Comments: There is some confusion regarding the age of this point type. Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) list the point as "Middle to Late Archaic" which would correspond to the Elam Archaic Phase of the Upper Trinity River watershed. Trinity points have been found in unambiguous stratigraphic contexts with Gower, Carrollton, and other Early Archaic dart point types. Trinity points are not found in Elam Phase occupational levels. Thus they should be considered late stage Early Archaic extending into the lower part of the Middle Archaic. In this regard, the proposed projectile point sequence of Prikryl (1990:62) should be modified to reflect this older occurrence. Type specimens of Trinity points can be found in the collections of either Wilson W. Crook, Jr. or R. King Harris. Much of the type material referenced below is stored in the Museum Support Center of the Smithsonian Institution and is available to the public for research.

Selected References:

Crook, Wilson W., Jr.
1952 The Wheeler Site: A 3,500 Year Old Culture in Dallas County, Texas. *Field and Laboratory* 20(2):43-60. Southern Methodist University, Dallas, Texas.

1959 C-14 Date for Late Carrollton Focus Archaic Level: 6,000 Years B.P. *Oklahoma Anthropological Society Newsletter* 8(3):1-2. Oklahoma Anthropological Society, Norman.

Crook, Wilson W., Jr. and R. K. Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society* 23:7-38.

1953 Some Recent Finds at the Wheeler Site Near Carrollton, Texas. *The Record* 11(5):1-3. Dallas Archeological Society, Dallas.

1954 Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. *The Record* 12(1):1-16. Dallas Archeological Society, Dallas.

1955 Scottsbluff Points in the Obshner Site Near Dallas, Texas. *Bulletin of the Texas Archeological Society* 26:75-100.

Crook, Wilson W., III
2007a The Frognot Site (41COL165): A Late Paleoindian to Middle Archaic Occupation in Collin County, Texas. *The Record* 55(2):1-10. Dallas Archeological Society, Dallas.

2007b The Upper Farmersville North Site (41COL166): A Pure Archaic Occupation in Collin County, Texas. *The Record* 55(2):11-18. Dallas Archeological Society, Dallas.

2007c The Dowdy Ferry Site: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Journal* 131:9-25. Houston Archeological Society, Houston.

2008a The Milton Pit: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Record* 56(1):1-11. Dallas Archeological Society, Dallas.

2008b The Carrollton Dam Site (41DL12): A Small Archaic Campsite in Northwestern Dallas County, Texas. *The Record* 56(1):22-30. Dallas Archeological Society, Dallas.

2018 The Occurrence of Carrollton Phase Archaic Materials in Southeast Texas. In, *Neither Snow, Nor Rain, Nor Heat, Nor Dark of Night, Shall Stay These Couriers: Essays Honoring Jay C. Blaine*, edited by S. Alan Skinner and Molly A. Hall, pp. 87-96. Texas Archeological Society.

Crook, Wilson W., III, Robert J. Sewell, Linda C. Gorski and Louis F. Aulbach
2017 *The Andy Kyle Archeological Collection*. Report of the Houston Archeological Society No. 29:13-56, Houston.

Kindall, S. M. and L. W. Patterson
1986 The Andy Kyle Archeological Collection Southeast Texas. *The Journal* 86:14-25. Houston Archeological Society, Houston.

McClure, W. L. and L. W. Patterson
1988 Early Projectile Points from 41HR290, Harris County, Texas. *The Journal* 92:15-16. Houston Archeological Society, Houston.

Patterson, L. W.
1991 Dart Point Chronologies of Southeast Texas. *The Journal* 101:1-5. Houston Archeological Society, Houston.

1998 Early Archaic Projectile Points in Southeast Texas. *The Journal* 121:1-13. Houston Archeological Society, Houston.

Patterson, L. W. and J. D. Huggins
1987 Test Excavations at Site 41FB37, Fort Bend County, Texas. *The Journal* 88:1-8. Houston Archeological Society, Houston.

Prikryl, Daniel J.
1990 *Lower Elm Fork Prehistory*. Office of the State Archeologist Report 37. Texas Historical Commission, Austin.

Stephenson, Robert L.
1959 Archeological Survey of Lavon and Garza-Little Elm Reservoirs: A Preliminary Report. *Bulletin of the Texas Archeological and Paleontological Society* 20(21-62).

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Suhm, Dee Ann, and Edward B. Jelks
1962 *Handbook of Texas Archeology: Type Descriptions.* Published by the Texas Archeological Society, Special Publication Number One and the Texas Memorial Museum, Bulletin Number 4.

Turner, Ellen Sue, and Thomas R. Hester
1985 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1993 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1999 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

Turner, Ellen Sue, Thomas R. Hester, and Richard L. McReynolds
2011 *Stone Artifacts of Texas Indians.* Taylor Trade Publishing.

Wheeler Leaf

General Description: A medium-sized dart point that is leaf-shaped in general outline. The blade is prominently triangular with an ovoid, contracting stem. Shoulders and barbs are completely absent. No edge grinding is present. The point is typically thick and crudely made but some thinner, better made examples have been found.

This point was originally described by Wilson W. Crook, Jr. from the Wheeler site (41DL30) in Dallas County and from similar Early Archaic to Middle Archaic sites in the Upper Trinity watershed (Carrollton phase Archaic). The point is named for its type locality in Dallas County. Wheeler Leaf points are predominantly constructed from chert, although points made from novaculite, quartzite and silicified wood are also known. In most cases, points made from lithic material other than chert have been extensively heat-treated prior to knapping.

Wheeler Leaf points look very similar to many forms of ovoid to leaf-shaped bifacial cutting tools including knives. However, extensive examination of type specimens under a high power microscope (20-200x) has failed to reveal any wear patterns that are consistent with their use as anything but a projectile point. Moreover, a number of examples have distal end impact fractures which are consistent with their use as dart points. Beveling, either two or four edged, is also absent which further distinguishes Wheeler Leaf points from some bifacial knives. Wheeler Leaf points have contracting, rounded stems which serves to distinguish them from Lerma points. They are longer and narrower than Absolo points, having a length-to-width ratio typically close to 2:5 whereas Absolo points have a ratio significantly below 2:1. Wheeler Leaf points are very similar in general shape to Refugio points but are significantly older having been found in situ with Early Archaic and Middle Archaic artifacts of the Carrollton phase. As Refugio points are primarily a later South and South-Central Texas artifact, is remains unclear what, if any, association there is between the two point types.

Type Wheeler Leaf points from sites in Dallas, Denton, and Kaufman Counties.
Top Row, Left to Right: Wheeler (41DL30), Dowdy Ferry (41DL332) (n=2),
Lake Dallas (41DN6) (n=2)
Bottom Row, Left to Right: Dowdy Ferry (41DL332) (n=2), Wheeler (41DL30),
Miklas, (41KF59), Wheeler (41DL30)
Note the prominent impact fracture on the last point on the bottom row.

Original Recorder: Wilson W. Crook, Jr. (1952) and later Wilson W. Crook, Jr. with R. King Harris (1952, 1954) were the first to describe this point. Crook and Harris named it "Wheeler Leaf" for examples found along the Elm Fork and the main stem of the Trinity River in Dallas, Denton, Kaufman and Ellis Counties. Wilson W. Crook, III (2007c, 2008a, 2008b) found the point type in Carrollton Phase Archaic sites along the main stem of the Trinity as well as in Early Archaic sites along the East Fork of the Trinity in Collin County (Crook 2007a, 2007b). The point has also been found in similarly aged sites in Kaufman County (Crook 2012). As the point type was never fully described by Crook and Harris, it was not included in the listing of Texas dart point types by Suhm and Krieger (1954), Suhm and Jelks (1962) or in subsequent guidebooks of Texas point types (Turner and Hester 1985, 1993, 1999 and Turner et al. 2011). Crook (2018a) wrote a comprehensive point description which was published in *The Journal* of the Houston Archeological Society. The dual name of Wheeler Leaf was retained to avoid confusion with the Wheeler Paleoindian point type of the Southeastern United States.

Other names: None

Age: Early Archaic to Middle Archaic. Like many points in Texas, the Wheeler Leaf point has not been precisely dated. Crook (1959) reported a date for the upper part of the Carrollton phase occupation as ca. 6000 B.P. based on a single radiocarbon date from the Wood Pit (41DL76) in Dallas County. The majority of the Carrollton phase Archaic, including Wheeler Leaf points, has been found as much as 50-70 cm below the level where the radiocarbon date was obtained. Thus the 6000 B.P. date should be seen as an absolute minimum date for the point with its origins being significantly older, possibly as old as 7000-8000 B.P. Like Carrollton and Trinity point types, Wheeler Leaf points are also found above the level where the ca. 6000 B.P. date was obtained so they extend up into the lower part of the Middle Archaic.

Cultural Affiliation: Early Archaic to Middle Archaic; Wheeler Leaf points are found with other Archaic point types including Gower, Carrollton, Trinity, Calf Creek Horizon (Andice/Bell/Calf Creek), Bulverde, and Dallas points. Other associated diagnostic lithic artifacts include Clear Fork gouges, Waco sinkers, and Carrollton double-bitted axes.

Texas Distribution: Found throughout the Upper Trinity watershed in North Central Texas including Denton, Dallas, Collin, and Kaufman counties. Examples of similar points have been found in the Andy Kyle Artifact Collection (Sam Houston Regional Library and Research Center) from four sites in Liberty County (Wood Springs, Savoy, Knight's Forest, and Moss Hill). Therefore its distribution probably extends the length of the Trinity River as does that for Carrollton, Trinity, and Dallas points. Wheeler Leaf points were also found at the Acton site in Hood County in association with other elements of the Carrollton phase Archaic (Blaine et al. 1968). Thus the point's full distribution outside of the Trinity watershed region remains unknown.

Major Texas Wheeler Leaf Sites: Wheeler (41DL30) (Crook 1952; Crook and Harris 1952, 1953, 1954), Lake Dallas (41DN6), Obshner (41DL116) (Crook and Harris, 1955), Dowdy Ferry (41DL332) (Crook 2007c), Milton Pit (41DL259) (Crook 2008a), Post Oak (41DL429) (Crook 2008b), Frognot (41COL165) and Upper Farmersville North (41COL166) along the East Fork of the Trinity (Crook 2007a, 2007b), and Miklas (41KF59) in Kaufman County; also at Wood Springs (41LB15), Moss Hill (41LB65), and other sites in Liberty County that are within the Trinity River drainage.

Sources for Illustrations and Descriptions: Crook (1952), Crook and Harris (1952, 1954), Crook (2008a, 2008b, 2012); Crook et al. (2017); Crook (2018a, 2018b).

Comments: Based on the number of examples identified, their distribution extends from the Upper Trinity watershed to Liberty County in Southeast Texas. As extensive physical examination demonstrates conclusively their use as projectile points, the Wheeler Leaf should be considered a valid Texas dart point type. The point is also distinct from other ovoid to leaf-shaped points such as Lerma, Absolo, and Refugio. Much of the original type material referenced below is curated either in the collections of Wilson W. Crook, Jr. or those of R. King Harris which is stored in the Museum Support Center of the Smithsonian Institution and is available to the public for research. Other examples are part of the Andy Kyle Artifact Collection curated at the Sam Houston Regional Library and Research Center in Liberty, Texas.

Selected References:

Crook, Wilson W., Jr.
1952 The Wheeler Site: A 3,500 Year Old Culture in Dallas County, Texas. *Field and Laboratory* 20(2):43-60. Southern Methodist University, Dallas, Texas.

1959 C-14 Date for Late Carrollton Focus Archaic Level: 6,000 Years B.P. *Oklahoma Anthropological Society Newsletter* 8(3):1-2. Oklahoma Anthropological Society, Norman.

Crook, Wilson W., Jr. and R. K. Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society* 23:7-38.

1953 Some Recent Finds at the Wheeler Site Near Carrollton, Texas. *The Record* 11(5):1-3. Dallas Archeological Society, Dallas.

1954 Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. *The Record* 12(1):1-16. Dallas Archeological Society, Dallas.

1955 Scottsbluff Points in the Obshner Site Near Dallas, Texas. *Bulletin of the Texas Archeological Society* 26:75-100.

Crook, Wilson W., III
2007a The Frognot Site (41COL165): A Late Paleoindian to Middle Archaic Occupation in Collin County, Texas. *The Record* 55(2):1-10. Dallas Archeological Society, Dallas.

2007b The Upper Farmersville North Site (41COL166): A Pure Archaic Occupation in Collin County, Texas. *The Record* 55(2):11-18. Dallas Archeological Society, Dallas.

2007c The Dowdy Ferry Site: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Journal* 131:9-25. Houston Archeological Society, Houston.

2008a The Milton Pit: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Record* 56(1):1-11. Dallas Archeological Society, Dallas.

2008b The Post Oak Site (41DL429): A Unique *In Situ* Archaic Campsite in Southeastern Dallas County, Texas. *The Record* 56(1):12-21. Dallas Archeological Society, Dallas.

2012 The Miklas Site (41KF59): A Large Multi-Component Archaic Campsite in Southwestern Kaufman County, Texas. *Archeological Journal of the Texas Prairie-Savannah* 2(1):24-31.

2018a The Wheeler Leaf Point: A Diagnostic Component of the Carrollton Phase of the Trinity River Archaic. *The Journal* 139:39-48. Houston Archeological Society, Houston.

2018b The Occurrence of Carrollton Phase Archaic Materials in Southeast Texas. In, *Neither Snow, Nor Rain, Nor Heat, Nor Dark of Night, Shall Stay These Couriers: Essays Honoring Jay C. Blaine*, edited by S. Alan Skinner and Molly A. Hall, pp. 87-96. Texas Archeological Society.

Crook, Wilson W., III, Robert J. Sewell, Linda C. Gorski and Louis F. Aulbach
2017 *The Andy Kyle Archeological Collection*. Report of the Houston Archeological Society No. 29:13-56, Houston.

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Suhm, Dee Ann, and Edward B. Jelks
1962 *Handbook of Texas Archeology: Type Descriptions.* Published by the Texas Archeological Society, Special Publication Number One and the Texas Memorial Museum, Bulletin Number 4.

Turner, Ellen Sue, and Thomas R. Hester
1985 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1993 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1999 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

Turner, Ellen Sue, Thomas R. Hester, and Richard L. McReynolds
2011 *Stone Artifacts of Texas Indians.* Taylor Trade Publishing.

Dallas

General Description: A small to medium-sized dart point that is generally pentagonal in outline. The blade is triangular with weak shoulders. The stem tapers slightly to a straight to slightly concave base thus creating an overall pentagonal shape. Edge grinding to facilitate hafting is present on the stems of some but not all specimens. Dallas points are relatively thick and crudely flaked.

This point was originally described by Wilson W. Crook, Jr. from occurrences at the Wheeler site (41Dl30) in Dallas County. Crook and R. King Harris further described the point from similar Early Archaic to Middle Archaic sites in the Upper Trinity watershed (Crook 1952; Crook and Harris 1952, 1953, 1954, 1955). Dallas points are constructed from either chert or local quartzite and are found in association with other Early Archaic to Middle Archaic dart point types such as Carrollton, Trinity, and Wheeler Leaf. In Southeast Texas, especially east of the Trinity River, Dallas points are also known to have been constructed from silicified wood.

Type Dallas points from sites in Dallas, Denton, and Hunt Counties.
Top Row, Left to Right: Bachman Dam (41DL23), Wheeler (41DL30) (n=2), Hess (41HU81)
Bottom Row, Left to Right: Wheeler (41DL30) (n=2), Lake Dallas (41DN6) (n=2)

Original Recorder: Wilson W. Crook, Jr. (1952) and Wilson W. Crook, Jr. with R. King Harris (1952, 1954) were the first to describe this point. Crook and Harris named it "Dallas Pentagonal" for examples found along the Elm Fork and the main stem of the Trinity River in Denton, Dallas, and Kaufman counties. Suhm and Krieger (1954) and Suhm and Jelks (1962) shortened the name to just "Dallas". Wilson W. Crook, III found the point type in other sites along the main stem of the Trinity River (Bachman Dam 41DL23, Dowdy Ferry 41DL332) as well as in Early Archaic to Middle Archaic sites along the East Fork of the Trinity in Collin County (Frognot 41COL165) (Crook 2007a, 2007b, 2012). Recently, Dallas points have been found in Southeast Texas from sites east of the Trinity River in Liberty and Sabine counties (Crook et al. 2017; Crook 2018b).

Other names: Dallas Pentagonal, Dallas Stemmed

Age: Middle Archaic. Like many dart points in Texas, the Dallas point has not been precisely dated. Crook (1959) reported a date for the upper part of the Carrollton Phase occupation as ca. 6000 B.P. based on a single radiocarbon date from the Wood Pit (41DL76) in Dallas County. The majority of the Carrollton phase Archaic has been found as much as 50-70 cm below the level where the radiocarbon date was obtained. However, Dallas points have only been found at or above the level of this date thus the 6000 B.P. date should be seen as the oldest possible date for the point with its occurrence typically being less than 6000 B.P.

Cultural Affiliation: Middle Archaic; Dallas points are found with other Archaic point types including Carrollton, Trinity, Wheeler Leaf, and Bulverde points. Other associated diagnostic lithic artifacts include Clear Fork gouges, Waco sinkers, and Carrollton axes.

Texas Distribution: Found throughout the Upper Trinity watershed in North Central Texas including Denton, Dallas, Collin, and Kaufman counties. The point has also been found in Carrollton phase Archaic sites east of the Trinity River in Liberty County as well as at one site in Sabine County.

Major Texas Dallas Sites: Wheeler (41DL30) (Crook 1952; Crook and Harris 1952, 1953, 1954), Lake Dallas (41DN6), Obshner (41DL116) (Crook and Harris, 1955), Dowdy Ferry (41DL332) (Crook 2007b), Bachman Dam (41DL23) (Crook 2012), and Frognot (41COL165) along the East Fork of the Trinity (Crook 2007a); at Wood Springs (41LB15) and Moss Hill (41LB65) in Liberty County; and at Brookeland (41SB73) in Sabine County.

Sources for Illustrations and Descriptions: Crook (1952), Crook and Harris (1952, 1954), Suhm and Krieger (1954), Suhm and Jelks (1962), Crook et al. 2017; Crook (2018b). Some of the depictions in Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) do not depict Dallas points as originally described by Crook and Harris from the Upper Trinity watershed as they show points with wider shoulders which are not present in any of the type material.

Comments: There is some confusion regarding the age of this point type. Turner and Hester (1985, 1993, 1999) and Turner et al. (2011) list the point as "Middle to Late Archaic" which would correspond to the Elam Archaic phase of the Upper Trinity River watershed. It should be noted that Dallas points have been in Carrollton phase Archaic contexts but only at or above the Pattillo-Albritton Formation contact. As this level has been radiocarbon dated at ca. 6000 B.P., Dallas points should be seen as a Middle Archaic dart point. Type collections of Dallas points can be found in the collections of either Wilson W. Crook, Jr. or R. King Harris. Much of the type material referenced below is stored in the Museum Support Center of the Smithsonian Institution and is available to the public for research.

Selected References:

Crook, Wilson W., Jr.
1952 The Wheeler Site: A 3,500 Year Old Culture in Dallas County, Texas. *Field and Laboratory* 20(2):43-60. Southern Methodist University, Dallas, Texas.

1959 C-14 Date for Late Carrollton Focus Archaic Level: 6,000 Years B.P. *Oklahoma Anthropological Society Newsletter* 8(3):1-2. Oklahoma Anthropological Society, Norman.

Crook, Wilson W., Jr. and R. K. Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society* 23:7-38.

1953 Some Recent Finds at the Wheeler Site Near Carrollton, Texas. *The Record* 11(5):1-3. Dallas Archeological Society, Dallas.

1954 Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. *The Record* 12(1):1-16. Dallas Archeological Society, Dallas.

1955 Scottsbluff Points in the Obshner Site Near Dallas, Texas. *Bulletin of the Texas Archeological Society* 26:75-100.

Crook, Wilson W., III
2007a The Frognot Site (41COL165): A Late Paleoindian to Middle ArchaicOccupation in Collin County, Texas. *The Record* 55(2):1-10. Dallas Archeological Society, Dallas.

2007b The Dowdy Ferry Site: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Journal* 131:9-25. Houston Archeological Society, Houston.

2012 The Bachman's Dam Site (41DL23): A Small Early Archaic Campsite in Northwestern Dallas County, Texas. *Archeological Journal of the Texas Prairie-Savannah* 2(1):16-23.

2018 The Occurrence of Carrollton Phase Archaic Materials in Southeast Texas. In, *Neither Snow, Nor Rain, Nor Heat, Nor Dark of Night, Shall Stay These Couriers: Essays Honoring Jay C. Blaine*, edited by S. Alan Skinner and Molly A. Hall, pp. 87- 96. Texas Archeological Society.

Crook, Wilson W., III, Robert J. Sewell, Linda C. Gorski and Louis F. Aulbach
2017 *The Andy Kyle Archeological Collection*. Report of the Houston Archeological Society No. 29:13-56, Houston.

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Suhm, Dee Ann, and Edward B. Jelks
1962 *Handbook of Texas Archeology: Type Descriptions.* Published by the Texas Archeological Society, Special Publication Number One and the Texas Memorial Museum, Bulletin Number 4.

Turner, Ellen Sue, and Thomas R. Hester
1985 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1993 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1999 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

Turner, Ellen Sue, Thomas R. Hester, and Richard L. McReynolds
2011 Stone Artifacts of Texas Indians. Taylor Trade Publishing.

Carrollton Axe

General Description: A medium to large-sized crudely flaked bifacial tool almost ubiquitously made from large cobbles of quartzite. One end of the cobble has been percussion flaked into a cutting/chopping bit while the opposite end is shaped into a more blunt edge and appears to have been used as a hammer. Extreme battering, edge crushing, and step fractures are common on both ends but especially on the blunt end of the tool. Near the midpoint of the artifact, two rough notches have been flaked, presumably to facilitate hafting. Some Carrollton axes show polish around the midpoint notches from hafting wear. Original cobble cortex is often present on one or both faces between the two flaked ends.

This tool was originally described by Harris (1941) from sites in Denton and Kaufman counties and later by Wilson W. Crook, Jr. and R. King Harris from 12 Carrollton phase Archaic sites in Denton, Dallas, Kaufman, and Henderson counties (Crook and Harris 1952, 1954a, 1954b, 1955). A total of 51 Carrollton axes have now been recorded from the Upper Trinity watershed from 23 sites. Typically larger Carrollton phase Archaic sites contain one to four Carrollton axes; the exception is the Miklas (41KF59) site in Kaufman County where a total of 10 axes have been recovered. Carrollton axes are almost universally made from local quartzite cobbles; the only exception being one axe from the Dowdy Ferry site which was made from silicified sandstone. McCormick's (1976) assertion that Carrollton axes were made from ironstone is patently false. Most do not show any signs of having been heat treated prior to construction. The artifact is found in association with Early Archaic to Middle Archaic dart point types such as Carrollton, Trinity, Wheeler Leaf, Bulverde, Calf Creek Horizon (Andice/Bell/Calf Creek), and Dallas. Other associated artifacts include Clear Fork gouges and Waco sinkers. In Southeast Texas, a single Carrollton axe has been found at the Wood Springs (41LB15) site.

Carrollton axe from the Wood Springs (41LB15) site, Liberty County, Texas.

Original Recorder: R. King Harris (1940) and later Wilson W. Crook, Jr. (1952), and Wilson W. Crook, Jr. with R. King Harris (1952, 1953, 1954a, 1954b, 1955) were the first to describe this tool. Crook and Harris originally referred to it as the "Carrollton bit-and-hammer" and later as the Carrollton "double-bitted axe". This was shortened to just the Carrollton axe by Suhm and Krieger (1954), Suhm and Jelks (1962), and Turner and Hester (1985, 1993, 1999). Although Carrollton phase sites have been found along the East Fork of the Trinity River and its tributaries, to date no Carrollton axes have been found in Collin County. One Carrollton axe was recently found at the Wood Springs site in Liberty County.

Other names: Carrollton Double-Bitted Axe, Carrollton Bit-and-Hammer

Age: Early Archaic to Middle Archaic. Like many Archaic artifacts in Texas, the Carrollton axe has not been precisely dated. Crook (1959) reported a date for the upper part of the Carrollton Phase occupation as ca. 6000 B.P. based on a single radiocarbon date from the Wood Pit (41DL76) in Dallas County. The majority of the Carrollton phase Archaic has been found as much as 50-70 cm below the level where the radiocarbon date was obtained. Only one Carrollton axe has been found in situ from the Obshner (41DL116) site and it was slightly below this level. Galm (1978) reported similar artifacts from Late Archaic sites in southern Oklahoma, however, Carrollton axes are completely unknown from the Late Archaic (Elam phase) in the Upper Trinity watershed. Late Prehistoric age axes in the region are considerably smaller and more celt-like.

Cultural Affiliation: Early Archaic to lower part of the Middle Archaic; Carrollton axes are found with Early to Middle Archaic point types including Carrollton, Trinity, Wheeler Leaf, Bulverde, and Dallas points. Other associated diagnostic lithic artifacts include Clear Fork gouges and Waco sinkers.

Texas Distribution: Found throughout the Upper Trinity watershed in North Central Texas including Denton, Dallas, and Kaufman counties. One axe is known from the Trinidad (41HE251) site in Henderson County Hatzenbuehler 1947). The artifact has also been found in one Carrollton phase Archaic site (Wood Springs) east of the Trinity River in Liberty County.

Major Texas Carrollton Axe Sites: Wheeler (41DL30) (Crook 1952; Crook and Harris 1952, 1954a, 1954b, 1955), Lake Dallas (41DN6), Wood Pit (41DL76) (Crook and Harris 1952), Obshner (41DL116) (Crook and Harris, 1955), Cottonwood (41DL235), Dowdy Ferry (41DL332) (Crook 2007), Edwards (41KF57), and Miklas (41KF59) (Crook 2012); Trinidad (41HE251); also at Wood Springs (41LB15) in Liberty County.

Sources for Illustrations and Descriptions: Crook (1952), Crook and Harris (1952, 1954, 1955), Turner and Hester (1985, 1993, 1999).

Comments: There is some confusion regarding the age of this artifact type. Turner and Hester (1985, 1993, 1999) list the artifact as Late Archaic in age based on Galm's (1978) excavations the Curtis Lake (34Lf-5A) site in LeFlore County, Oklahoma. This would correspond to the Elam phase Archaic in the Upper Trinity where Carrollton axes, in fact, any axes except choppers, are completely absent. Carrollton axes have been found in situ within the Albritton Formation at both the Wheeler and Obshner sites in Dallas County. Both occurrences are below the horizon where Crook (1959) obtained the ca. 6000 B.P. radiocarbon date. Thus the type Carrollton axe is restricted to the Early Archaic and lower part of the Middle Archaic in the Trinity River watershed. However, the basic form may extend out in time in other regions. Type collections of Carrollton axes can be found in the collections of either Wilson W. Crook, Jr. or R. King Harris. Much of the type material referenced below is stored in the Museum Support Center of the Smithsonian Institution and is available to the public for research.

Selected References:

Crook, Wilson W., Jr.
1952 The Wheeler Site: A 3,500 Year Old Culture in Dallas County, Texas. *Field and Laboratory* 20(2):43-60. Southern Methodist University, Dallas, Texas.

1959 C-14 Date for Late Carrollton Focus Archaic Level: 6,000 Years B.P. *Oklahoma Anthropological Society Newsletter* 8(3):1-2. Oklahoma Anthropological Society, Norman.

Crook, Wilson W., Jr. and R. K. Harris
1952 Trinity Aspect of the Archaic Horizon: The Carrollton and Elam Foci. *Bulletin of the Texas Archeological and Paleontological Society* 23:7-38.

1953 Some Recent Finds at the Wheeler Site near Carrollton. *The Record* 11(5):21. Dallas Archeological Society, Dallas.

1954a Traits of the Trinity Aspect Archaic: Carrollton and Elam Foci. *The Record* 12(1):1-16. Dallas Archeological Society, Dallas.

1954b Another Distinctive Artifact: the Carrollton Axe. *The Record* 13(2):10-18. Dallas Archeological Society, Dallas.

1955 Scottsbluff Points in the Obshner Site Near Dallas, Texas. *Bulletin of the Texas Archeological Society* 26:75-100.

Crook, Wilson W., III
2007 The Dowdy Ferry Site: A Multi-Component Archaic Campsite in Southeastern Dallas County, Texas. *The Journal* 131:9-25. Houston Archeological Society, Houston.

2012 The Miklas Site (41KF59): A Large Multi-Component Archaic Campsite in Southwestern Kaufman County, Texas. *Archeological Journal of the Texas Prairie-Savannah* 2(1):24-31.

Galm, Jerry R.
1978 *The Archeology of the Curtis Lake Site (41Lf-5A), LeFlore County, Oklahoma*. Research Series No. 2, Archeological Research and Management Center, The University of Oklahoma, Norman.

Harris, R. King
1941 Additional Information about Dallas County Axes. *The Record* 3(1):3. Dallas Archeological Society, Dallas.

Hatzenbuehler, Robert
1947 A Net Sinker Site near Trinidad, Texas. *The Record* 6(1):1-1-4. Dallas Archeological Society, Dallas.

McCormick, Olin F.
1976 The Archaic Period in Northcentral Texas. In *The Texas Archaic: A Symposium*, edited by Thomas R. Hester, pp. 39-45. Center for Archeological Research, Special Report 2. The University of Texas at San Antonio, San Antonio.

Suhm, Dee Ann, Alex D. Krieger, and Edward B. Jelks
1954 An Introductory Handbook of Texas Archeology. *Bulletin of the Texas Archeological Society* 25.

Suhm, Dee Ann, and Edward B. Jelks
1962 *Handbook of Texas Archeology: Type Descriptions.* Published by the Texas Archeological Society, Special Publication Number One and the Texas Memorial Museum, Bulletin Number 4.

Turner, Ellen Sue, and Thomas R. Hester
1985 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1993 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

1999 *A Field Guide to Stone Artifacts of Texas Indians.* Texas Monthly Press.

Proof

Houston Archeological Society www.txhas.org

ISBN 9798627245483
50000