Volume 2015 Article 233

2015

An Intensive Cultural Resources Survey within the 586.0-Acre Flat Creek Mitigation Bank Project, Henderson County, Texas

Jennifer L. Cochran

An Intensive Cultural Resources Survey within the 586.0-Acre Flat Creek Mitigation Bank Project, Henderson County, Texas

An Intensive Cultural Resources Survey within the 586.0-Acre Flat Creek Mitigation Bank Project, Henderson County, Texas

By:

Jennifer L. Cochran

HJN 150085 AR

Prepared for:

Wildwood Environmental Credit Company, LLC
Tyler, Texas

Prepared by:

Horizon Environmental Services, Inc.
Austin, Texas

June 2015

An Intensive Cultural Resources Survey within the 586.0-Acre Flat Creek Mitigation Bank Project, Henderson County, Texas

By:

Jennifer L. Cochran

Prepared for:

Wildwood Environmental Credit Company, LLC
P.O. Box 6602
Tyler, Texas 75711

Prepared by:

Horizon Environmental Services, Inc.

Horizon Environmental Services, Inc.
1507 South IH 35
Austin, Texas 78741

Jennifer L. Cochran, Principal Investigator
HJN 150085 AR

June 2015

MANAGEMENT SUMMARY

On 21 and 22 April 2015, Horizon Environmental Services, Inc. (Horizon) conducted an intensive cultural resources survey within the 586.0-acre Flat Creek Mitigation Bank Project in Henderson County, Texas (Project Area). Although the Project Area is located on private property and will be developed and maintained with private funds, the enhancement of US Army Corps of Engineers (USACE) jurisdictional wetland areas within the mitigation bank via vegetation planting activities will require the usage of a Nationwide Permit (NWP) issued by the USACE. As an NWP is a federal permit, the undertaking also falls under the regulations of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Approximately 413.0 acres within the 586.0-acre Project Area consisted of completely inundated areas. Additionally, approximately 65.6 acres within the overall 586.0-acre Project Area have been previously permitted under an NWP and were not resurveyed during the current survey efforts. As such, the Area of Potential Effect (APE) for the current Project Area totals approximately 107.4 acres. At the request of Wildwood Environmental Credit Company, LLC (Wildwood), Horizon conducted the cultural resources assessment of non-inundated and non-previously permitted areas within the Flat Creek Mitigation Bank Project in compliance with Section 106 of the NHPA of 1966, as amended. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites eligible for inclusion on the National Register of Historic Places (NRHP).

The survey of non-inundated and non-previously permitted areas within the Project Areas resulted in entirely negative findings. No cultural materials were observed on the surface of the Project Area or within any of the 45 excavated shovel tests in these areas. In general, the majority of the Project Area contained deep, sandy loam soils with the potential to contain deep, subsurface cultural deposits. However, only shallow, subsurface impacts, less than 3.3 feet (ft) (1.0 meters [m]) deep, are anticipated during vegetation planting activities. As such, since no deep, subsurface impacts are anticipated within the Project Area, shovel testing was considered an adequate site-prospecting survey technique.

Based on the negative results of the cultural resources survey within the Project Area, it is Horizon's opinion that the 586.0-acre Flat Creek Mitigation Bank Project will have no adverse effect on significant cultural resources listed on or considered eligible for listing on the NRHP and that no further investigations are warranted. Horizon therefore recommends that Wildwood

be allowed to proceed with the undertaking, relative to the jurisdiction of the USACE and Section 106 of the NHPA. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during development, use, or ongoing maintenance within the Project Area, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the USACE and Texas Historical Commission (THC) should be notified of the discovery.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This document reports the results of an intensive cultural resources survey within the overall 586.0-acre Flat Creek Mitigation Bank Project in Henderson County, Texas (Project Area; Figures 1-1 and 1-2). Although the Project Area is located on private property and will be developed and maintained with private funds, the enhancement of US Army Corps of Engineers (USACE) jurisdictional wetland areas within the mitigation bank via vegetation planting activities will require the usage of a Nationwide Permit (NWP) issued by the USACE. As an NWP is a federal permit, the undertaking also falls under the regulations of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Approximately 413.0 acres within the 586.0-acre Project Area consisted of completely inundated areas. Additionally, approximately 65.6 acres within the overall 586.0-acre Project Area have been previously permitted under an NWP and were not resurveyed during the current survey efforts (see Figures 1-1 and 1-2). As such, the Area of Potential Effect (APE) for the current Project Area totals approximately 107.4 acres. At the request of Wildwood Environmental Credit Company, LLC (Wildwood), Horizon conducted the cultural resources assessment of non-inundated and non-previously permitted areas within the Flat Creek Mitigation Bank Project in compliance with Section 106 of the NHPA of 1966, as amended. The purpose of the survey was to determine if any archeological sites were located within the Project Area and, if any existed, to determine if the project had the potential to have any adverse impacts on sites eligible for inclusion on the National Register of Historic Places (NRHP).

The cultural resources investigations consisted of an archival review, an intensive cultural resources survey of the USACE jurisdictional areas along the proposed ROW, and the production of a report suitable for review by the State Historic Preservation Officer (SHPO) in accordance with the Texas Historical Commission's (THC) Rules of Practice and Procedure, Chapter 26, Section 27, and the Council of Texas Archeologists (CTA) Guidelines for Cultural Resources Management Reports. Jennifer Cochran served as the project's Principal Investigator, while she and Jared Wiersema (Horizon staff archeologist) conducted the field investigations.

The Texas State Minimum Archeological Survey Standards (TSMASS) require a minimum of 1 shovel test per 3.0 acres on projects over 100.0 acres in size. As such, a total of 36 shovel tests would have been necessary on the 107.4 acres of non-inundated and non-previously permitted areas within the overall 586.0-acre Project Area in order to comply with the

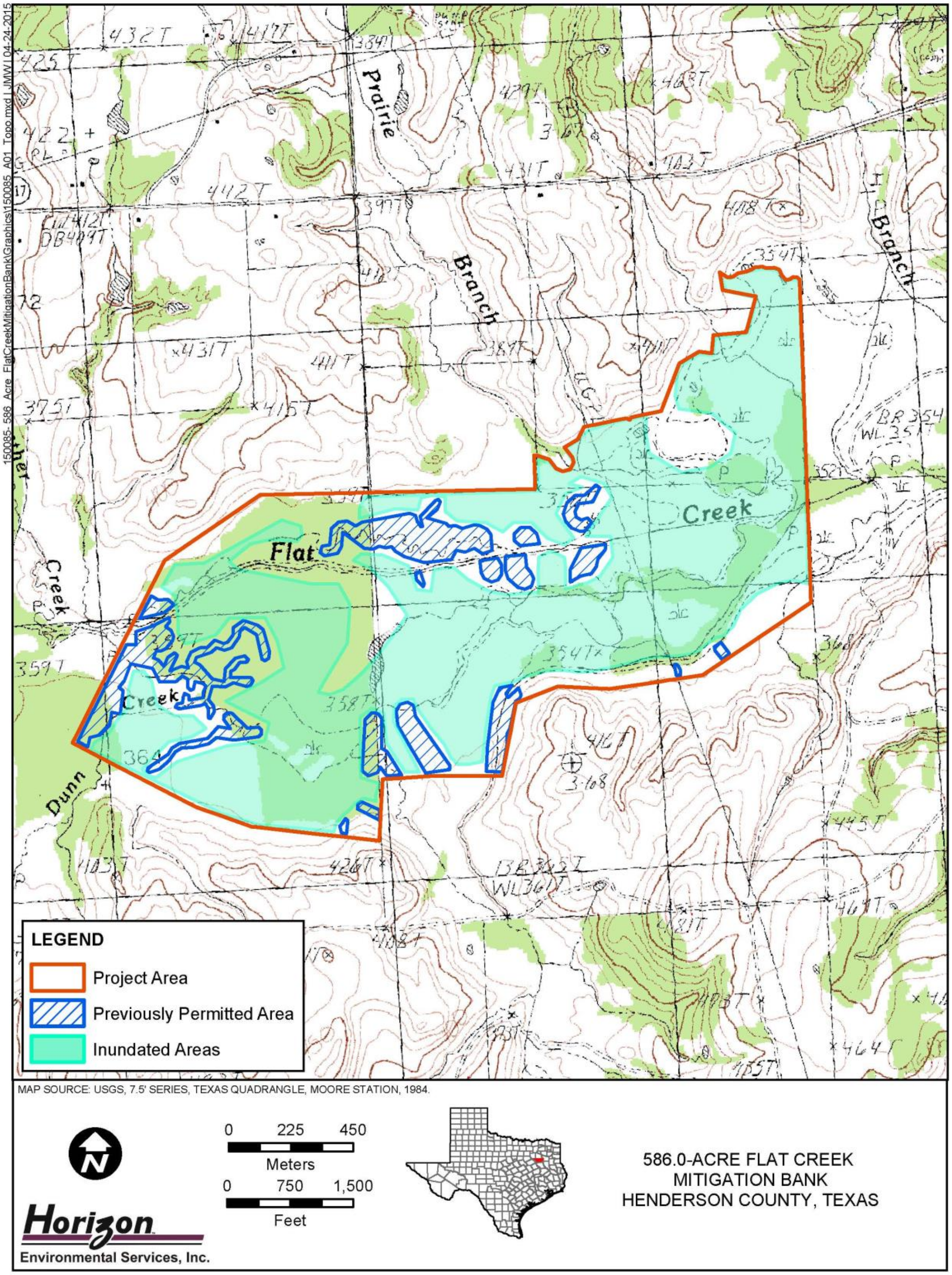

Figure 1-1. Location of Project Area on USGS topographic quadrangle

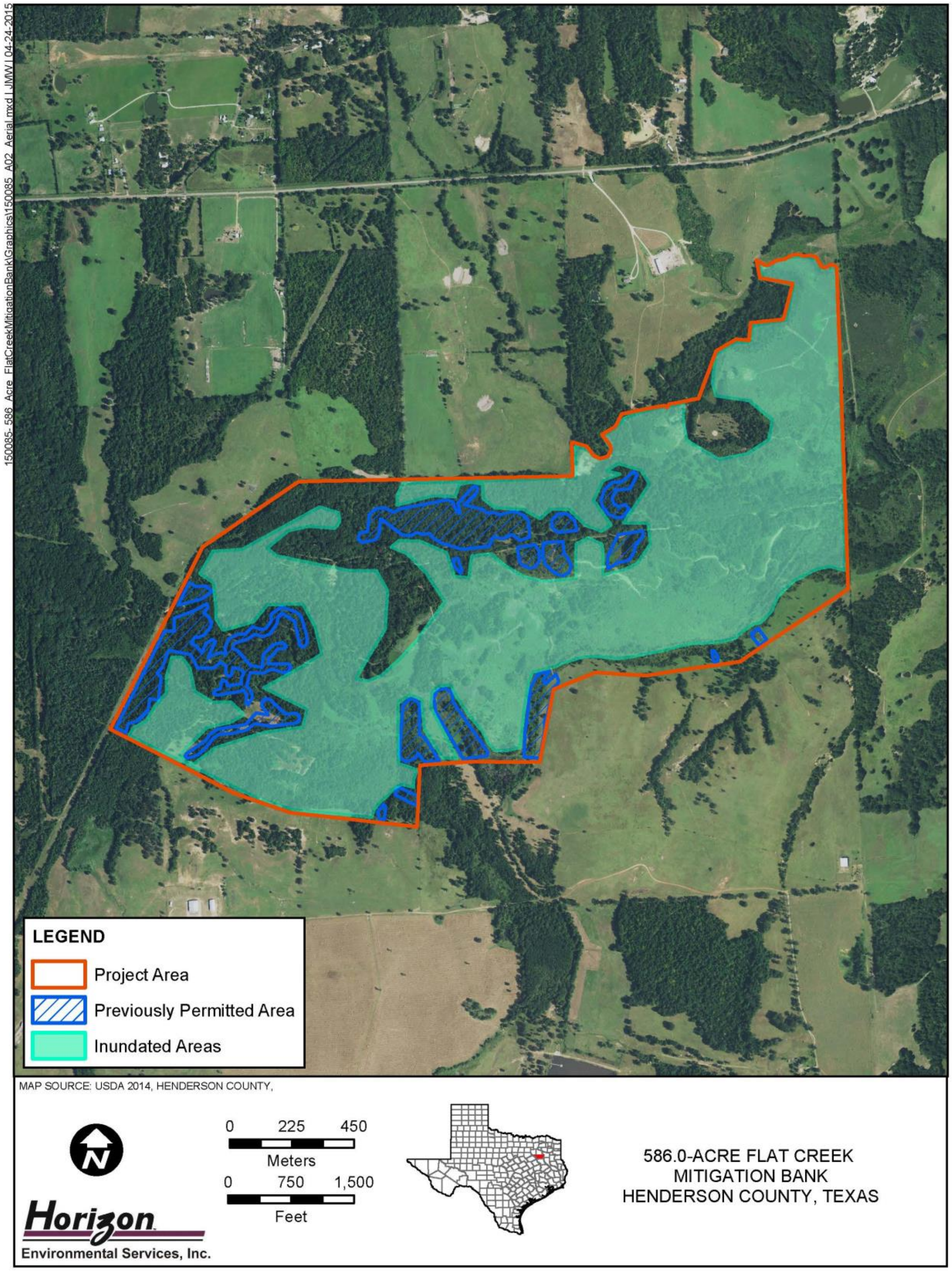

Figure 1-2. Location of Project Area on aerial photograph

TSMASS. Per discussions with Mr. Skipper Scott, regulatory archeologist with the USACE, Fort Worth District, Mr. Scott requested that Horizon visually survey the entire Project Area and target shovel testing efforts within non-inundated and non-previously permitted areas that appear to represent small hummocks within the low-lying wetland landscape. Additionally, Horizon placed shovel tests near the outer boundaries of the Project Area at the edges of the surrounding prominent landforms. Horizon exceeded the minimum survey standards by excavating 45 shovel tests within the non-inundated and non-previously permitted areas of the Project Area.

The TSMASS also require backhoe trenching in stream terraces and other areas with the potential to contain buried archeological materials at depths below those that shovel tests are capable of reaching (approximately 3.3 feet [ft] [1.0 meter (m)] below surface). The Project Area is located in a low-lying setting with some alluvial terrace deposits near Flat Creek and deep, sandy and loamy sediments throughout much of the Project Area. Shovel testing revealed deep, sandy and loamy sediments overlying sandy clay, indicating that shovel testing was not capable of penetrating to the bottom of sediments that may contain archeological deposits. The potential exists for deeply buried cultural deposits to occur within the sandy and loamy sediments observed within the Project Area. However, only shallow subsurface impacts are anticipated during vegetation planting activities. As such, shovel testing was considered to constitute an adequate and effective survey technique for identifying archeological resources within the Project Area, and mechanical trenching was consequently not employed as a site-prospecting technique.

The survey of non-inundated and non-previously permitted areas within the Project Areas resulted in entirely negative findings. No cultural materials were observed on the surface of the Project Area or within any of the 45 excavated shovel tests in these areas. In general, the majority of the Project Area contained deep, sandy loam soils with the potential to contain deep, subsurface cultural deposits. However, as previously noted, only shallow subsurface impacts are anticipated during vegetation planting activities.

Based on the negative results of the cultural resources survey within the Project Area, it is Horizon's opinion that the 586.0-acre Flat Creek Mitigation Bank Project will have no adverse effect on significant cultural resources listed on or considered eligible for listing on the NRHP and that no further investigations are warranted. Horizon therefore recommends that Wildwood be allowed to proceed with the undertaking, relative to the jurisdiction of the USACE and Section 106 of the NHPA. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during development, use, or ongoing maintenance within the Project Area, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the USACE and THC should be notified of the discovery.

2.0 ENVIRONMENTAL SETTING

2.1 GENERAL PROJECT AREA DESCRIPTION

The overall Project Area consists of a 586.0-acre tract in eastern Henderson County, Texas. Approximately 413.0 acres within the 586.0-acre Project Area consisted of completely inundated areas. Additionally, approximately 65.6 acres within the overall 586.0-acre Project Area have been previously permitted under an NWP and were not resurveyed during the current survey (see Figures 1-1 and 1-2). The Project Area is situated approximately 1.9 miles (mi) (3.0 kilometers [km]) to the southwest of the intersection of Farm-to-Market Road (FM) 314 and FM 317 near Chandler, Texas. It can be found on the US Geological Survey (USGS) Moore Station, Texas, 7.5-minute topographic quadrangle (see Figure 1-1). Overall, the Project Area consists of large, inundated areas with a variety of wetland vegetation. Several 2-track roads traverse the Project Area allowing access into the interior portion of the Project Area. Overall, surface visibility was poor across most of the Project Area. Photographs of the Project Area are provided in Figures 2-1 through 2-7.

2.2 PHYSIOGRAPHY AND HYDROLOGY

The proposed Project Area is located in eastern Henderson County within the Gulf Coastal Plains physiographic region (Fenneman 1938:605-630). Environmentally, the Gulf Coastal Plain is characterized as:

> …an area where the temperate southeastern woodlands gradually give way to the grasslands of the plains. It is a land of mixed forests, pine barrens, open savannas, tall grass prairies, and littoral marshes. Much of the terrain is gently rolling but mountains (the Ouachitas) and coastal flats are to be found in the northern and southern margins of the region, respectively. A number of perennial rivers and streams cross the area, ending in the deltas and bays along the…Gulf of Mexico (Story and Guy 1990:2).

Northeastern Texas supports 3 major physiographic communities—the Blackland Prairie, the Post Oak Savanna (or Oak Woodlands), and the Pineywoods (Diamond et al. 1987). The Blackland Prairie is a narrow physiographic zone situated between the Edwards Plateau to the west and the Gulf Coastal Plain to the east. This area consists of low, rolling land that extends in a narrow band along the eastern edge of the Balcones Fault Zone from the Red River Valley in Northeast Texas to the southern edge of the Edwards Plateau. This is an area of

Figure 2-1. General view of inundated areas within Project Area (facing northeast)

Figure 2-2. Another view of inundated areas within Project Area (facing south)

Figure 2-3. View of Flat Creek within Project Area (facing west)

Figure 2-4. General view of trenching location within Project Area (facing north)

Figure 2-5. General view of trenching location within Project Area (facing north)

Figure 2-6. General view of trenching location within Project Area (facing north)

Figure 2-7. View of typical shovel test (facing north)

low topographic relief and poor drainage in which water often ponds after rainstorms and streams flow at very gentle gradients. The Blackland Prairie supports a tall-grass community that commonly includes such species as little bluestem, yellow Indian grass, big bluestem, switchgrass, and various forbs (Diamond et al. 1987:209, 211). The distribution of the tall-grass prairie is closely related to patterns of rainfall and soil character, as the prairie tends to occur in areas that receive less than 40.0 inches (in) (102.0 centimeters [cm]) of rain annually and that have clayey, calcareous soils (Collins and Bousman 1990:29).

The Post Oak Savanna and Pineywoods support medium-tall to tall, broadleaf deciduous forests, and shortleaf loblolly pines are common in the Pineywoods on upland, fine sandy loam soils with adequate moisture. Small areas of tall-grass prairie may occur in both communities (cf. Jordan 1981). The Post Oak Savanna, within which the Project Area is located, is a narrow, southwest-to-northeast-trending woodland belt that marks a natural transition zone, or ecotone, between the more xeric Blackland Prairie to the west and the more mesic Pineywoods to the east (Kuchler 1964). The Post Oak Savanna is composed primarily of post oak, blackjack oak, hickory, pecan, and ash (Kuchler 1964).

The Pineywoods region is composed of 2 distinct forest communities—mixed pine-hardwood forest and longleaf pine forest. The mixed pine-hardwood forest is characterized by medium-tall to tall broadleaf deciduous hardwoods, including a wide variety of oak, elm, hickory, maple, sweetgum, and other mesic species. In some cases, the presence of pine represents a subclimax vegetation association. The longleaf pine forest, within which the current Project Area is situated, is most common in the southern part of Northeast Texas, extending south to the coastal prairies of Southeast Texas. Longleaf, shortleaf, and loblolly pines, as well as a variety of hardwoods such as oak, hickory, beech, birch, gum, and magnolia, as well as tupelo and bald cypress in swampy floodplain areas, are constituents of this vegetation region. Within both Pineywoods vegetation communities, bottomland forests and wetlands are common. These communities are dominated by hardwood and swamp forests, marsh and bog vegetation, herbs, shrubs, and other plants that tolerate extended periods of stream overflow. Common trees in these habitats are sweetgum, black tupelo, elm, green ash, bald cypress, water oak, overcup oak, cottonwood, black willow, and American hornbeam (Diamond et al. 1987:212). Herbs, shrubs, ferns, cane, wax myrtle, sassafras, holly, yaupon, cane, and buttonbush occur along the margins of marshes, bogs, and channel lakes and sloughs.

As a result of moderately high rainfall and extensive aquifers, perennial rivers and streams are common across most of the Gulf Coastal Plain (Story 1990:8-9). With the exception of some small coastal streams, 6 major river basins occur in this region—the Brazos, Neches, Red, Sabine, San Jacinto, and Trinity—all of which flow in a more or less southeasterly direction and discharge into the Gulf of Mexico. Under current climatic conditions, all of the larger rivers are reliable sources of surface water, though smaller streams are more variable. The most dependable are those that receive groundwater discharge and delayed runoff (Thurmond 1981:29-36). The least reliable are those fed solely by direct runoff. Two other sources of surface water, lakes and springs, also occur in the area. With the exception of Caddo Lake (a natural, albeit artificially enlarged, impoundment) on the Cypress River and lakes on the Red and lower Brazos floodplains, most lakes in the region occur on smaller streams, are dry at least part of the year, and have minimal subsistence value. Springs are fairly numerous in the region, and even high-order streams often have sustained water flow because they are fed by groundwater discharge and aquifers (Story 1990:8-9). Changing land use practices, farming, and erosion have caused many springs to dry up over the last 150 years or to have a much reduced flow (Kenmotsu and Perttula 1993:38).

Hydrologically, the Project Area is located within the Neches River Basin. Flat Creek flows through the Project Area in an easterly direction and converges with Lake Palestine approximately 1.9 mi (2.8 km) east of the Project Area. Lake Palestine discharges into the Neches River to the southeast of the Project Area. The Neches River flows in a south to southeast direction before discharging into Sabine Lake and, eventually, the Gulf of Mexico approximately 184.0 mi (296.2 km) to the southeast of the Project Area.

2.3 GEOLOGY AND GEOMORPHOLOGY

The Project Area is situated within the West Gulf Coastal Plain physiographic province (Perttula and Kenmotsu 1993). Sedimentary bedrock formations of limestone and sandstone laid down during the Cretaceous Period parallel the margins of the ancient, receding coastline of the Gulf of Mexico and crop out as cuestas or escarpments across the generally southward dip of the modern land surface (Perttula and Kenmotsu 1993). Little internal relief of over 164.0 ft

(50.0 m) occurs, except along the eroded fronts of the cuestas and in the ironstone hills (Fisher 1965; Godfrey et al. 1973).

Soils in Northeast Texas are divided into 2 broad groups—upland soils and alluvial valley soils (Godfrey et al. 1973). Upland soils support tall grasses and hardwoods and tend to form directly on bedrock, except where colluvial deposition has occurred during the Quaternary Period. These soils vary from moist, acidic soils with a sandy to loamy surface horizon and clayey subsoil to soils whose basic loamy surface horizons overlie clay-enriched B-horizons. Bone and shell preservation is common in archeological deposits in the latter soils (Story 1990:9). Mixed hardwood and pine forests occur on the acidic upland soils in Northeast Texas. Tall-grass prairie occurs on the dark, clayey soils of the Blackland Prairie to the west of the Project Area (Perttula and Kenmotsu 1993).

As a region, Northeast Texas exhibits relatively little topographic relief. The bedrock is exclusively sedimentary and is not very resistant to erosion. Drainage is well developed, including major river systems that arise outside of the region (i.e., Red and Trinity) as well as within it (i.e., Angelina, Attoyac, Cypress, Neches, Sabine, and Sulphur). Much of Northeast Texas is dominated by fluvial transport systems in which streams tend to meander within their valleys, locally cutting into the outer banks of bends and depositing sediment packages against the inner banks of bends (Perttula and Kenmotsu 1993). Valley soils are important archeologically because they often contain stratified cultural deposits, usually in association with buried, cumulic soils. Point bars, levees, and flood basins are distinctive geomorphic features that share the common attribute of active aggradation. In theory, archeological sites may be expected to form in such landforms and, depending on the rates of sedimentation and human occupation, may develop internal stratification. To date, however, most archeological surveys conducted along streams in Northeast Texas have documented almost no sites on levees or point bars (Hsu 1969; Anderson et al. 1974; Bruseth et al. 1977). The low density of recorded archeological sites in such areas likely results from the low site visibility and difficult survey conditions. The low number of archeological sites recorded in these drainages is almost certainly a function of the difficulty of surveying floodplain environments partially covered by impenetrable swamps (Perttula and Kenmotsu 1993; Perttula 2004:370).

Natural lakes, ponds, and swamps are also common features of Northeast Texas floodplains, and they typically represent sections of abandoned channels of rivers and streams that have not been filled by alluvial deposits (Perttula and Kenmotsu 1993). Lakes generally contain some open water, marshes are heavily vegetated (usually with grasses) but do not form peat, and bogs are waterlogged and spongy areas in which mosses and other decaying vegetation produce an acidic environment conducive to peat development. Lakes, ponds, and marshes in Northeast Texas are generally of fresh water and form aerobic, basic environments—they may contain excellent stratigraphic records and preserved bone, though they are not conducive to botanical preservation. Bogs, on the other hand, are anaerobic, acidic, and may have remained permanently saturated over long periods of time. Such environments are optimal for the preservation of normally perishable artifacts (Chelf 1946) as well as the entire spectrum of natural organic remains (Bryant 1989). Bog material is suitable for direct radiocarbon dating, and the 2 pollen cores upon which much of the palynological record of Northeast Texas is based were obtained from the Boriack and Weakly bogs in Lee and Leon counties, respectively (Bryant 1969, 1977; Holloway and Bryant 1984; Holloway et al. 1987).

Valley margins in Northeast Texas streams include colluvial slopes and occasional alluvial fans. Such geomorphic features represent areas of natural deposition that may be well suited to some kinds of human activity, a combination favoring the formation of stratified archeological sites (Perttula and Kenmotsu 1993). The lower reaches of such features afford high ground adjacent to flood basin resources, and archeologists commonly find sites in these settings in Northeast Texas.

Aeolian landscape features pose a somewhat more complicated scenario in Northeast Texas (Perttula and Kenmotsu 1993). These are extensive surficial sand deposits that are subject to modification by wind at any time that vegetative cover is disrupted. Some indications of aeolian modification of sand deposits have been noted in and near the region (e.g., Gunn and Brown 1982; Mandel 1987; Perttula et al. 1986), but the validity of some of these interpretations, the possible extent of Quaternary aeolian-modified landscapes, and the timing of any increased aeolian activity are in question.

The Project Area is underlain by Alluvium (Qal) composed of mud, silt, clay, and gravels in a floodplain setting and Queen City Sand (Eqc) composed of quartz sand, cross-bedded interbeds of sandy clay, with ferruginous sandstone, and abundant ironstone concretions (Barnes 1965). Specifically, the Project Area is situated on 3 distinct soil units. Along the upland formations, near the edges of the Project Area, the soils consist of Cuthbert fine sandy loam, 8 to 20% slopes (7) and Wolfpen loamy fine sand, 2 to 5% slopes (43), while the soil that comprises the majority of the Project Area is characterized by Nahatche loam, frequently flooded (27). These soils are described below in Table 2-1 (NRCS 2015), and their distribution is mapped in Figure 2-8.

Table 2-1. Soils mapped within Project Area

Soil Name	Soil Type	Soil Depth (inches)	Setting
Cuthbert fine sandy loam, 8 to 20% slopes (7)	Fine sandy loam	0-10: Fine sandy loam 10-28: Clay 28-36: Sandy clay loam 36-60+: Clay loam	Interfluves
Nahatche loam, frequently flooded (27)	Loam	0-13: Loam 13-75: Clay loam 75-79+: Stratified loam to silty clay loam	Floodplains
Wolfpen loamy fine sand, 2 to 5% slopes (43)	Loamy fine sand	0-27: Loamy fine sand 27-80+: Sandy clay loam	Interfluves

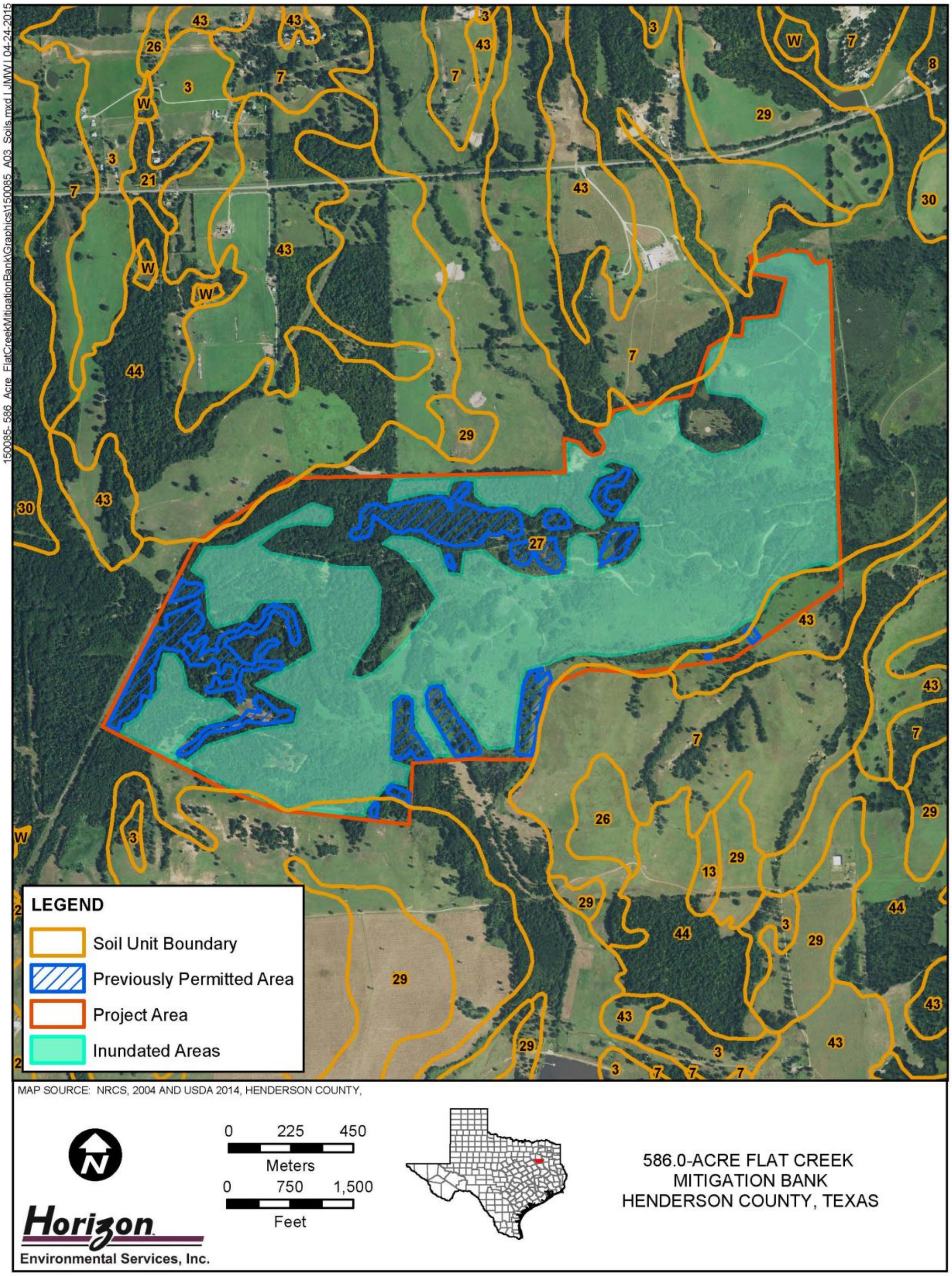

Figure 2-8. Distribution of mapped soils in Project Area

Aboriginal cultural resources are commonly encountered in deep, alluvial sediments adjacent to major streams in Central Texas. The deep, Eocene-age sand deposits and Holocene- age alluvial deposits mapped within the Project Area suggest the potential exists for cultural resources to be in deeply buried contexts that retain integrity, rather than in deflated surface contexts. Intact, buried archeological deposits may occur within alluvial sediments like those mapped within the current Project Area.

2.4 CLIMATE

The environment in Northeast Texas has not remained the same throughout the ca. 12,000 years during which humans have lived in the region. Archeological, faunal, geological, and pollen evidence suggests that significant changes have occurred, and these changes have major implications for the development and maintenance of human adaptive strategies in the region (Perttula and Kenmotsu 1993). At present, these changes are poorly understood as only limited evidence of past environments prior to ca. 3,000 years ago has been obtained (Bryant and Holloway 1985; Collins and Bousman 1990; Story 1990).

Evidence for climatic change from the late Pleistocene to the present is most often obtained through studies of pollen sequences (Bryant and Holloway 1985). Few pollen studies have been conducted in Northeast Texas—to date, only a few studies from Buck Creek Marsh and Jewett Mine have provided interpretable pollen data from this portion of the state (Jacobs 1991; Scott-Cummings 1991), but these are poorly dated or have serious gaps in their records. Nevertheless, an important series of pollen sites occur in areas surrounding Northeast Texas (cf. Perttula and Kenmotsu 1993). The best dated and most informative pollen sequences come from Boriack Bog in Lee County and Weakly Bog in Leon County (Bryant 1969, 1977; Holloway and Bryant 1984; Holloway et al. 1987). The radiocarbon dates from Boriack Bog suggest a regular accumulation of deposits and indicate that Boriack Bog surface sediments are approximately 3,000 years old. Bryant (1977) indicates that the bog was drained and the surface peat was excavated in the 20th century; thus, the surface of the peat was lowered to sediments of that age. Weakly Bog, by contrast, covers the last 3,000 years or so, and the bottom samples roughly match the younger portion of Boriack Bog. Thus, Boriack and Weakly bogs cumulatively provide a general picture of vegetation change throughout most of the late Pleistocene and Holocene periods for this region of Texas.

Bryant and Holloway (1985) present a sequence of climatic change for East Texas that includes 3 separate climatic periods—the Wisconsin Full Glacial Period (22,500 to 14,000 B.P.), the Late Glacial Period (14,000 to 10,000 B.P.), and the Post-Glacial Period (10,000 B.P. to present). Evidence from the Wisconsin Full Glacial Period suggests that the climate was considerably cooler and more humid than at present. The limited available evidence suggests that the region was more heavily forested in deciduous woodlands than during later periods and that, prior to ca. 10,000 years B.P., it was forested with species that prefer cool, temperate conditions, including boreal taxa such as spruce (Bryant and Holloway 1985). This late Pleistocene/early Holocene climate is inferred to have been cooler than today, with increased precipitation and/or more effective moisture, but with perhaps less seasonal climatic constraints. The Late Glacial Period was characterized by a slow warming and/or drying trend (Collins 2004) during which the deciduous woodlands were gradually replaced by grasslands and post oak savannas (Bryant and Holloway 1985).

During the Post-Glacial Period, the environment appears to have been more stable. During the early Holocene (ca. 10,000 to 7000 B.P.), warmer temperatures prevailed, with less moisture and presumably a lower density of forest cover. The deciduous forests were replaced by prairies and post oak savannas. Collins and Bousman (1990) suggest that significant expanses of grassland were present along the western edge of the Northeast Texas region. The drying and/or warming trend that began in the Late Glacial Period continued into the mid-Holocene, at which point there appears to have been a brief amelioration to more mesic conditions lasting from roughly 6000 to 5000 B.P. In the middle Holocene, the period between ca. 7000 and 4000 B.P., much drier and warmer conditions may have characterized the region's climate, possibly resulting in even more widespread grasslands and replacement of forests along its western edge. The forest cover in Northeast Texas is suspected to have been at its lowest density during this time period (Collins and Bousman 1990:62).

Following the warm and dry interlude of the middle Holocene, environmental data suggest that a gradual reforestation of the region continued into the late Holocene (ca. 4000 B.P. to present). Collins and Bousman (1990) suggest that prairie areas were replaced first by oak savanna, then by oak-hickory forest in the western part of the region and by oak-hickory-pine forest in the eastern portions of the region. Bryant and Holloway (1985) suggest that essentially modern environmental conditions in Northeast Texas were probably achieved by about 1,500 years ago.

Stable carbon, nitrogen, oxygen, and hydrogen isotope analyses are becoming increasingly important sources of information about past climatic conditions and changes. A 14,000-year stable isotopic record from the Aubrey Site in the Trinity River Basin in North-Central Texas documents changing climatic conditions with wetter (and perhaps slightly cooler) or more humid climates from ca. 11,000 to 7500 B.P., again between 4000 and 2000 B.P., and yet again after 1,000 years ago (Humphrey and Ferring 1994; Perttula 2004:371). Conversely, the Aubrey Site record suggests periods of warmer-than-present climate between 7,500 and 4,000 years ago and between about 2,000 and 1,000 years ago. Interestingly, fossil vertebrate, pollen, and stable isotope data from Central Texas and the Edwards Plateau tell a somewhat different story, highlighting 2 dry climatic peaks between ca. 7000 and 3000/2500 B.P. and after 1,000 years ago (Toomey et al. 1993; Perttula 2004:371). The timing and nature of such climatic changes have major implications regarding the relative position of the prairie-forest border, the possible presence or absence of bison, and the natural resource potential of the Pineywoods and Post Oak Savanna.

The modern climate of the region is characterized as humid subtropical, with warm, humid weather from the spring to the fall, and cool, humid weather in the fall and winter. The climate is influenced primarily by tropical Maritime air masses from the Gulf of Mexico, but it is modified by polar air masses. Tropical Maritime air masses predominate throughout spring, summer, and fall. Modified polar air masses are dominant in winter and provide a continental climate characterized by considerable variations in temperature. Summers are long and warm. Winters are short, mild, and are characterized by short periods of clear, cold, or freezing weather interspersed with cloudy and rainy periods and clear, pleasant days. Extremely hot or cold temperatures are rare. Sudden temperature changes are not very common during summer, but may occur frequently in winter. Rapid drops in winter temperature are caused by cold waves or sudden, strong north winds, though freezing weather is uncommon. Average winter temperatures range between 35.0 and 50.0 degrees Fahrenheit (°F), and average summer temperatures range from 85.0 to 95.0°F. Valleys and low divides are often covered with frost on early winter mornings, but freezing temperatures are of short duration. The average frost-free season is 246.0 days (March 15 to November 16) (Bomar 1983).

The region is well watered—precipitation falls rather uniformly over the area and is fairly well distributed throughout the year. Normally, it is heaviest in December, March, April, and May, and lowest in August. Rainfall varies from year to year, but the average is about 45.0 in (114.3 cm). Torrential rains fall occasionally, especially in winter and spring, and light snows fall occasionally in winter but melt rapidly. Hailstorms are infrequent but do occur in the vicinity of the Project Area. Precipitation generally increases from north to south across the region and decreases from east to west in a clinal pattern. The wettest counties in the area (Shelby, Sabine, and San Augustine) receive more than 48.0 in (121.9 cm) of annual precipitation, while the driest counties (Fannin, Henderson, and Anderson) receive between 36.0 and 40.0 in (91.0 and 101.6 cm) of precipitation each year. Droughts are not uncommon, and periods of lower summer precipitation are often accompanied by extended droughts caused by warm continental Pacific air masses moving across the area from the west.

Dendrochronological analyses of tree rings suggest that numerous wet and dry spells occurred during the last 1,000 years (Stahle and Cleaveland 1994, 1995). Dry conditions and the worst droughts occurred in the late A.D. 1200s, in the mid-1400s and 1600s, and then again in the mid-1700s (Stahle and Cleaveland 1995). Stahle et al. (1985) suggest that the worst June drought to occur in the past 450 years occurred during the period between A.D. 1549 and 1577. More favorable conditions probably occurred during the intervening years, especially between ca. A.D. 1390 and 1440, then in the late part of the 16th and early 17th centuries (Perttula 2004:371). Such climatic perturbations presumably affected the predictability and success of maize harvests during the Caddoan occupation of the Pineywoods and neighboring Post Oak Savanna (Perttula 2004:371). Similar fluctuations throughout the Holocene would also have affected the range, distribution, and abundance of naturally occurring plants and animals upon which non-agricultural human populations relied.

2.5 FLORA AND FAUNA

The Northeast Texas Archeological Region is situated within the Austroriparian biotic province (Blair 1950). This province includes the Gulf Coastal Plain from the Atlantic Ocean to eastern Texas. Its western boundary, which is approximated by a line running north from western Harris County to western Red River County (Dice 1943), is the western boundary of the main body of pine and hardwood forests of the eastern Gulf Coastal Plain. In Texas, Austroriparian vegetation consists of 2 vegetation regions, the long-leaf pine and pine-oak forest regions. The Project Area is situated in a lightly forested, upland environment within the Post

Oak Savanna, which is composed primarily of post oak, blackjack oak, hickory, pecan, and ash interspersed with mesic scrubland.

3.0 CULTURAL BACKGROUND

The Project Area is located within the Northeast Texas Archeological Region, a subdivision of the THC's Eastern Planning Region (Kenmotsu and Perttula 1993). The cultural history of Northeast Texas can be subdivided into 9 broad temporal periods, although the historic period has been differentiated into overlapping Historic Caddoan and Historic EuroAmerican periods to distinguish between the highly divergent historical experiences of the indigenous Native Americans and EuroAmerican settlers during the settlement of Texas (Table 2).

3.1 PALEOINDIAN PERIOD (CA. 9500 TO 7000 B.C.)

The initial human occupation of the New World can be confidently extended back before 10,000 B.C. (Dincauze 1984; Lynch 1990; Meltzer 1989). Evidence from Meadowcroft Rockshelter in Pennsylvania suggests that humans were present in Eastern North America as early as 14,000 to 16,000 years ago (Adovasio et al. 1990), while more recent discoveries at Monte Verde in Chile provide unequivocal evidence for human occupation in South America by at least 12,500 years ago (Dillehay 1989, 1997; Meltzer et al. 1997). Most archeologists presently discount claims of much earlier human occupation in North America during the Pleistocene glacial period.

The earliest generalized evidence for human activities in Northeast Texas is represented by the PaleoIndian period (ca. 9500 to 7000 B.C.) (Perttula and Kenmotsu 1993). This period coincided with ameliorating climatic conditions following the close of the Pleistocene epoch that witnessed the extinction of herds of mammoth, horse, camel, and bison. Cultures representing

Table 3-1. Chronological Framework for Northeast Texas Archeological Region

Cultural Period	Approximate Dates	Cultural Period	Approximate Dates
PaleoIndian	9500 to 7000 B.C.	Middle Caddoan	A.D. 1200 to 1400
Archaic	7000 to 200 B.C.	Late Caddoan	A.D. 1400 to 1680
Early Ceramic	200 B.C. to A.D. 800	Historic Caddoan	A.D. 1690 to 1860
Formative Caddoan	A.D. 800 to 1000	Historic EuroAmerican	A.D. 1519 to Present
Early Caddoan	A.D. 1000 to 1200		

Source: Perttula and Kenmotsu (1993:44, Tab. 2.1.2) various periods within this stage are characterized by series of distinctive, relatively large, often fluted, lanceolate projectile points. These points are frequently associated with spurred end-scrapers, gravers, and bone foreshafts.

PaleoIndian groups are often inferred to have been organized into egalitarian bands consisting of a few dozen individuals that practiced a fully nomadic subsistence and settlement pattern. Due to poor preservation of floral materials, subsistence patterns are known primarily through the study of faunal remains. Subsistence focused on the exploitation of small animals, fish, and shellfish during the PaleoIndian period. There is little evidence in Northeast Texas for hunting of extinct megafauna, as has been documented elsewhere in North America; rather, a broad-based subsistence pattern appears to have been practiced until the Late Prehistoric period.

The distribution of PaleoIndian artifacts within the region suggests that these early aboriginal occupations were principally situated within the valleys of major stream basins (Anderson 1996; Perttula 2004:373; Thurmond 1990) as well as in resource-rich areas like the Ouachita Mountains escarpment to the north (Anderson 1996). Anderson (1996) hypothesizes that the initial and most intensive PaleoIndian settlement of the Southeast (including Northeast Texas) occurred in the resource-rich valleys of the Mississippi River and its principal tributaries. From there, PaleoIndian groups spread throughout the wooded Southeast and East, with concentrations at 155.0- to 249.0-mi (250.0- to 400.0-km) intervals. The relatively sparse PaleoIndian archeological record, combined with the dispersion of artifacts across many different landforms and physiographic settings, seems to indicate that PaleoIndian groups were highly mobile, generalized hunters and gatherers rather than specialized hunters of extinct megafauna (Fields and Tomka 1993), as has been inferred for PaleoIndian populations on the Great Plains.

3.2 ARCHAIC PERIOD (CA. 7000 TO 200 B.C.)

Throughout most of North America, the onset of the hypothesized Hypsithermal drying trend marks the beginning of the Archaic period (ca. 7000 to 200 B.P.) (Perttula and Kenmotsu 1993). In many regions, this climatic trend marked the beginning of a significant reorientation of lifestyle—the changing climatic conditions and corresponding decrease in the big game populations forced people to rely more heavily upon a diversified resource base composed of smaller game and wild plants. In Northeast Texas, however, a generalized hunting and gathering pattern is characteristic of most of prehistory prior to the advent of large-scale agricultural systems during the Late Prehistoric.

Traditionally, the Archaic period is subdivided into Early, Middle, and Late subperiods. Changes in projectile point morphology are often used as markers differentiating these 3 subperiods, though other changes in material culture have been noted as well. Johnson (1962) employs archeological data from the Yarbrough site (41VN6) on the upper Sabine River to bring chronological order to the diverse Archaic archeological record in Northeast Texas. Johnson's (1962) temporal divisions are based on projectile point sequences and on the introduction of plain ceramics at the end of the Archaic period. More recent refinements of the projectile point sequence (Story 1990; Thurmond 1990) document straight and expanding-stem forms characteristic of the Early and Middle Archaic subperiods and contracting-stem darts during the Late Archaic and subsequent Early Ceramic periods (Schambach 1982, 1998).

3.3 Early Ceramic Period (ca. 200 B.C. to A.D. 800)

The Early Ceramic period (ca. 200 B.C. to A.D. 800), also known as the Woodland period, is characterized in much of Northeast Texas, especially from the Sabine to the Red rivers, primarily by plain, relatively thick ceramic bowls and flowerpot-shaped jars, double-bitted axe heads, smaller and thinner versions of Gary dart points, and later in the period by corner-notched arrow points (Thurmond 1990). Early Ceramic sites along the Red River in southwestern Arkansas and in Northeast Texas have abundant ceramics, though many sites of this age, especially between the Sulphur and Sabine rivers, do not evince such prevalent use of ceramics (Perttula 2004:376). This situation suggests regional differences in food processing technologies and/or dietary habits, and may further highlight differences in the degree of sedentism among populations across the area (Skibo and Blinman 1999). Lower Mississippi Valley ceramic styles (e.g., Tchefuncte Stamped, Churupa Punctated, Marksville Incised, Troyville Stamped, and Marksville Stamped) occur with some regularity at sites in the Sabine, Sulphur, and Big Cypress basins (Story 1990). These ceramics may provide evidence of contact and interaction between Trans-Mississippi South and Lower Mississippi Valley populations, or they may represent the adoption of Lower Mississippi Valley stylistic and decorative attributes by local potters (Perttula and Bruseth 1995; Schambach 1982, 1998).

The Early Ceramic inhabitants of Northeast Texas were still primarily hunter-gatherers, though they may have lived in increasingly large groups and/or resided for longer periods of time at certain sites (Perttula 2004:377). Larger villages and multiple mound centers begin to be constructed during this period on the major streams (e.g., the Red and Sabine rivers). Some sites have relatively substantial midden deposits, particularly along the Red River and in the upper Sulphur River basin (Fields et al. 1997; Schambach 1982), and some evidence for structures (probably daubed pole and thatch structures), but the degree of settlement permanence is still less than that seen in the subsequent, long-term, Caddoan settlements of Northeast Texas (Perttula et al. 1993:99).

On the basis of available paleobotanical information, Early Ceramic groups may have cultivated squash (McGregor 1996) and used native seeds, tubers, and roots in addition to a variety of woodland and aquatic animal resources (Webb et al. 1969). The presence of chipped stone axes and hoe-shaped tools in Early Ceramic occupations suggests that some level of horticultural activity was occurring, though intensive use of colonizing weedy annuals may similarly account for the presence of these implements. Bruseth (1998) has suggested that maize was being cultivated during the latter portions of this period, but stable isotope analyses of some 25 or more Late Archaic, Fourche Maline, and Formative to Early Caddoan human remains indicate that maize was not a major part of the diet at this time (Rose et al. 1998). Early Ceramic period burial mounds have been documented in bluff top and alluvial valley settings on the Red River in northwestern Louisiana and southwestern Arkansas (Schambach 1982, 1997; Webb 1984) and on the Angelina, Neches, and Sabine rivers in Northeast Texas (Story 1990). Mortuary ceremonialism included the interment of costly, non-local raw materials and artifacts, including chert, copper, and Lower Mississippi Valley ceramic vessels, in the burial mounds. Evidence of mortuary or ritual practices also occurs in non-mound contexts such as the Hurricane Hill Site, which contained a small cemetery on a prominent hill, and the Mahaffey Site on the Kiamichi River in southeastern Oklahoma, which had a large cemetery with flexed and semiflexed burials without grave goods (Perino and Bennett 1978). In the broadest sense, the establishment of bounded cemeteries is often interpreted as a correlate of increasing sedentism in the western Gulf Coastal Plain of Northeast Texas (Perttula 2004:378).

3.4 Formative, Early, and Middle Caddoan Periods (ca. A.D. 800 to 1400)

The Caddoan archeological record represents the fluorescence of aboriginal complex societies in northeastern Texas, northwestern Louisiana, southwestern Arkansas, and southeastern Oklahoma, and generations of archeologists have long been captivated by the beautifully manufactured ceramics and other material goods, the earthen mounds, the well-preserved villages and hamlets, and the existence of a paleobotanical record (e.g., Perttula 2004; Swanton 1942). In the Northeast Texas Archeological Region, the timeframe referred to in many surrounding regions as the Late Prehistoric period is usually subdivided into the Formative Caddoan (ca. A.D. 800 to 1000), the Early Caddoan (ca. A.D. 1000 to 1200), the Middle Caddoan (ca. A.D. 1200 to 1400), and the Late Caddoan (ca. A.D. 1400 to 1680) periods (Perttula 1993a). European contact with Caddoan groups in Northeast Texas began around ca. A.D. 1540, but it was sporadic until after ca. A.D. 1680 (Perttula 1992), and the Historic Caddoan period (ca. A.D. 1680 to 1860) therefore covers the period of regular interaction with Spanish, French, and other EuroAmerican settlers up to the expulsion of the Caddo peoples from their homelands and forced removal to Indian Territory in 1859. General characteristics of Caddoan tradition are discussed below.

In general terms, the Caddo were characterized by:

> …a large population represented by many small settlements scattered within particular resource areas; a reliance upon horticulture as one of the primary means of subsistence; differentiated and undifferentiated mound/habitation sites with structurally differentiated mound classes (producing an apparently hierarchic division of places on the landscape); differential treatment of the dead reflective of a system of ranking; [and] indications of long-term cooperation in disposal of the dead by groups represented by some of the archeological units (Prewitt 1974:76).

Broadly, these basic characteristics of settlement, subsistence, sociopolitical organization, and mortuary practices are representative of the Caddoan archeological area from ca. A.D. 750 to 1750 and are similar, if not identical, to what constitutes the Mississippian period cultural traditions of the Mississippi River Valley and Eastern Woodlands of North America (Griffin 1967, 1985; Smith 1990). Despite these similarities, Caddoan archeologists maintain that the prehistoric and early historic Caddoan tradition developed largely independently of Mississippian-period chiefdoms elsewhere (Smith 1990).

Formative to Middle Caddoan period groups seem to have been horticulturalists, cultivating maize and squash along with several kinds of native seeds (Perttula and Bruseth 1983). They also gathered nuts, tubers, and roots and were proficient hunters of deer, fish, rabbits, raccoon, turkey, squirrel, and turtles. Available paleobotanical and bioarcheological evidence from Northeast Texas and elsewhere within the Caddoan area, including stable carbon isotope analyses of human remains (Rose et al. 1998), suggests that Caddoan groups became dependent primarily upon maize and other domesticated crops only after about A.D. 1300. By ca. A.D. 1450, maize comprised more than 50% of the diet (Burnett 1990; Perttula 1996; Rose et al. 1998), though local variation in dependence upon cultivated plants has been noted (Cliff 1997; Largent et al. 1997; Perttula 1999).

The most distinctive material culture item of the Caddo populations living in Northeast Texas was the ceramics they made for cooking, storage, and serving needs (Perttula et al. 1995). The variety of styles and forms of ceramics recovered from the region hint at the range, temporal span, and geographic extent of prehistoric Caddoan groups across the landscape (Thurmond 1990). Story (1990:246-247, 277-319) suggests that the earliest ceramics in the region date between ca. 500 and 100 B.C. and are closely related to the ceramics being produced in the Lower Mississippi Valley. Between the introduction of ceramics in the region and the emergence of distinctive Caddoan vessel forms and decorative motifs around A.D. 800, the local plainware traditions seem to have continued relatively unchanged.

Aside from ceramics, Formative to Middle Caddoan period populations in the Pineywoods possessed a sophisticated technology based on the use of stone, bone, wood, shell, and other media for the manufacture of tools, clothing, basketry, ornaments, and other items (Perttula 1992:15). Well-made corner-notched and rectangular-stemmed arrow points were common, along with siltstone and greenstone celts, perforators and borers, large Gahagan bifaces, and a variety of more expedient stone tools, such as unifacial flake scraping and cutting implements (Perttula 2004:386). Long-stemmed Red River (Hoffman 1967) and cigar-shaped ceramic pipes, as well as ceramic earspools and figurines, were also manufactured by the Caddo at this time (Newell and Krieger 1949).

Locally available lithic materials were usually employed for the manufacture of stone tools, but non-local raw materials and finished goods made from these raw materials were also obtained through trade (Brown 1983; Perttula 1990). The development and maintenance of long-distance east-to-west and north-to-south trade networks were notable features of prehistoric Caddoan tradition. Trade items included bison hides and salt; raw materials such as copper, stone, and marine shell; and finished objects such as pottery vessels and large ceremonial bifaces (Brown 1983; Creel 1991; Early 1990; Vehik 1988, 1990). Many of the more exotic trade items, especially marine shell and copper artifacts, were obtained from areas more than 186 km (300 mi) away from the Caddoan area (Perttula 1992).

3.5 Late Caddoan Period (ca. A.D. 1400 to 1680)

As currently defined, the Late Caddoan period extends from ca. A.D. 1400 to 1680 (Story 1990). Late Caddoan occupation in Northeast Texas was arguably centered on the Great Bend area of the Red River, where Late Caddoan archeological sites are included in the contemporaneous Belcher and Texarkana phases (Schambach 1983). Texarkana phase sites occur on the Red River northwest of Texarkana to the Arkansas-Oklahoma state line, as well as on the lower Sulphur River (Jelks 1961), while Belcher phase sites are distributed from about

Fulton, Arkansas, to below Shreveport, Louisiana (Kelley 1997; Schambach 1983; Webb 1959). The McCurtain phase represents another Late Caddoan archeological complex upstream from the Texarkana phase (Bruseth 1998). Texarkana and Belcher phase sites include large, permanent settlements with mounds, cemeteries, hamlets, and farmsteads (Perttula 2004:393). The mound centers were marked by the construction of earthen mounds used as temples, burial mounds, and/or ceremonial fire mounds, as during earlier Caddoan periods (Kelley 1998; Webb 1959). These settlements were inhabited by sedentary Caddo agricultural communities with complex societies led by individuals with high status (Story 1990).

Late Caddoan period settlements in the Pineywoods of Northeast Texas have been termed rural Caddoan community systems (Perttula 1991) because they were distributed along secondary streams, were widely dispersed, and consisted of functionally equivalent farmsteads and hamlets. Small mound centers were being constructed by Titus phase and other Late Caddoan groups up until ca. A.D. 1500, and possibly later, in Northeast Texas, but they lack evidence of burial mounds or large platforms; rather, these mounds contain buried, burned structures (Perttula 2004:398). The larger Caddoan towns were distributed along the major stream valleys, such as the Red, Ouachita, and Little rivers. These communities were hierarchically arranged, with civic-ceremonial centers at the “top” surrounded by associated towns of linear but dispersed farmstead compounds with several structures (such as bark- or brush-covered shelters and storage platforms) (Schambach 1983:7-8), followed by hamlets, farmsteads, and specialized processing and/or procurement locales, such as salt-making sites (Early 1993; Gregory 1980:356-357).

Faunal subsistence remains are known from a few sites in Northeast Texas dating to this time period but have so far received relatively little attention (Perttula 1993a; Thurmond 1990). Vertebrate species represented in trash middens include deer, turkey, cottontail rabbit, jackrabbit, squirrel, beaver, turtle, and fish, though deer and turkey appear to have been the dominant economic species (Perttula et al. 1982; 1993). In general, subsistence evidence suggests that Pineywoods Caddo practiced a strongly maize-based economy at this time (Fritz 1990:421, 425). Floral evidence from trash midden deposits suggests that maize (*Zea mays*) provided a dietary staple, and beans (*Phaseolus vulgaris*) were also an important food source (Perttula 2004:4005). Nuts and seeds were gathered but appear to have been of lesser importance than during earlier time periods (Crane 1982; Perttula and Bruseth 1983; Perttula et al. 1982).

By early historic times, the Caddoan nation comprised at least 25 separate groups, bands, or tribes organized into loosely affiliated kin-based groups referred to by European observers as the Hasinai, Kadohadacho, and Natchitoches confederacies (Perttula 1992). The Hasinai groups lived in the Angelina and Neches river valleys in East Texas, the Kadohadacho groups on the Red River in the Great Bend area, and the Natchitoches groups on the Red River in the vicinity of the French trading post of Natchitoches established in A.D. 1714.

3.6 Historic Caddoan Period (ca. A.D. 1519 to Present)

The first European incursion into what is now known as Texas was in 1519, when Álvarez de Pineda explored the northern shores of the Gulf of Mexico (Weddle 1985). While no documentary evidence exists for direct contact with Caddoan peoples during these initial forays, Europeans were already conducting slave raiding and native resettlement projects along the Texas Coast by 1550 (Bolton 1912). From 1528 to 1534, Álvar Núñez Cabeza de Vaca and other survivors of the Narváez Florida expedition crossed South Texas after being shipwrecked along the Texas Coast near Galveston Bay (Bandelier 1964). Swanton (1942:29) does not believe that Cabeza de Vaca actually encountered any Caddoan people during his wanderings, though his dealings in Native American trade goods between coastal and inland groups suggest that he might have traveled in the region (Perttula 1992:19). While direct contact between Cabeza de Vaca and Caddoan peoples cannot be established by historical documentation, Perttula (1992) argues that diseases such as typhoid and measles carried by the Narváez party could have been transmitted to Native American groups living elsewhere along the Texas Coast and then inland to Caddoan groups through aboriginal trade and other contact. Thus, the Narváez and Cabeza de Vaca exploration may have been an important benchmark for the initiation of contact between Europeans and Native Americans in the Spanish Borderlands West (Hester 1989:199; Perttula 1992:19, 1993b), and may have introduced epidemic diseases that resulted in substantial population declines prior to the inception of more regular contact later in the 16th century.

In the early 1540s, the Hernando de Soto *entrada*, led by Luis de Moscoso following the death of de Soto along the Mississippi River near present-day Memphis, passed into the Caddoan area, spending several months among the Caddoan groups who lived between the Ouachita and Trinity rivers (Swanton 1939; Perttula 1992:19). The death of de Soto on the Mississippi River at the province of Guachoya in the spring of 1542:

> …freed the survivors from continuing upon the original objectives of the expedition. There was only one thought shared by all: to escape from the whole dreadful adventure. Under the leadership of Luis de Moscoso, they officially decided it was hopeless to seek the sea…in fact, the cavaliers were clearly reluctant to take to boats…and instead determined to march west in the direction of New Spain (Brain 1985:xlv).

Within what is now recognized as the Caddoan archeological area, Moscoso described the provinces of Naguatex, Nondacao, and Guasco, for example, as groups that had dense populations in scattered settlements and abundant reserves of maize (Swanton 1939:258-280). Perttula's (1992) examination of Moscoso's travels suggests that his route passed through settlements of aboriginal Caddoan groups known archeologically as the Late Mid-Ouachita (or Social Hill), Belcher, Texarkana, Titus, and Frankston phases. Different versions of Moscoso's route have been proposed by various researchers (e.g., Hudson 1986; Perttula 1992; Swanton 1939). The basic import of the de Soto-Moscoso expedition in 1542 is that these explorers documented and described aspects of Caddoan settlement, subsistence strategies, aboriginal routes of travel and trade, and social organization that are broadly consistent with inferences that have been made based on the archeological record.

Between 1520 and 1685, various Europeans actually lived in the Caddoan area less than 1.5 years in total, and it is virtually certain that most Caddoan peoples during this time never saw a European (Perttula 1992:29). As a result, artifactual evidence of this phase of European contact is minimal. As Krieger points out:

> In any one site, something like twenty beads and two bits of iron may be all that can be found to represent perhaps a century of contact; and this being true, there must be scores of sites actually occupied during the same 'historic period' from which the archaeologist cannot recover a single European object (in Davis 1961:120).

The second major phase of European contact in the Caddoan historic period began with the renewed exploration of the Mississippi Valley following the establishment of the Illinois colony by the French in the 1670s. The Mississippi River, initially explored by Marquette and Joliet in 1673 to the mouth of the Arkansas River (Delangez 1946), was fully explored to its mouth by La Salle. Three years later, another expedition directed by La Salle intended to colonize the area and link the Gulf Coast with the growing French colonies of Illinois and Canada. For unknown reasons, this expedition missed the mouth of the Mississippi River and came ashore on the Texas Gulf Coast at Matagorda Bay (Cox 1922; Gilmore 1986). La Salle made several trips from Fort St. Louis to explore the region and try to find the Mississippi River, visiting the Hasinai (or Cenis, in the French transcription) in 1686 before turning back with several horses purchased from the Hasinai. Another effort was made in 1687 by the survivors of Fort St. Louis; however, La Salle was murdered by several of the men partway through this trip, and the remaining party decided to stay on with the Hasinai.

The years between 1685 and 1714 were a time of continual French and Spanish exploration of the Caddoan area. The threat of French settlement in an area the Spanish considered to be officially under their hegemony spurred serious Spanish efforts to settle and missionize the country east of New Mexico and the Rio Grande known to them as the "Kingdom of the Tejas" (Bolton 1912; Perttula 1992:30). At the same time, the French were determined to take advantage of the La Salle explorations to extend their claims in the region. Shortly thereafter, English colonies were established along the South Atlantic Coast that wished to extend trade routes west to Native American groups living on the Mississippi River and the Texas Gulf Coast (Coker and Watson 1986; Crane 1929; Usner 1989). European political relationship, trade and religious objectives, and the larger spheres of influence under the control of the Spanish, French, and British in the developing world economy all played important parts in the fate of the Caddo between ca. 1685 and 1800 (Braudel 1984:21-85, 387-429; Wallerstein 1974; Wolf 1982:129-231). Trade contacts, rumors of settlement, and exploration by one government were responded to in kind by others as part of the unstable process of colonization. The nature and character of sustained European contact has been comprehensively discussed by many researchers (Bolton 1915, 1987; Cox 1909; Fieldhouse 1966; Galloway 1982; Gibson 1989; Giraud 1957, 1963, 1974a, 1974b; John 1975, 1985; Surrey 1916; Swagerty 1984; Usner 1987; Wade 1989), and only the broad outlines are presented below in the interest of summarizing the varying European objectives as they impacted the Caddo.

From the 1790s, containment of the expanding US east of the Mississippi River dominated Spain's concerns in its Texas and Louisiana colonies, and the allegiance of the various Indian nations of the Provincias Internas, such as the Caddo, Wichita, and Comanche, was perceived by the Spanish government as a critical factor in controlling the frontier. The 1790s were a period of growth in the American fur trade, and another major growth period in the industry occurred from 1800 to 1808 (Clayton 1967). Beaver was the primary fur resource in the trade from 1790 to 1820. The Kadohadacho and Hasinai participated in the trade from the outset, and their contributions to the fur trade were considered important parts of the Spanish and Louisiana economies (Ewers 1969:47-48; Flores 1984; Peake 1954:17-18). Following the purchase of the Louisiana Territory in 1803, the US moved rapidly to explore the boundaries and character of its new territory, and the federal government emphasized the establishment of commercial and political relationships with resident aboriginal groups, including Caddoan tribes. The Freeman and Custis expedition of 1806 on the Red River followed specific guidelines regarding interaction with the Indians. This expedition was ultimately abandoned due to interference with the Spanish related to questions about the boundary between Spanish Texas and the Louisiana Territory. The US initiated a border war with Spain that resulted in the 1806 Neutral Ground Agreement. Possession of the Red River, as well as the territorial allegiance of the Kadohadacho, remained unresolved (Flores 1984:287).

As Spanish and American trading ventures evolved through the first 2 decades of the 19th century, the actual settlement of the Red River, its tributaries, and the neutral ground between Louisiana and Texas began in earnest (Strickland 1937; Haggard 1945). By 1818, nearly 3,000 settlers from the Midwest and upper South had squatted illegally in Caddo country along the south side of the Red River from the Great Bend to the Kiamichi River (Lottinville 1980:170-172). Anglo-American settlements increased up to and beyond the time of the Texas Revolution in 1836 (Strickland 1937:64-238). This settlement expansion was also accompanied by an influx of aboriginal groups from east of the Mississippi River and from the Arkansas River, including Choctaw, Cherokee, Delaware, Kickapoo, Quapaw, Shawnee, and Koasati groups (Anderson 1990; Everett 1990; Ewers 1969; Kniffen et al. 1987; Williams 1964). These groups exchanged hides, corn, pumpkins, and beans at the trading house in Nacogdoches (Swanton 1942:88) as well as with American government traders at the new agency house at the mouth of the Sulphur River. As the frontier moved west, Caddoan Indians in Louisiana became more isolated in the Anglo-American community and were under continual pressure from these settlers and from the immigrant Indians (Swanton 1942:88; Williams 1964). In Texas, settlement pressures did not impinge on Caddoan lands until after 1830 (Strickland 1937:318-355), though Stephen F. Austin viewed the aboriginal populations of Texas as a hindrance to the security of settlement (Barker 1925).

Following the death of the Caddo chief Dehahuit in 1833, American pressure in Louisiana on the new Caddo chiefs led to the ceding of Caddo homelands within the limits of the US on 1 July 1835 (Swanton 1942:89-92). The Caddo relinquished their lands for $80,000, agreed to move at their own expense within 1 year of the treaty date, and moved to Texas just prior to the establishment of the Republic of Texas in 1836. The term *Caddo Nation* came to be associated with the Cherokee as well as with the Hasinai, Anadarko, and other related tribes of East Texas, and the Indians became subject to the repressive measures of successive Republic of Texas administrations (Neighbours 1973, 1975). By the early 1840s, the Caddo Nation was composed of remnants of the Kadohadacho, Hasinai, and other once-independent Caddoan tribes, and it had been essentially pushed out of East Texas along with the other groups who had signed the Treaty of Peace and Friendship with the Republic of Texas in 1843 (Strickland 1937:355; Swanton 1942:97). In 1846, the Kadohadacho, Hasinai, and Anadarko lived together in a village of about 150 houses on the Brazos River near the present City of Waco, Texas; shortly thereafter, they moved near the Clear Fork of the Brazos to maintain their distance from

Anglo-American frontier communities. From 1846 to 1854, the US government and the Texas legislature founded the Texas Indian Reservation on the Brazos River (Neighbours 1957, 1973), but this reservation lasted only until 1859 due to frictions among white settlers, Indian agents, and the agglomeration of tribal members. Accordingly, in August 1859, the Caddo Nation, then about 1,050 people in number, was removed to the Indian Territory and the Wichita agency in western Oklahoma. Since that time, the history of the Caddo peoples is largely similar to the overall history of the US.

3.7 HISTORIC EUROAMERICAN PERIOD (CA. 1519 TO PRESENT)

The first European incursion into what is now known as Texas was in 1519, when Álvarez de Pineda explored the northern shores of the Gulf of Mexico. In 1528, Cabeza de Vaca crossed South Texas after being shipwrecked along the Texas Coast near Galveston Bay. However, European settlement did not seriously disrupt native ways of life until after 1700. The first half of the 18th century was the period in which the fur trade and mission system, as well as the first effects of epidemic diseases, began to seriously disrupt the native culture and social systems. This process is clearly discernable at the Mitchell Ridge site, where burial data suggest population declines and group mergers (Ricklis 1994), as well as increased participation on the part of the Native American population in the fur trade. By the time that heavy settlement of Texas began in the early 1800s by Anglo-Americans, the indigenous Indian population was greatly diminished.

The future Henderson County was part of the Nacogdoches District in Spanish and Mexican Texas, and people of European origin did not settle in the area until after the Texas Revolution in 1836.[1] Although no settlers lived in the area at the time, more than a dozen Mexican land grants were made there. In 1836, the region was inhabited by Cherokees, Shawnees, Delawares, and Kickapoos, who migrated westward in the winter of 1819 to 1820 ahead of European settlement. The Spanish and Mexican governments welcomed the Indians as a buffer between themselves and the American settlers. The first part of the battle of the Neches, the decisive defeat of the Indians in East Texas, took place in the future Henderson County in July 1839. Soon afterward, President Mirabeau B. Lamar, in accord with his harsh Indian policy, forced the remaining Indians to abandon their homes and seek refuge in Oklahoma Territory.

European settlers moved first into the area along the Trinity River and then into those areas previously occupied by the Indians. Some of the first settlers were Jane Irvine, who had a Mexican land grant of a league and a labor, and Henry Jeffreys, who owned the league of land where the first community, Buffalo, developed. The town was at a ferry crossing on the Trinity River in the northwestern part of the county, near the site of present-day Seven Points. John H. Reagan surveyed the town lots and began his law practice there. The first commissioners were William Ware, David Carlisle, Alfred Moore, Thacker Vivion, Sr., and James Hooker. The Texas legislature established Henderson County on April 27, 1846, and named it in honor of James

---

[1] The following historical summary of Henderson County is adapted from TSHA (2015).

Pinckney Henderson, first governor of the state of Texas. The county was formed from parts of Nacogdoches and Houston counties. Its court was first held in the home of William Ware, and later, William Love. Henderson County was organized on August 4, 1846, and comprised 3,500 square miles at the time. Buffalo was the county seat until March 1848. Bennett H. Martin presided over the first district court in Buffalo in 1847. Centerville, located 6 miles west of the site of present-day Eustace near the center of the county, was to be the permanent county seat. James Harper Starr donated 100 acres of land in the John P. Brown survey for the town, and on September 11, 1848, Chief Justice B. Graham held court there. Centerville, however, did not remain the county seat. On April 2, 1849, the archives and county government were returned to Buffalo, for reasons not exactly clear, and Centerville ceased to exist.

In 1848, the legislature formed Van Zandt and Kaufman counties out of Henderson County and reduced it to its present size, and the county seat moved again. J.B. Luker became chief justice, James Boggs sheriff, and E.J. Thompson county clerk. Court was held under a grove of red oak trees where the present courthouse stands. The name of the new county seat, Athens, was suggested by Dulcina A. Holland (later Mrs. Dull Avriett), who hoped the town would be a center of learning. The first courthouse, built in 1850, cost the county 50 dollars. That year, the population of Henderson County consisted of 1,155 white persons, 81 slaves, and 1 free black. Farming was the chief source of income; the county's 106 farms had a value of $64,214, mainly from corn and sweet potatoes. In 1850, the early settlers of Henderson County were from the upper South, but during the following decade westward migration from the lower South greatly increased. Cotton was introduced, though at the beginning production was negligible. By 1855, the courthouse had been sold and the proceeds given to W.B. Stirman to build a jail, from which only 1 prisoner ever escaped. The second county courthouse, a 2-story, wooden, weather-boarded structure with 4 brick chimneys, was completed in 1860 and sat in the center of the square until it burned in 1885.

Several Henderson County communities developed not long after county organization. Normandy, established in 1845, was the first Norwegian settlement in Texas. Science Hill, established in 1848, had the first school of higher learning and Masonic lodge in the county. Brownsboro, 3 miles from Normandy at a ferry crossing on Kickapoo Creek, is the oldest existing town in the county; it was established in 1849 by John (Red) Brown. In the late 1840s, Buffalo had 100 residents and a debating society presided over by John H. Reagan. Fincastle had the first public school and got the first post office in 1852; residents had previously traveled to Palestine for their mail. Stillwater, later renamed for A.H. Chandler, was established in 1859. Citizens read the *Palestine Trinity Advocate* for news; no newspaper was printed in Henderson County until the 1880s. Other communities that no longer exist were New York, Goshen, Wild Cat, Carroll Springs, and Cat Fish.

By 1860, the county more resembled the Deep South. Roads, ferries, and bridges replaced buffalo trails. Cotton had increased in importance. Lumber, leather work, and clay products were manufactured. Levi Cogburn established a pottery company in 1857 to manufacture cups and saucers. Two other manufacturing firms, a lumber mill and a gristmill, helped boost the number of persons employed in manufacturing to 39, who received $14,700 in wages and produced $35,180 worth of goods. As the decade ended, the 1860 census reflected the changing character of the county. The total population was 4,595: 3,478 whites, 1,116 slaves, and 1 free black. Farms worth $498,041 produced more than 3 times more corn and 4 times more sweet potatoes than reported in the previous census, as well as tobacco, peas, oats, and 2,105 bales of cotton. Almost 3,000 milk cows, 8,000 other cattle, 18,000 hogs, 1,600 sheep, and more than 1,000 horses were listed in the agricultural census of 1860. The county was not on any major trade routes, though in 1859 a stage route extended from Shreveport through Athens to Waco.

Henderson County did not escape the trials of Southern life during the Civil War and Reconstruction era. In 1859, 2 sellers of wheat-winnowing machines were accused of attempting to organize a slave rebellion and were hanged without benefit of trial. A slave revealed the alleged plot and implicated a slave leader, Black Bob, who was tried and hanged. When the secession vote came, the county voted 400 to 49 to secede. Among residents of the county were 155 slaveholders in 1860. Fincastle had the largest slave population and was the largest and wealthiest community. Robert J. (Howdy) Martin, Jerry Warren, and a Captain Manion each organized a volunteer company. In all, about 1,500 Henderson County men served in the war, while the home front provided leather goods, crocks, food, and clothing to the army. One-tenth of the farm products was taxed to cover war expenses, and a county tax helped care for indigent wives, widows, and orphans. During Reconstruction, most Henderson County whites resented black suffrage and the rule imposed by Congress. However, the military government rarely impinged on the county. From their Tyler headquarters, federal troops investigated an incident in Henderson County in 1867 that involved a fight between J.J. Faulk and Jim McEwin. The 1870 census showed an increase in population from 4,595 in 1860 to 6,786 in 1870. The number of whites increased by 1,654 and that of blacks by 537. Significant immigration from the Deep South occurred during this time. Many slaves were brought into the county from Louisiana and Arkansas and were left there when the war ended. Many of these African Americans remained in the county. In 1870, at the nadir of the postwar depression, manufacturing had dropped to less than half its production a decade before; only a cotton gin, a gristmill, and the pottery mill remained. Farm values dropped to almost half of what they had been. Milk cows, however, almost doubled in number during the decade.

In an attempt to recoup their previous financial status, citizens pooled their resources beginning in 1875, donated the right-of-way, and built the bed of the St. Louis Southwestern (SLSW) Railway. In 1880, the first railroad came to the county. In the 1880s, the Cotton Belt, as the SLSW Railway was called, brought new life, as citizens moved to start new communities and rename old ones. Stillwater became Chandler in honor of A.H. Chandler, who was instrumental in having the railroad built. Malakoff became the post office for Science Hill, Wild Cat, Willow Springs, and Cross Roads. Murchison, founded in 1877, shipped watermelons out of its depot. Part of Brownsboro moved a short distance, to form New Brownsboro, while Trinidad was founded by the railroad as a water and refueling stop. The census of 1880 reflected growth in every area. Population increased to 9,735 (7,641 whites and 2,094 blacks), and agricultural production increased during the decade. The clay subsoils of the county provided a new manufacturing base when Miller Pottery began to produce flower pots in 1882, Gus Hill began producing building and fire brick in 1885, and Athens Tile and Pottery Company was formed in 1885. The courthouse burned in 1885, killing the original red oak trees under which the first court met.

The county continued to grow into the 1890s, aided by the completion of the SLSW Railroad, although manufacturing declined. The Texas and New Orleans was extended from Dallas through Kemp to Athens by 1898. Eustace was established along this line in 1900. Commercial development increased, and in 1890 T.F. Murchison became the first banker because his store had the only vault in the county. The census figures for 1890 showed an increase in population, farm values, and production. The population increased to 12,285. Farm values rose to over a million dollars, and corn, peas, molasses, and peaches competed with the cotton production of 7,949 bales. All phases of agriculture showed a rise as cattle, hogs, sheep, horses, and poultry surpassed all previous levels.

In 1902, J.J. Faulk helped pass the first good-road law, and roads were improved with sand and clay. W.D. Dodd developed the county’s lignite deposits for the railroads; migrant Mexican workers first worked the mines. The first automobile in the county appeared in Athens in 1910. The first county school board formed to provide public education for the first time since before the Civil War. Women formed clubs for civic and preservation work, the first public library was established, and the Daughters of the American Revolution and United Daughters of the Confederacy began to preserve the county’s history. In 1913, the present courthouse was built; Boy Scouts planted the trees that grow around it. In 1900, 52 manufacturing firms employed 161 people who earned $41,494 in wages and made products worth $154,332. Farms numbered more than 3,000 and were valued at more than $1.5 million. Between 1900 and 1920, agriculture reached its peak as the economic base of the county. Cattle, hogs, poultry, and cotton production reached their highest levels. The population increased from 19,970 persons in 1900 to 28,327 in 1920. Henderson County contributed 1,119 men and 3 women to the war effort during World War I. Twenty-six of the men died, but only 4 were killed in action; the others died from influenza. The American Legion post was named for Brady Shelton, the first county man killed in action. The Council of Defense toured county schools to urge children to get their parents to invest in war bonds.

The economy suffered recession in the early 1920s, but several developments rescued it and subsequently helped the county to avoid some of the worst hardships of the Great Depression. By 1926, Texas Power and Light began to build the power plant at Trinidad to utilize the lignite deposits for power generation. Oil was discovered at Pine Grove in 1934, at the Cayuga field in 1937, at the Flag Lake field in 1940, and afterward at Tri-City; the Opelika gas works of Lone Star Gas Company helped boost the county’s economy. The 1920s and 1930s saw a drop in manufacturing, however. As the depression took its toll on manufacturing nationwide, the number of county firms dropped from 17 in 1920 to 12 by 1940, and the value of products dropped from $615,608 in 1920 to $255,000 in 1940. The number of farms decreased very little, but the value of farms dropped from $18 million to $8 million. The numbers of farm animals dropped by more than half. The population of the county continued to grow, but at a slower rate. The black population increased from 4,860 in 1920 to 6,115 in 1940. County residents numbered 31,822 in 1940.

The young men of the county responded to the call for volunteers and registered for the draft in World War II, which claimed the lives of 108 of them. In the 1940s, the economy began to diversify. A canning plant built in 1940 canned the fruits and vegetables that began to be a larger part of the agricultural production. Tomatoes, peaches, black-eyed peas, sweet potatoes, and melons eventually replaced cotton. Farm values again rose; crop production declined as a whole, and livestock production doubled, while forest products rose slightly. Farms became mechanized during the labor shortages in the 1940s.

Agriculture and manufacturing progressed subsequently. Hay and livestock production replaced the traditional crops of family farms in the 1950s, when the Henderson County Livestock Association was formed. From the 1950s to the 1970s, the number of farms decreased to mid-19th-century levels. Production of cattle, peaches, and pears rose to higher levels than ever before; the last cotton crop reported in the census, that of 1969, amounted to only 60 bales. In the 1970s, 50 manufacturing firms hired 1,800 employees and paid wages of more than $14 million. Workers made products valued at more than $48 million—processed food, lumber, clay products, furniture, chemical and medical instruments, ladies' intimate apparel, machinery, and electrical equipment.

4.0 ARCHIVAL RESEARCH

4.1 DATABASE REVIEW

Archival research conducted via the Internet at the THC's *Texas Archeological Sites Atlas* (Atlas) website indicated the presence of 1 previously recorded archeological site and 1 cemetery within a 1.0-mi (1.6-km) review radius of the Project Area (THC 2015), while a review of the National Park Service's (NPS) NRHP Google Earth map layer indicated the presence of no historic properties listed on the NRHP within the review radius (NPS 2015). No previously recorded archeological sites, including any listed on the NRHP, are located within or immediately adjacent to the Project Area. These documented cultural resources are summarized in Table 4-1, while their locations relative to the Project Area are presented in Figure 4-1. According to the Atlas, the Project Area has not been previously assessed for cultural resources.

Table 4-1. Documented cultural resources within 1.0 mi (1.6 km) of Project Area

Trinomial, Cemetery, Historic Property	Site Type	NRHP Eligibility	Distance/Direction from Project Area	Potential to be Impacted by Project?
Friendship Cemetery (HE-C015)	Cemetery	N/A	0.5 mi (0.8 km) northeast	No
41HE138	Prehistoric campsite	Undetermined	0.5 mi (0.8 km) north	No

4.2 PROBABILITY ASSESSMENT

Prehistoric archeological sites are commonly found in upland areas and on alluvial terraces near stream/river channels or drainages. Much of the Project Area is situated in low-lying, swampy areas; however, the outer edges of the Project Area encompass the lower edges of several upland formations in close proximity to Dunn and Flat creeks. Based on the location of the Project Area on these upland formations in proximity to Dunn and Flat creeks, it was Horizon's original opinion, prior to the field efforts, that there existed a moderate potential for undocumented prehistoric cultural deposits within portions of the Project Area.

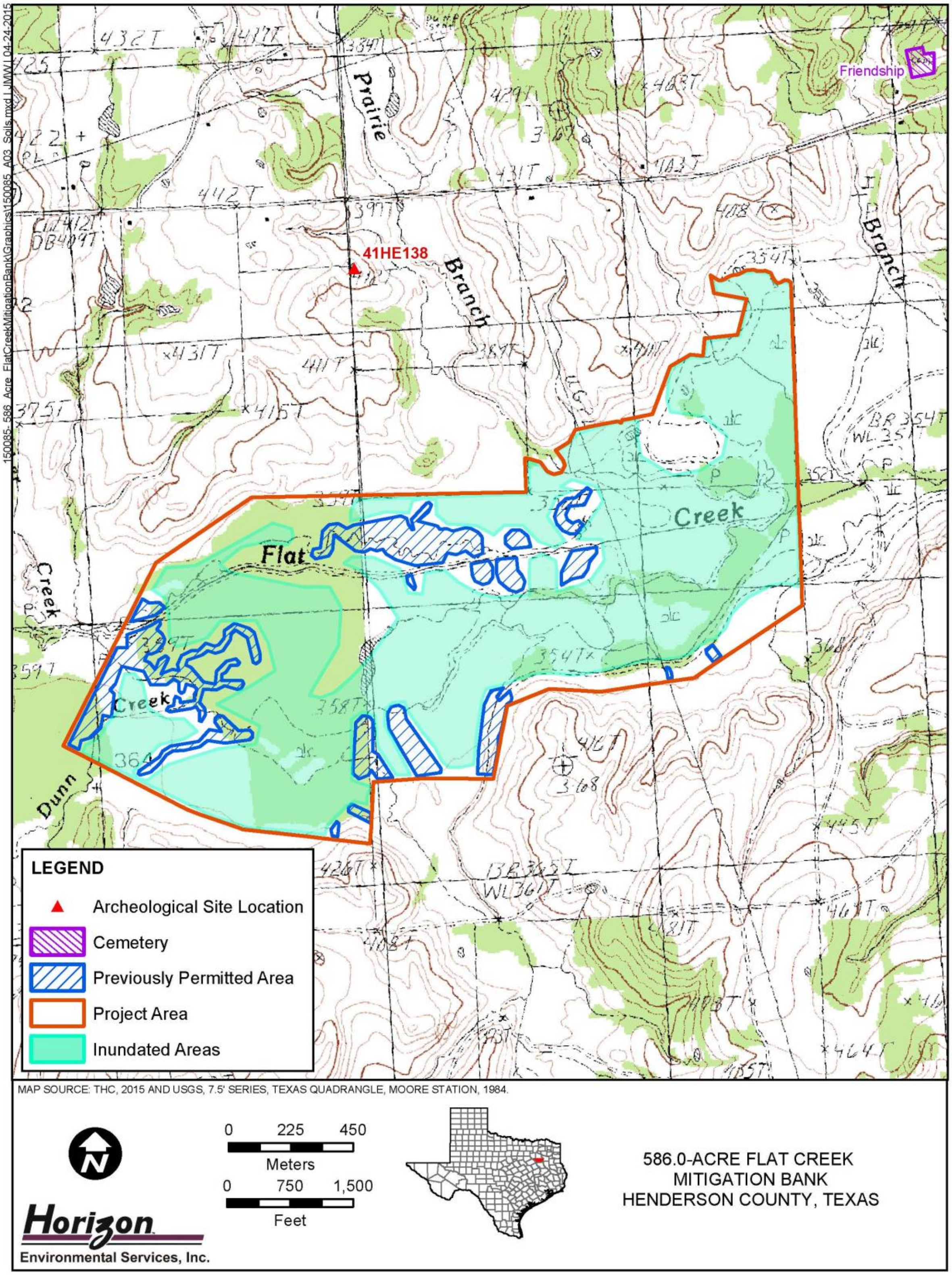

Figure 4-1. Documented cultural resources within 1.0 mi (1.6 km) of Project Area

In regard to historic-era resources, no structures are visible within the boundaries of the Project Area as seen on the 2015 Google Earth imagery or on the relevant 1984 USGS 7.5-minute Moore Station, Texas, topographic quadrangle. Due to the lack of any visible historic-era structures in proximity to the Project Area, it was Horizon's original opinion, prior to field efforts, that there existed a low potential for historic-era architectural or archeological resources within the Project Area.

5.0 SURVEY METHODOLOGY

A 2-person Horizon archeological field crew completed the intensive pedestrian survey of the Project Area on 21 and 22 April 2015. This entailed intensive surface inspection and subsurface shovel testing efforts within non-inundated and non-previously permitted portions of the Project Area. The TSMASS require a minimum of 1 shovel test per 3.0 acres on projects over 100.0 acres in size. As such, a total of 36 shovel tests would have been necessary on the 107.4 acres of non-inundated and non-previously permitted areas within the overall 586.0-acre Project Area in order to comply with the TSMASS. Per discussions with Mr. Skipper Scott, regulatory archeologist with the USACE, Fort Worth District, Mr. Scott requested that Horizon visually survey the entire Project Area and target shovel testing efforts within non-inundated and non-previously permitted areas that appear to represent small hummocks within the low-lying wetland landscape. Additionally, Horizon placed shovel tests near the outer boundaries of the Project Area, at the edges of the surrounding prominent landforms. Horizon exceeded the minimum survey standards by excavating 45 shovel tests within the non-inundated and non-previously permitted areas of the Project Area. All excavated matrices were screened through 0.25-inch (6.0-millimeter [mm]) hardware mesh or were trowel-sorted if the dense, wet sandy soils prohibited successful screening.

In general, shovel tests measured approximately 12.0 in (30.0 cm) in diameter and were excavated to a target depth of 3.3 ft (1.0 m) below ground surface, to the top of pre-Holocene deposits, or to the maximum depth practicable. In practice, shovel tests were terminated at depths of to 1.6 to 3.3 ft (0.5 to1.0 m) below surface due to the presence of either water infilling the shovel test or sandy and loamy soils too deep to continue excavating with a shovel. The locations of all shovel tests were recorded via handheld global positioning system (GPS) units utilizing the Universal Transverse Mercator (UTM) coordinate system and the North American Datum of 1983 (NAD 83). Shovel test locations are presented in Figures 5-1 and 5-2, and shovel test data are presented in Appendix A.

The TSMASS also require backhoe trenching in stream terraces and other areas with the potential to contain buried archeological materials at depths below those that shovel tests are capable of reaching (approximately 3.3 ft [1.0 m] below surface). The Project Area is located in a low-lying setting with some alluvial terrace deposits near Flat Creek and deep, sandy and loamy sediments throughout much of the Project Area. Shovel testing revealed

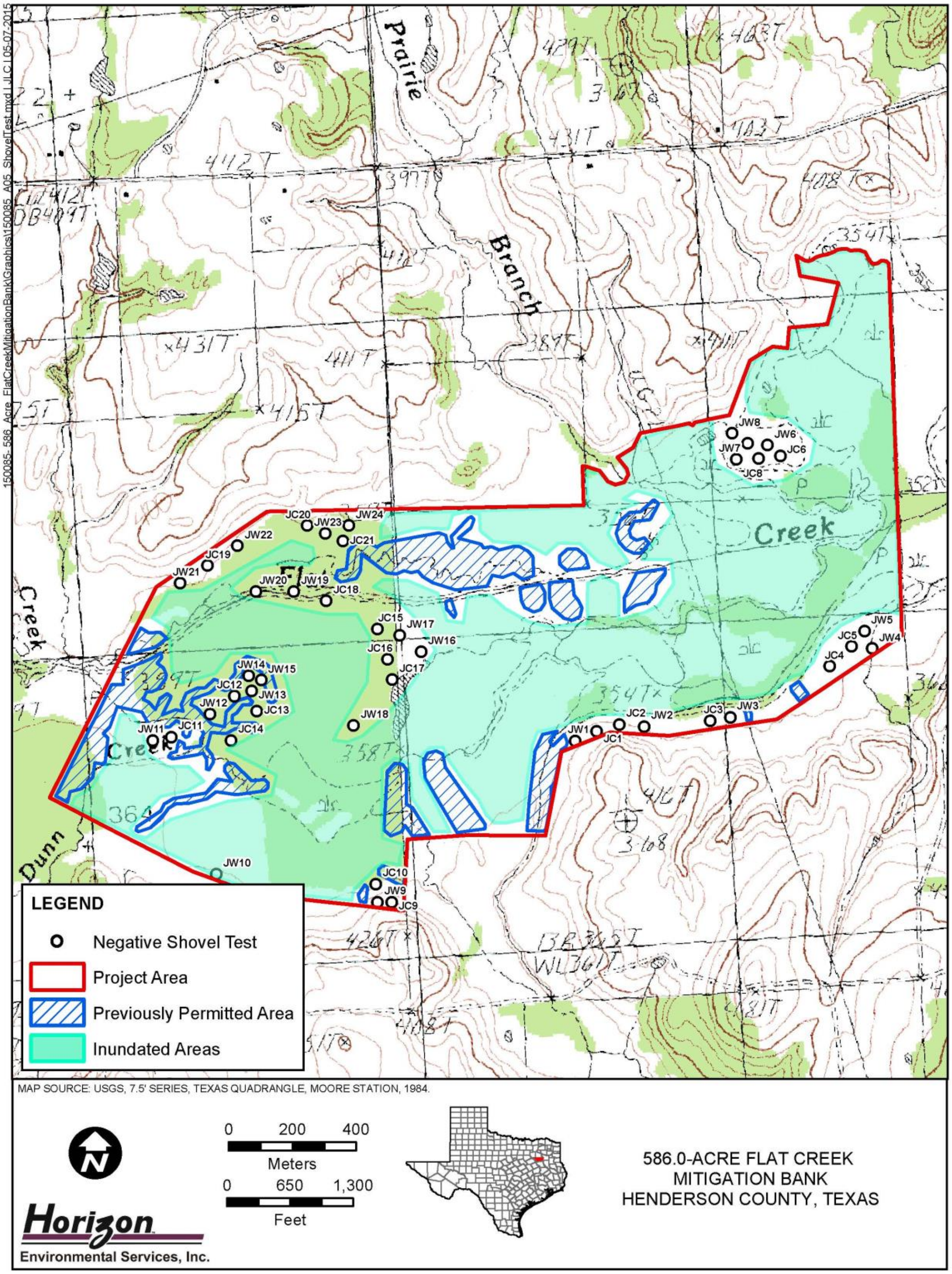

Figure 5-1. Shovel test locations within Project Area on topographic quadrangle

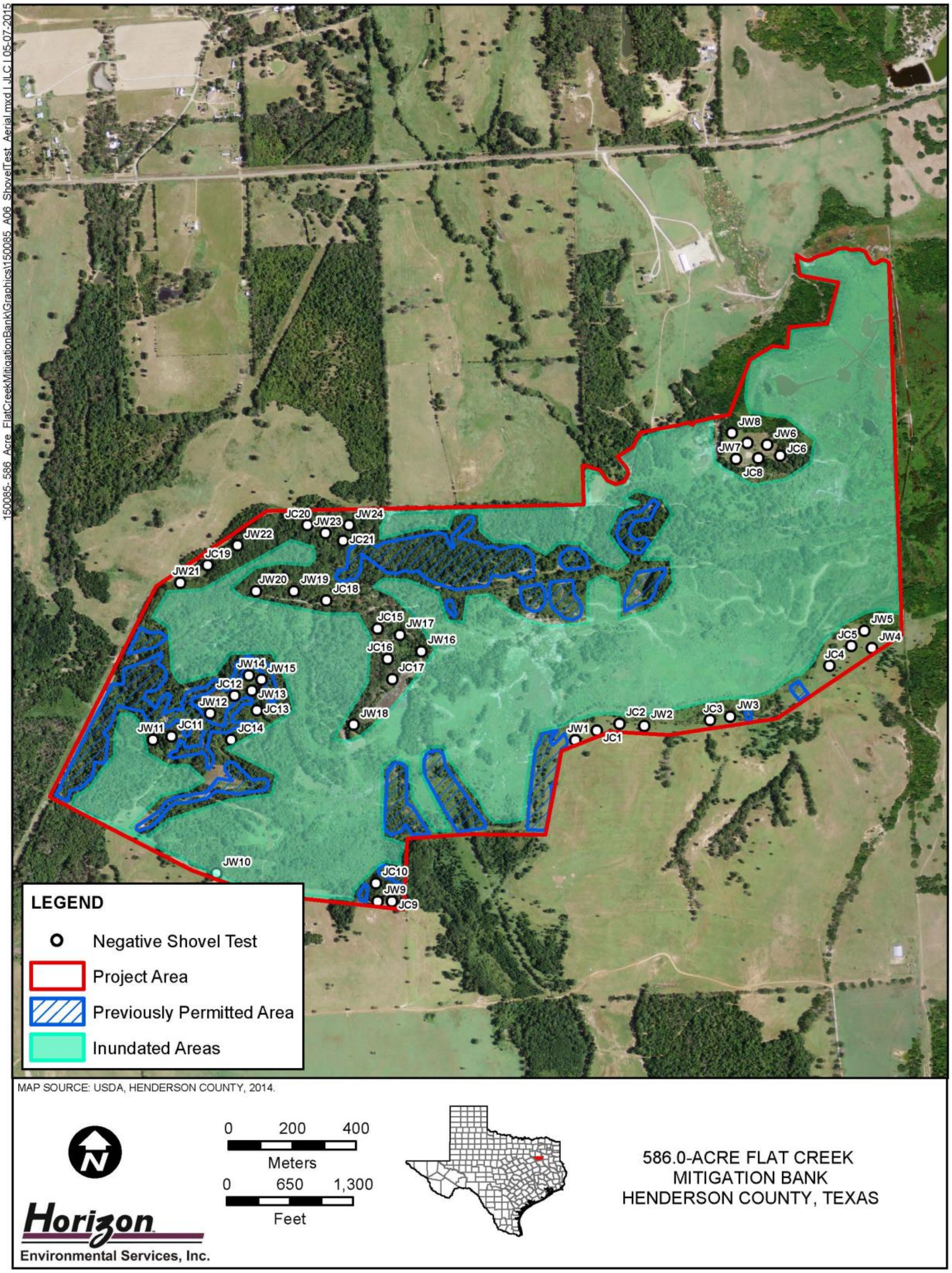

Figure 5-2. Shovel test locations within Project Area on aerial photograph

deep, sandy and loamy sediments overlying sandy clay, indicating that shovel testing was not capable of penetrating to the bottom of sediments that may contain archeological deposits. The potential exists for deeply buried cultural deposits to occur within the sandy and loamy sediments observed within the Project Area. However, only shallow subsurface impacts are anticipated during vegetation planting activities. As such, shovel testing was considered to constitute an adequate and effective survey technique for identifying archeological resources within the Project Area, and mechanical trenching was consequently not employed as a site-prospecting technique.

During the survey, field notes were maintained on terrain, vegetation, soils, landforms, survey methods, and shovel test results. Digital photographs were taken, and a photographic log was maintained. Horizon employed a non-collection policy for cultural resources. Diagnostic artifacts (e.g., projectile points, ceramics, historic materials with maker's marks) and non-diagnostic artifacts (e.g., lithic debitage, burned rock, historic glass, and metal scrap) were to be described, sketched, and/or photo-documented in the field and replaced in the same location in which they were found. As no cultural resources were observed during the survey, the collections policy was not brought into play.

6.0 RESULTS AND RECOMMENDATIONS

6.1 RESULTS

The survey of non-inundated and non-previously permitted areas within the Project Areas resulted in entirely negative findings. No cultural materials were observed on the surface of the Project Area or within any of the 45 excavated shovel tests in these areas. In general, the majority of the Project Area contained deep, sandy loam soils with the potential to contain deep, subsurface cultural deposits. However, only shallow, subsurface impacts, less than 3.3 feet (ft) (1.0 meters [m]) deep, are anticipated during vegetation planting activities. As such, since no deep, subsurface impacts are anticipated within the Project Area, shovel testing was considered an adequate site-prospecting survey technique.

6.2 MANAGEMENT RECOMMENDATIONS

Based on the negative results of the cultural resources survey within the Project Area, it is Horizon's opinion that the 586.0-acre Flat Creek Mitigation Bank Project will have no adverse effect on significant cultural resources listed on or considered eligible for listing on the NRHP and that no further investigations are warranted. Horizon therefore recommends that Wildwood be allowed to proceed with the undertaking, relative to the jurisdiction of the USACE and Section 106 of the NHPA. However, in the unlikely event that any cultural materials (including human remains or burial features) are inadvertently discovered at any point during construction, use, or ongoing maintenance within the Project Area, even in previously surveyed areas, all work at the location of the discovery should cease immediately, and the USACE and THC should be notified of the discovery.

7.0 REFERENCES CITED

Adovasio, J.M., J. Donahue, and R. Stuckenrath

1990 The Meadowcroft Rockshelter Chronology 1975-1990. *American Antiquity* 55:348-354.

Anderson, D.B.

1996 Approaches to Modeling Regional Settlement in the Archaic Period Southeast. In *Archaeology of the Mid-Holocene Southeast*, edited by K.E. Sassaman and D.G. Anderson, pp. 157-176. Gainesville: University Press of Florida.

Anderson, H.A.

1990 The Delaware and Shawnee Indians and the Republic of Texas, 1820-1845. *Southwestern Historical Quarterly* 94(2):231-260.

Anderson, K.M., K. Gilmore, O.F. McCormick, III, and R.R. Morenon

1974 *Archaeological Investigations at Lake Palestine, Texas*. Contributions in Anthropology No. 11, Department of Anthropology, Southern Methodist University, Dallas.

Bandelier, F. (translator)

1964 [1904] *The Journey of Alvar Núñez Cabeza de Vaca and his Companions from Florida to the Pacific, 1528-1536*. New York: Allerton Press.

Barker, E.C.

1925 *The Life of Stephen F. Austin, Founder of Texas, 1793-1836: A Chapter in the Westward Movement of the Anglo-American People*. Austin: The University of Texas Press.

Barnes, V.E.

1965 *Geologic Atlas of Texas—Tyler Sheet*. Bureau of Economic Geology, The University of Texas at Austin.

Blair, W.F.

1950 The Biotic Provinces of Texas. *Texas Journal of Science* 2:93-117.

Bolton, H.E.

1912 The Spanish Occupation of Texas, 1519-1690. *Southwestern Historical Quarterly* 11:249-276.

1915 *Texas in the Middle Eighteenth Century: Studies in Spanish Colonial History and Administration*. Berkeley: University of California Press.

1987 *The Hasinais: Southern Caddoans as Seen by the Earliest Europeans*. Norman: University of Oklahoma Press.

Bomar, G.W.

1983 *Texas Weather*. Austin: University of Texas Press.

Brain, J.P.

1985 Introduction: Update of De Soto Studies since the United States De Soto Expedition Commission Report. In *Final Report of the United States De Soto Expedition Commission*, by J.R. Swanton, xi-lxxii. Classics in Anthropology Series. Washington, D.C.: Smithsonian Institution Press.

Braudel, F.

1984 *Civilization and Capitalism: Fifteenth to Eighteenth Century, Vol. 3, The Perspective of the World*. New York: Harper & Row.

Brown, I.W.

1983 Historic Aboriginal Pottery from the Yazoo Bluffs Region, Mississippi. *Southeastern Archaeological Conference Bulletin* 21:1-17.

Bruseth, J.E.

1998 The Development of Caddoan Polities along the Middle Red River Valley of Eastern Texas and Oklahoma. In *The Native History of the Caddo: Their Place in Southeastern Archaeology and Ethnohistory*, edited by T.K. Perttula and J.E. Bruseth, pp. 47-68. Studies in Archeology No. 30. Austin: Texas Archeological Research Laboratory, University of Texas at Austin.

Bruseth, J.E., J.T. Bagot, K.M. Banks, and M.A. McKinley

1977 *Archaeological Research at Lake Fork Reservoir: Site Inventory and Assessment*. Research Report No. 87, Archaeology Research Program, Southern Methodist University, Dallas.

Bryant, V.M., Jr.

1969 *Late Full-glacial and Post-glacial Pollen Analysis of Texas Sediments*. Unpublished Ph.D. dissertation, Department of Botany, The University of Texas at Austin.

1977 A 16,000 Year Pollen Record of Vegetational Change in Central Texas. *Palynology* 1:143-155.

1989 Botanical Remains in Archaeological Sites. In *Interdisciplinary Workshop on the Physical-Chemical-Biological Processes Affecting Archeological Sites*, compiled by C.C. Mathewson, pp. 85-115. Department of the Army, US Army Corps of Engineers, Washington.

Bryant, V.M., and R.G. Holloway

1985 A Late Quaternary Paleoenvironmental Record of Texas: An Overview of the Pollen Evidence. In *Pollen Records of Late Quaternary North America Sediments*, edited by V.M. Bryant and R.G. Holloway, pp. 39-67. Dallas: The American Association of Stratigraphic Palynologists Foundation.

Burnett, B.A.

1990 The Bioarcheological Synthesis of the Eastern Portion of the Gulf Coastal Plain. In *The Archeology and Bioarcheology of the Gulf Coastal Plain*, by D.A. Story, J.A. Guy, B.A. Burnett, M.D. Freeman, J.C. Rose, D.G. Steele, B.W. Olive, and K.J. Reinhard, pp. 385-418. Research Series No. 38. Fayetteville: Arkansas Archeological Survey.

Chelf, C.

1946 Grooved Clubs from a Peat Bog in Milam County, Texas. *Bulletin of the Texas Archeological and Paleontological Society* 17:42-47.

Clayton, J.L.

1967 The Growth and Economic Significance of the American Fur Trade, 1790-1890. In *Aspects of the Fur Trade: Selected Papers of the 1965 North American Fur Trade Conference*, edited by R.W. Fridley and J.D. Holmquist, pp. 62-72. St. Paul: Minnesota Historical Society.

Cliff, M.B.

1997 The Middle Caddoan Period in the Lower Sulphur River Area. *Journal of Northeast Texas Archaeology* 9:9-16.

Coker, W.S., and T.D. Watson

1986 *Indian Traders and the Southeast Spanish Borderlands: Panton, Leslie and Co. and John Forbes and Co*. Gainesville: University Presses of Florida.

Collins, M.B.

2004 Archeology in Central Texas. In *The Prehistory of Texas*, edited by T.K. Perttula, pp. 101-126. College Station: Texas A&M University Press.

Collins, M.B., and C.B. Bousman, with contributions by T.K. Perttula

1990 Historic Context: Quaternary Environments and Archeology in Northeastern Texas. In *Archeology in the Eastern Planning Region, Texas: A Planning Document*, edited by N.A. Kenmotsu and T.K. Perttula, pp. 49-67. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

Cox, I.J.

1909 The Significance of the Texas-Louisiana Frontier. *Mississippi Valley Historical Association Proceedings* 3:198-213.

1922 *The Journeys of René Robert Cavelier, Sieur de La Salle*. New York: Allerton Book Company.

Crane, C.J.

1982 Plant Utilization at Spoonbill, an Early Caddo Site in Northeast Texas. *Midcontinental Journal of Archaeology* 7:81-97.

Crane, V.W.

1929 *The Southern Frontier, 1670-1732*. Ann Arbor: University of Michigan Press.

Creel, D.G.

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

Davis, E.M.

1961 Proceedings of the Fifth Conference on Caddoan Archaeology. *Bulletin of the Texas Archeological Society* 31:77-150.

Delangez, J.

1946 The "Récit des Voyages et des Découvertes du Père Jacques Marquette." *Mid-America* 28:173-194, 211-258.

Diamond, D.D., D.H. Riskind, and S.L. Orzell

1987 A Framework for Plant Community Classification and Conservation in Texas. *The Texas Journal of Science* 39:203-221.

Dice, L.R.

1943 *The Biotic Provinces of North America*. Ann Arbor: University of Michigan Press.

Dillehay, T.D.

1989 *Monte Verde: A Late Pleistocene Settlement in Chile—Paleoenvironment and Site Context, Vol. 1*. Smithsonian Institution Press: Washington, D.C.

1997 *Monte Verde: A Late Pleistocene Settlement in Chile—The Archaeological Context, Vol. 2*. Smithsonian Institution Press: Washington, D.C.

Dincauze, D.F.

1984 An Archaeo-Logical Evaluation of the Case for Pre-Clovis Occupations. *Advances in World Archaeology* 3:275-323.

Early, A.M.

1990 Hardman and Salt Making. In *Hardman (3CL418): A Prehistoric Salt Processing Site*, by I. Williams and A.M. Early, pp. 13-1 to 13-31. Project Report No. 642, Sponsored Research Program. Fayetteville: Arkansas Archeological Survey.

1993 *Caddoan Saltmakers in the Ouachita Valley: The Hardman Site*. Research Series No. 43. Fayetteville: Arkansas Archeological Survey.

Everett, D.

1990 *The Texas Cherokee: A People Between Two Fires, 1819-1840*. Norman: University of Oklahoma Press.

Ewers, J.C. (editor)

1969 *The Indians of Texas in 1830 by Jean Louis Berlandier*. Washington, D.C.: Smithsonian Institution Press.

Fenneman, N.M.

1938 Physiography *of the Eastern United States*. New York: McGraw-Hill Book Company, Inc.

Fieldhouse, D.K.

1966 *The Colonial Empires: A Comparative Survey from the Eighteenth Century*. London: G. Weidenfeld and Nicolson.

Fields, R.C., M.E. Blake, and K.W. Kibler

1997 *Synthesis of the Prehistoric and Historic Archeology of Cooper Lake, Delta and Hopkins Counties, Texas*. Reports of Investigations No. 104. Austin: Prewitt and Associates, Inc.

Fields, R.C., and S.A. Tomka, with contributions by T.K. Perttula

1993 Historic Context: Hunter-Gatherer Mobility in Northeast Texas, 10,000 – 200 B.C. In *Archeology in the Eastern Planning Region, Texas: A Planning Document*, edited by N.A. Kenmotsu and T.K. Perttula, pp. 69-96. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

Fisher, W.L.

1965 *Rock and Mineral Resources of East Texas*. Report of Investigations No. 54, Bureau of Economic Geology, The University of Texas at Austin.

Flores, D.L.

1984 *Jefferson and Southwestern Exploration: The Freeman and Custis Accounts of the Red River Expedition of 1806*. Norman: University of Oklahoma Press.

Fritz, G.J.

1990 Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory* 4:387-435.

Galloway, P.K. (editor)

1982 *La Salle and His Legacy: Frenchmen and Indians in the Lower Mississippi Valley*. Jackson: University Press of Mississippi.

Gibson, C.

1989 Spanish Indian Policies. In *Handbook of North American Indians, Vol. 4, History of Indian-White Relations*, edited by W.E. Washburn, pp. 96-102. Washington, D.C.: Smithsonian Institution Press.

Gilmore, K.

1986 La Salle's Fort St. Louis in Texas. *Bulletin of the Texas Archeological Society* 55:61-72.

Giraud, M.

1957 *Histoire de la Louisiane Française, Vol. 2, Années de Transition, 1715-1717*. Paris: Presses Universitaires de France.

1963 *Histoire de la Louisiane Française, Vol. 3, La Système de Law, 1717-1720*. Paris: Presses Universitaires de France.

1974a *Histoire de la Louisiane Française, Vol. 4, La Louisiane Après le Système de Law, 1721-1723*. Paris: Presses Universitaires de France.

1974b *A History of French Louisiana, Vol. 1, The Reign of Louis XIV, 1698-1715*. Baton Rouge: Louisiana State University Press.

Godfrey, C.L., G.S. McKee, and H. Oakes

1973 *General Soil Map of Texas*. Texas Agricultural Experiment Station, Texas A&M University, and Soil Conservation Service, US Department of Agriculture, College Station, Texas.

Gregory, H.F.

1980 A Continuity Model for Caddoan Adaptation on the Red River in Louisiana. *Louisiana Archeology* 5:347-360.

Griffin, J.B.

1967 Eastern North American Archaeology: A Summary. *Science* 156:175-191.

1985 Changing Concepts of the Prehistoric Mississippian Cultures of the Eastern United States. In *Alabama and the Borderlands: From Prehistory to Statehood*, edited by R.R. Badger and L.A. Clayton, pp. 40-63. University: University of Alabama Press.

Gunn, J., and D.O. Brown

1982 *Eagle Hill: A Late Quaternary Upland Site in Western Louisiana*. Special Report No. 12, Center for Archeological Research, The University of Texas at San Antonio.

Haggard, J.V.

1945 The Neutral Ground Between Louisiana and Texas, 1806-1821. *Louisiana Historical Quarterly* 28:1001-1128.

Hester, T.R.

1989 Texas and Northeastern Mexico: An Overview. In *Columbian Consequences, Vol. 1, Archaeological and Historical Perspectives on the Spanish Borderlands West*, edited by D.H. Thomas, pp. 191-211. Washington, D.C.: Smithsonian Institution Press.

Hoffman, M.P.

1967 Ceramic Pipe Style Chronology along the Red River Drainage in Southwestern Arkansas. *Arkansas Archeologist* 8(1):4-14.

Holloway, R.G., and V.M. Bryant, Jr.

1984 *Picea Glauca* Pollen from Late Glacial Deposits in Central Texas. *Palynology* 8:21-32.

Holloway, R.G., L.M. Raab, and R. Stuckenrath

1987 Pollen Analysis of Late-Holocene Sediments from a Central Texas Bog. *Texas Journal of Science* 39:71-79.

Hsu, D.P.

1969 *Appraisal of the Archeological Resources of Titus County Reservoir, Titus, Camp, and Franklin Counties*. Survey Report No. 4, Texas State Building Commission. Austin.

Hudson, C.M.

1986 Hernando De Soto in the Caddo Area. Paper presented at the 28th Annual Caddo Conference, 13 to 15 March, University of Arkansas, Little Rock.

Humphrey, J.D., and C.R. Ferring

1994 Stable Isotopic Evidence for Latest Pleistocene and Holocene Climatic Change in North-Central Texas. *Quaternary Research* 41:200-213.

Jacobs, B.F.

1991 Palynology Report on Locality 8 at Lambs Creek and Localities 9 and 13 and Backhoe Trench 6 at Buffalo Creek. In *Excavations at the Bottoms, Rena Branch, and Moccasin Springs Sites, Jewett Mine Project, Freestone and Leon Counties, Texas*, by R.C. Fields, L.W. Klement, C.B. Bousman, S.A. Tomka, E.F. Gadus, and M.A. Howard, pp. 363-368. Report of Investigations No. 82, Prewitt and Associates, Inc. Austin.

Jelks, E.B.

1961 *Excavations at Texarkana Reservoir, Sulphur River, Northeastern Texas*. Bureau of American Ethnology Bulletin No. 179, River Basin Survey Papers No. 21. Washington, D.C.: US Government Printing Office.

John, E.A.H.

1975 *Storms Brewed in Other Men's Worlds*. College Station: Texas A&M University Press.

1985 La Situación y Visión de los Indios de la Frontera Norte de Nueva España (Siglos XVI-XVIII). *América Indigena* 45(3):465-483.

Johnson, L., Jr.

1962 The Yarbrough and Miller Sites of Northeastern Texas, with a Preliminary Definition of the LaHarpe Aspect. *Bulletin of the Texas Archeological Society* 32:141-284.

Jordan, T.G.

1981 *Trails to Texas: Southern Roots of Western Cattle Ranching*. Lincoln: University of Nebraska Press.

Kelley, D.B.

1997 *Two Caddoan Farmsteads in the Red River Valley: The Archeology of the McLelland and Joe Clark Sites*. Research Series No. 51. Fayetteville: Arkansas Archeological Survey.

1998 Protohistoric and Historic Caddoan Occupation of the Red River Valley in Northwest Louisiana. In *The Native History of the Caddo: Their Place in Southeastern Archeology and Ethnohistory*, edited by T.K. Perttula and J.E. Bruseth, pp. 91-111. Studies in Archeology No. 30. Austin: Texas Archeological Research Laboratory, The University of Texas at Austin.

Kenmotsu, N.A., and T.K. Perttula (editors)

1993 *Archeology in the Eastern Planning Region, Texas: A Planning Document*. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

Kniffen, F.B., H.F. Gregory, and G.A. Stokes

1987 *The Historic Indian Tribes of Louisiana: From 1542 to the Present*. Baton Rouge: Louisiana State University Press.

Kuchler, A.W.

1964 *Potential Natural Vegetation of the Conterminous United States*. Special Publication No. 36, American Geographical Society. New York.

Largent, F.B., D.L. Beene, M.B. Cliff, and S.M. Hunt

1997 *Cultural Resources Testing of Two Sites within the White Oak Creek Wildlife Management Area (WOCMA), Bowie and Titus Counties, Texas*. White Oak Creek Wildlife Management Area Archaeological Technical Series, Report of Investigations No. 6. Plano, Texas: Geo-Marine, Inc.

Lottinville, S. (editor)

1980 *A Journal of Travels into the Arkansas Territory During the Year 1819*, by T. Nuttall. Norman: University of Oklahoma Press.

Lynch, T.F.

1990 Glacial-Age Man in South America?: A Critical Review. *American Antiquity* 55(1):12-36.

Mandel, R.D.

1987 Geomorphological Investigations. In *Buried in the Bottoms: The Archeology of Lake Creek Reservoir, Montgomery County, Texas*, by L.C. Bement, R.D. Mandel, J.F. de la Teha, D.K. Utley, and S.A. Turpin. Research Report No. 97, Texas Archeological Survey, The University of Texas at Austin.

McGregor, D.E.

1996 Archaeological Investigations at 41HP137. In *Archaeological Investigations at Cooper Lake, Delivery Order Numbers 2, 3, and 4, 1987: Cultural Resource Studies for Cooper Lake, Hopkins and Delta Counties, Texas*, Vol. 1, by D.E. McGregor, M.M. Green, D.H. Jurney, W.A. Martin, R.W. Moir, and J.W. Saunders, pp. 341-362. Dallas: Archaeology Research Program, Institute for the Study of Earth and Man, Southern Methodist University.

Meltzer, D.J.

1989 Why Don't We Know When the First People Came to America? *American Antiquity* 54(3):471-490.

Meltzer, D.J., D.K. Grayson, G. Ardila, A.W. Barker, D.F. Dincauze, C.V. Haynes, F. Mena, L. Nuñez, and D.J. Stafford

1997 On the Pleistocene Antiquity of Monte Verde, Southern Chile. *American Antiquity* 62(4):659-663.

Natural Resources Conservation Service (NRCS)

2004 SSURGO Database for Henderson County, Texas. Natural Resources Conservation Service, US Department of Agriculture.

2015 Web Soil Survey, <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. Accessed 28 April 2015. US Department of Agriculture.

National Park Service (NPS)

2015 National Register of Historic Places online database. <http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome>. Accessed 28 April 2015.

Neighbours, K.F.

1957 Chapters from the History of the Texas Indian Reservation. *West Texas Historical Association Year Book* 33:3-16.

1973 *Indian Exodus: Texas Indian Affairs, 1835-1859*. Quannah: Nortex Offset Publications.

1975 *Robert Simpson Neighbors and the Texas Frontier, 1836-1859*. Waco: Texian Press.

Newell, H.P., and A.D. Krieger

1949 *The George C. Davis Site, Cherokee County, Texas*. Memoir No. 5. Washington, D.C.: Society for American Archaeology.

Peake, O.B.

1954 *A History of the United States Indian Factory System, 1795-1822*. Denver: Sage Books.

Perino, G., and W.J. Bennett

1978 *Archaeological Investigations at the Mahaffey Site, Ch-1, Hugo Reservoir, Choctaw County, Oklahoma*. Idabel: Museum of the Red River.

Perttula, T.K.

1990 Part I: The Development of Agricultural Subsistence, Regional and Diachronic Variability in Caddoan Subsistence, and Implications for the Caddoan Archaeological Record, and Part II: Faunal and Paleobotanical Data from the Caddoan Area. Manuscript on file, Department of Antiquities Protection, Texas Historical Commission. Austin.

1991 European Contact and Its Effects on Caddoan Populations between A.D. 1520 and A.D. 1680. In *Columbian Consequences, Vol. 3—A Pan American Perspective*, edited by D.H. Thomas, pp. 501-518. Washington, D.C.: Smithsonian Institution Press.

1992 *"The Caddo Nation": Archaeological and Ethnohistoric Perspectives*. Austin: University of Texas Press.

1993a Historic Context: The Development of Agriculture in Northeast Texas before A.D. 1600. In *Archeology in the Eastern Planning Region, Texas: A Planning Document*, edited by N.A. Kenmotsu and T.K. Perttula, pp. 121-146. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

1993b Historic Context: Effects of European Contact on Native and Immigrant Indians in Northeast Texas, A.D. 1540-1859. In *Archeology in the Eastern Planning Region, Texas: A Planning Document*, edited by N.A. Kenmotsu and T.K. Perttula, pp. 147-190. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

1996 Caddoan Area Archaeology since 1990. *Journal of Archaeological Research* 4(4):295-348.

1999 *The Hurricane Hill Site (41HP106): The Archaeology of a Late Archaic/Early Ceramic and Early-Middle Caddoan Settlement in Northeast Texas*, 2 Vols. Special Publication No. 4. Pittsburg and Austin: Friends of Northeast Texas Archaeology.

2004 The Prehistoric and Caddoan Archeology of Northeastern Texas Pineywoods. In *The Prehistory of Texas*, edited by T.K. Perttula, pp. 370-407. College Station: Texas A&M University Press.

Perttula, T.K., and J.E. Bruseth

1983 Early Caddoan Subsistence Strategies, Sabine River Basin, East Texas. *Plains Anthropologist* 28(99):9-21.

1995 Trade and Exchange in Eastern Texas, 1100 B.C.-A.D. 800. In *Exchange in the Lower Mississippi Valley and Contiguous Areas in 1100 B.C.*, edited by J.L. Gibson. *Louisiana Archeology* 17:93-121.

Perttula, T.K., C.J. Crane, and J.E. Bruseth

1982 A Consideration of Caddoan Subsistence. *Southeastern Archaeology* 1(2):89-102.

Perttula, T.K., B.D. Skiles, M.B. Collins, M.C. Trachte, and F. Valdez, Jr.

1986 *"This Everlasting Sand Bed": Cultural Resources Investigations at the Texas Big Sandy Project, Wood and Upshur Counties, Texas*. Reports of Investigations No. 52, Prewitt and Associates, Inc. Austin, Texas.

Perttula, T.K., R.C. Fields, J.E. Corbin, and N.A. Kenmotsu

1993 Historic Context: The Emergence of Sedentism in the Northeast Texas Archeological Region, ca. 500 B.C. to A.D. 1000. In *Archeology in the Eastern Planning Region, Texas: A Planning Document*, edited by N.A. Kenmotsu and T.K. Perttula, pp. 97-

120. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

Perttula, T.K., and N.A. Kenmotsu

1993 Introduction—Section Two: Regional Preservation Plan for Archeological Resources, Northeast Texas Archeological Region, Eastern Planning Region. In *Archeology in the Eastern Planning Region, Texas: A Planning Document*, edited by N.A. Kenmotsu and T.K. Perttula, pp. 35-48. Cultural Resource Management Report No. 3, Department of Antiquities Protection, Texas Historical Commission. Austin.

Perttula, T.K., M.R. Miller, R.A. Rickliss, D.J. Prikryl, and C. Lintz

1995 Prehistoric and Historic Aboriginal Ceramics in Texas. *Bulletin of the Texas Archeological Society* 66:175-235.

Prewitt, T.J.

1974 Regional Interaction Networks and the Caddoan Area. *Papers in Anthropology* 15(2):73-101.

Ricklis, R.A.

1994 Toyah Components: Evidence for Occupation in the Project Area During the Latter Part of the Late Prehistoric Period. In *Archaic and Late Prehistoric Human Ecology in the Middle Onion Creek Valley, Hays County, Texas*, by R.A. Ricklis and M.B. Collins, pp. 207-316. Studies in Archeology, No. 19. Texas Archeological Research Laboratory, The University of Texas at Austin.

Rose, J.C., M.P. Hoffman, B.A. Burnett, A.M. Harmon, and J.C. Barnes

1998 Skeletal Biology of the Prehistoric Caddo. In *The Native History of the Caddo: Their Place in Southeastern Archeology and Ethnohistory*, edited by T.K. Perttula and J.E. Bruseth, pp. 113-126. Studies in Archeology No. 30. Austin: Texas Archeological Research Laboratory, The University of Texas at Austin.

Schambach, F.F.

1982 An Outline of Fourche Maline Culture in Southwest Arkansas. In *Arkansas Archeology in Review*, edited by N.L. Trubowitz and M.D. Jeter, pp. 132-197. Research Series No 15. Fayetteville: Arkansas Archeological Survey.

1983 The Archeology of the Great Bend Region in Arkansas. In *Contributions to the Archeology of the Great Bend Region*, edited by F.F. Schambach and F. Rackerby, pp. 1-11. Research Series No. 22. Fayetteville: Arkansas Archeological Survey.

1997 The Development of the Burial Mound Tradition in the Caddo Area. *Journal of Northeast Texas Archaeology* 9:53-72.

1998 *Pre-Caddoan Cultures in the Trans-Mississippi South: A Beginning Sequence*. Research Series No. 53. Fayetteville: Arkansas Archeological Survey.

Scott-Cummings, L.

1991 Pollen, Phytolith, Macofloral and Charcoal Analysis in the Jewett Mine Project Area, Texas. In *Excavations at the Bottoms, Rena Branch, and Moccasin Springs Sites, Jewett Mine Project, Freestone and Leon Counties, Texas*, by R.C. Fields, L.W.

Klement, C.B. Bousman, S.A. Tomka, E.F. Gadus, and M.A. Howard, pp. 329-362. Report of Investigations No. 82, Prewitt and Associates, Inc. Austin.

Skibo, J.M., and E. Blinman

1999 Exploring the Origins of Pottery on the Colorado Plateau. In *Pottery and People: A Dynamic Interaction*, edited by J.M. Skibo and G.M. Feinman, pp. 171-183. Salt Lake City: University of Utah Press.

Smith, B.D. (editor)

1990 *The Mississippian Emergence*. Washington, D.C.: Smithsonian Institution Press.

Stahle, D.W., and M.C. Cleaveland

1994 Tree-Ring Reconstructed Rainfall over the Southeastern U.S.A. during the Medieval Warm Period and Little Ice Age. *Climatic Change* 26:194-212.

1995 Texas Paleoclimatic Data from Daily to Millennial Time Scales. In *The Changing Climate of Texas: Predictability and Implications for the Future*, edited by J. Norwine, J.R. Giardino, G.R. North, and J.B. Valdes, pp. 49-69. College Station: GeoBooks, College of Geosciences and Maritime Studies, Texas A&M University.

Stahle, D.W., E.R. Cook, and J.W.C. White

1985 Tree-ring Dating of Baldcypress and the Potential for Millenia-Long Chronologies in the Southeast. *American Antiquity* 50:796-802.

Story, D.A.

1990 Cultural History of the Native Americans. In *The Archeology and Bioarcheology of the Gulf Coastal Plain: Volume 1*, by D.A. Story, J.A. Guy, B.A. Burnett, M.D. Freeman, J.C. Rose, D.G. Steele, B.W. Olive, and K.J. Reinhard, pp. 163-366. Research Series No. 38, Arkansas Archeological Survey. Fayetteville.

Story, D.A., and J.A. Guy

1990 Introduction. In *The Archeology and Bioarcheology of the Gulf Coastal Plain: Volume 1*, by D.A. Story, J.A. Guy, B.A. Burnett, M.D. Freeman, J.C. Rose, D.G. Steele, B.W. Olive, and K.J. Reinhard, pp. 1-4. Research Series No. 38, Arkansas Archeological Survey. Fayetteville.

Strickland, R.W.

1937 *Anglo-American Activities in Northeastern Texas, 1803-1845*. Unpublished Ph.D. dissertation, The University of Texas at Austin.

Surrey, N.M.M.

1916 *The Commerce of Louisiana During the French Regime, 1699-1763*. Columbia University Studies in History, Economics, and Public Law, Vol. 71. New York: Columbia University.

Swagerty, W.R.

1984 Spanish-Indian Relations, 1513-1821. In *Scholars and the Indian Experience: Critical Review of Recent Writings in the Social Sciences*, edited by W.R. Swagerty, pp. 36-78. Bloomington: Indiana University Press for the D'Arcy McNicle Center for the History of the American Indian.

Swanton, J.R.

1939 *Final Report of the United States De Soto Expedition Commission*. Report prepared for the US House of Representatives, 76th Congress, 1st Session, Historical Document No. 71.

1942 *Source Material on the History and Ethnology of the Caddo Indians*. Bulletin No. 132. Washington, D.C.: Bureau of American Ethnology, US Government Printing Office.

Texas Historical Commission (THC)

2015 *Texas Archeological Sites Atlas Restricted Database*. <http://www.nueces.thc.state.tx.us/>. Accessed 28 April 2015.

Texas State Historical Association (TSHA)

2015 Henderson County. *The Handbook of Texas Online*. <http://www.tshaonline.org/handbook/online/articles/hch13>. Accessed 28 April 2015.

Thurmond, J.P.

1981 *Archeology of the Cypress Creek Drainage Basin, Northeastern Texas and Northwestern Louisiana*. Unpublished Master's thesis, Department of Anthropology, The University of Texas at Austin.

1990 *Archeology of the Cypress Creek Drainage Basin, Northeastern Texas and Northwestern Louisiana*. Studies in Archeology 5, Texas Archeological Research Laboratory, The University of Texas at Austin.

Toomey, R.S., III, M.D. Blum, and S. Valastro, Jr.

1993 Late Quaternary Climates and Environments of the Edwards Plateau, Texas. *Global and Planetary Change* 7:299-320.

US Department of Agriculture (USDA)

2014 Digital orthophoto quarter-quadrangle, Henderson County, Texas. National Agriculture Imagery Program, Farm Service Agency, Aerial Photography Field Office.

US Geological Survey (USGS)

1984 Moore Station, Texas, 7.5-minute topographic quadrangle.

Usner, D.H.

1987 The Frontier Exchange Economy of the Lower Mississippi Valley in the Eighteenth Century. *William and Mary Quarterly* 44:165-192.

1989 Economic Relations in the Southeast until 1783. In *Handbook of North American Indians, Vol. 4, History of Indian-White Relations*, edited by W.E. Washburn, pp. 391-395. Washington, D.C.: Smithsonian Institution Press.

Vehik, S.C.

1988 Late Prehistoric Exchange on the Southern Plains and its Periphery. *Midcontinental Journal of Archaeology* 13:41-68.

1990 Late Prehistoric Plains Trade and Economic Specialization. *Plains Anthropologist* 35(128):125-145.

Wade, M.

1989 French Indian Policies. In *Handbook of North American Indians, Vol. 4, History of Indian-White Relations*, edited by W.E. Washburn, pp. 20-28. Washington, D.C.: Smithsonian Institution Press.

Wallerstein, I.

1974 *The Modern World-System*. New York: Academic Press.

Webb, C.H.

1959 *The Belcher Mound, a Stratified Caddoan Site in Caddo Parish, Louisiana*. Memoirs No. 16. Kenosha, Wisconsin: Society for American Archaeology.

1984 The Bellevue Focus: a Marksville-Troyville Manifestation in Northwestern Louisiana. *Louisiana Archaeology* 9:251-274.

Webb, C.H., F.E. Murphey, W.G. Ellis, and H.R. Green

1969 The Resch Site 41HS16, Harrison County, Texas. *Bulletin of the Texas Archeological Society* 40:3-106.

Weddle, R.S.

1985 *Spanish Sea: Discovery on the Gulf of Mexico, 1500-1685*. College Station: Texas A&M University Press.

Williams, S.

1964 The Aboriginal Locations of the Kadohadacho and Related Tribes. In *Exploration in Cultural Anthropology*, edited by W. Goodenough, pp. 545-570. New Haven: Yale University Press.

Wolf, E.R.

1982 *Europe and the People Without History*. Berkeley: University of California Press.

APPENDIX A:

SHOVEL TEST DATA

Table A-1. Shovel Test Summary Data

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JW1	254524	3566858	0-100+	Brown sandy loam	None
JW2	254713	3566871	0-70	Brown sandy loam	None
			70-100+	Grayish-brown wet sand	None
JW3	254999	3566902	0-70	Dark brown wet sandy loam	None
			70+	Very dark brown sand	None
JW4	255456	3567091	0-10	Grayish-brown sandy loam	None
			10-40+	Reddish-brown sandy clay	None
JW5	255398	3567145	0-10	Grayish-brown sandy loam	None
			10-40+	Reddish-brown sandy clay	None
JW6	254972	3568371	0-10	Grayish-brown sandy loam	None
			10-40+	Reddish-brown sandy clay	None
JW7	255122	3567750	0-100+	Brown sand	None
JW8	255055	3567790	0-100+	Brown sand	None
JW9	253863	3566385	0-100+	Pale brown sand	None
JW10	253362	3566501	0-20	Grayish-brown loamy sand	None
			20-40+	Gray and orange mottled clay	None
JW11	253217	3566956	0-60	Grayish-brown sandy loam	None
			60+	Dark gray brown clay	None
JW12	253421	3567007	0-30+	Grayish-brown clay	None
JW13	253473	3567069	0-60	Grayish-brown wet sandy loam	None
			60-80+	Pale brown sand	None
JW14	253499	3567115	0-60	Grayish-brown wet sandy loam	None
			60-80+	Pale brown sand	None
JW15	253538	3567100	0-45+	Wet pale brown sand	None
JW16	254044	3567160	0-50+	Gray sandy clay	None
JW17	253979	3567216	0-50+	Gray sandy clay	None
JW18	253819	3566942	0-50+	Gray sandy clay	None
JW19	253650	3567355	0-100	Pale brown sand	None
JW20	253561	3567370	0-60	Pale brown sand	None
			60+	Grayish-brown sandy clay	None
JW21	253281	3567441	0-100	Pale brown sand	None
JW22	253462	3567539	0-50	Pale brown sand	None
			50-60+	Yellowish-brown sandy clay	None
JW23	253774	3567540	0-110+	Brown sandy loam	None
JW24	253838	3567568	0-40+	Dark gray brown clay	None
JC1	254601	3566876	0-50	Gray brown sand	None
			50-70	Pale brown sand	None
			70-80+	Yellowish-brown and yellowish-red mottled sandy clay	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
JC2	254644	3566886	0-35	Dark gray brown sandy loam	None
			35-45	Pale brown sand	None
			45-50+	Yellowish-red clay	None
JC3	254975	3566886	0-35	Dark grayish-brown sandy loam	None
			35-70+	Dark yellowish-brown sand	None
JC4	255361	3567046	0-25	Dark grayish-brown sandy loam	None
			25-80	Dark yellowish-brown sand	None
			80+	Water	None
JC5	255373	3567098	0-25	Dark grayish-brown sandy loam	None
			25-75	Dark yellowish-brown sand	None
			75+	Water	None
JC6	254965	3568367	0-50	Dark gray brown sand	None
			50-70+	Pale brown sand	None
JC7	255183	3567703	0-55	Dark brown sand	None
			55-90+	Brown sand	None
JC8	255049	3567725	0-55	Dark brown sand	None
			55-100+	Brown sand	None
JC9	253907	3566375	0-100+	Reddish-brown sand	None
JC10	253839	3566402	0-15	Very dark gray sandy loam	None
			15-70+	Pale brown sand with yellowish-brown clay mottles	None
JC11	253253	3566944	0-25	Very dark gray sandy loam	None
			25-80+	Pale brown sand with yellowish-brown clay mottles	None
JC12	253427	3567031	0-15	Very dark gray sandy loam	None
			15-45+	Pale brown sandy loam	None
JC13	253476	3567003	0-15	Very dark gray sandy loam	None
			15-45+	Pale brown sandy loam	None
JC14	253434	3566937	0-30	Brown sand	None
			30-50+	Pale brown sand with reddish-brown/yellowish-brown mottles	None
JC15	253910	3567239	0-40	Grayish-brown sand	None
			40+	Water	None
JC16	253937	3567143	0-10	Very dark gray sandy loam	None
			10-50	Brown sand	None
			50+	Water	None
JC17	253948	3567078	0-15	Very dark gray sandy loam	None
			15-60	Brown sand	None
			60+	Water	None
JC18	253755	3567337	0-15	Very dark gray sandy loam	None
			15-50	Brown sand	None

ST No.	UTM Coordinates[1]		Depth (cmbs)	Soils	Artifacts
	Easting	Northing			
			50+	Water	None
JC19	253373	3567491	0-50	Brown sand	None
			50-100+	Yellowish-brown sand	None
JC20	253743	3567562	0-20	Dark brown sandy loam	None
			20-50+	Brown sand	None
JC21	253817	3567520	0-20	Very dark brown sandy loam	None
			20-50	Brown sand	None
			50-75+	Pale brown sand	None

[1] All UTM coordinates are located in Zone 15 and utilize the North American Datum of 1983 (NAD 83)

cmbs = Centimeters below surface

ST = Shovel test

UTM = Universal Transverse Mercator