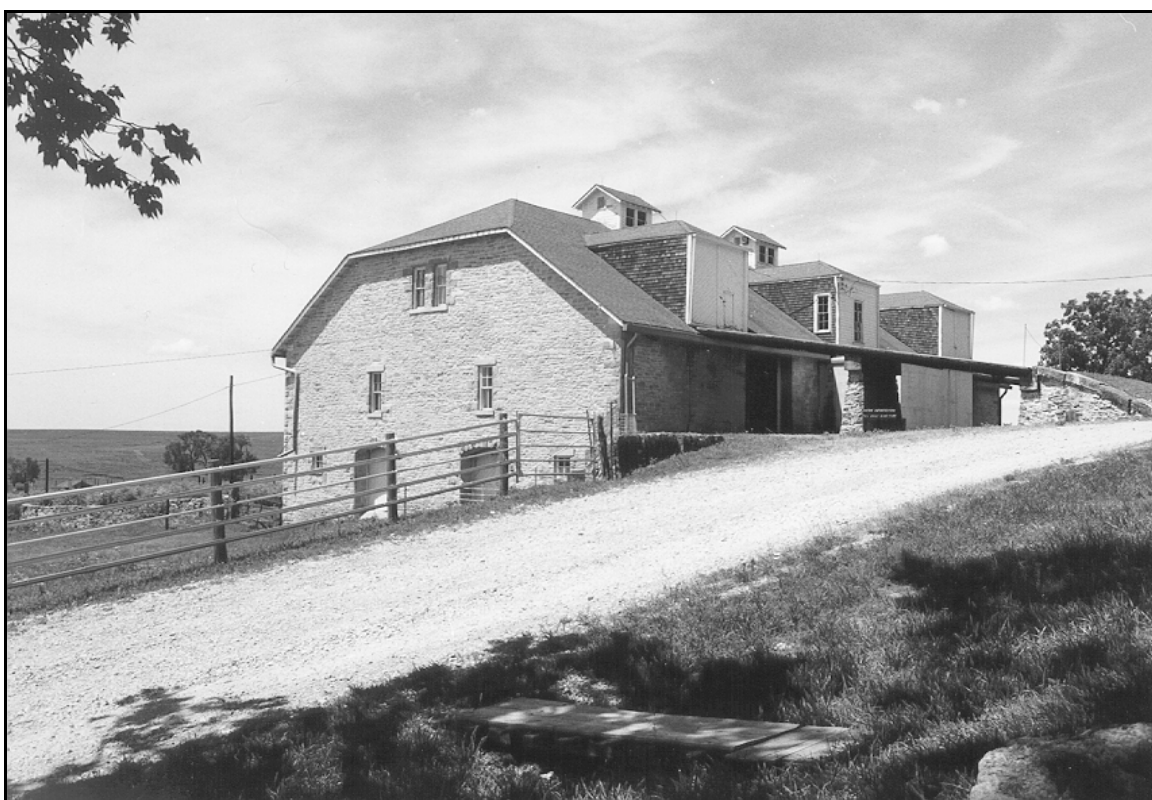


**Archeological Overview and Assessment for
Tallgrass Prairie National Preserve,
Chase County, Kansas**



By

Bruce A. Jones

National Park Service - Midwest Archeological Center

Archeological Overview And Assessment
for Tallgrass Prairie National Preserve,
Chase County, Kansas

By

Bruce A. Jones

Midwest Archeological Center
Technical Report No. 61

United States Department of the Interior
National Park Service
Midwest Archeological Center
Lincoln, Nebraska

1999

This report has been reviewed against the criteria contained in 43CFR Part 7, Subpart A, Section 7.18 (a) (1) and, upon recommendation of the Midwest Field Area Office and the Midwest Archeological Center, has been classified as

Available

Making the report available meets the criteria of 43CFR Part 7, Subpart A, Section 7.18 (a) (1).



Abstract

This archeological overview and assessment for Tallgrass Prairie National Preserve describes the multiple episodes of archeological research that have occurred in the Flint Hills region, and documents the presence of archeological materials reflecting 12,000 years of American Indian occupation and use of the lands around the preserve. Paleoindian and Archaic remains in this portion of the Great Plains are relatively few in number, and may reflect the effects of intensive Altithermal-age erosion. Later prehistoric occupations, those dating from roughly AD 1 to AD 1500, are much better represented in the Flint Hills.

This report also briefly describes the historic American Indian occupation and utilization of the area, together with the arrival of historic Euroamerican populations in the Flint Hills. The overview documents the twelve prehistoric and historic sites that were formally recorded in the preserve in the spring of 1998, and concludes with a discussion of the potential for additional unrecorded archeological resources on preserve lands.

Contents

Abstract	i
List of Figures	iv
Introduction	1
Project Background	1
The Kansas Flint Hills	2
Geology and Physiography	2
Rivers, Streams, Springs, and Seeps	2
Climate, Soils, Vegetation, and Fauna	3
Importance of the Flint Hills to Prehistoric Populations	4
Regional Prehistory	5
Previous Archeology in the Flint Hills	5
Regional Culture History	6
The Physical Context of Flint Hills Prehistory	6
The Paleoindian Tradition: 12,000–8000 BP (10,000–6000 BC)	6
The Archaic Period: 8000–2000 BP (6000 BC–AD 1)	7
The Early Ceramic Period: 2000–1000 BP (AD 1–950)	10
The Middle Ceramic Period: 1000–500 BP (AD 950–1500)	14
The Late Ceramic Period: 500–125 BP (AD 1500–1825)	17
The Historic Period: 125 BP–Present (AD 1825–Present)	21
Recorded Sites in the Preserve	25
Site Descriptions	25
14CS104	25
14CS105	26
14CS106	26
14CS107	27
14CS108	27
14CS109	28
14CS110	28
14CS111	29
14CS112	29
14CS113	29
14CS405	30
14CS406	30
Expected Archeology in the Preserve	31
Physiographic Considerations	31
Site and Feature Types	32
Site Density	34
Site Ages	35
Threats to Archeological Resources	37
Grazing	37
Fires	37
Roads, Trails, Overlooks, and Visitor Use	38
Gas Leases	38

Threats to Archeological Resources (continued)	
Farming Practices	38
Flood and Erosion Control	39
Historic Trash Dumps.....	39
Facility Development	39
Management Recommendations	41
Cultural Sites Inventory.....	41
Preserve-Wide Archeological Inventory	41
Inventory Current Development and Use Areas.....	42
Inform the Public <i>and</i> Protect the Resource	42
References Cited	43

Figures

1. Tallgrass Prairie National Preserve, Chase County, Kansas	57
2. Tallgrass Prairie National Preserve. View to the east across uplands after the annual pasture burn. Note limestone outcrops	58
3. Tallgrass Prairie National Preserve. View to the south down Lower Palmer Creek. Note shallow soils and limestone bedrock in streambed.....	58
4. Reservoir areas where archeological research has been undertaken in eastern Kansas	59
5. Prehistoric/historic American Indian cultural sequence for the Kansas Flint Hills and adjacent areas	60
6. 14CS104, Tallgrass Prairie National Preserve. View from cairns west across Fox Creek	61
7. 14CS104, Tallgrass Prairie National Preserve. View to the north across Feature 32 following test excavation.....	62
8. 14CS106, Tallgrass Prairie National Preserve. East facade, Spring Hill Ranch house. View to the northwest	63
9. 14CS106, Tallgrass Prairie National Preserve. Three-story barn at the Spring Hill Ranch complex. View to the southwest	63
10. 14CS106, Tallgrass Prairie National Preserve. Poultry house at the Spring Hill Ranch complex. View to the northwest.....	64
11. 14CS106, Tallgrass Prairie National Preserve. Privy (left) and smokehouse (right) at the Spring Hill Ranch complex. View to the northeast	64
12. 14CS107, Tallgrass Prairie National Preserve. Barn footings visible in foreground. View to the west.....	65

13.	14CS110, Tallgrass Prairie National Preserve. Figure stands in structure depression. Rock walls in background. View to the northwest.....	65
14.	14CS111, Tallgrass Prairie National Preserve. View to the southwest across creek toward standing ruins	66
15.	14CS111, Tallgrass Prairie National Preserve. Northeast corner of standing structure. View to the southwest	66
16.	14CS112, Tallgrass Prairie National Preserve. Lower Fox Creek School. View to the northwest	67
17.	14CS113, Tallgrass Prairie National Preserve. View to the southwest across brick and mortar scatter and mounds. Rail spur lies in background against tree line.....	67
18.	14CS405, Tallgrass Prairie National Preserve. Figures stand below the cutbank along the south edge of the site. View to the north	68
19.	14CS405, Tallgrass Prairie National Preserve. Flags mark surface artifacts near limestone outcrops. Palmer Creek (right) and unnamed tributary (left) in background. View to the east.....	68

Introduction

Project Background

Tallgrass Prairie National Preserve entered the National Park System on November 12, 1996, established by Congress to preserve, restore, and interpret a remnant of the tallgrass prairie ecosystem on the North American Great Plains. It is fitting that the preserve lies in the very heart of the Kansas Flint Hills, a vast, open landscape that sustains some of the last remnants of the precontact big and little bluestem grasslands. Situated in northern Chase County (Figure 1), Tallgrass Prairie embraces parts of four named stream valleys and almost 11,000 ac of rangeland. The immense vistas from its hilltops (Figure 2) are timeless—essentially unaltered by the hand of man.

Within this exquisite natural setting, the lands of the preserve contain the remains of a number of small homesteads and farms, vestiges of the initial Euroamerican occupation of the area. Tallgrass also contains features and structures relating to the later, larger cattle industry on the Great Plains, including a 20-ac complex of late-nineteenth- and twentieth-century limestone and wooden ranch buildings known variously as the Z Bar or Spring Hill Ranch. The Lower Fox Creek School, a small one-room limestone structure that dates to the same time period, stands a short distance north of the ranch complex.

All of the land within the preserve is presently owned by the National Park Trust (NPT), and the National Park Service (NPS) will eventually manage Tallgrass under a cooperative agreement with NPT. The majority of the rangeland in the preserve is being grazed under a 35-year lease, and visitor access to and use of the leased areas is limited. The Spring Hill Ranch complex is the present focus of most of the present visitation at the preserve, and will likely continue to receive intensive use. The National Park Service is currently completing a General Management Plan for the preserve that addresses a multitude of issues, foremost of which is a mandate to maintain the character and enhance the biodiversity of the tallgrass prairie, balancing those concerns against the needs engendered by the substantial visitation.

There is abundant archeological evidence from adjacent areas of the Flint Hills that this region has supported rich natural resources for thousands of years, and that it has drawn human populations throughout their occupation of North America. The details of these successful prehistoric and historic human adaptations are an important component in the paleoenvironmental history of the Flint Hills, and the prehistory of the surrounding area is a critical point of reference for documentation of the past biodiversity of the preserve lands themselves.

There were no formally recorded archeological sites in the preserve at the time the it was established, and little systematic archeological research has yet taken place there. Details of the history and prehistory of Tallgrass Prairie are thus only beginning to emerge. The overriding purpose of this overview and assessment is therefore to assemble and assess the baseline archeological data on the region and the preserve so that its cultural resources, both the known and unknown, may be considered in the General Management Plan.

This report first documents the history of archeological research in the region and identifies the most important written references to that work. It summarizes the known culture history of the Flint Hills, noting archeological data from investigations in adjacent areas that have relevance to the prehistory of the preserve itself. The small number of recorded prehistoric and historic sites in the preserve are presented in detail, and predictions are made concerning the range of other archeological resources that may be expected to occur elsewhere in the preserve. The report concludes with a brief discussion of present and future threats to archeological values at Tallgrass, and makes recommendations for appropriate professional management of the preserve's archeology.

The Kansas Flint Hills

Geology and Physiography

The Kansas Flint Hills are a prominent physiographic feature within the Central Lowlands Province of the Interior Plains of North America (Schoewe 1949:262–289). Ranging in width from 20 to 80 mi (Hawley 1993:22), the Flint Hills have been formed by erosion of a belt of resistant limestones and softer shales and sandstones that include 40 separate formations and measure 3,000 ft in total thickness. Differential removal of some of the less resistant materials has exaggerated the dramatic physiography of the region, and some areas of the Flint Hills have 350–400 ft of local relief.

The Flint Hills extend in a band from Marshall County in the north to Cowley County on the Oklahoma border. On the east, where they meet the Osage Cuestas, the Flint Hills are marked by a steep escarpment and prominent east-facing benches. In contrast, the western boundary of the Flint Hills is indicated only by a gentle incline where the Permian deposits dip below the Wellington and McPherson Lowlands and the Smoky Hills.

The Blue and Kansas Rivers mark the southernmost limits of Pleistocene glacial advance, and the Flint Hills north of these two streams have been diminished in height due to glaciation. This landscape contains scattered glacial debris, and has been classified as part of the Dissected Till Plains (Schoewe 1949:288). South of the Blue and the Kansas, however, the remarkable rolling topography of the Flint Hills is unaltered by glaciation, and the hills and valleys have much greater prominence. This zone, the Flint Hills Upland, covers 16,000 mi² and is itself part of the larger Osage Plains (Schoewe 1949:286–289).

Rivers, Streams, Springs, and Seeps

The Flint Hills are dissected by several major drainages including the Republican, Blue, Kansas, Neosho (Grand), Cottonwood, Marais des Cygnes (Osage), and Walnut Rivers. Only the first three streams actually cross the Flint Hills; the others rise from small spring-fed streams in the region (Wedel 1959:13), and most of them drain to the east. Many of the Flint Hills streams flow in channels that are alternating deep and shallow, the latter reaches typically marked by rocky ledges (Schoewe 1949:286; Figure 3). The complex drainage pattern of the Flint Hills is completed by the numerous first- and second-order tributary streams that flow through the region.

Stream valleys in the Flint Hills are often asymmetrical in cross section, with the steeper slopes usually found on the south sides of the drainages. Where the streams cross resistant limestones, the streams typically flow through box-like channels. When the streams cross shales, lateral erosion of these softer materials has opened up the valleys to greater widths (Hawley 1993:22). Most of the larger rivers in the region were subject to flooding historically, and those streams typically contain deep soils (Wedel 1959:13).

Four permanent streams have formed the drainage pattern within the preserve. The largest of the four, Fox Creek, flows from north to south down the eastern side of the preserve to its confluence with the Cottonwood River a short distance below the Tallgrass boundary at Strong City. Palmer Creek, a right-bank tributary of Fox Creek, flows from west to east to drain the northern part of the preserve, while the western edge of Tallgrass is drained by Diamond Creek, which flows north to south outside the boundary of the preserve into the Cottonwood River. The extreme eastern edge of the preserve is drained by Stout Run, a short stream that flows directly into the Cottonwood River a short distance to the southeast.

Numerous seasonal and some permanent seeps and springs flow from the slopes throughout the Flint Hills. Several of the springs within the preserve were dammed or boxed in the past century, and the

Spring Hill Ranch complex was originally supplied with water carried from a spring further uphill on the western side of the Fox Creek valley.

Climate, Soils, Vegetation, and Fauna

The Flint Hills region has a sub-humid continental climate, with warm, moist air masses moving north into the region from the Gulf of Mexico and producing moderate to occasionally heavy rains (Rohn and Emerson 1984:8; National Park Service 1991). The climate of the region is characterized by extreme winter and summer temperatures and considerable diurnal temperature change throughout the year. The area receives moderate annual precipitation of 26–35 in (Mandel 1987), mostly during the growing season, which is 170–190 days long. Spring may come early to the Flint Hills, but spring temperatures and precipitation are greatly variable. The fall season is often extended, dry, and fair.

Soils in the Flint Hills are derived from in-place pedogenesis of parent limestones, sandstones, and shales. This process has formed clayey soils with abundant flinty gravels that impede erosion in upland areas (Buchanan 1984:19). Soils may be relatively deep in the bottoms of the larger stream valleys, but are typically thin in the tributary drainages and on the flanks and tops of the hills themselves. Bedrock exposures are visible throughout the region.

Four separate soil associations have been identified within the area of the preserve (O'Neill 1974). Florence–Labette soils, which cover uplands in 42 percent of Chase County, are gently to steeply sloping, deep to moderately deep, and have a subsoil of cherty clay or silty clay. In the area of the preserve, this association is primarily found on the uplands east of Fox Creek.

Clime–Sogn soils occur on gentle to steep slopes and have a subsoil of silty clay. These are well-drained soils and have been mapped on the hillsides above Kansas Highway 57/177 on the west flank of Fox Creek.

Reading–Tully soils are nearly level to sloping and are occasionally deep, with a subsoil of silty clay loam or silty clay. They have formed in alluvium or slope wash on terraces and uplands, on valley floors, and along valley slopes. Reading–Tully soils are found in the bottom of the Fox Creek valley in the area of the preserve.

Finally, Chase–Osage soils are nearly level, deep bottomland soils with silty clay subsoils which are found on floodplains and lower terraces. These have been mapped in the lower reach of Fox Creek at the extreme southern boundary of the preserve.

The Flint Hills are unique in the Great Plains in that they have largely retained their precontact bluestem prairie vegetation (Hawley 1993:22). This may in part be due to prehistoric droughts and natural and human-induced prairie fires, which would have slowed the growth of brush and deciduous trees (Williams 1993; Buchanan 1984:20; O'Brien and Wood 1998:103–105). Additionally, however, and due to their predominantly thin soils, the Flint Hills have historically served only as grazing land, so that only the bottoms of the larger stream valleys have undergone cultivation.

The potential natural vegetation of the Flint Hills is tallgrass prairie, an association that is dominated by big and little bluestem, switchgrass, and Indian grass (Wedel 1959:14; Kuechler 1974; Mandel 1987). However, the total flora of the Flint Hills includes as many as 700 plant species (Mandel 1987), and over 400 species of vascular plants are estimated to presently grow within the preserve (National Park Service 1991).

The tallgrass prairie flora have been characterized as a dynamic mosaic of vegetation patches, the relative abundance of which has changed with the effects of fires, grazing practices, and climatic change (Williams 1993; Dodds et al. 1998). The tallgrass prairie association includes warm-season perennial

tallgrasses and cool-season grasses together with composites, legumes, and other forbs (Dodds et al. 1998) and a variety of woody species. Narrow strips of gallery forest grow along the bottoms of the larger stream valleys, usually dominated by deciduous trees including cottonwood, willow, and elm. Bur oak and hackberry also grow along Fox and Palmer Creeks (National Park Service 1991; Dodds et al. 1998).

Side slopes in the upland areas may support stands of bur oak, with walnut, ash, and sycamore growing in lower areas where water sources are more reliable. Persimmon, Osage orange, elderberry, serviceberry, chokecherry, and wild grape are also found in the larger Osage Plains (Wedel 1959:14). Considerable plant diversity typically occurs in and around the wetlands that have formed below the seeps and springs at Tallgrass Prairie. However, it has been recently noted that the long-term effects of historic grazing practices in the Flint Hills and on preserve lands are likely to include a general reduction in species diversity (Dodds et al. 1998).

The diverse precontact mosaic of the Flint Hills vegetation would have provided food and habitat for a wide range of fauna, and would likely have supported a similar range of resources at Tallgrass in the prehistoric past. Present Flint Hills fauna include white-tailed deer, coyote, cottontail and jackrabbit, beaver, red fox, raccoon, opossum, squirrel, wild turkey, and prairie chicken. The prehistoric Flint Hills fauna would also have included bison, elk, antelope, black bear, wildcat, wolf, mule deer, and smaller mammals including gray fox, otter, and passenger pigeon (Wedel 1959:14).

Importance of the Flint Hills to Prehistoric Populations

The Flint Hills take their name from the nodules of interbedded flint or chert which outcrop throughout the region on the exposed limestone slopes, and these resources were undoubtedly a primary focus of much of the area's prehistoric activity over the past 10–12,000 years. Prehistoric quarry sites have been recorded throughout the Flint Hills, and represent locations where chert nodules were acquired and tested, and where the first stages of chipped-stone tool manufacture were begun. The chert quarries are frequently coterminous with the outcrops, and may consequently extend over considerable areas. The characteristic grey Type B cherts found interbedded in the Florence Formation limestones appear to have been most heavily exploited in the general region of the preserve.

The diverse flora and unusual soil characteristics and physiography of the Flint Hills would have undoubtedly provided food and habitat for a substantial number of native animal species, many of which would have served as food or other resources for American Indian populations. Primary among these would have been the bison herds, and several historic tribes are known to have hunted these large herbivores in the Flint Hills on a seasonal basis. Deer and antelope were probably also present in large numbers throughout much of the Holocene.

Gathered plant resources were undoubtedly available in abundance along the larger stream valleys in the preserve or around the springs and seeps on the hillsides. Finally, it is possible that rudimentary horticulture was practiced out of small villages or hamlets along the lower reaches of Fox Creek, where there are true bottomland soils.

A file search at the Kansas State Historical Society in January 1998 indicated that 155 prehistoric and historic sites had been recorded to date in Chase County, while another 80 sites had been formally identified in adjoining Morris County to the north. The prehistoric sites identified in the two counties ranged from probable kill sites, where a single animal or animals were taken, to quarries, workshops, single and multiple component habitation or campsites, possible burial mounds, and rockshelters. Considered as a unified body of information, these data document the high site density through the Flint Hills region, and suggest that numerous prehistoric and historic cultural resources probably exist in the area of the preserve.

Regional Prehistory

Previous Archeology in the Flint Hills

Archeological research in the Flint Hills region has produced abundant evidence of at least 10,000 years of human occupation and use, a testimony to the richness of the resources in the region that would have attracted those human populations. Even the archeological investigations themselves have considerable time depth. The earliest documented archeological study in the Flint Hills occurred in the late nineteenth century, when J.V. Brower (1898, 1899) collected artifacts and described sites in the area of Manhattan, Kansas, 60 mi north of the preserve.

However, the most intensive period of investigation came roughly 50 years after Brower, with the large-scale archeological salvage effort that was undertaken as part of the nationwide postwar Federal reservoir construction program. Eight large reservoirs were built within 60 mi of the preserve (Figure 4), and all have undergone archeological investigations that bear upon the interpretation of Tallgrass prehistory. The following are the reservoirs and the primary references for the archeological investigations that were conducted there:

Tuttle Creek Reservoir, Marshall, Pottawatomie, and Riley Counties. References: Solecki (1953); Cummings (1958); Johnson (1973).

Council Grove Reservoir, Morris County. References: Witty (1961a, 1982).

Milford Reservoir, Clay, Dickinson, and Geary Counties. References: Witty (1963b); Muller and Schock (1964).

El Dorado Reservoir, Butler County. References: Grosser (1973); Bastian (1979).

Marion Reservoir, Marion County. Reference: Witty (1963a).

John Redmond Reservoir, Lyon and Coffey Counties. References: Witty (1961b, 1980).

Melvorn Reservoir, Osage County. References: Smith and Birkby (1962); Moore and Birkby (1962); Bradley (1968, 1973).

Pomona Reservoir, Osage County. Reference: Wilmeth (1970).

A great deal more archeological data have accumulated as the result of subsequent small-scale cultural resource management studies conducted at many of these same locations. A partial list of references for these projects includes Adair (1981); Bradley and Nepveu (1995); Brockington (1982); Fulmer (1976); Johnson (1983); Johnson et al. (1980); Leaf (1979); Malone and Rohn (1980); Mandel (1984); Miller (1982); Molyneaux et al. (1995); O'Brien (1976, 1983); Rager and O'Brien (1983); Reynolds (1984); Rogers (1979); Rohn and Emerson (1984); Rohn and Malone (1980); Schmits (1978, 1980a, 1980b, 1982, 1984); Schweikhard and O'Brien (1982); Smith (1977); Thies (1981a, 1981b); and Tomkins and LeeDecker (1977).

Finally, other archeological data from the Flint Hills region have come from inventories and evaluative testing conducted for the Kansas Department of Transportation (Hawley 1993; Weston 1993, 1997); the Soil Conservation Service (Ashworth 1980, 1981, 1982; Calabrese 1967a, 1967b; Witty 1965); the Corps of Engineers (Reynolds 1970, 1975); the U.S. Army (Coopridge 1979; Larson and Penny 1996); and the Kansas State Historical Society (Blasing 1985). A substantial number of master's theses (Eyman

1966; Bradley 1973; Haury 1974; Artz 1974; Miller 1979; Root 1980) and doctoral dissertations (Grosser 1977; Brown 1984) have also been based upon Flint Hills archeological research. Three major overviews of Kansas and Central Plains prehistory also specifically address the data that have derived from Flint Hills investigations (Brown and Simmons 1987; Hofman 1996a; Wood 1998).

Together, these and other studies have generated an enormous volume of information relating to the prehistory of the Flint Hills and central Kansas (Witty 1969). The following summary of regional archeology has been derived from the more prominent of the above studies. Radiocarbon ages presented in this summary will be provided in years BP (**B**efore **P**hysics [Flint and Deevey 1962:i], now conventionally **B**efore **P**resent, and measured in years *before* AD 1950). The BP ages may be roughly converted to the Christian calendar by subtracting the BP age from 1950 and interpreting the resulting minus number as a BC date or a plus number as an AD date. A radiocarbon *age* of 3500 years BP would thus convert to a *date* of 1550 BC. A radiocarbon *age* of 1400 years BP would convert to a *date* of AD 550. The radiocarbon ages in this summary will be presented *as they were reported* in the relevant references. Unless specifically indicated, they may reflect calculation at either the 5568 or the 5730 carbon-14 half-life, and unless specified, they are also probably dendrochronologically uncorrected.

Regional Culture History

The Physical Context of Flint Hills Prehistory

Four decades of archeological research in the Kansas Flint Hills have produced evidence of essentially continuous, if intermittent, human occupation and use of the area from as early as 10,000 years BP (8000 BC) until the modern era. The region is now known to contain artifactual materials from all of the major prehistoric cultural periods thus far defined in Kansas (Figure 5). The following pages will summarize the information that has derived from archeological research in areas adjacent to Tallgrass Prairie. Some of it will bear directly upon the prehistoric resources that are identified within the boundaries of the preserve, while other data will eventually prove to be tangential to Tallgrass prehistory. However, the summary will clearly illustrate that archeological evidence in the Flint Hills has often accumulated in small increments: single important sites, intensively investigated and primarily multiple component, have provided most of the background information that follows.

As archeological research continues to evolve at Tallgrass, the confirmed *absence* of data in any location should also have significance beyond simple negative evidence of human activity. Many archeologists initially interpreted the general dearth of Archaic Period sites in much of the Central Plains as reflecting abandonment of the area during the Altithermal, the extended period of climatic deterioration that occurred between about 8000 and 5000 BP. Recent investigations by geomorphologists (Johnson and Park 1996; Mandel 1995; Arbogast and Johnson 1994) have not refuted the abandonment theory, but have demonstrated that intensive Altithermal-age erosion has removed a great deal of alluvium and, presumably, archeological evidence from the smaller drainages in Kansas.

This important basic research suggests that the archeological record for much of the Early and Middle Archaic on the Great Plains may simply no longer exist except in certain locales. Coincidentally, these latter locations reflect the same settings where several of the important multiple component sites discussed in the following pages have been found and studied during the last 40 years. But it is almost certain that natural processes driven by climatic change have had a significant impact upon the archeological resources that were deposited in the narrow tributary stream valleys of the Flint Hills.

The Paleoindian Tradition: 12,000–8000 BP (10,000–6000 BC)

In the Late Pleistocene, the plains in the area of present-day Wichita supported a mosaic of grassland/steppe taxa similar to those now found around the southern edge of the boreal forest in Canada

(Jaumann 1991 in Johnson and Park 1996:12). The retreat of the last Pleistocene ice from northern Kansas and Nebraska began as early as 20,000 BP, and gradually opened the Central and Northern Plains for human occupation. The climatic shift during this time period was not a unidirectional change to warmer/drier conditions, but included an interval of warming between roughly 13,000 and 11,000 years BP and an abrupt, sharp cooling, the Younger Dryas, between 11,000 and 10,000 BP which concluded the Pleistocene. The Holocene begins at 10,000 BP with another episode of warming (Johnson and Park 1996:18).

The Paleoindian Tradition is the first inarguable evidence of human activity in North America, and was initially interpreted as a widespread hunting adaptation oriented toward the exploitation of now-extinct Pleistocene big game resources such as mammoth, mastodon, *Bison antiquus*, horse, and camel. The earliest undisputed evidence for this adaptation, which includes the sequential Clovis, Folsom, and Plano Complexes, came from surface finds of diagnostic chipped-stone projectile points and a small number of excavated kill sites on the western High Plains (Hofman 1996b). The extinction of the Pleistocene megafauna, naturally or human-induced, concluded by about 8000 BP (Johnson and Park 1996:18).

More recent investigations have identified a wider range of Paleoindian site types, and have suggested substantially greater subsistence diversity in this adaptation, particularly during the terminal Paleoindian Plano Complex at circa 9000–8000 BP. The Paleoindian Tradition is presently interpreted as an opportunistic (Hofman 1996a:49), generalist hunting-and-gathering adaptation, one that emphasized the hunting of large mammals, but which also included the exploitation of smaller animals, together with considerable gathering of wild plant foods.

At least 27 recorded archeological sites in Kansas have produced diagnostic Paleoindian artifacts (Blasing 1985), and numerous other Paleoindian projectile points may be found in private collections throughout the state. On the High Plains of western Kansas, these materials are often found as surface artifacts. Geomorphological evidence (Mandel 1993:74–75) and studies of the subsequent Archaic Period suggest that if intact Paleoindian components are present in the eastern part of the state, they will most likely be deeply buried and only exposed occasionally through erosion, construction, etc.

In the intermediate region of the Flint Hills and Tallgrass Prairie, isolated Paleoindian materials have thus far been primarily reported as surface finds (Shippee 1953; Solecki 1953; O'Brien 1972; Johnson et al. 1980). No Paleoindian materials have yet been reported from the immediate area of the preserve.

While climatic conditions in the Early Holocene clearly moderated from those of the Late Pleistocene, the Early Holocene climate did not in fact remain constant. A growing body of paleo-environmental data indicates that large- and small-scale climatic fluctuations occurred throughout the Holocene. Periods of Late Pleistocene/Early Holocene alluviation and soil formation, indicating general climatic stability, have been identified and dated in stream deposits in the Kansas River system at about 10,500 years BP, during the Younger Dryas, and at 8900 years BP (Arbogast and Johnson 1994:302). Because of the recognized regional synchronicity of stream erosion and deposition in much of Kansas, these stable periods likely occurred at Tallgrass also.

The Archaic Period: 8000–2000 BP (6000 BC–AD 1)

The Archaic Period was initially believed to be a generalized, diverse, Middle Holocene hunting-and-gathering adaptation that developed out of the single-focus Early Holocene Paleoindian big-game hunting adaptation. The adaptational shift from big game hunting to the exploitation of modern fauna and gathering of wild plant foods was believed to be marked by the appearance of a greater range of artifact types and projectile point styles than was present during the Paleoindian Tradition. A more diverse array of archeological cultures also becomes apparent at this time. But as was indicated previously, it is now

perceived that the origins of Archaic adaptational diversity were undoubtedly present within the Paleoindian cultures from the outset.

On the Eastern Plains, which includes the Tallgrass Prairie area, the Archaic Period has been subdivided (Chapman 1975) into the Early, Middle, and Late Archaic. These subdivisions are largely arbitrary, however, and may not have specific meaning in the Kansas Flint Hills or adjacent areas (O'Brien and Wood 1998:101). The Early and Middle Archaic fall within the Middle Holocene, a time of renewed climatic change in the Central Plains. Resolution of the Middle Holocene climate appears to be absolutely critical to understanding the character and dimensions of this adaptation before meaningful distinctions may be made regarding the Archaic cultural–historical sequence.

Climatic conditions in the Central Plains at 8000 BP were largely controlled by the eastward-flowing Maritime Tropical and Pacific air mass (O'Brien and Wood 1998:102–103), which produced precipitation conditions conducive to the formation of vast prairie regions. In Western North America, the start of the Middle Holocene is marked by the onset of the Altithermal (Antevs 1955) or Hypsithermal (Deevey and Flint 1957) Climatic Interval, an extended period of warmer, drier climatic conditions that began at about 8000 BP and continued until about 5000 BP. Altithermal-age palynological data from the Great Plains indicate the marked dimensions of the change (Mandel 1995:59): tree growth diminished throughout the region, grasslands increased, and the prairie/forest interface retreated eastward as far as Illinois.

The Altithermal has been debated at great length since it was first identified, but precise details of its extent and severity have been slow to emerge. In the mountains of the American West, the severity of the Altithermal was apparently quite uneven, and its effects upon human, plant, and animal populations appear to have been quite localized depending upon the area in question. On the Great Plains, however, there is evidence that the Altithermal was quite widespread and almost undoubtedly had a pronounced effect upon plant, animal, and human populations.

As was indicated previously, the impact of the Altithermal upon Early and Middle Archaic populations in the Flint Hills remains uncertain. However, recent geomorphological studies at several locations in Kansas (Mandel 1995) have produced data suggesting that the reduced vegetative cover brought on by Altithermal drought conditions, coupled with a different pattern of infrequent but intense episodes of precipitation, caused greatly increased erosion during this time period. There is now evidence that many of the alluvial and colluvial deposits which would have contained the Early and Middle Holocene–age archeological record have in fact been largely scoured out of the smaller drainages and upper watersheds in Kansas.

Utilizing geomorphological and radiocarbon evidence, Mandel (1995:58) has predicted that the archeological record of this time period may in fact only still exist in two general settings. These include alluvial fans that formed at the mouths of the smaller drainages between 9000 and 4000 BP, and intact alluvial deposits in the larger (greater than or equal to 4th order) stream valleys into which they flow. The data for this model have been substantiated by a considerable number of associated radiocarbon ages. South of the preserve, Mandel dated soils underlying a T-1 terrace along the Cottonwood River to 2300 years BP, while charcoal buried in a T-2 terrace along the Cottonwood generated a radiocarbon age of 7510 years BP (Mandel 1989 in Mandel 1995:45–46).

It is thus becoming increasingly clear that the environmental conditions generated during the Altithermal Climatic Interval greatly affected the *archeological record* of the Early and Middle Archaic Period. What remains to be determined is the effect that the warmer/drier climate had upon the indigenous Archaic *cultures* on the plains. Schmits (1981:187) has suggested that a bipartite Archaic chronology may more realistically apply to the Archaic Period and more accurately acknowledge the strong relationship between climate and culture. His scheme would include an Early Archaic that dates to roughly 8000–5500 BP, essentially equivalent in time to the Altithermal, and a post-Altithermal Late Archaic dating to 5500–2000 BP.

In spite of the effects of the Altithermal, however, Archaic Period occupations are much better represented in Kansas than are the Paleoindian components, and numerous Archaic sites have thus far been recorded in the eastern portion of the state, where they are often found in intact subsurface contexts. Unfortunately, however, the Early Archaic is still not well represented, and little can be reported for this time period in the Flint Hills region. The oldest dated Archaic materials from the Flint Hills come from Unit II at the deeply buried Coffey Site in the Blue River watershed of Tuttle Creek Reservoir, 65 mi north of Tallgrass (Schmits 1978, 1981). A radiocarbon age of 6285 years BP (4335 BC) was obtained from the lowest level of this stratified site, but no diagnostic artifacts were found in association with the charcoal.

By contrast, the archeological record of the Late Archaic is much better represented throughout the area of the Flint Hills and Osage Cuestas.

Black Vermillion Phase. The Late Archaic Black Vermillion Phase was defined in Unit III at the Coffey Site (Schmits 1981:190–195), with associated radiocarbon ages that ranged from 5270–5055 years BP (3320–3105 BC). The Archaic components at Coffey suggest living floors with multiple hearths (Kay 1998:178). Structural evidence is problematical, although a small number of isolated postmolds were identified. Faunal remains recovered from the Archaic components include bison, deer, smaller mammals, fish, and migratory waterfowl, the latter suggesting seasonal occupation in the late summer/fall/winter.

Chelsea Phase. The Chelsea Phase was defined by investigations at the Snyder Site, which lay along the Walnut River in the El Dorado Reservoir to the south of the preserve (Grosser 1973). Chelsea initially appeared to reflect hunter–gatherer occupations that produced burned limestone scatters and short, broad, chipped-stone projectile points with slightly concave bases. Grosser suggested that the Chelsea Phase adaptation might involve groups using seasonal base camps that contained habitation structures and on-site mortuary areas (Grosser 1977:124–129 in Kay 1998:181). The Chelsea Phase was estimated to date either to 4150–3980 BP (2200–2030 BC) or to 4750–3450 BP (2800–1500 BC) (Kay 1998:181).

Munkers Creek Phase. The Late Archaic Munkers Creek Phase was subsequently defined at 14MO304, the William Young Site, which lay deeply buried along a tributary to the Neosho River in Council Grove Reservoir, only 20 mi north of the preserve (Witty 1982). Chipped-stone artifacts diagnostic of the Munkers Creek Phase included heavy elongated knives with use-polish, as well as gouges and projectile points, all of local cherts. Isolated postmolds suggested the possibility of structural remains, and rock-filled hearths and shallow pits were also exposed at the site. Modeled ceramic effigies in the shape of human heads were also recovered (Witty 1982:218–222).

Based upon one accepted radiocarbon age of 5340±160 years BP, the Munkers Creek component at William Young was estimated to date to about 5000 years BP (Witty 1982:201). Considering the other radiocarbon ages from William Young, together with other Archaic dates and similar artifacts from nearby adjacent areas, Witty (1982:219) proposed that the Munkers Creek Phase probably dated between 5500 and 5000 BP (3500 and 3000 BC).

Witty (1982:219) also suggested that Munkers Creek was basically a Flint Hills/Osage Cuestas phenomenon, one that flourished within a circumscribed area 90 mi north–south by 40 mi east–west. In addition to Horizon II at the Coffey Site in the Blue River drainage, Munkers Creek materials have been found elsewhere in the Kansas River drainage and along the upper Neosho and Cottonwood Rivers, mostly in floodplain settings along rivers or major tributary streams (Witty 1982:218). Sites near the preserve that have produced Munkers Creek materials include 14CS375, the Roniger Site Complex, in Chase County only a few miles south of the preserve (Ashworth 1980; Witty 1982:202–205).

Additional Late Archaic data have come from Area 741 at 14OS347, the Cow-Killer Site, which was exposed in a construction site borrow area on a low terrace remnant along the Marais des Cygnes River (Reynolds 1984:62–79). Initially indicated by clusters of deeply buried burned rock, bone, and mixed soil, the Archaic stratum at Cow-Killer contained structural remains in the form of two postmolds, several hearth features, and a number of shallow, basin-shaped, trash-filled pits. Artifactual material recovered from the Archaic component included Munkers Creek–like bifaces, chipped-stone gouges and scrapers, and a ground-stone muller or hand stone. Several pieces of worked hematite were found, together with faunal remains that included turtle carapace, fish vertebrae, and bone from white-tailed deer, bison, raccoon, coyote, cottontail rabbit, and beaver.

Based upon the presence of the Munkers Creek artifacts, the Archaic component at the Cow-Killer Site probably also dates to around 5000 BP. The three spatially separate concentrations of Archaic material exposed at Cow-Killer suggest either a single long occupation on a terrace along the Marais des Cygnes, or several episodes of reoccupation, all by hunter–gatherer groups (Reynolds 1984:79; Witty 1982:202–205).

El Dorado Phase. Other Late Archaic–age sites have been examined in the areas of the El Dorado and John Redmond Reservoirs south and east of the preserve. Like the Chelsea Phase, the Late Archaic El Dorado Phase was defined at the Snyder Site in Butler County (Grosser 1973). This component produced long, stemmed chipped-stone projectile points, stone axes and drills, large bifaces, and ground-stone implements, together with retouched and utilized stone flakes. Of considerable importance, burned earth, grass-impressed burned clay, and burned mud-dauber wasp nests suggested that associated habitation structures were also present. Two radiocarbon ages for the El Dorado Phase component at the Snyder Site indicate occupation between 3650 and 3910 radiocarbon years BP (1700–1960 BC). The shape and relatively small size of the projectile points also suggested introduction of bow and arrow technology during this time period.

Eagle Creek Complex. Witty identified the Eagle Creek Complex in the Unit II excavations at the Williamson Site, 14CF330, in John Redmond Reservoir (Schmits 1980a). This deeply buried component on a tributary to the Neosho River produced several concentrations of burned rock, lanceolate and stemmed projectile points, ground-stone implements, and bone tools. Two radiocarbon dates from the Archaic Period component at the Williamson Site fall at about 3600 and 3500 years BP.

Finally, investigations in the Upper Verdigris watershed in Lyon County east of Tallgrass have also produced Archaic Period artifacts. Charcoal from deeply buried hearths at 14LY305 generated dates of about 1880 BC (Witty 1965), while 14GR309 in the Fall River Reservoir area contained four circular concentrations of burned earth and sandstone with mussel shell, burned bone, and charcoal but no other artifacts (Calabrese 1967a:13–14).

In summary, the Archaic Period on the Central Plains has been described as a time of varied cultural responses to a changing physical environment. Archaic cultures throughout the Plains and the Flint Hills “responded successfully to Hypsithermal climatic and environmental pressures, established identifiable groups that often conform to regional physiography, first experimented with ceramic technologies and with horticulture, and participated in exchange networks that extended well beyond the Plains” (Kay 1998:193). Together, all of these data suggest a series of long-lived, successful adaptations that required considerable flexibility and necessarily exploited a diverse range of floral and faunal resources.

The Early Ceramic Period: 2000–1000 BP (AD 1–950)

The conclusion of the Archaic Period in Kansas is signaled by the appearance of an array of new subsistence patterns and technological traits that include routine production of ceramics, use of domesticated plants, and bow and arrow hunting (O’Brien 1984; Reynolds 1984:22). The appearance of these innovations, together with the altered social relationships, patterns, and structures that undoubtedly

accompanied them, did not happen overnight. The seeds of ceramic technology, for instance, are in fact visible during the Late Archaic Period in the ceramic figurine heads found at the William Young Site above Council Grove (Witty 1982). Cultigens, too, first appeared in the Eastern Woodlands during the Archaic Period, and horticultural technology probably moved west gradually, finally having archeological expression in the Early Ceramic Period on the Great Plains.

Kansas City Hopewell. It is also possible that the Early Ceramic Period on the Central Plains may have seen the physical movement of certain Eastern Woodlands populations west into the areas of northwestern Missouri and eastern Kansas. This presence may be visible in the Kansas City Hopewell Phase (Wedel 1943, 1959; Johnson 1979), sites of which were first defined in the Kansas City area. However, while Kansas City Hopewell was first thought to represent a migration of technology, ideas, and/or people from western Illinois (Johnson and Johnson 1998:201), recent data suggest that it may instead have been an in-place development in the Early Ceramic Period.

Whatever its origin at the eastern edge of the Great Plains, Kansas City Hopewell was well established by AD 1 (Johnson and Johnson 1998:203). Kansas City Hopewell materials have subsequently been found west up the Kansas River as far as Manhattan (O'Brien et al. 1979), and southeast into the Lower Verdigris and other drainages. Ceramics in the Roniger collection from 14CS1, a complex of sites only a few miles south of the preserve on the South Fork of the Cottonwood River, for example, show Hopewellian influence (Wedel 1959:494–497), as do materials from the El Dorado Reservoir area (see below).

Three Early Ceramic phases and two foci have thus far been defined within the Flint Hills region.

Butler Phase. The Butler Phase was defined after research in 1968–1969 in an Early Ceramic component at the previously mentioned Snyder Site in the El Dorado Reservoir south of the preserve (Grosser 1973, 1977). Estimated to date between AD 200 and AD 800 (1800 and 1200 BP), the Butler Phase component at Snyder included both calcite-tempered, cord-marked and feldspar- and sherd-tempered, dentate stamped pottery. Small chipped-stone projectile points and larger notched and stemmed dart points are present in the Butler Phase component at Snyder, together with a substantial number of pits which suggest a relatively stable, semi-permanent camp. The ceramics were believed to reflect a mixture of Keith Focus Plains Woodland and Kansas City Hopewell Phase Middle Woodland traits.

Schultz Focus. The Schultz Focus was defined in Dickinson, Geary, Riley, and Clay Counties to the north of Tallgrass Prairie (Eyman 1966; O'Brien et al. 1973). Primarily studied through burial mound excavations (Schultz and Spaulding 1948), Schultz Focus cultural materials include small Scallorn-like projectile points, tubular stone beads, and thick Plains Woodland ceramics with some Hopewellian surface treatments. The Schultz Focus has been identified at the Younkin Mound, which has Hopewellian ceramics, and it is possible that Schultz Focus materials reflect a Hopewellian mortuary complex adapted by an Early Ceramic Plains Woodland culture (Wedel 1959:207).

Valley Variant. Middle Woodland Valley Variant sites have been identified in Clay, Geary, Riley, and Pottawatomie Counties to the north of Tallgrass (O'Brien 1984:50), but the Valley Variant appears to be primarily a Nebraska phenomenon (Bozell and Winfrey 1994). Valley Variant components in Nebraska have been dated to 1942–1445 years BP, or from 90 BC until AD 425 (Bozell and Winfrey 1994:129–130).

Greenwood Phase. The last Early Ceramic taxon thus far defined in the Flint Hills is the Greenwood Phase, which was first observed in the 1965–1966 excavations at 14GW301, the Curry Site, in Greenwood County east of the preserve (Calabrese 1967a). Situated on a series of terrace remnants along the Verdigris River, the site was initially indicated by a surface artifact scatter across a plowed field. Curry contained an Archaic component indicated by a single, deeply buried hearth. However, the major occupation at Curry was Early Ceramic, and was indicated by two distinctive pottery types,

Verdigris and Greenwood. The Verdigris ceramics had crushed limestone and clay temper, and were derived from large cord-roughened and smoothed vessels with straight rims, slight shoulders, and conoidal bases. The Greenwood ceramics at 14GW301 were clay-tempered, and were derived from medium-sized cord-roughened vessels with straight or recurved rims, globular bodies, and rounded bases.

A number of burials were also exposed in the Greenwood Phase component at Curry. These included the remains of a single adult female and several infant and juvenile inhumations that were accompanied by calcite, shell, and bone beads, and shell pendants. A single radiocarbon date of AD 380±240 was obtained from charcoal accompanying the adult burial.

While the material recovered from the Early Ceramic component at the Curry Site was clearly distinctive, the Greenwood Phase was not formally defined until some years later (Jones and Witty 1980:120–125) when analysis was completed on material from three other sites in the region: Two Dog, Gilligan, and Cow-Killer.

The Two Dog Site, 14MO301, was recorded along Munkers Creek just above its confluence with the Neosho River in Morris County a short distance north of the preserve (Witty 1982). Tested in 1961 and 1962, the site produced a complex of postmolds, pieces of burned clay, several shallow trash-filled pits, and four burned-rock concentrations, together with chipped-stone artifacts and the remains of as many as twelve separate pottery vessels. The Two Dog ceramics are similar to the Greenwood Phase Verdigris Ware first described at Curry, and include two possible vessel shapes, one barrel-like and cord-roughened, the other with slight shoulders and smoothed exterior surface. Most of the pottery from the Two Dog Site is clay- or shale-tempered, with lower percentages of crushed limestone or grit temper. Surface treatment is either cord-roughening or smoothed-over cord-roughening.

A grinding slab was recovered at Two Dog, as were the remains of white-tailed deer, beaver, turtle, bird, and Blue point mussels similar to those found at the Curry Site. Together, these data indicate both hunting activities and the processing of gathered animal and plant foods.

Wood charcoal from Two Dog produced a radiocarbon age of 905±115 years BP (AD 930–1160), and the site has been interpreted as a single component habitation along the river that was occupied by a small group, probably a single family unit. The pattern of postmolds exposed in the excavations is problematical, but probably reflects the remains of a wood frame structure with a diameter as great as 35 ft which would have been covered by brush or grass and clay. The structure could have enclosed at least one of the burned-rock complexes.

The Gilligan Site lay on a terrace of Eagle Creek, a major tributary of the Neosho in the John Redmond Reservoir east of the preserve. Excavated in 1963 (Jones and Witty 1980), the site contained hearth features indicated by clusters of burned limestone and sandstone intermixed with burned earth and charcoal. Chipped-stone artifacts from the site included a variety of Late Archaic/Early Ceramic projectile point types, together with other bifaces, celts, scrapers, and ground-stone implements. Animal bone recovered at Gilligan reflected bison, deer, turtle, and beaver, while charcoal from the site generated a radiocarbon age of 1400±250 years BP (AD 550).

The ceramics found at the Gilligan Site include four types: Verdigris, Greenwood, Grasshopper, and Hopewell. The first two are identical to those found at Curry. Verdigris Ware is predominant at Gilligan, and has crushed limestone, shale, and clay temper which has sometimes leached out. The exterior surface treatment of the Verdigris sherds from Gilligan is equally distributed between cord-roughened and smoothed, and vessel shapes appear to be straight-sided with wide mouths.

The Greenwood ceramics from Gilligan contain limonite, clay, and shale temper, and their surface finish is parallel or intersecting cord-roughening. The Greenwood vessels at Gilligan appear to be jars with constricted orifices and vertical rims.

The grit-tempered Grasshopper ceramics at Gilligan are definitive of the Plains Woodland Grasshopper Falls Phase, which was defined 70–100 mi to the northeast of the preserve in the Delaware River drainage (Reynolds 1979). The Grasshopper Falls materials from Gilligan have parallel cord-roughened exterior surfaces.

The Hopewell ceramics from Gilligan have bone, quartzite sand, and limonite temper, and are smooth-surfaced with incised cross-hatching or zoned incising. The vessels represented in the Hopewell ceramics appear to be small in size, and have conical bases or are medium-sized jars. Cross-hatching is characteristic of the Kansas City Hopewell Phase, but Hopewellian Cuesta Phase ceramics found in the Elk City Reservoir in southeastern Kansas (Marshall 1972) also have bone temper.

Finally, the multiple component Cow-Killer Site on the Marais des Cygnes River in Osage County (Reynolds 1984) also contained evidence of an Early Ceramic occupation. The Greenwood Phase material at Cow-Killer lay in a thick stratum that contained postmolds and general midden fill. The latter included chipped- and ground-stone artifacts, animal bone and mussel shell, and grass-impressed burned clay. Six of the postmolds were found in an arc, the diameter of which was approximately 40 ft, suggesting a habitation structure size similar to that at the Two Dog Site. The ceramic material recovered from Cow-Killer was similar to the Verdigris and Greenwood types observed elsewhere, and the site was estimated to date between AD 500 and 600.

The Greenwood Phase has now been identified through excavation at several eastern Kansas sites, and is the most intensively studied of the several indigenous Early Ceramic Period taxa. Greenwood Phase materials have also been identified in surface collections from as far north as Topeka, Kansas. They have also been found in the Cedar Creek watershed on the Upper Neosho River; and in the Roniger Site Complex along the South Fork of the Cottonwood River only a few miles south of the preserve (Witty 1982:72–76).

As it is presently understood, the Greenwood Phase settlement pattern includes small and medium-sized habitation sites positioned adjacent to dependable water sources, usually larger, third-order or greater, streams. Structural remains identified at Greenwood Phase sites indicate medium-sized to relatively large oval or round houses covered with clay that was plastered over thatched material, probably grass. Some of the structures appear to have contained interior hearths, suggesting that they reflect cool- or cold-season occupations. The substantial quantity of midden deposits at the Greenwood Phase sites suggests extended occupations, although sites with probable smaller, shorter occupations are also known.

Subsistence data reveal that Greenwood Phase populations exploited a substantial range of locally available floral and faunal resources. The latter include both aquatic and terrestrial animals: turtle, mussels, deer, bison, rabbit, raccoon, beaver, coyote, bobcat, squirrel, prairie dog, mink, and pocket gopher. The data on gathered wild plant foods processed by Greenwood Phase populations are not yet as extensive, but the Early Ceramic component at Cow-Killer produced charred seeds of unknown origin, together with walnut shell fragments (Reynolds 1984:187–188).

The Greenwood Phase cemetery complex exposed at the Curry Site shared traits with Keith Focus Plains Woodland sites in northern Kansas and Nebraska, and included flexed and semi-flexed adult and juvenile inhumations with accompanying bone and shell artifacts. The Greenwood Phase dates to 1570 years BP (AD 380) at the Curry Site, to 1400 years BP (AD 550) at the Gilligan Site, to AD 500–600 at Cow-Killer, and to 905 years BP (AD 1045) at Two Dog.

In summary, the appearance of domesticated plants and horticultural practices would probably have allowed for larger human populations during the Early Ceramic Period, with resultant changes in social complexity and settlement patterns. This population increase is strongly suggested by the sheer numbers of Early Ceramic Period (Middle and Plains Woodland) sites recorded in the state, which outnumber

those of any other cultural unit by a factor of two to one (Ashworth 1980:12). The presence of Middle Woodland Hopewell traits such as smoothed finish or cross-hatched ceramics in Butler and Greenwood Phase materials clearly indicates the pervasiveness of this Eastern Woodlands culture in the Flint Hills region. Other details and ramifications of Hopewell influence upon indigenous Plains Woodland populations in the region remain to be clarified.

The Middle Ceramic Period: 1000–500 BP (AD 950–1500)

The Middle Ceramic Period, which includes the Central Plains Tradition (Wedel 1961; Witty 1978a; Steinacher and Carlson 1998), is marked by further changes in technology and subsistence patterns, and perhaps by related shifts in social organization as well. In Kansas, the Middle Ceramic Period is reflected archeologically by evidence of more intensive horticulture, together with a range of features and artifacts that reflect the shift to settled village life that accompanies a predominantly horticulture adaptation. Importantly, the archeological evidence from the Middle Ceramic Period in Kansas indicates that hunting and gathering still functioned as essential subsistence activities.

Middle Ceramic Period populations throughout the Central Plains lived in small villages and extended hamlets. In the northern part of the state, the characteristic house type for this time period is the earthlodge (Witty 1978a:56), a substantial semi-permanent habitation structure built of heavy timber framing overlain by sod or earth.

Smoky Hill Aspect. The Smoky Hill Aspect is the recognized Middle Ceramic Period culture across the northern Flint Hills, and is found in the lower Smoky Hill, Solomon, and Saline drainages and along the upper Kansas River and its north- and south-bank tributaries (Witty 1978a). The spatial range of Smoky Hill is thus intermediate between the sites of the Nebraska Culture in northeast Kansas and those of the Upper Republican Aspect further to the west (Wedel 1959:562–563).

The Smoky Hill Aspect is estimated to date between AD 1000 and 1350 (Blakeslee 1994). Smoky Hill habitation sites occur as small clusters of square, rectangular, or in one case, circular earthlodges built along minor creek or major stream terraces (Steinacher and Carlson 1998:248). These structures may number as many as two dozen in a single location, such as at the Minneapolis Site north of Salina (Witty 1978a), but were more typically scattered as single units or in small numbers as extended hamlets. The sites represent open, unfortified rural communities, the individual populations of which probably did not exceed 100 inhabitants (Wedel 1961:95). Smoky Hill populations grew corn, beans, and squash, and crop surpluses were stored in cache pits within the lodges or outside them. Their horticultural activities were supplemented with extensive hunting and gathered wild plant and aquatic animal resources as well.

The characteristic pottery associated with Smoky Hill Aspect occupations includes medium- to large-sized globular vessels with prominent shoulders, out-flaring collared rims, and overall cord-roughened surfaces. Smoky Hill sites typically contain greater quantities of midden debris than do Plains Woodland sites, with numerous bone tools and a more varied and extensive artifact inventory (Wedel 1961:94). Smoky Hill Aspect burials occur both as flexed and extended primary inhumations, sometimes in substantial numbers (near the Whiteford Site outside Salina), or in ossuaries as secondary burials.

The Smoky Hill Aspect has been divided into two subgroups based upon ceramic and other differences. Sites in the western half of the Smoky Hill range have been designated the Salina Focus (Wedel 1959:563), while those sites along and north of the Kansas River at the eastern edge of the Flint Hills Upland have been designated the Manhattan Focus.

The eastern limits of the Manhattan Focus appear to lie northeast of Wamego along Vermillion Creek, a left-bank tributary of the Kansas River at the extreme eastern edge of the Flint Hills (Reynolds 1970,1975). Relative to Tallgrass, south-bank tributaries of the Kansas in the Flint Hills are also known to contain Manhattan Focus sites (Wedel 1959). Additionally, Smoky Hill Aspect ceramics were

tentatively identified in association with small chipped-stone projectile points and burned clay (structural remains) at 14CS1, the Roniger Complex, a few miles south of Tallgrass on the South Fork of the Cottonwood River (Wedel 1959:494–497). Depending upon the temper of the ceramics and the nature of the structural remains, this locale may reflect the southern limits of the Manhattan Focus.

The first Manhattan Focus site to be professionally studied was 14RY21, the Griffing Site (Brower 1898:24), which lies on Wildcat Creek a short distance above its confluence with the Kansas River in the vicinity of Manhattan. Investigations at Griffing in 1937 (Wedel 1959:178–187) exposed the remains of a square earthlodge with an extended entryway, a central fireplace, four central posts, and interior cache pits. Chipped-stone artifacts found at Griffing included a variety of chert knives; small, triangular projectile points, celts, and scrapers; and ground-stone implements. The diagnostic pottery found at Griffing and other Manhattan Focus sites is Riley Cord-Roughened, which is typically sand-tempered and cord-roughened on its exterior surfaces. Riley Cord-Roughened vessel forms include small- to medium-sized globular containers with rounded shoulders, constricted necks, and out-flaring rims or thickened rims with collars.

Pomona Variant. Another Middle Ceramic Period culture that may be identified in the area of the preserve is the Pomona Variant, formerly the Pomona Focus (Witty 1967; Wilmeth 1970). Pomona was interpreted first as an indigenous Plains Woodland culture in transition to a Plains Farmer adaptation (Witty 1980 in Ashworth 1981), and then as a variant of the Plains Village Tradition (Brown 1984). Generally found south of the Kansas River but also north of the Kansas between the Smoky Hill Aspect and the Nebraska Aspect, the Pomona Variant is recognized as culturally distinct from the earthlodge communities of the Central Plains Tradition (Wilmeth 1970; Witty 1978a). It may have its origins in any or all of three Early Ceramic cultures: the Greenwood Phase in the eastern Flint Hills and Osage Cuestas, the Cuesta Phase in extreme southeastern Kansas, or the Grasshopper Falls Phase to the north of the preserve. However, the present radiocarbon ages of Pomona components, which range from about 950–350 years BP (AD 1000–1600), clearly place the culture within the Middle Ceramic Period (Witty 1978a).

The Pomona Variant has been most intensively investigated in the Pomona and John Redmond Reservoirs in Osage and Coffey Counties east of Tallgrass (Wilmeth 1970; Schmits 1980b), but Pomona materials have also been found in Wabaunsee and Geary Counties to the north of the preserve (Wilmeth 1970:29). Pomona components are typically found on floodplains, natural levees, and ridgetops. They often contain loose clusters of oval or J-shaped houses that are smaller and of lighter construction than the Smoky Hill Aspect or Nebraska Culture earthlodges. Hearth placement is consistently outside the structures.

Pomona sites have sometimes been interpreted as warm season or short-term campsites associated with food gathering or other specialized activities (Thies 1981a). However, they nonetheless reflect occupation of the area by an indigenous population that continued many of the patterns of the previous Early Ceramic Period. Scapula hoes in Pomona sites reflect continued horticultural activity, while projectile points and animal bone found at Pomona sites confirm the importance of supplementary hunting practices. Data from sites in John Redmond Reservoir indicate that Pomona populations utilized both the arable valley floors and the valley uplands (Thies 1981a, 1990).

The type site of the Pomona Variant is the Hart Site, 14OS305, which was excavated in 1958 along 110 Mile Creek in the Marais des Cygne drainage (Wilmeth 1970:18–47). The Hart Site contained the remains of a single oval house structure that measured 23 by 14 ft and had central posts and smaller supports around its perimeter. Burned, grass-impressed clay indicated that the walls and roof of the structure were grass- and mud-covered. A single interior trash-filled pit was found within the house, but there was no evidence of an interior hearth.

The diagnostic ceramics found at Hart, now defined as Pomona Ware, are clay-tempered and cord-roughened, and represent globular jars with straight or gently flaring rims. Chipped-stone artifacts included small, triangular, unnotched and side-notched projectile points, abundant end scrapers, drills and knives. No ground-stone artifacts or bone were recovered at Hart, but freshwater mussel shells found in the excavations indicated exploitation of aquatic resources. Charcoal from the interior pit at Hart generated a radiocarbon age of 860 ± 100 years BP, or AD 1090.

Another Pomona Variant occupation, the Dead Hickory Site, 14CF301, was excavated in 1963 along the Neosho River near Burlington east of the preserve (Schmits 1980b:133–162). The site was indicated by a surface scatter of general occupational debris, but subsequent excavation exposed several concentrations of burned clay, indicating the probable locations of individual house structures. One of these features was marked by a J-shaped pattern of postmolds with a long axis of 25 ft. Other problematical postmold patterns were also found at Hart that may reflect a variety of other structure types and/or functions. Pottery recovered at Dead Hickory included Pomona Ware, together with some sherds that had a smoothed surface finish. Charcoal from the Dead Hickory Site generated a radiocarbon age of 930 ± 150 BP, or AD 1020.

Bemis Creek Phase. A final Middle Ceramic taxon that may be relevant to the preserve is the Bemis Creek Phase (Johnson 1983). Bemis Creek was defined from archeological materials recovered from three field seasons of research at the Two Deer Site, 14BU55, in the Upper Walnut drainage south of Tallgrass (Adair and Brown 1981:237–356). Block excavations at Two Deer revealed the presence of two probable house structures, the radiocarbon ages of which averaged about 1000 BP.

The first house was defined by a concentration of burned clay daub, and contained ground-stone metates and a concentration of ash that may have been an interior hearth. A dark stain within the daub concentration contained abundant organic material that included charred maize kernels. The second house structure was indicated by a complicated array of postmolds, the limits of which could not be identified. The shapes of the houses are believed to be oval to rectangular, and the first structure is estimated to have been 12 m in diameter.

The quantity of the artifactual material at Two Deer suggests that it was occupied for an extended period of time, certainly longer than a single season. The ceramics are primarily bone-tempered and cord-roughened, most of them derived from vessels with straight necks, slight shoulders, and conical bases. However, a smaller fraction of the assemblage reflects more globular vessels with constricted necks. The site produced a wide range of chipped-stone tools, including small hafted bifaces such as projectile points and knives, together with scrapers, perforators, choppers and edge-modified flakes. Florence Type A chert was the predominant lithic raw material type.

Clear definition of the biotic taxa exploited by Middle Ceramic populations has been somewhat problematical, but extensive macrofloral analysis of plant remains recovered at Two Deer provided data relating to the range of local subsistence activity. Forty different floral taxa were represented by charred seeds or shells. Many of these are believed to be local plants whose seeds were inadvertently incorporated into the archeological deposits. However, 16 plant species found at Two Deer are possible food sources, and include pigweed, goosefoot, spurge, pokeweed, purslane, black walnut, acorns, and hackberry. While *Helianthus* (sunflower) grows locally in the area, Adair and Brown (1981) suggested that the concentration of sunflower remains in certain portions of the excavations might indicate that they too were being intentionally grown at the site.

Two Deer was interpreted as a transitional Plains Woodland–Plains Village occupation, since traits of both periods, particularly the two distinct ceramic vessel forms, were present in the data recovered at the site. The macrofloral information from Two Deer substantiates this interpretation: the maize remains from Two Deer are an early type evolving toward the 8-row variety that is found on the Plains after

AD 1000, while the pumpkin seeds from Two Deer are smaller than those found in later Plains Village sites (Adair and Brown 1981:324).

In summary, the Middle Ceramic Period in the Flint Hills and east-central Kansas saw continued occupation of river and stream valleys by indigenous populations in transition toward fully horticultural adaptations. Hunting and gathering activity certainly continued during the Middle Ceramic Period, but ceramic technology clearly advanced with the development of new vessel forms. Middle Ceramic villages remained relatively small in size with probable simple social organization, and there is no evidence of strong pressure from other groups outside the area.

The onset of drought conditions at about AD 1500 may be responsible for the changes that followed the Middle Ceramic Period, perhaps prompting northward movement of some of the Late Ceramic Kansas populations into Nebraska and South Dakota.

The Late Ceramic Period: 500–125 BP (AD 1500–1825)

The Late Ceramic Period in Kansas is the transitional time between the end of the prehistoric and the beginning of written history. The Late Ceramic includes both the Protohistoric, the era when the first ephemeral contacts occurred between American Indian groups and Euroamerican populations, and the Historic era, when written records and descriptions of American Indian/Euroamerican contact become commonplace.

Among the prehistoric groups in Kansas, the Late Ceramic Period was a time of more intensive horticultural activity than before, although there is also clear evidence of increased bison hunting (Witty 1980) that is almost certainly due to acquisition of the horse by American Indian groups. Throughout much of Kansas, the Late Ceramic is reflected archeologically by a gradual increase in nucleated village sites, which may indicate more densely concentrated populations than were present in earlier periods.

For most archeologists, the Protohistoric is also the critical first time that archeological sites and artifacts can be clearly associated with specific American Indian tribal groups, and in the area of the preserve, these tribes may include the Wichita, Osage, Pawnee, and Kansa. The Protohistoric descriptions of American Indian groups come from the journals and diaries of the first Euroamerican explorers in the central Great Plains. The first Spanish expedition onto the plains took place in AD 1541, while French explorers traveled west from the Missouri River into central Kansas beginning in the mid-1600s (Wedel 1959), providing the first written descriptions of the northeastern quarter of the state.

Wichita. In south-central Kansas, the Protohistoric Wichita are represented archeologically by the Great Bend Aspect. Great Bend sites are found across a large area from near Larned in Pawnee County on the west to Strong City in Chase County to the east, and south down the Arkansas River into Cowley County. The Flint Hills generally form the eastern limits of the Great Bend Aspect, while the Smoky Hill River marks its northern boundary.

Great Bend Aspect sites occur as small permanent settlements or larger extended villages along stream and river floodplains and in upland locales, and they represent the remains of an adaptation that was largely based upon maize horticulture. However, Great Bend groups probably practiced what Rohn and Emerson (1984) call sedentary seasonal settlements. They lived near the crops during the part of the year that planting, crop maintenance, and harvest required, but then actively pursued the bison herds at other times of the year, living in less visible short-term camps while on the hunt.

The time range for the Great Bend Aspect extends from about AD 1450 to 1700, for the Protohistoric Wichita were one of several Plains Indian groups contacted and described by early Spanish expeditions from the Southwest. Wedel (1959) has defined two distinct Great Bend Aspect foci which appear to reflect the two separate Wichita settlements that were visited by Coronado in 1541 and by Oñate in 1601.

The Little River Focus, in the western Great Bend Aspect territory along Cow Creek and the Little Arkansas River, occupied the area where Coronado concluded his search for the Kingdom of Quivira. The Lower Walnut Focus, defined along the lower Arkansas near Arkansas City, lay in the area where Wedel believes Oñate reached other Wichita settlements.

The Spanish descriptions of the Great Bend Aspect/Quivira/Wichita add a great deal to our understanding of the late prehistory and early history of this group. The Spanish were impressed by the numerical size of the Wichita populations. The villages were described as large but sometimes discontinuous clusters of circular grass lodges built of timbers, poles, and grass thatch which measured 10–26 ft in diameter (Drass 1998:443). Spanish journal entries also describe other grass-roofed structures that stood on posts in the villages which may have been granaries for the harvested corn crops. While the Spanish impression was that most of the Wichita economy was still bison-based, two crops of maize were reportedly raised annually by the villagers.

Great Bend Aspect artifacts have been found in the Strong City area and elsewhere in Chase County. However, the nearest concentration of Great Bend Aspect sites may lie 30 mi west of Tallgrass along the Cottonwood River in the vicinity of Marion, Kansas (Rohn and Emerson 1984). The Marion sites are situated on hills, on floodplains along the streams themselves, and on bluff tops overlooking the streams. Both streamside and upland locales contain habitation and activity areas, storage pits, and trash deposits, and all of the sites probably contain the remains of clustered grass-covered lodges.

The numerous cylindrical and bell-shaped storage pits and the trash mounds found at the Marion sites are probably the true measure of the wealth of the Protohistoric Wichita, and clearly indicate the volume of food resources that they produced. Subsistence activities in the Great Bend Aspect settlements at Marion involved both cultivation of domesticated plants and the gathering of wild species. Two-thirds of the Marion sites lie in floodplain settings, and the tributary stream valleys in the area have deep, sandy soils. Floodplain agriculture in the stream bottoms could have been accomplished with simple bone and wooden tools.

Maize was clearly the major crop for the Great Bend Aspect, the Marion fields producing 8- to 12-rowed flint corn, but beans (*Phaseolus vulgaris*) and sunflowers (*Helianthus*) were also grown. Macrofloral evidence recovered from the Marion sites indicates that black walnuts, hickory nuts, plums, knotweed, pigweed, and other unidentified grasses were probably collected. Upland areas around the valley would have been hunted, and faunal remains are abundant in the Great Bend Aspect deposits at Marion. Bison is the primary animal represented, but elk, white-tailed deer, beaver, cottontail rabbit, and turtle bone and Blue point and Squaw-foot mussels are also represented.

Great Bend Aspect sites usually contain abundant artifactual information, and the Marion sites are typical in this regard. Pottery was found in large quantities and exhibited considerable uniformity. The Marion ceramics usually have a smooth surface finish, and the vessels represented appear to have been globular with flat bottoms, vertical necks, and frequent strap handles. The Marion ceramics primarily represent Cowley Plain, the pottery type that is diagnostic of the Lower Walnut Focus sites to the southeast. Cowley Plain has mussel shell temper, while Geneseo Plain, with sand temper, is predominant in the Little River Focus sites and occurs in smaller quantities in the Marion ceramic assemblage.

The Marion sites were also found to contain abundant chipped-stone tools including small and large hafted bifaces, diagnostic beveled knives, scrapers, and drills or perforators. Limestone metates and manos were recovered, together with sandstone abraders and bone and antler tools. The Marion sites also contained artifacts that reflect personal adornment, such as pendants and beads of bone, shell, copper, and clay, and pipes, miniature ceramic vessels, and small effigies are typically present in the Great Bend Aspect deposits. There is ample evidence of Great Bend trade networks, too, in the Marion data: chert materials from some of the sites come from the Southern Plains, the Northern Plains, and the Ozarks (Drass 1998:444). Other exotic materials include pipestone from southern Minnesota and copper from

the Great Lakes, while Puebloan pottery and obsidian indicate contact with American Indian groups in New Mexico.

The Marion sites are tightly concentrated in the area of the present town, and do not extend even a short distance upstream to the area of Marion Lake (Witty 1963a), or further downstream along the Cottonwood River. Rohn and Emerson (1984:192) have suggested that the concentration reflects a Great Bend Aspect population center, but they do not speculate as to why the occupations did not extend further down the Cottonwood drainage.

Wedel (1982:123–130) has suggested that the Quivira/Wichita largely abandoned the northern part of their territory between AD 1690 and 1719, perhaps leaving a few scattered settlements in the north and west, and moved south down the Arkansas River toward and into present-day Oklahoma. This movement may have been due to hostility with the Pawnee to the north, the Osage to the east, or the Apache to the west. However, Wichita settlements postdating this period are more tightly concentrated than before, suggesting that the extended hamlets were consolidated for protection.

Rohn and Emerson believe that the Quivira/Wichita abandonment included the Marion area, and they estimate the occupations there to date between AD 1525 and 1720. Since none of the Marion sites contained any artifactual evidence of European contact, however, they suggest that the Marion Complex may actually have begun earlier in time.

Osage. In the late 1700s, the Siouan-speaking Osage lived in two bands, the Great and Little Osage, along the Osage and Little Osage Rivers in west-central and southwestern Missouri. They were well-known to early French explorers (Norall 1988), and accompanied Etienne de Bourgmond on his expedition onto the Plains in 1723–1724. The Osage claimed hunting territory to the west in what is now southeastern Kansas (Connelly 1928 in Weston 1997:136), and may have ranged as far west as the Tallgrass area in search of game. As early as the 1780s, a faction split off to occupy the confluence of the Neosho, Verdigris, and Arkansas Rivers in northeastern Oklahoma (Foley and Rice 1983:47). In the 1790s, another faction, under Chief Clermont or Gra Mon, split off to occupy land along the Verdigris River near the present town of Claremore, Oklahoma.

By 1802, the Osage consisted of two primary factions, the Missouri and Arkansas Osage, largely due to influence from trader Pierre Choteau. The Arkansas band included most of the Great Osage and part of the Little Osage bands under Clermont (Foley and Rice 1983), and their villages lay along the Arkansas near the mouth of the Verdigris in northeastern Oklahoma. However, Henning (1998:390) also mentions two Big Osage villages on the Arkansas River south of the preserve just prior to 1808.

In 1816, the territory of the Grand Osage was described (Choteau 1940:137) as extending from the mouth of the Gasconade River in Missouri west up the Arkansas to the Rocky Mountains, and north to the divide between the Arkansas and Smoky Hill Rivers. However, per the treaty of Fort Clark (Fort Osage), the Osage bands gave up their holdings in Missouri, and by 1820 the Osage had completely removed from Missouri, resettling in extreme southeastern Kansas and northeastern Oklahoma (Thies 1990:32).

While the Osage range and hunting territory would certainly have included the Flint Hills, there are no known Osage sites closer to Tallgrass than those identified in Labette County, in the southeastern corner of the state. It has been suggested (Chapman 1974) that the Osage developed out of an indigenous prehistoric culture in the coterminous four corners of Missouri, Kansas, Arkansas, and Oklahoma. Johnson (1991) has recently proposed that this parent culture could well have been the same Middle Ceramic Pomona Variant that also evolved into the Kansa (see below).

Pawnee. Another Caddoan-speaking tribe, the Pawnee, occupied a number of earthlodge villages in central Nebraska and north-central Kansas by the eighteenth century (Wedel 1936; Grange 1979; O'Shea 1989:54), but also had outlying villages as far south as the Bogan Site in Geary County (Marshall and

Witty 1990). Historically, the Pawnee were comprised of four bands, the Skidi, Grand, Republican, and Tappage. Linguistically related to the Wichita (and, by extension, to the archeological Great Bend Aspect) to the south, the Pawnee are believed to have moved slowly north into central Nebraska, their archeological roots lying in the small Central Plains Tradition Upper Republican earthlodge communities found in southern Nebraska and north-central Kansas.

Protohistoric Pawnee Lower Loup Phase ceramics have been found in Great Bend Aspect sites in central Kansas, and the general contemporaneity of the two taxa can thus be demonstrated (Lower Loup beginning between AD 1500 and 1550 [Grange 1979:141]). A chief of the Pawnee is reported to have traveled south to visit Coronado during his trip through the Little River Focus Wichita/Quivira villages in 1541 (Wedel 1979:191).

Ludwickson (1978) has suggested that the Pawnee are first visible as an ethnic group in an archeological Loup River Phase, which he believes to be transitional between the prehistoric Upper Republican, ending about AD 1350, and the Lower Loup Phase (Ludwickson 1978:104). Prompted by adverse climatic conditions or by simple northward migration, Loup River Phase populations moved into the Loup River drainage in Nebraska, developing into the Protohistoric Lower Loup Phase.

All of this late evolution appears to have occurred in Nebraska, well north of the preserve. However, Wedel (1979:184) notes that an AD 1700 French map by Bergier indicates that *les panis* (perhaps meaning Pawnee settlements) stood on a northern tributary of the Arkansas River south of the Kansas. In 1777, Spanish Lieutenant Governor Cruzat placed the Republican Band of the Pawnee on the Republican River at 14RP1, the Kansas Monument Site, near the Nebraska border (O'Shea 1989:56). It is quite possible that any of the Protohistoric Pawnee groups ranged as far south as the Tallgrass area to hunt.

Kansa. The Siouan-speaking Kansa are believed to have occupied the area of northeastern Kansas and northwestern Missouri in the late seventeenth century (Wedel 1974), and in 1816 (Choteau 1940:138) their territory included parts of the Nemaha and Blue River drainages, the former in Nebraska, the latter in Nebraska and Kansas, and the lower Republican drainage in Kansas as well. However, the first historic documentation of the Kansa was by French explorer Etienne de Bourgmond, who reported them living in a large village along the Missouri River in present-day northeast Kansas in 1724 (Wedel 1959:100–101; Reichart 1978; Norall 1988; Thompson and Reichart 1993). The Kansa have been described as living in several types of round lodges (Staub 1995). Some of these were turf-covered and were presumably the earthlodges that have been referred to in various Kansa reports, although they were apparently constructed on a lighter wooden framework than were Pawnee earthlodges, for instance. Other Kansa lodges are described as mat- or hide-covered.

Native tradition has the Kansa moving west from east of the Mississippi, where they had lived in the seventeenth century with other Dhegiha Siouan-speaking groups that included the Osage (Unrau 1986:12–15). The archeological origins of the Kansa are uncertain. However, Johnson (1991) has recently suggested that the Kansa may have developed in-place out of the indigenous Pomona Variant, the Middle Ceramic/Early Plains Village culture that has been identified in western Missouri and eastern Kansas. While most Pomona sites date between AD 950 and 1350 (Brown 1984), Johnson (1991:59) reports and analyzes a series of later Pomona radiocarbon ages that suggest northward movement of the culture from east-central to north-central Kansas during the intervening 300 years before de Bourgmond's report of the Kansa village.

By 1796, French maps indicate that the Kansa had resettled to the west up the Kansas River drainage (Unrau 1986:21–23), perhaps due to pressure from other American Indian groups to the east, or because of easier access to bison resources in the Upper Arkansas drainage. In the first two decades of the nineteenth century, the Kansa core territory included the Kansas River valley from the Blue River east to the Missouri, and south to the Neosho River east of Tallgrass. They were described by Lewis and Clark in 1804 as having a village near the mouth of the Blue Earth (Big Blue or Blue) River on the floodplain of

the Kansas River a short distance east of Manhattan (Wedel 1959:38,52). Blue Earth Village contained 128 lodges when it was visited by Sibley in 1811 (Unrau 1986:90).

The hunting range around the Kansa core territory included lands farther to the west up the Solomon and Smoky Hill Rivers, and south to the Great Bend of the Arkansas (Staub 1995:24). However, the early 1800s for the Kansa were also marked by periodic conflict with the Republican and Loup River Pawnee, suggesting that their range extended to the north as well (Unrau 1986:88–92).

The Late Ceramic/Protohistoric Period on the Kansas Plains is a complex web of human relationships in rapid transition, driven by shifting alliances between the great powers of Europe—France, Spain, and England—American Indian groups, and eventually Euroamericans. Much of the complexity evolves around early European and Euroamerican exploration of the area to identify exploitable economic resources in western North America, and their use of American Indian groups to achieve those ends (Thorne 1996). The tensions between all of these populations, begun in the Protohistoric Period, continued in the following centuries.

The Historic Period: 125 BP–Present (AD 1825–Present)

The Historic Period in Kansas really begins with the displacement of a substantial number of eastern American Indian tribes and their resettlement onto 17 different reservations throughout eastern Kansas (King 1996:11–15, Figure 3). The resettlement followed treaties between the Federal Government and the indigenous Osage and Kansa. The immigrant groups included the Otoe and Missouri; the Iowa, Sauk, and Fox of Missouri; the Kickapoo; the Delaware and Wyandot; the Shawnee; Sauk and Fox of Mississippi; the Chippewa; the Ottawa; the Peoria and Kaskaskia; the Wea and Piankashaw; the Potawatomi; the Miami; the New York; the Cherokee; and the Quapaw. Two other reservations were set aside for the Osage and Kansa (Kansas State Historical Society 1987:30). The introduction and consolidation of the immigrant tribes prompted greater contact between all of the American Indian groups, immigrant and indigenous, as well as between the American Indians, Indian agents, and missionaries (Staub 1995).

Osage. In 1825, the Osage ceded their lands in Missouri and Arkansas, retaining a narrow strip of land along the Neosho and Verdigris Rivers in southern Kansas (Reynolds 1984:34; King 1996:11). It is likely that the Osage bands continued to mount hunting expeditions to the west into the bison country during this time, certainly into the Arkansas drainage (Unrau 1986:79). However, no clear archeological expression of this episode of occupation and use has been identified (Weston 1997:137). Tixier's 1840 description (in McDermott 1940:116–117) of an Osage site near Oswego, Kansas, indicates a village of roughly 30 bark- and mat-covered lodges, the larger ones 40–50 ft long and 15–18 ft tall. By 1872, the Osage had given up all of their lands in Kansas and moved to Oklahoma. Any Osage use of the Tallgrass area would certainly have ended by this time.

Kansa. The Kansa occupied Blue Earth Village from about 1800 to 1830 (Wedel 1959:177; Unrau 1986:79). In 1825, the Kansa were reallocated a smaller reserve that stretched in a narrow corridor from east of Manhattan west onto the High Plains. They began moving eastward from Blue Earth after 1825, and in 1830 occupied three contemporaneous villages in the area immediately west of Topeka (Thies 1987). One of the three locations, Hard Chief's Village, contained 500–600 people living in 50–60 earthlodges on high ground above the north side of the Kansas River.

Kansa–Pawnee hostilities continued well into the 1800s, and in 1829 the Pawnee killed a Kansa caught in what the Pawnee considered to be their hunting grounds near Council Grove (Unrau 1986:157). Hunting rights and personal revenge seemed to prompt most of the hostilities.

The Kansa were removed further southwest to a small reservation southeast of Council Grove following the Mission Creek Treaty of 1846, and there they occupied three villages of bark-covered

lodges on the Neosho River northeast of Tallgrass. Hard Chief's village was established on Cahola Creek ten mi southeast of Council Grove, while Fool Chief the Second's village lay on the right bank of the Neosho River some seven mi southeast of the town. The third village lay immediately northwest of Fool Chief's village near the mouth of Big John Creek (Unrau 1986:166–167). A Methodist mission to the Kansa was established in Council Grove in 1850 (Unrau 1986:165). In addition to the three villages on the Neosho, there are other references to Kansa encampments near the preserve, one in 1855 on the Cottonwood River in the vicinity of Emporia, and another near the former town of Toledo in Chase County in 1858 (Staub 1995).

The Kansa continued to travel seasonally to the bison territory, probably along the Kaw Trail to the north of the preserve (Wedel 1959:53–54), which led from Council Grove west into the Arkansas drainage near McPherson (Staub 1995). There is also a reference to another Kaw Trail that may have led south through the preserve, perhaps along the ridge between Fox Creek and the Diamond Creek drainage to the west (Hawkins and Starkey 1940). A north–south trail through the area of the preserve marked on an 1857 Government Land Office map may corroborate the second trail, but further details of its nature and use are unknown at the present time. Staub (1995:33) notes an 1858 reference to 400 Kaw bringing furs and ponies to sell and trade at Cottonwood Falls. He also refers to accounts of fall and winter hunting by the Kansa west along the Saline and Smoky Hill Rivers in 1859–1861, with the Kansa returning to their reservation lands at the end of the winter, selling and trading their furs and robes in Council Grove and Salina.

The Kansa reservation outside Council Grove was reduced from 250,000 to about 80,000 ac in 1859, as conflict between the Kansa, the white residents and merchants of Council Grove, and other Plains Indian tribes continued (Unrau 1986:164–194). The Kansa occupied the remaining land along the Neosho River until 1873, when they were removed to northern Oklahoma (Wedel 1959:54), and 1873 is a generally accurate terminal date for all Kansa activity in the vicinity of the preserve.

Pawnee. Two historic Pawnee settlements are known in Kansas. Both of these are fortified village sites that contain the remains of both earthlodges and palisade walls. The Kansas Monument Site, 14RP1, sits on the bluffs above the Republican River outside the town of Republic (Roberts 1978). A remnant of another village, the Bogan Site (Marshall and Witty 1990) lies within the Flint Hills in the vicinity of Milford Reservoir in Geary County several tens of miles north of the preserve. Excavation of a single lodge at Bogan in 1967 produced only a small quantity of artifactual material, and suggested that the village was not occupied for an extended period. The precise date of occupation at Bogan is unknown. However, the site is clearly an outlier at the extreme southeastern edge of the historic Pawnee range (O'Shea 1989:86), and it may have been difficult for the Pawnee to maintain a village at the periphery of their core area.

In 1833, the Pawnee gave up all lands south of the Platte River in Nebraska except for continued hunting access to the south, probably in response to loss of control of those lands to the several immigrant tribes which had been relocated in Kansas (O'Shea 1989:56). Essentially all subsequent Pawnee occupation and activity occurred outside Kansas, either to the north in Nebraska or to the south in Oklahoma when the tribe removed there in 1876.

Euroamericans. The Euroamerican history of the area of Kansas (Barry 1972; Kansas State Historical Society 1987), and particularly of the preserve, will not be described in detail here, but begins with the earliest exploration of central and eastern Kansas, first by Coronado in 1541 and then by de Bourgmond, who crossed through the Flint Hills in 1724 (Reichart 1978; Norall 1988). Other major exploratory expeditions included that of Zebulon Pike, who crossed the Flint Hills south of the preserve in 1806 to explore a land route to the west. A detachment of the Stephen Long expedition visited a Kansa Indian village on the Blue River in 1819 (Kansas State Historical Society 1987:4).

Fur traders including Jacob Fowler and Jedediah Smith traveled along the Santa Fe Trail route to the north of the preserve, and the trail itself opened in 1821 when Mexico achieved independence from Spain. It remained the primary overland route to the American Southwest until the advent of the railroads in mid-century. The first wagons moved down the Santa Fe Trail in 1822, and written descriptions of the trail and the land followed quickly (Gregg 1954). The trail was not officially surveyed until 1825, and the surveyors signed a treaty with the Osage at the future site of Council Grove in that year to obtain access through the Osage lands.

Missouri joined the Union in 1821. All lands to the west remained unorganized, but were referred to as “Indian Country” after 1834. Throughout the first half of the nineteenth century, permanent non-Indian settlements were not allowed within this region (King 1996:11), but when Kansas Territory was formally established in May, 1854, the area opened for Euroamerican occupation. The earliest known settlement in the immediate vicinity of the preserve was that of Seth Hays, a trader who established himself at the mouth of Diamond Creek a short distance southwest of the preserve in 1854 (Starkey 1940:49). Chase County was established in 1859 with a population of 549 individuals, and Kansas achieved statehood in 1861. The Atchison, Topeka, and Santa Fe Railroad crossed Chase County in 1871, at which time Cottonwood Station was renamed Strong City.

The earliest records of land transactions in the immediate area of the preserve begin in 1868, while Stephen Jones, the owner of the Spring Hill Ranch, first purchased land in the area in 1878 from individuals and from the AT&SF Railroad and the Missouri, Kansas, and Texas Railway. The Barney Lantry family purchased the Jones holdings in 1888, and there were a series of small farms/landholders in the area of the preserve through the 1880s. Essentially all of the Euroamerican activity in the immediate vicinity of the Spring Hill Ranch has related to either farming or ranching.

Recorded Sites in the Preserve

The Tallgrass archeological overview/assessment includes the results of three weeks of field inventory that were conducted in the preserve in March and April, 1998. The fieldwork was scheduled to take place immediately after the annual spring burning of the pastures in order to take advantage of the optimal ground surface visibility.

The purpose of the fieldwork was twofold. First, the investigations were needed in order to formally record the several prehistoric and historic archeological sites and features that had been reported to or discovered by NPT and NPS personnel in the short time since the preserve was established. This work included confirmation of the find spots of isolated prehistoric and historic artifacts. It also involved verification of a number of small homesteads/farmsteads, the locations of which became known during archival research by the staffs of the preserve and the NPS Midwest Regional Office. Additional post-inventory information on historic sites and features in the preserve was derived from a set of 1:20,000 scale aerial photographs of the area that date to the summer and fall of 1938.

Second, the overview/assessment fieldwork was an opportunity to formally assess the archeological potential of the preserve, none of which had yet been professionally examined.

A small quantity of prehistoric and historic artifactual material was collected from the sites that were identified during the 1998 inventory at Tallgrass, and this material is curated at the Midwest Archeological Center under MWAC Accession Number 741. At the time of the inventory, the preserve had no accession system in place, and there is no preserve accession number assigned to the 1998 collection.

Site Descriptions

Only two prehistoric archeological sites had been formally identified at Tallgrass prior to the start of the 1998 fieldwork. Both had been recorded by Wade Parsons, an avocational archeologist who had been studying the resources of the preserve prior to its formal establishment as a unit of the NPS. In addition to the two sites identified by Parsons, the 1998 fieldwork at Tallgrass Prairie formally recorded an additional ten historic and prehistoric sites within the preserve.

14CS104

This historic site lies atop a prominent high point of land above the east side of Fox Creek and almost due east of the Spring Hill Ranch complex. Various reports to Center staff by NPT and NPS personnel and by Parsons, the site includes a complex of 185 dry-laid limestone cobble cairns (Figure 6) that range from 1.3 to 3.9 m in diameter and from 25 to 65 cm in height. The features extend from the tip of the point above Fox Creek eastward for a distance of approximately 160 m.

The site was formally recorded in 1998, and the cairns were numbered and transit-mapped. Additionally, two of the features, F32 and F139, were selected for evaluative testing, and each was subsequently cross-sectioned by a 1 by 3-m trench that was excavated to bedrock (Figure 7). The two test excavations indicated that the rock features had been built either directly atop the limestone outcrop (F32) or atop a thin layer of black silty clay soil (F139). No artifactual materials were recovered in the screened fill excavated from the two features.

Three or four isolated pieces of grey chert flaking debris were observed across the surface of the point in 1998 which probably indicate the presence of a prehistoric component, perhaps a workshop

related to a nearby quarry site. It is likely that additional lithic debris or tool fragments are present atop the point.

However, while it had been rumored that the cairns represented a complex of burial mounds, the features at 14CS104 are not similar to the low stone burial mounds that have been identified in corresponding physiographic settings elsewhere in the Flint Hills. These latter features are typically 5–15 m in diameter, 30–45 cm high, and are usually constructed of flat stones laid in an overlapping fashion around a central core that contains one or more primary or secondary inhumations, sometimes cremated. These features are usually covered with wind-blown soil and are grassed-over. By contrast, the cairns at 14CS104 are smaller in horizontal dimension, taller in the vertical, and are constructed of rounded limestone cobbles. The testing at two of the features produced no evidence of human remains, burning, etc., that are typically found in burial mounds in Kansas.

Mr. Orville Burtis, former manager of the Davis/Z Bar Ranch, indicated in a telephone interview that he had heard that the features had been constructed when the Benninghoven family owned the land in the early 1900s. The cairns are clearly visible in the 1938 aerial photographs of the preserve area.

Burtis recalled that the Benninghovens were grazing sheep on the point at that time, and rock cairns are common features of sheep camps elsewhere in the American West. Conversely, cairn features have also been identified as American Indian trail markers in Montana, Wyoming, and Colorado. While other cairn sites are known to exist a short distance outside the preserve and elsewhere in the Flint Hills, they typically occur either as isolated features or in very small numbers, not in large complexes as observed at 14CS104. The precise function of the features at 14CS104 remains unknown.

14CS105

This prehistoric site was recorded along the west side of Fox Creek near the southern end of the preserve. Estimated to cover approximately 25 ac, the occupation was indicated by an extensive but sparse scatter of grey chert flakes, retouched flakes, cores, and biface blanks. The scatter lay north and south of an east–west county road and approximately 50–150 m from the present course of Fox Creek.

Ground surface visibility north of the road was poor due to brome grass cover, and very few artifacts could be observed. The site area has been under cultivation for a considerable period of time, and archeological materials and features in the upper 15–30 cm of the site are probably badly scattered. However, several low terrace remnants are still visible in the cultivated field north of the road, and it is likely that additional surface artifacts are present at the site. Isolated deeper features in the area may also still be intact.

No temporally or culturally diagnostic artifacts were recovered at 14CS105 in 1998, and the date(s) of the prehistoric occupations cannot presently be determined. However, 14CS405 is mostly likely a single campsite or a series of repeated short-term occupations. The setting of the site along a secondary stream is typical of Early and Middle Ceramic Period occupations elsewhere in the Flint Hills.

14CS106

This is the site of the Spring Hill Ranch complex on the west flank of Fox Creek. The earliest ranch buildings were constructed in 1881 by Stephen Jones, and include the three-story Second Empire limestone ranch house and a three-story barn (Figures 8, 9). Other site structures dating to this general time period include a poultry house (Figure 10), a privy, and a springhouse/smokehouse (Figure 11), all of limestone. More recent structures include a metal quonset, a smaller frame ranch house, and a metal storage shed. There are corrals adjacent to the barn, and a complex of dry-laid and stone masonry walls stand on the east side of the main ranch house.

The Spring Hill Ranch complex subsequently existed under several other names, and was a working ranch until 1986. The complex was nominated to the National Register of Historic Places in 1971, and is also listed as a National Historic Landmark. The 1998 investigations at the Spring Hill Ranch complex were limited to formal site recording and the establishment of several permanent reference points, which were recorded as part of a large-scale transit map.

14CS107

This small historic homestead/farmstead lies 0.6 mi due north of the Lower Fox Creek School and just inside the eastern boundary of the preserve. The site appears as a complex of limestone footings, at least four depressions, and a generalized artifact scatter that covers as many as three acres on a gentle slope above the west side of Fox Creek. A two-track road that enters the preserve a few meters southeast of the site extends across the east side of the features, and is presently used to access the pastures during cattle operations and the spring pasture burn.

The farmstead has been razed and the building materials robbed for use elsewhere. However, visible features at 14CS107 include badly disturbed limestone footings that probably reflect the foundation of a small house. A few meters to the north lies a rectilinear pattern of limestone footings that suggests a small barn with two or three interior subdivisions or rooms (Figure 12). A short distance southwest of the barn is a large rectangular depression, while two small circular depressions to the southwest are either cisterns or privies. Further to the west up the hillside lie two additional small limestone footing outlines, one of which may be a corn crib. Remnants of a stone-lined walkway extend east from the house structure to what was probably an old section road, and another small stone-lined depression, perhaps an ice house, lies on the east side of the access road a short distance northeast of the house and barn.

Artifacts collected at 14CS107 in 1998 include window and bottle glass, several whiteware fragments, fragments of Portland cement mortar, and a single nondiagnostic grey chert biface. The window glass assemblage from the site consists of 15 fragments recovered from around the presumed house structure and the barn. The glass ranges in thickness from 1.80 to 2.81 mm, with a mean assemblage thickness of 2.29 mm. Recent analysis of window glass from other historic sites in the Great Plains (Schoen 1985:89) suggests that the glass collected from 14CS107 dates to the period 1870–1880.

However, the presence of Portland cement at 14CS107 indicates that construction of some features at the site occurred post-1900 (Wulfkuhle and Schoen 1993:29). This suggests a longer period of site occupation and use, and in fact, a complex of 5–8 structures and/or features is still visible in the 1938 aerial photographs of the site area. The features do not clearly correlate with what is exposed at the site today, but the photos will provide a good reference point for any future work there. A large structure, perhaps a barn, is visible in the photographs immediately south of the Section 30/31 section line, and probably also relates to this site. The barn was not observed during the 1998 fieldwork, and consequently was not initially recorded as part of the site.

The single chipped-stone biface found on the surface at 14CS107 in 1998 does not, in and of itself, document the presence of a prehistoric component. Found in the vicinity of the house, it could have been collected by the residents from another location in the area and then lost on-site. However, subsequent investigations at 14CS107 may produce sufficient additional artifactual material and other evidence to confirm a prehistoric occupation.

14CS108

This large prehistoric quarry and workshop lies along the eastern edge of a prominent hill on the west side of the Fox Creek drainage. The site was initially indicated by a dense scatter of chert cores, flakes, and biface blanks which lay atop a small knoll that was being used as an overlook during NPT-sponsored bus tours of the uplands. Subsequent examination of the east-facing slope of the hill indicates

that the original concentration of lithic material is simply a small part of a much larger quarry/workshop, one that is presently known to cover at least 50–60 ac. However, the actual northern limits of this site have not yet been determined.

Artifactual material at 14CS108 is concentrated along two horizontal limestone outcrops on the hillside which contain exposed nodules of grey chert. The outcrops are separated vertically by only 10–15 m. Artifactual material is dense both above and below the outcrops, and includes abundant waste flakes or debitage, the vast majority of it reflecting primary reduction activity. Other materials at the site include irregularly shaped chert cores, tested nodules, and very occasional chert biface blanks or preforms. There is no clear evidence of quarry excavations at the site, and most of the tested and reduced chert appears to have simply been collected or broken loose at the face of the outcrops.

No temporally or culturally diagnostic artifacts were recovered from 14CS108 in 1998, and it is probable that the site was periodically utilized by prehistoric groups over a considerable time span. It is also unlikely that many finished artifacts are present at the site, as the evidence suggests that the quarry/workshop reflects raw material acquisition and preliminary reduction activities only. These would have been sufficient to identify suitable cherts within the limestone outcrop and reduce the mass and weight of adequate stone materials. However, the remaining reduction activities to produce functional chipped-stone artifacts presumably occurred away from the quarry/workshop at other locations, probably nearby habitation sites.

14CS109

This prehistoric site was indicated by a low-density lithic scatter that lay atop a dissected terrace remnant along the west side of Fox Creek due east of the Spring Hill Ranch complex. Part of the site area was fallow and weed-covered, the remainder in brome grass, and ground surface visibility in the area was not good at the time of the inventory. A two-track access road extends east through the site and north along Fox Creek, and a small amount of artifactual material was observed along the sides of the road, suggesting that additional materials are present. Examination of the west bank of Fox Creek was unproductive, however, and no evidence of a buried cultural stratum was observed in the cutbank.

Surface materials observed at 14CS109 in 1998 include a small quantity of grey chert debitage together with incidentally retouched flakes, but no temporally or culturally diagnostic artifacts were seen. Visible surface materials cover approximately seven acres, however, and it is likely that the site represents a series of short-term occupation sites similar to the one identified further to the south at 14CS105.

14CS110

This small historic homestead/farmstead sits on a rocky bluff above the confluence of Palmer Creek and an unnamed left-bank tributary in the extreme northern end of the preserve. The site is currently fallow and grass-covered, and ground surface visibility is poor. However, site features observed in 1998 include a shallow 3 by 4-m rectangular depression and a complex of intersecting dry-laid limestone rock walls (Figure 13).

Most of these features sit atop a 3-4 m-high limestone outcrop that overlooks Palmer Creek 150 m to the south. However, a possible privy location was identified along a two-track access road that extends east and west along the southern edge of the site at the base of the outcrop. No artifactual material was observed at 14CS110 in 1998, and the nature and age of the occupations there are unknown. However, Orville Burtis has recalled seeing the depression from horseback at the time that he was ranch manager (between 1947 and 1987), and he recalled that the site had been abandoned for a long time at that point. Parenthetically, there are no structures clearly visible in the 1938 aerial photographs of the site area.

Site 14CS110 was estimated to cover approximately 6,000 m², but may prove to be larger when surface visibility is better and other features, artifact scatters, etc., are identified. Several small flattened areas atop the outcrop and a short distance from the depression may ultimately prove to be additional structure locations.

14CS111

This site, known locally as Red House, is a multiple component historic homestead/farmstead lying on either side of a small, unnamed, south-flowing stream in the southwestern corner of the preserve. The site includes several features constructed around a developed spring on the west side of the stream that flows from the base of an east-facing hillside (Figure 14). The features at 14CS111 include a concrete and limestone masonry spring box with an inscribed date of 1952, and an alignment of limestone foundations on the east side of the creek that may represent the former location of a small rectangular barn. The remains of a dry-laid limestone corral wall extend south from the barn. Finally, the site also includes a partially collapsed, dry-laid limestone structure, probably two-room, on the hillside west of the stream and north of the spring box (Figure 15). A long, dry-laid limestone wall extends south down the west edge of a terrace along the east side of the creek.

Artifactual material collected at the site was found almost entirely around the two-room structure, with much of it coming from sheet trash deposits on the hillside immediately above the feature. The artifact collection from the site includes crock fragments and bottle glass, most of which is temporally nondiagnostic. However, 85 pieces of window glass collected at Red House, mostly around the two-room structure, range in thickness from 1.42 to 3.05 mm, and the collection as a whole has a mean thickness of 2.25 mm. Recent analysis of historic Great Plains window glass (Schoen 1985:89) suggests that such a mean thickness is indicative of an 1870–1880 initial occupation. The two-room structure may be visible in the 1938 aerial photographs of the site area, although the barn to the east does not appear to have been standing at that time.

The stone around the barn has been robbed for use elsewhere, and there has been major damage to the two-room structure from cattle accessing the water source. Because it is a rare example of standing architecture outside the Spring Hill Ranch complex, however, Red House is believed to be significant to the interpretation of early farming and ranching activity in the preserve. It is recommended that the remains of the two-room structure be fenced quickly in order to prevent further damage by livestock.

14CS112

This is the site of the Lower Fox Creek School, a one-room limestone schoolhouse that was built in 1882 on a low hill a short distance north of the Spring Hill Ranch complex (Figure 16). The schoolhouse stands within a wire-fenced enclosure that extends south from the structure for a distance of about 65 m. A wooden privy stands just within the northwest corner of the enclosure.

While the schoolhouse is the central component of this site, it is possible that there are additional features within the enclosure that are related to the school and its use. These would presumably include traces of playground equipment, prior privy locations, a trash dump, etc.

The Lower Fox Creek School was nominated to the National Register of Historic Places in 1974.

14CS113

This multiple component historic site is represented by a complex of features lying in a cultivated field on the west side of Fox Creek at the extreme southern edge of the preserve (Figure 17). The site lies immediately north of the present route of U.S. Highway 50 and south of an east–west gravel road.

The features at 14CS113 include a short section of earthen railroad bed that is part of a spur that ran north and south along the base of a terrace at the west edge of the site. The rails for the spur have been pulled, but the berm and a number of ties remain.

The site also includes a T-shaped concrete foundation and at least two low mounds that represent former structure locations. The ground surface around these features is littered with broken bricks, mortar, and occasional roughly dressed limestone blocks that are undoubtedly debris from the demolished buildings.

The spur probably initially relates to the Stephen Jones ranching operation, and would have served to move cattle and supplies to and from a siding at Strong City. The three structures most likely relate to farming or ranching operations subsequent to the Jones era. A concrete feed trough runs the length of the site adjacent to the old railroad bed, indicating that livestock were present at one time in the past history of the site, and the 1938 aerial photographs of the area in fact illustrate a probable feed lot. A short string of railroad cars is visible on the spur next to the feed lot, indicating that the spur was in use at least until that time.

14CS405

This large prehistoric quarry/workshop and habitation site was identified by Parsons in 1997 in the extreme northwestern corner of the preserve. The site was first indicated by a small quantity of flakes and chipped-stone artifacts that were found eroding out from the top of the cutbank along the north side of Palmer Creek just west of its confluence with a small unnamed tributary (Figure 18). Subsequent examination of the site after the 1998 burn indicated that these lithic materials extended west along the stream for a distance of 300 m to the western boundary of the preserve.

Additionally, a great deal more surface artifactual material was found north of the cutbank across a gentle hillside (Figure 19). Flakes, broken cores, rough bifacial implements, and abundant primary reduction debris are scattered along several linear limestone outcrops in this area, and extend 450 m north to the northern boundary of the preserve. The minimal area of the site is 25 ac, but the site undoubtedly extends farther to the north and west outside the preserve.

Site 14CS405 is now believed to reflect a quarry site where exposed chert nodules were recovered from the limestone outcrops. The abundant flaking debris that is scattered over the hillside is characteristic of primary reduction activity. It suggests that the site also had a workshop function similar to that observed at 14CS108, the large quarry/workshop site on the hillside overlooking Fox Creek about 4 km to the south, and at 14CS406, the quarry/workshop site 1.5 km to the south (see below). The variety of finished chipped-stone tools and smaller dimension lithic debris in the lower, or southern, edge of the site along the stream probably indicates the presence of one or more associated habitation sites where finished tools were manufactured and where tool maintenance activities occurred. It is likely that the lower edge of the site also contains subsurface features such as hearths, trash middens, and perhaps even habitation structures.

Based upon the large projectile point recovered at the site by Parsons in 1997, 14CS405 has been tentatively assigned an Early Ceramic Period date of 2000–1000 BP (AD 1–950). It is likely that the site is multiple component, however, and the remains of earlier and later prehistoric occupations are probably also present. The highest potential for datable features and artifacts will be along the lower, southern edge of the site nearest Palmer Creek.

14CS406

This prehistoric quarry/workshop site was recorded by Parsons in 1997 on a north-facing slope just below the crest of the highest point of land in the preserve. The hillside contains a limestone outcrop, and

the slope above and below the exposure is covered with primary chert flaking debris, probably reflecting another quarry/workshop location similar to 14CS108 and 14CS405.

The site was originally estimated to cover approximately four acres, but may eventually prove to be larger. No temporally or culturally diagnostic artifacts were recovered at 14CS406, but the outcrops probably saw repeated short-term use over several millennia. The absence of finished tools suggests that tool blanks were roughed out at the quarry and then carried to another location, perhaps a camp or habitation site, for completion. Site 14CS406 was not reexamined during the 1998 fieldwork at Tallgrass Prairie.

Expected Archeology in the Preserve

As was indicated previously, a January 1998 search of the Kansas State Historical Society archeological site files produced records of 235 known prehistoric and historic sites in Morris and Chase Counties combined, suggesting that a substantial number of archeological sites will ultimately be recorded in the area of the preserve. The 1998 field investigations at Tallgrass addressed the small number of known but mostly unrecorded sites, and probably covered a total of no more than 150 ac, or less than two percent of the total preserve. It is therefore necessary to project from the small amount of preserve data and the larger body of Flint Hills archeological information to predict the types of cultural resources that may be expected to occur elsewhere at Tallgrass.

Physiographic Considerations

Like the biota of the tallgrass prairie ecosystem, the distribution of basic natural resources across the Flint Hills and the preserve is a mosaic, and is therefore uneven. It is expected that the evidence of prehistoric and historic human occupation and use of the region will be similarly concentrated in certain locales and largely invisible in others.

Water. Water resources in the Flint Hills include permanent streams such as the Cottonwood River, permanent tributary streams such as Fox and Palmer Creeks, intermittent streams, and permanent or intermittent springs. Most of the water resources are concentrated at the bottoms of the valleys, and it is in these locations that the majority of the prehistoric habitation sites should be expected.

Additional resources such as firewood, and human comfort conditions such as shelter from winds, etc., are also typically present or available in the valley bottoms, and these factors, too, suggest that the habitation sites in the preserve will primarily occur on the valley floors.

Springs in the Flint Hills usually occur away from the valley bottoms and are frequently found midway up the sides of the hills themselves. These features occur either as simple seeps or as occasional flowing springs, and are not necessarily found in sheltered locations. However, springside locales support a more diverse array of plant resources than most other locations within the region, and there is good potential for short-term warm-season habitation sites to be present in their vicinities.

Valley Bottoms and Stream Terraces. The larger Flint Hills streams presently contain stands of deciduous trees and brush which would have provided critical resources such as firewood and building materials, etc. These same locations often have developed terrace systems with first and occasional second terraces, and terrace remnants are visible along Fox Creek within the preserve, and along portions of Palmer Creek. Any rudimentary prehistoric horticulture would have occurred immediately adjacent to the streams, but most likely in the lower reaches of Fox Creek near the south boundary of the preserve.

Prehistoric habitation or campsites are found on stream terraces throughout much of eastern Kansas, and streamside occupations should likewise be expected to occur on terrace remnants in Tallgrass. Such

habitation sites would typically be indicated by a relatively diverse array of artifact types, including chipped- and ground-stone tools, evidence of both tool manufacture and maintenance, features such as hearths and trash middens, and perhaps the remains of the actual habitation structures themselves. The latter might be indicated by scatters of charcoal, patterns of postmolds, and perhaps by fragments of daub or burned clay.

Game resources in the valley bottoms would have included those species which typically require such cover, including deer, elk, and turkey. Waterfowl would have been present along quiet or ponded reaches of the streams. Bison would probably have moved between the uplands and the stream valleys.

While human activity undoubtedly included the narrow floodplains of these streams, most evidence of human use of the floodplains will have either been eroded away or buried under subsequent deposition.

Ridgetops and Upland Areas. The natural resources and physiographic characteristics of the uplands in the Flint Hills do not overlap a great deal with those of the valley bottoms. Upland resources would have included a specific array of game, the primary locations where lithic raw materials occur, optimal routes for long distance human movement across the landscape, and a number of other selected features that are not typically found in the valley bottoms.

Upland game resources would have included fowl such as prairie chicken together with antelope, and it is possible that some of the upland areas in the region contain rock alignments or cairns related to game drive systems such as those found elsewhere in western North America. Likewise, the abundant chert resources that were so heavily exploited in the Flint Hills usually occur high on the hillsides or in the resistant limestone caps that ring the upper edges of the hills.

The 1857 Government Land Office map of the area identifies a road that may have extended south into the preserve, crossing from the east flank of the Fox Creek valley north of Tallgrass to the west flank, then apparently down the high ground that is the divide between Fox and Diamond Creeks. The road is not identified as to ownership or use, and may in fact have simply been a trail, perhaps a second Kaw Trail. Elsewhere in dissected areas of the Great Plains there is ethnographic reference to American Indian selection of trail routes that followed upland areas whenever possible, reducing the effort required to descend and climb out of deep stream valleys (Kuehn 1990).

Site and Feature Types

Given what has been identified and investigated elsewhere in the Flint Hills, the following prehistoric archeological site types may be expected to occur within the preserve.

Quarries/Workshops. Quarry and workshop sites will largely be coterminous with limestone exposures that contain suitable interbedded nodules of Florence chert. Most of the quarry sites will not show evidence of excavated quarry pits, but will be found on relatively steep hillsides, where the chert nodules naturally eroded and could be collected from the limestone outcrops with little effort. Workshop areas will frequently be found in the immediate vicinity of the quarries, either on adjacent hilltops or on benches below the exposures. Both the workshops and the quarries will contain abundant primary lithic reduction debris and rough chipped-stone blanks or preforms, but few finished artifacts. These sites are likely to have been used repeatedly throughout the prehistoric era. However, due to their lack of temporally diagnostic associated artifacts, the quarries and workshops identified in the preserve will be quite difficult to date.

Other Task-Specific Sites. These types of archeological sites will reflect short-term episodes of use related to specific activities, and will include kill sites, where game was taken or hunted, and gathering sites, where specific plant resources were obtained and perhaps processed. The locations of task-specific sites will be difficult to predict, and the sites themselves will usually be quite difficult to identify, for they

frequently contain only very small quantities of preserved artifactual material. When identified, however, they will help to more fully document the total range of human activity in any given area.

Habitations/Campsites. These site types will occur both as single components, reflecting one-time occupations, or as multiple components, reflecting locations that were periodically reoccupied, perhaps over the course of several thousand years. Habitations or campsites are usually characterized by a wider range of artifact types, midden or trash deposits, and features that together reflect a more substantial range of human activities. Large- and small-dimension lithic debitage, complete and fragmentary finished chipped-stone artifacts, and general trash including animal bone, broken ceramics, and charcoal are all to be expected. Hearth features, burned-rock complexes, and postmold patterns indicating house structure remains may also be present at habitations or campsites. Some of the finished artifacts, particularly projectile points, and charcoal from structures and hearth features will enable some of these occupations to be placed in time.

The multiple component habitation sites will be found in areas where critical resources such as water were predictably available, the critical resources essentially prompting the repeated occupation of the same locale. Habitation sites may thus be expected in streamside locales such as the valley bottoms of the Fox and Palmer Creek drainages, but may also occur in the vicinity of springs or in proximity to other resources such as limestone/chert exposures.

Repeated occupations at multiple component habitation sites will be reflected in increased quantities of living debris. The repeated occupations may be directly superimposed atop one another, or they may be indicated by horizontal stratigraphy of features and artifacts that may only minimally overlap. The real potential for deeply buried habitation site components at Tallgrass, such as those at the William Young Site in the Council Grove Reservoir, probably lies only in the extreme southeastern corner of the preserve along the lower reach of Fox Creek. There is also low potential for the preserve to contain large villages such as the Great Bend Aspect sites recorded at Marion to the west of the preserve. However, there is good potential for the types of small, extended Early Ceramic Greenwood Phase and Middle Ceramic Pomona Variant communities such as those found along the eastern edge of the Flint Hills.

Tipi Rings. This particular type of short-term campsite may eventually be identified in upland areas of the preserve along routes that would facilitate easy travel. Tipi rings may be found in the vicinity of rock cairns or along known trail routes, and will appear as rough circles of cobble stone that have been partially covered by prairie sod, the stone having served to anchor the sides of a lightweight hide structure. As they usually document brief episodes of occupation by small groups in transit to other areas, tipi rings typically contain few artifactual materials, and may thus be difficult to place in time.

Rock Alignments. These features are known to occur on hilltops and upland areas across the Great Plains. They often reflect the remains of game drive systems in which herds of bison, etc., were stampeded over a cliff or up a draw. However, they may also reflect other activities, perhaps even religious expression, and may take the form of figure outlines such as the Penokee Stone Indian in Graham County, Kansas (Witty 1978b). An unconfirmed medicine wheel, a spoked stone circle, has been reported from high ground in the Diamond Creek watershed west of the preserve.

Cairns. These dry-laid rock features are known to occur in adjacent areas of the Flint Hills (Wedel 1959), and typically appear as isolated rock piles but occasionally are found in small numbers, such as in pairs. In other areas of the Great Plains, cairns are found along known American Indian trail routes, and may have served as trail markers. While they may contain small quantities of cultural material, rock cairns are usually undatable due to a lack of temporally diagnostic artifacts.

Burial Mounds. Two probable prehistoric burial mound sites have been recorded in Morris County to the north of the preserve, and it is conceivable that similar features are present in the more remote areas of Tallgrass. Burial mounds will usually appear as low, grass-covered rises that are only slightly visible

on hilltops or valley overlooks. While they may measure 5–15 m in diameter, they may have a height of only 30–45 cm above the surrounding land.

Burial mounds in the Flint Hills are usually constructed of dry-laid, locally obtained flat stones. The stones themselves are usually overlapped shingle fashion around a small central chamber or space that contains either extended inhumations or fragmentary human bone reflecting secondary burial of decomposed remains. Burial mounds in the Flint Hills may include evidence of fire or cremation, and may also contain relatively small quantities of diagnostic artifactual material. The central dimple visible on many burial mounds in Kansas is simply an indicator that they have been previously disturbed. Given the high degree of local interest in archeology, it is quite likely that any prehistoric burial mounds in the preserve have been similarly compromised.

Historic Sites and Features. It is likely that the preserve lands will ultimately be found to contain a small number of historic farmsteads/homesteads and a larger number of seemingly isolated farm- or ranch-related features. Typified by the historic remains identified at 14CS107, 14CS110, 14CS111 (the Red House ruin), and 14CS113, most of these sites will have an initial occupation date in the mid- to late nineteenth century, though certain of them may have continued to be used well into the twentieth century.

The homesteads/farmsteads will contain the remains of habitation structures, together with out-buildings such as barns or corn cribs, root cellars, and privies. Corrals and other livestock-related features may be present in proximity to the structures. A variety of underground features such as water wells, cisterns, drains, or water supply lines may also be present, but may have only minimal surface visibility. Other isolated features found across the preserve will relate to farming or ranching activities or oil and gas exploration, and may include spring boxes, corrals or extended fence lines, roads, quarries, etc.

Use of plat maps and records will help to date some of these sites and identify some of their probable occupants, although archeological test excavations may be needed to determine the nature, extent, and condition of subsurface features. Several recent historic farming community (Hickey 1995) and homestead studies (Wulfkuhle 1991; Schoen 1992, 1994a, 1994b; Wulfkuhle and Schoen 1993) have clearly demonstrated that these sites have considerable research potential.

Additionally, public interest in these resources is often quite strong, and several of the historic sites already known to exist in Tallgrass, such as 14CS107, which is so readily accessible, easily lend themselves to public visitation and on-site interpretation. Such sites have also been found to represent an excellent K–12 educational source for the study of frontier communities, lifeways and family life, agriculture, etc. (Willits 1997).

Site Density

It is difficult to accurately estimate the density of archeological sites at Tallgrass in the absence of any systematic inventory efforts in the preserve. However, a general prediction may be made based upon the numbers and types of sites identified thus far in Chase and adjoining Morris Counties.

Prehistoric habitation site density is likely to be the greatest along Fox and Palmer Creeks in the eastern and northern portions of the preserve. Water and timber resources will certainly have been the greatest/most reliable in these areas throughout prehistory, and gathered plant diversity will likewise have been routinely higher along the streams than in the drier uplands. For those Early and Middle Ceramic Period groups practicing rudimentary horticulture, arable land would have been confined to the valley bottoms. The lowland sites will probably be reflected archeologically by the remains of small, scattered hamlets rather than large villages.

The density of upland sites in the preserve will probably be less than that of the streamside sites, but the physical dimensions of some of the upland sites, particularly the quarries or workshops, will be

greater. The latter will often cover tens of acres wherever suitable chert materials have been exposed, and because such sites reflect repeated episodes of use, their spatial dimensions will be large.

Other upland sites and features, including tipi rings, cairns, burial mounds, and stone alignments, will be infrequent.

Historic Euroamerican sites and features will be found in essentially all areas of the preserve. Dry-laid stone fence lines will cross uplands and lowlands. Water control devices, including spring boxes, small dams, etc., will be found at or near the water sources, mostly on upland slopes. A number of homesteads/farmsteads are known to exist on preserve lands, and these sites will contain a variety of structures including farmhouses, root cellars, small barns or livestock sheds, and corn cribs, together with privies, cisterns, corrals, associated trash deposits, sidewalks, and even remnant historic ornamental plantings. Many of the old two-track roads are still visible on preserve lands, but additional roads, stream crossings, etc., may be found almost anywhere at Tallgrass.

Site Ages

It is likely that artifacts diagnostic of all of the major prehistoric time periods will eventually be identified within the preserve, since information from adjacent areas suggests that the Flint Hills have seen intermittent occupation for ten millennia. However, the streamside locales in the preserve are not likely to contain evidence of the complete archeological record.

The Paleoindian occupation of the area of the preserve, from circa 12,000 to around 8000 years BP, will most likely be indistinct. This is in part due to the small numbers of humans utilizing the area at that time, and in part due to the probable loss of certain Paleoindian deposits to natural factors such as erosion. Isolated Paleoindian artifacts are still likely to be found at Tallgrass, however.

It is also possible that evidence of Archaic Period occupations, particularly those dating to the Middle Archaic, may be underrepresented if the Flint Hills were in fact abandoned for any extended time during the arid Altithermal. Of greater concern, however, Early and Middle Archaic-age soil deposits in many locations in Kansas appear to have been eroded out of smaller stream valleys during the arid Altithermal, and the Palmer and Fox Creek drainages may only contain alluvial and archeological deposits that postdate 5000–4000 BP. Mandel (1995) has shown that Early and Middle Archaic-age archeological materials in Kansas are most likely to be found only in the alluvial fans that formed at the mouths of such streams. In the preserve, this kind of feature would be found only in the Chase–Osage soils at the extreme south end of the preserve, just above the confluence of Fox Creek and the Cottonwood River.

Post-Archaic occupations dating to the Early and Middle Ceramic Period are likely to be well represented in the preserve, as it is likely that both time periods saw increased population numbers. General post-Archaic climatic stability has probably also contributed to reduced erosion of Early and Middle Ceramic Period deposits. However, nowhere in the preserve is the complete erosional/depositional sequence likely to be present (see Mandel 1993:74). Possible post-AD 1350 aridity may have prompted a final episode of erosion of Late Ceramic deposits.

Any Protohistoric or Historic American Indian resources identified in the preserve will date in the three centuries between AD 1541, when the first written descriptions of Plains Indian life were made, and 1854, when the last indigenous tribe, the Kansa, was removed to Oklahoma. Historic Euroamerican sites, the earliest being the small homesteads/farmsteads that preceded the large ranching operations of Stephen Jones, Barney Lantry, and the Davis Ranch, will primarily date from AD 1854 to 1900. Isolated features such as spring boxes, corrals, fences, roads, etc., may date to almost any time period after 1854.

Threats to Archeological Resources

The Congressional intent behind the establishment of Tallgrass Prairie National Preserve was primarily one of preservation and interpretation of the tallgrass prairie ecosystem and the ranching industry that has flourished there. Given the anticipated low level of development at Tallgrass that is indicated in the Preferred Management Alternative to the preserve's General Management Plan, the presently perceived threats to the archeological resources of Tallgrass are not numerous. While several are potentially serious enough to warrant discussion, essentially all of the concerns may be at least partially resolved with better preserve-wide archeological inventory data that may be employed to avoid and thereby protect cultural resources.

Grazing

Bison herds undoubtedly moved across the Flint Hills region throughout much of the post-Pleistocene, and the preferred alternative to the Tallgrass Prairie General Management Plan includes the reintroduction of bison to the preserve. Additionally, the majority of the preserve is presently grazed under an extended lease, by which cattle are moved onto the rangeland in the spring, and are taken off again in the late summer. The effects of grazing and movement of herd animals, be they bison or cattle, represent a potential threat to cultural resources at Tallgrass, for these animals will periodically congregate at water sources, moving along stream banks and around stock ponds and spring boxes.

Some of these areas have been physically disturbed by herd animals for a considerable length of time, and the repeated concentration of activity along streams and around spring boxes has created erosional problems that have accelerated the loss of cultural resource information. Cattle activity around the water source at the historic Red House, 14CS111, for instance, has undoubtedly accelerated the erosion of historic trash deposits around the small standing stone structure. Cattle rubbing on the standing walls themselves have further degraded the structure itself, actually polishing the limestone on one corner of the structure.

Streambank erosion continues in the area of 14CS405, the prehistoric quarry, workshop, and habitation site on the north side of Palmer Creek in the northwest corner of the preserve. Movement of cattle up and down the bank between the pasture to the north and the stream to the south will continue to degrade a narrow strip of land that probably contains hearths, midden deposits, and perhaps even habitation structures. Similar erosion is occurring along the west side of Fox Creek a short distance southeast of the Spring Hill Ranch complex in an area where isolated prehistoric artifacts have been found. This location is in the immediate vicinity of a low-water crossing, and periodically receives heavy animal traffic when cattle are moved onto the range and uplands east of the stream.

Fires

It is likely that the Flint Hills were periodically swept by wildfires throughout the past millennia. Many of these fires would have had natural origins, while others were undoubtedly set by American Indian populations. Under the terms of the grazing lease, the pastures in the preserve are burned in the spring (Figure 2), a ranching practice that is used to kill weeds and stimulate spring grass growth.

A considerable amount of recent research (Sayler et al. 1989; Eininger 1990; Connor and Cannon 1991) has addressed the effects of fires, both forest and prairie, upon prehistoric and historic archeological resources. Two recent studies (Picha and Ahler 1989a:30–31; Picha and Ahler 1989b; Lent et al. 1992:98, 119) concluded that fast-moving fires with flame heights of under 10 ft and which

produce light ground char (typical of the grassland fires at Tallgrass) have low potential to impact surface artifactual materials depending upon their physical and chemical characteristics. While fragile surface artifacts of shell and bone will be consumed even in a fast-moving fire, grass fires have reduced potential to impact subsurface artifacts of any kind unless those materials lie in unstable settings that are being actively exposed by erosion.

However, because the preserve has not undergone a comprehensive archeological inventory, it is unknown whether there are any surface or above-ground historic remains outside the main ranch complex that could be impacted by range fires (Ayres 1989). Such remains would include wooden elements in any standing structures such as the two-room structure at Red House, or wooden corrals, etc.

Roads, Trails, Overlooks, and Visitor Use

It is anticipated that some of the preserve outside the Spring Hill Ranch complex will eventually be opened up for visitor use. The nature of the public access has not been determined at this point, but may include both day use and hiking, as well as backcountry camping in more remote areas. Visitor activity outside the ranch complex will be carefully controlled in order to adhere to the enabling legislation and preserve the natural landscape. However, it will also be essential to consider the various effects of this more intensive human use upon cultural resources. Prior intensive archeological inventory will be needed in order that the resources may be avoided, and measures may need to be implemented to protect against the illicit collection of artifacts.

While there is a network of two-track roads across the preserve, there is currently little vehicular activity at Tallgrass outside the area of the Spring Hill Ranch complex, and little is anticipated in the future. Cattle herds are largely managed by horseback, and the annual rangeland burns are accomplished by small all-terrain vehicles.

However, the preserve currently conducts periodic guided tours to an overlook in the uplands west of the ranch complex, during which time visitors are transported in vans or small buses. It is possible that continued use of these roads may impact unrecorded archeological resources, particularly those on side slopes where natural erosion is hastened by vehicle traffic. Additionally, even controlled visitor access in 1997 to the overlook drew attention to 14CS108, the major prehistoric quarry/workshop site, and resulted in the loss of artifactual materials exposed on the ground surface. It will be important to evaluate the nature of archeological resources at these and other locations, and to seek solutions that resolve the impact of preserve visitors upon the sites in question.

Gas Leases

A number of abandoned gas wells exist within the preserve. While none of the wells are active, continued use of the existing access roads by vehicles or heavy equipment to maintain or remove the wellheads or lines will accelerate erosion, particularly on unstable hillsides. It is possible that unrecorded cultural resources exist in these same areas, and that vehicle activity or excavation will hasten their loss.

Farming Practices

The preserve may eventually undertake to plant row crops in certain areas in order to recreate the cultural landscape as it existed during the Jones and Lantry ranching eras. Most of this activity will probably occur along Fox Creek, where several prehistoric and historic sites are already known to exist.

The significance and subsurface extent of these sites should be determined prior to any replanting, and the impact of the activity upon the cultural resources should be assessed.

Flood and Erosion Control

It is also possible that erosion and flood control measures such as channelization or levees may eventually be undertaken along the lower reach of Fox Creek in the southeast corner of Tallgrass. This area has the potential to contain deeply buried Archaic-age archeological deposits similar to those identified in the Council Grove and Tuttle Creek Reservoirs to the north and in the El Dorado Reservoir to the south. Any large-scale earthmoving activity that occurs as part of a flood or erosion control project will clearly have a substantial impact upon any such resources that are present.

Historic Trash Dumps

A historic trash dump along Fox Creek east of the Spring Hill Ranch complex appears to contain building debris reflecting the architectural history of the ranch, perhaps the Jones and Lantry occupations themselves. There are important health and aesthetic reasons to quickly clean up and remove the trash. However, trash dumps in other units of the National Park Service, including those of Yellowstone National Park, have been found to contain invaluable information about the early history of those locales and, in the case of Yellowstone, operation of that park.

The deepest deposits in the trash dump at Tallgrass are likely to contain valuable information relating to the early architectural history of the ranch, and perhaps to the interpretation of the families that lived there. These deposits should not be removed without appropriate prior documentation.

Facility Development

Some of the most pressing problems that currently face National Park Trust and National Park Service personnel at Tallgrass involve management of the large numbers of visitors. Most of the present visitor attention is directed at the historic structures in the Spring Hill Ranch complex, and there are numerous concerns relating to the balance between visitor use, visitor safety, and cumulative impact upon the historic structures and cultural landscape themselves. Obtaining a reliable source of potable water is a major problem. Controlling vehicular and pedestrian traffic at the ranch and at the nearby Lower Fox Creek School is another issue.

All of these concerns will be eventually resolved, but it is likely that some of the solutions will require substantial ground disturbance in locations that may contain unrecorded subsurface features or sites. At this point in the early history of the preserve, there is only minimal historic documentation of the ranch complex. Undergrounding of power and water lines, construction of parking lots, etc., will require detailed coordination to ensure that unrecorded cultural features in the area may be identified and evaluated ahead of construction.

Management Recommendations

Except for the small number of recorded historic and prehistoric sites that are described in this report, the cultural resources of Tallgrass Prairie National Preserve are still largely unknown. Very little is presently understood about the archeological resources that actually exist in the preserve. But there is every reason to believe that the sites and features at Tallgrass contain a wealth of archeological information relating to twelve thousand years of American Indian presence in the Flint Hills and more than a century of Euroamerican settlement and farming and ranching history (Kansas State Historical Society 1984; Lees 1989).

The recommendations for management of the Tallgrass Prairie archeological resources are relatively simple at this early point: proceed carefully, learn as much as possible as soon as possible, and protect what is already known in the meantime.

Cultural Sites Inventory

The Tallgrass Prairie Cultural Sites Inventory will be initiated in the near future. This document will provide a detailed reference for relevant archeological literature for the area, together with a chronology and initial documentation of the archeological investigations that have actually been conducted in the preserve. The Cultural Sites Inventory will list the formally recorded sites in Tallgrass, and will identify on USGS base maps both their locations and the physical limits of the various individual archeological inventories that have taken place. This reference will provide NPT and NPS staff with a ready source of information whenever archeological questions arise regarding isolated artifact finds, the extent of prior survey coverage, etc. The Tallgrass Cultural Sites Inventory will be constructed, maintained, and periodically updated by Midwest Archeological Center staff, and copies will be made available for use by preserve personnel. Utilizing the Cultural Sites Inventory, Center personnel will also develop an archeological layer for the preserve's Geographical Information System database.

Tallgrass staff should become familiar with the Cultural Sites Inventory and integrate it into their cultural resource compliance process. They should routinely consult it as a basic component of the Section 106 process prior to any undertaking that is not a programmatic exclusion as specified in the 1995 Servicewide Programmatic Agreement with the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers (National Park Service 1997). Preserve staff should also understand that the archeological site location information contained in the Cultural Sites Inventory is not for public distribution, and has been exempted from the Freedom of Information Act.

Preserve-Wide Archeological Inventory

It will continue to be difficult for NPT and NPS personnel to make informed management decisions about the archeological resources of the preserve in the absence of accurate inventory information. A systematic, preserve-wide archeological inventory of large blocks of land would provide detailed baseline data regarding the range and types of sites that are actually present at Tallgrass. These data would include specific site locations, the prehistoric and historic cultures and activities that are represented, and the ages of the occupations, and would cumulatively document the relative numbers of each type of site.

These kinds of information are essential to the determination of individual site significance at Tallgrass. Knowledge of site significance is, in turn, critical to informed management decisions when even small-scale construction and/or development activities must be undertaken to provide visitor

services in locations like the Spring Hill Ranch complex. Every effort should continue to be made to seek preserve-wide archeological inventory funds.

Inventory Current Development and Use Areas

The present focus of most visitor activity at Tallgrass is in the area of the Spring Hill Ranch complex. As plans are made to provide and enhance basic visitor services and manage visitor traffic and use of this facility, it is important that archeological investigations precede any ground disturbance. It is very likely that a number of former structures and features at the Spring Hill Ranch no longer have surface expression. However, the physical extent of these remains may sometimes be estimated from archival information, and then substantiated via archeological test excavations. These small-scale episodes of research will begin to provide the basic information needed to both understand and protect the subsurface record of prehistoric and historic activity in the area. As was indicated previously in the discussion of historic site types in the preserve, the ready accessibility of such sites and features would give them considerable interpretive value for visitors to Tallgrass.

Outside the main Spring Hill Ranch complex, the routine use of access roads, trails, stock tanks, corrals, etc., by NPS and NPT personnel and by the lessee has the potential to impact unrecorded historic and prehistoric resources in the preserve. In the intervening time before a preserve-wide inventory is undertaken, systematic archeological inventory of road corridors and use areas should be conducted to identify any archeological values in those areas, in order that a concerted effort may be made to preserve those resources that are significant and interpret those that are particularly relevant to the Tallgrass themes.

Both the Spring Hill Ranch and the Lower Fox Creek School are listed on the National Register of Historic Places. Almost any ground disturbance activity at these locations and elsewhere within the preserve will technically constitute an undertaking, and should routinely engage the Section 106 compliance process in order to seek concurrence from the Kansas State Historic Preservation Officer.

Inform the Public and Protect the Resource

Visitors to Tallgrass Prairie National Preserve will inevitably ask both general and specific questions regarding the archeology and American Indian history of the area. Many of the visitors from the immediate area of the preserve are interested in archeology. Many local residents have personal artifact collections, and they may wish to communicate information regarding sites in the preserve and elsewhere in the Flint Hills.

When questioned by visitors, it is best that NPT and NPS personnel communicate the importance of the archeological resources at Tallgrass by speaking generally to the prehistory of the larger Flint Hills region. Some of the visitors' questions may be answered through judicious use of this overview. Nevertheless, it is important that such discussions take place without embellishment of the basic data, and without providing preserve-specific information regarding known site locations.

It may not be completely possible to avoid discussion of sensitive topics such as American Indian burials, sacred areas, etc. However, no known archeological or culturally sensitive site locations should be provided to visitors without prior consultation with Service cultural anthropologists or archeologists.

References Cited

Adair, Mary J. (editor)

1981 *Prehistory and History of the El Dorado Lake Area, Kansas (Phase II)*. Project Report Series No.47. University of Kansas Museum of Anthropology, Lawrence.

Adair, Mary J., and Marie E. Brown

1981 The Two Deer Site (14BU55): A Plains Woodland–Plains Village Transition. In *Prehistory and History of the El Dorado Lake Area, Kansas (Phase II)*, edited by Mary J. Adair, pp. 237–356. Project Report Series No. 47. University of Kansas Museum of Anthropology, Lawrence.

Antevs, Ernst

1955 Geologic-Climatic Dating in the West. *American Antiquity* 20(4):317–355.

Arbogast, Alan F., and William C. Johnson

1994 Climatic Implications of the Late Quaternary Alluvial Record of a Small Drainage Basin in the Central Great Plains. *Quaternary Research* 41:298–305.

Artz, Joe A.

1974 *The Soils and Geomorphology of the East Branch Walnut Valley: Contexts of Human Adaptation in the Kansas Flint Hills*. Master's Thesis, Department of Anthropology, University of Kansas, Lawrence.

Ashworth, Kenneth A.

1980 Phase I Project Review of Diamond Creek Watershed, Morris and Chase Counties, Kansas. Kansas State Historical Society, Topeka.

1981 Phase II Archeological Survey of Middle Creek Watershed, Chase, Morris, and Marion Counties, Kansas. Kansas State Historical Society, Topeka.

1982 Phase III Archeological Investigations Within the Middle Creek Watershed. Kansas State Historical Society, Topeka.

Ayres, James E.

1989 Post-Fire Assessment of Historic Sites, Yellowstone National Park, 1988. Compiled and edited by the National Park Service, Rocky Mountain Region, Denver, Colorado.

Barry, Louise (compiler)

1972 *The Beginning of the West: Annals of the Kansas Gateway to the American West*. Kansas State Historical Society. Topeka.

Bastian, Tyler

1979 *Archaeological Investigations in the El Dorado Lake Area, Kansas*. University of Kansas Museum of Anthropology, Lawrence.

Blakeslee, Donald J.

1994 Reassessment of Some Radiocarbon Dates from the Central Plains. *Plains Anthropologist* 39:203–210.

- Blasing, Robert
1985 Archeological Survey of the Upper Deep Creek Drainage, Kansas. Department of Anthropology, Wichita State University, Wichita.
- Bozell, John R., and James V. Winfrey
1994 Review of Middle Woodland Archaeology in Nebraska. *Plains Anthropologist* 39(148): 125–144.
- Bradley, Lawrence E.
1968 Archaeological Investigations in the Melvern Reservoir, Osage County, Kansas 1967. University of Kansas Museum of Anthropology, Lawrence.

1973 Subsistence Strategy at a Late Archaic Site in South Central Kansas. Master's Thesis, Department of Anthropology, University of Kansas, Lawrence.
- Bradley, Lawrence E., and Shonna Nepveu
1995 A 1993 Cultural Resources Inventory at Pomona Lake in Osage County, Kansas. U.S. Army Corps of Engineers, Kansas City District, Kansas City, Missouri.
- Brockington, Paul E., Jr.
1982 *Archaeological Investigations at El Dorado Lake, Butler County, Kansas (Phase III)*. Project Report Series No. 51. University of Kansas Museum of Anthropology, Lawrence.
- Brower, J.V.
1898 Quivira. Mem. Explorations in the Basin of the Mississippi, Vol. 1. St. Paul, Minnesota.

1899 Harahey. Mem. Explorations in the Basin of the Mississippi, Vol. 2. St. Paul, Minnesota.
- Brown, Kenneth L.
1984 *Pomona: A Plains Village Variant in Eastern Kansas and Western Missouri*. Ph.D. dissertation, Department of Anthropology, University of Kansas, Lawrence.
- Brown, Kenneth L., and Alan H. Simmons
1987 *Kansas Prehistoric Archaeological Preservation Plan*. Office of Archaeological Research, Museum of Anthropology, and Center for Public Affairs, University of Kansas, Lawrence.
- Buchanan, Rex (editor)
1984 *Kansas Geology*. University of Kansas Press, Lawrence.
- Calabrese, F.A.
1967a *The Archeology of the Upper Verdigris Watershed*. Anthropological Series No. 3. Kansas State Historical Society, Topeka.

1967b Archeological Survey of the Upper Black Vermillion Watershed, Marshall, Nemaha, and Pottawatomie Counties, Kansas. *Kansas Anthropological Association Newsletter* 12(7).
- Chapman, Carl H.
1974 Background Material on the Oto and Missouri Indians as of 1953. In *American Indian Ethnohistory*, edited by David A. Horr, pp. 1–30. Garland Publishing, Inc., New York.

1975 *The Archaeology of Missouri, I*. University of Missouri Press, Columbia.

- Choteau, Auguste
1940 Notes on the Boundaries of Various Indian Nations. *Glimpses of the Past* 7(9–12):119–140. Missouri Historical Society
- Connelly, William E.
1928 *History of Kansas State and People*. 5 volumes. The American Historical Society, Inc., Chicago.
- Connor, Melissa A., and Kenneth P. Cannon
1991 Forest Fires as a Site Formation Process in the Rocky Mountains of Northwestern Wyoming. *Archaeology in Montana* 32(2):1–14.
- Coopridger, Kevin
1979 Archeological Inventory of the Training Areas, Fort Riley Military Reservation, Parts I and II. Kansas State Historical Society, Topeka.
- Cummings, Robert B., Jr.
1958 *Archeological Investigations at the Tuttle Creek Dam, Kansas*. Bulletin 169, River Basin Surveys Paper No. 10. Bureau of American Ethnology, Washington.
- Deevey, Edward S., and Richard F. Flint
1957 Postglacial Hypsithermal Interval. *Science* 125:182–184.
- Dodds, W.K., D.C. Hartnett, A. Joern, K. Kindscher, J. Stubbendieck, and J.S. Zimmerman
1998 Opportunities to Enhance and Maintain the Tallgrass Prairie Ecosystem Within the Boundaries of Tallgrass Prairie National Preserve. U.S.D.I., National Park Service, Omaha, Nebraska.
- Drass, Richard R.
1998 The Southern Plains Villagers. In *Archaeology on the Great Plains*, edited by W. Raymond Wood, pp. 415–455. University of Kansas Press, Lawrence.
- Einiger, Susan F.
1990 Long Mesa Fire 1989, Archeological Survey and Post-Fire Assessment. Manuscript on file, Mesa Verde National Park, Cortez, Colorado.
- Eyman, C.E.
1966 *The Schultz Focus: A Plains Middle Woodland Burial Complex in Eastern Kansas*. Master's Thesis, Department of Archaeology, University of Alberta.
- Flint, Richard F., and Edward S. Deevey
1962 Editorial Comment. *Radiocarbon* 4:i–ii.
- Foley, William E., and C. David Rice
1983 *The First Choteaus*. University of Illinois Press, Urbana and Chicago.
- Fulmer, D.W.
1976 Archaeological Excavations within the El Dorado Reservoir Area, Kansas. University of Kansas Museum of Anthropology, Lawrence.

- Grange, Roger T., Jr.
1979 An Archeological View of Pawnee Origins. *Nebraska History* 60(2)134–160.
- Gregg, Josiah
1954 *The Commerce of the Prairies*. Edited by Max Moorehead. University of Oklahoma Press, Norman.
- Grosser, Roger
1973 Tentative Cultural Sequence for the Snyder Site, Kansas. *Plains Anthropologist* 18(61): 228–238.

1977 *Late Archaic Subsistence Patterns from the Central Great Plains: A Systemic Model*. Ph.D. dissertation, Department of Anthropology, University of Kansas, Lawrence.
- Haury, Cherie
1974 *Availability, Procurement, and Use of Chert Resources by Late Archaic Populations in the Southern Flint Hills of Kansas*. Master's Thesis, Department of Anthropology, University of Kansas, Lawrence.
- Hawkins, C.W., and George W. Starkey
1940 Old Trails Across Chase County. In *Chase County Historical Sketches, Vol. I*. Chase County Historical Society, Cottonwood Falls, Kansas.
- Hawley, Marlin
1993 *Cultural Resource Investigations for the U.S. Highway 166 Corridor: Results of Phase II Archeological Survey and Geomorphological Study in Cowley and Chautauqua Counties, Kansas*. Contract Archeology Publications No. 11. Kansas State Historical Society, Topeka.
- Henning, Dale R.
1998 The Oneota Tradition. In *Archaeology on the Great Plains*, edited by W. Raymond Wood, pp. 345–414. University of Kansas Press, Lawrence.
- Hickey, Joseph V.
1995 *Ghost Settlement on the Prairie: A Biography of Thurman, Kansas (Rural America)*. University of Kansas Press, Lawrence.
- Hofman, Jack L. (editor)
1996a *Archeology and Paleoecology of the Central Great Plains*. Research Series No. 48. Arkansas Archeological Survey, Fayetteville.

1996b Early Hunter–Gatherers of the Central Great Plains: Paleoindian and Mesoindian (Archaic) Cultures. In *Archeology and Paleoecology of the Central Great Plains*, edited by Jack L. Hofman, pp. 41–100. Research Series No. 48. Arkansas Archeological Survey, Fayetteville.
- Jaumann, P.J.
1991 *Evidence for Late Quaternary Boreal Environments in Arkansas River Valley, South-Central Kansas—Theoretical Aspects of Paleoecology and Climatic Inference*. Master's Thesis, University of Kansas, Lawrence.

- Johnson, Alfred E.
 1973 Archaeological Investigations at the Budenbender Site, Tuttle Creek Reservoir, North-Central Kansas. *Plains Anthropologist* 18(62):271–299.
- 1979 Kansas City Hopewell. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N’omi Greber, pp. 86–93. Kent State University Press, Kent, Ohio.
- 1991 Kansa Origins: An Alternative. *Plains Anthropologist* 36(133):57–65.
- Johnson, Alfred E., Charles A. Johnson II, Brad Logan, Nancy O’Malley, and Robert J. Ziegler
 1980 Prehistoric Cultural Resources of Tuttle Creek Lake, Kansas. University of Kansas Museum of Anthropology.
- Johnson, Alfred E., editor
 1983 *Phase IV Archaeological Investigations at El Dorado Lake, Butler County, Kansas, Summer 1980*. Project Report Series No. 52. University of Kansas Museum of Anthropology, Lawrence.
- Johnson, Ann Mary, and Alfred E. Johnson
 1998 The Plains Woodland. In *Archaeology on the Great Plains*, edited by W. Raymond Wood, pp. 201–234. University of Kansas Press, Lawrence.
- Johnson, William C., and Kyeong Park
 1996 Late Wisconsinan and Holocene Environmental History. In *Archeology and Paleoecology of the Central Great Plains*, edited by Jack L. Hofman, pp. 3–28. Research Series No. 48. Arkansas Archeological Survey, Fayetteville.
- Jones, Bruce A., and Thomas A. Witty, Jr.
 1980 The Gilligan Site. In *Salvage Archeology of the John Redmond Lake, Kansas*, edited by Thomas A. Witty Jr., pp. 67–125. Publications in Anthropology No. 8. Kansas State Historical Society, Topeka.
- Kansas State Historical Society
 1984 *Kansas Preservation Plan: Study Unit on the Period of Rural/Agricultural Dominance (1865–1900)*. Historic Preservation Department, Kansas State Historical Society, Topeka.
- 1987 *Kansas Preservation Plan: Study Unit on the Period of Exploration and Settlement (1820s–1880s)*. Historic Preservation Department, Kansas State Historical Society, Topeka.
- Kay, Marvin
 1998 The Central and Southern Plains Archaic. In *Archaeology on the Great Plains*, edited by W. Raymond Wood, pp. 173–200. University of Kansas Press, Lawrence.
- King, Marsha K.
 1996 Results of Phase III Archeological Investigations at the Shawnee Mill Site, 14JO365, Johnson County, Kansas. Contract Archeology Publications No. 14. Kansas State Historical Society, Topeka.
- Kuechler, A.W.
 1974 A New Vegetation Map of Kansas. *Ecology* 55(3):586–604[and Supplement].

Kuehn, David D.

1990 The Archeology of Theodore Roosevelt National Park, North Dakota: Final Results of the 1987–1989 University of North Dakota Investigations. Department of Anthropology, University of North Dakota, Grand Forks.

Larson, Thomas K., and Dori M. Penny

1996 Results of a Phase II Archeological Inventory at Fort Riley, Kansas. LTA, Inc., Laramie.

Leaf, Gary R.

1979 *Finding, Managing, and Studying Prehistoric Cultural Resources at El Dorado Lake, Kansas (Phase I)*. Research Series No. 2. University of Kansas Museum of Anthropology, Lawrence.

Lees, William B.

1989 Kansas Preservation Plan: Section on Historical Archeology. Archeology Department, Kansas State Historical Society, Topeka.

Lent, Stephen C., Joan K. Gaunt, and Adisa J. Willmer

1992 A Study of the Effects of Fire on Archaeological Resources, Phase I: The Henry Fire, Holiday Mesa, Jemez Mountains, New Mexico. Archaeology Notes No. 93. Museum of New Mexico Office of Archaeological Studies, Santa Fe.

Ludwickson, John

1978 Central Plains Tradition Settlements in the Loup River Basin: The Loup River Phase. In *The Central Plains Tradition: Internal Development and External Relationships*, edited by Donald J. Blakeslee, pp. 94–108. Report No. 11. Office of the State Archaeologist, University of Iowa, Iowa City.

Malone, Judith A., and Arthur H. Rohn

1980 Survey and Assessment of the Cultural Resources, Marion Lake Project. Wichita State University, Wichita.

Mandel, Rolf

1984 Geomorphology and Landscapes of the Milford, Melvern, and Pomona Lakes, Eastern Kansas. In *Archaeological Inventory and Evaluation at Milford, Melvern, and Pomona Lakes, Eastern Kansas*, by Larry J. Schmits. Cultural Resource Management Report No. 26. Environmental Systems Analysis, Inc., Kansas City, Missouri.

1987 The Environment of Kansas. In *Kansas Prehistoric Archaeological Preservation Plan*, edited by Kenneth L. Brown and Alan H. Simmons, pp. 3.1–3.30. Office of Archaeological Research, Museum of Anthropology, and Center for Public Affairs, University of Kansas, Lawrence.

1989 Geomorphological Investigations at Sites 14BU360, 14BU350, and 14BU356. Kansas State Historical Society, Topeka.

1993 Geomorphology. In *Cultural Resource Investigations for the U.S. Highway 166 Corridor: Results of Phase II Archeological Survey and Geomorphological Study in Cowley and Chautauqua Counties, Kansas*, by Martin Hawley, pp. 24–75. Contract Archeology Publications No. 11. Kansas State Historical Society, Topeka.

Mandel, Rolf (continued)

1995 Geomorphic Controls of the Archaic Record in the Central Plains of the United States. In *Archeological Geology of the Archaic Period in North America*, edited by E.A. Bettis III, pp.37–66. Geological Society of America Special Paper No. 297.

Marshall, James O.

1972 *The Archeology of the Elk City Reservoir, a Local Archeological Sequence in Southeast Kansas*. Anthropological Series No. 6. Kansas State Historical Society, Topeka.

Marshall, James O., and Thomas A. Witty, Jr.

1990 The Bogan Site, 14GE1: An Historic Pawnee Village. *The Kansas Anthropologist* 11(1):21–32.

McDermott, J.F. (editor)

1940 *Tixier's Travels on the Osage Prairies*. Translated by Albert J. Salvan. University of Oklahoma Press, Norman.

Miller, Patricia A.

1979 *An Archaic Tool Tradition in the Plains: A Case Study of the Coffey Site*. Master's Thesis, Department of Anthropology, University of Kansas, Lawrence.

1982 An Intensive Cultural Resources Survey at Tuttle Creek Lake, Pottawatomie and Riley Counties. Soil Systems, Inc., Overland Park, Kansas.

Molyneaux, Brian L., Nancy J. Hodgson, William H. Ranney, Andrew M. Stewart, and Ronald I. Marvin

1995 A 1993 Cultural Resources Inventory at Milford Lake in Geary, Clay, Dickinson, and Riley Counties, Kansas. Archeology Laboratory, University of South Dakota, Vermillion.

Moore, Petra S., and Walter H. Birkby

1962 Archeological Investigations in Melvern Reservoir, Osage County, Kansas, 1962. University of Kansas Museum of Anthropology, Lawrence.

Muller, J.D., and Jack M. Schock

1964 Appraisal of the Archaeological Resources of the Milford Reservoir, Geary, Clay Riley, and Dickinson Counties, Kansas. University of Kansas Museum of Anthropology, Lawrence.

National Park Service

1991 Special Resource Study, Z-Bar (Spring Hill) Ranch, Chase County, Kansas. USDI, National Park Service, Omaha, Nebraska.

1997 Cultural Resource Management Guideline. Release No. 5. USDI, National Park Service, Omaha, Nebraska.

Norall, Frank

1988 *Bourgmont, Explorer of the Missouri, 1698–1725*. University of Nebraska Press, Lincoln.

O'Brien, Michael J., and W. Raymond Wood

1998 *The Prehistory of Missouri*. University of Missouri Press, Columbia.

O'Brien, Patricia J.

1972 Clovis Point from the Waterville Kansas Area. *Plains Anthropologist* 17(55):60–64.

- O'Brien, Patricia J. (continued)
 1976 Milford Lake Shoreline Archaeological Survey. Department of Sociology, Anthropology, and Social Work, Kansas State University, Manhattan.
- 1983 Cultural Resources Survey of Council Grove Lake, Kansas. Department of Sociology, Anthropology, and Social Work, Kansas State University, Manhattan.
- O'Brien, Patricia J. (continued)
 1984 *Archeology in Kansas*. Public Education Series No. 9. University of Kansas Museum of Natural History Public, Lawrence.
- O'Brien, Patricia J., Margaret Caldwell, John Jilka, Lynn Toburen, and Barbara Yeo
 1979 The Ashland Bottoms Site (14RY603): A Kansas City Hopewell Site in North-Central Kansas. *Plains Anthropologist* 24(83):1–20.
- O'Brien, Patricia J., Clark Larsen, John O'Grady, Brian O'Neill, and Ann S. Stirland
 1973 The Elliott Site (14GE303): A Preliminary Report. *Plains Anthropologist* 18(59):54–72.
- O'Neill, James T.
 1974 *Soil Survey of Chase County, Kansas*. USDA Soil Conservation Service and the Kansas Agricultural Experiment Station. Government Printing Office, Washington, D.C.
- O'Shea, John M.
 1989 Pawnee Archaeology. *Central Plains Archaeology* 1(1):49–107.
- Picha, Paul R., and Stanley A. Ahler
 1989a Effects of Fire on Cultural Materials: A Selected Review. In *Impacts of Prescribed Burning on Archeological and Biological Resources of the Knife River Indian Villages NHS*, edited by Rodney D. Saylor, Robert W. Seabloom, and Stanley Ahler, pp. 19–31. University of North Dakota, Grand Forks.
- 1989a Execution of the Experimental Burning Program. In *Impacts of Prescribed Burning on Archeological and Biological Resources of the Knife River Indian Villages NHS*, edited by Rodney D. Saylor, Robert W. Seabloom, and Stanley Ahler, pp. 19–31. University of North Dakota, Grand Forks.
- Rager, Hal B., and Patricia J. O'Brien
 1983 Cultural Resource Survey of Council Grove Lake, Kansas. Department of Sociology, Anthropology, and Social Work, Kansas State University, Manhattan.
- Reichart, Milton
 1978 On the Trail of Bourgmont. *Kansas Anthropological Association Newsletter* 23(4):1–79.
- Reynolds, John D.
 1970 Appraisal of the Archeological Resources of the Onaga Reservoir, Pottawatomie County, Kansas. Kansas State Historical Society, Topeka.
- 1975 Archeological Survey for Onaga Lake, Kansas. Kansas State Historical Society, Topeka.

Reynolds, John D. (continued)

1979 *The Grasshopper Falls Phase of the Plains Woodland*. Anthropological Series No. 7. Kansas State Historical Society, Topeka.

1984 *The Cow-Killer Site, Melvern Lake, Kansas*. Anthropological Series No. 12. Kansas State Historical Society, Topeka.

Roberts, Ricky L.

1978 *The Archaeology of the Kansas Monument Site: A Study in Historical Archaeology on the Great Plains*. Master's Thesis, Department of Anthropology, University of Kansas, Lawrence.

Rogers, Richard A.

1979 *Archaeological Investigations in the John Redmond Reservoir Area, Kansas*. University of Kansas Museum of Anthropology, Lawrence.

Rohn, Arthur H., and Alice Emerson

1984 *Great Bend Sites at Marion, Kansas*. Publications in Anthropology No. 1. Wichita State University, Wichita.

Rohn, Arthur H., and Judith A. Malone

1980 *Cultural Resources Reconnaissance Survey, Marion County Lake Improvement District, Kansas*. Archeology Laboratory, Wichita State University, Wichita.

Root, Matthew J.

1980 *The Milbourn Site: Late Archaic Settlement in the Southern Flint Hills of Kansas*. Master's Thesis, Department of Anthropology, University of Kansas, Lawrence.

Sayler, Rodney D., Robert W. Seabloom, and Stanley A. Ahler (editors)

1989 *Impacts of Prescribed Burning on Archeological and Biological Resources of the Knife River Indian Villages NHS*. University of North Dakota, Grand Forks.

Schmits, Larry J.

1978 *The Coffey Site: Environment and Cultural Adaptation at a Prairie Archaic Site*. *Mid Continent Journal of Archeology* 3(1):69–185.

1980a *The Williamson Site, 14CF330*. In *Salvage Archeology of the John Redmond Lake, Kansas*, edited by Thomas A. Witty, Jr., pp. 13–66. Anthropological Series No. 8. Kansas State Historical Society, Topeka.

1980b *The Dead Hickory Site, 14CF301*. In *Salvage Archeology of the John Redmond Lake, Kansas*, edited by Thomas A. Witty, Jr., pp. 133–162. Anthropological Series No. 8. Kansas State Historical Society, Topeka.

1981 *Archaeological and Geological Investigations at the Coffey Site, Tuttle Creek Lake, Kansas*. USDI, National Park Service, Interagency Archeological Services, Denver.

1982 *Archaeological and Geological Investigations at the Coffey Site, Tuttle Creek Lake, Kansas*. University of Kansas Museum of Anthropology, Lawrence and Environmental Systems Analysis, Inc., Overland Park.

Schmits, Larry J. (continued)

1984 *Archaeological Inventory and Evaluation At Milford, Melvern, and Pomona Lakes, Eastern Kansas*. Cultural Resource Management Report No. 26. Environmental Systems Analysis, Inc., Kansas City.

Schoen, Christopher M.

1985 *Windows on the Plains: Flat Glass from the Nineteenth Century Plains Frontier*. Master's Thesis, Department of Anthropology, University of Nebraska. Lincoln.

1992 Phase IV Salvage Excavations at a Stone Cabin Near Madison, Greenwood County, Kansas. Manuscript on file, Kansas State Historical Society, Topeka.

1994a *Phase IV Salvage Investigations at the Martin Farmstead (14RP322) in Republic County, Kansas*. Contract Archeology Publication No. 12. Kansas State Historical Society, Topeka.

1994b *The Martin Farmstead: A Family Farm in Republic County, Kansas*. Highway Salvage Archeology Popular Report No. 2. Kansas State Historical Society, Topeka.

Schoewe, W.E.

1949 The Geography of Kansas, Part II, Physical Geography. *Transactions of the Kansas Academy of Science* 52(3):261–333.

Schultz, Floyd, and Albert C. Spaulding

1948 Hopewellian Burial Site in the Lower Republican Valley, Kansas. *American Antiquity* 13(4):306–313.

Schweikhard, Laura S., and Patricia J. O'Brien

1982 Sample Archaeological Survey of Milford Lake Public Use Areas. Department of Sociology and Anthropology, Kansas State University, Manhattan.

Shippee, J. Mett

1953 A Folsom Fluted Point from Marshall County, Kansas. *Plains Archeological Conference Newsletter* 5(4).

Smith, Carlyle S., and Walter Birkby

1962 Preliminary Report on Archaeological Investigations in the Melvern Reservoir, Osage County, Kansas. *Kansas Anthropological Association Newsletter* 8(4):33–36.

Smith, Carolyn A., editor

1977 Cultural Resource Studies at Tuttle Creek Lake and Marysville Flood Study Area. Iroquois Research Institute, Fairfax, Virginia.

Solecki, Ralph S.

1953 Appraisal of the Archeological and Paleontological Resources of the Tuttle Creek Reservoir, Marshall, Pottawatomie and Riley Counties, Kansas. Smithsonian Institution River Basin Surveys. On file, Midwest Archeological Center, Lincoln.

Starkey, George W.

1940 The Kaw Trail. In *Chase County Historical Sketches, Vol. I*. Chase County Historical Society, Cottonwood Falls, Kansas.

- Staub, Rodney
 1995 Kansa Presence in the Upper Kansas Valley, 1848–1867. *The Kansas Anthropologist* 16(1):24–45.
- Steinacher, Terry L., and Gayle F. Carlson
 1998 The Central Plains Tradition. In *Archaeology on the Great Plains*, edited by W. Raymond Wood, pp. 235–268. University of Kansas Press, Lawrence.
- Thies, Randall M.
 1981a Archeological Investigations at John Redmond Reservoir, East Central Kansas, 1979. Kansas State Historical Society, Topeka.
 1981b Archeological Survey in the Proposed Fancy Creek Wildlife Marsh Area, Riley County, Kansas. Kansas State Historical Society, Topeka.
 1987 Plans for the 1987 Kansas Archeology Training Program and Annual Dig. *Kansas Anthropological Association Journal* 8(1):17.
 1990 *The Archeology of the Stigenwalt Site, 14LT351*. Contract Archeology Publications No. 7. Kansas State Historical Society, Topeka.
- Thompson, Robert L., and Milton Reichart
 1993 The Kansa Village According to Lewis and Clark. *The Kansas Anthropologist* 14(2):1–9.
- Thorne, Tanis C.
 1996 *The Many Hands of My Relations: French and Indians on the Lower Missouri*. University of Missouri Press, Columbia.
- Tomkins, Sally Kress, and Charles LeeDecker
 1977 Cultural Resource Studies, Tuttle Creek Lake Marysville Flood Study Area. Iroquois Research Institute, Fairfax, Virginia.
- Unrau, William E.
 1986 *The Kansa Indians: A History of the Wind People, 1673–1873*. University of Oklahoma Press, Norman.
- Wedel, Waldo R.
 1936 *An Introduction to Pawnee Archeology*. Bulletin 112. Bureau of American Ethnology, Washington.
 1943 *Archeological Investigations in Platte and Clay Counties, Missouri*. Bulletin 183. U.S. National Museum, Washington.
 1959 *An Introduction to Kansas Archeology*. Bulletin 174. Bureau of American Ethnology, Washington.
 1961 *Prehistoric Man on the Great Plains*. University of Oklahoma Press, Norman.
 1974 The Prehistoric and Historic Habitat of Kansa Indians. In *American Indian Ethnohistory: Plains Indians*, edited by David A. Horr, pp. 416–454. Garland Publishing, Inc., New York.

Wedel, Mildred Mott

1979 The Ethnohistoric Approach to Plains Caddoan Origins. *Nebraska History* 60(2):183–196.

1982 The Wichita Indians in the Arkansas River Basin. In *Plains Indian Studies: A Collections of Essays in Honor of John C. Ewers and Waldo R. Wedel*, edited by Douglas H. Ubelaker and Herman J. Viola, pp. 118–134. Smithsonian Contributions to Anthropology No. 30. Smithsonian Institution Press, Washington, D.C.

Weston, Timothy

1993 *Phase II Cultural Resource Survey of High Potential Areas within the Southeast Kansas Highway Corridor*. Contract Archeology Publication No. 10. Kansas State Historical Society, Topeka.

1997 *Phase II Cultural Resource Survey of Low and Moderate Potential Areas Within the Southeast Kansas Highway Corridor*. Contract Archeology Publication No. 18. Kansas State Historical Society, Topeka.

Williams, Gerald W.

1993 References on the American Indian Use of Fire in Ecosystems. Draft manuscript on file, USDA Forest Service, Pacific Northwest Region, Portland, Oregon.

Willits, Ramona J.

1997 *A Place to Call Home: Anthropological Curriculum for Middle School Educators*. Popular Report No. 9. Kansas State Historical Society, Topeka.

Wilmeth, Roscoe

1970 *Excavations in the Pomona Reservoir*. Anthropological Series No. 5. Kansas State Historical Society, Topeka.

Witty, Thomas A., Jr.

1961a Appraisal of the Archeological Resources of the Council Grove Reservoir. Kansas State Historical Society, Topeka.

1961b Appraisal of the Archeological Resources of the John Redmond Reservoir, Coffey and Lyon Counties, Kansas. Kansas State Historical Society, Topeka.

1963a Appraisal of the Archeological Resources of the Marion Reservoir, Marion County, Kansas. *Kansas Anthropological Association Newsletter* 9(1).

1963b *The Woods, Avery, and Streeter Archeological Sites, Milford Reservoir, Kansas*. Anthropological Series No. 2. Kansas State Historical Society, Topeka.

1965 Archeological Survey of the Upper Verdigris Watershed. *Kansas Anthropological Association Newsletter* 11(3):2–11.

1967 The Pomona Focus. *Kansas Anthropological Association Newsletter* 12(9):1–5.

1969 Notes on Flint Hills Archeology. *Kansas Anthropological Association Newsletter* 14(8):1–5.

Witty, Thomas A., Jr. (continued)

1978a Along the Southern Edge: The Central Plains Tradition in Kansas. In *The Central Plains Tradition: Internal Development and External Relationships*, edited by Donald J. Blakeslee, pp. 56–66 Report 11. Office of the State Archeologist, University of Iowa, Iowa City.

1978b The Penokee Stone Indian. *Kansas Anthropological Association Newsletter* 23(6):6–9.

1982 *The Slough Creek, Two Dog, and William Young Sites, Council Grove Lake, Kansas*. Anthropological Series No. 10. Kansas State Historical Society, Topeka.

Witty, Thomas A., Jr. (editor)

1980 *Salvage Archeology of the John Redmond Lake, Kansas*. Anthropological Series No. 8. Kansas State Historical Society, Topeka.

Wulfkuhle, Virginia A.

1991 Phase III Testing of KDOT Project No. 57-37 K-2645-01, Greenwood County, Kansas. Manuscript on file, Kansas State Historical Society, Topeka.

Wulfkuhle, Virginia A., and Christopher M. Schoen

1993 *The Martindale Cabin: An 1857 Stone Structure in Greenwood County, Kansas*. Highway Salvage Archeology Popular Report No. 1. Kansas State Historical Society, Topeka.

Wood, W. Raymond

1998 *Archaeology on the Great Plains*. University of Kansas Press, Lawrence.

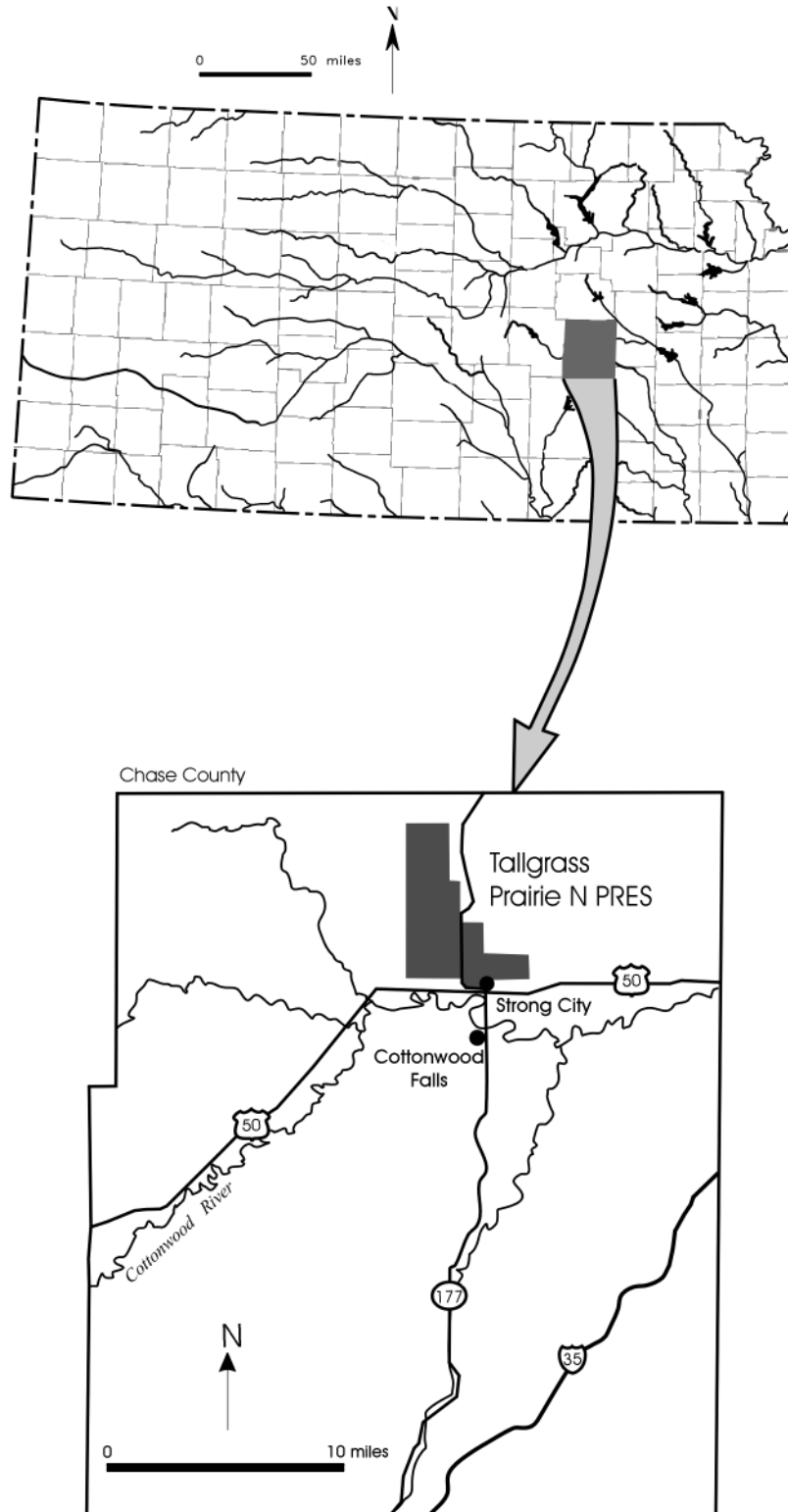


Figure 1. Tallgrass Prairie National Preserve, Chase County, Kansas.



Figure 2. Tallgrass Prairie National Preserve. View to the east across uplands after the annual pasture burn. Note limestone outcrops.



Figure 3. Tallgrass Prairie National Preserve. View to the south down Lower Palmer Creek. Note shallow soils and limestone bedrock in streambed.

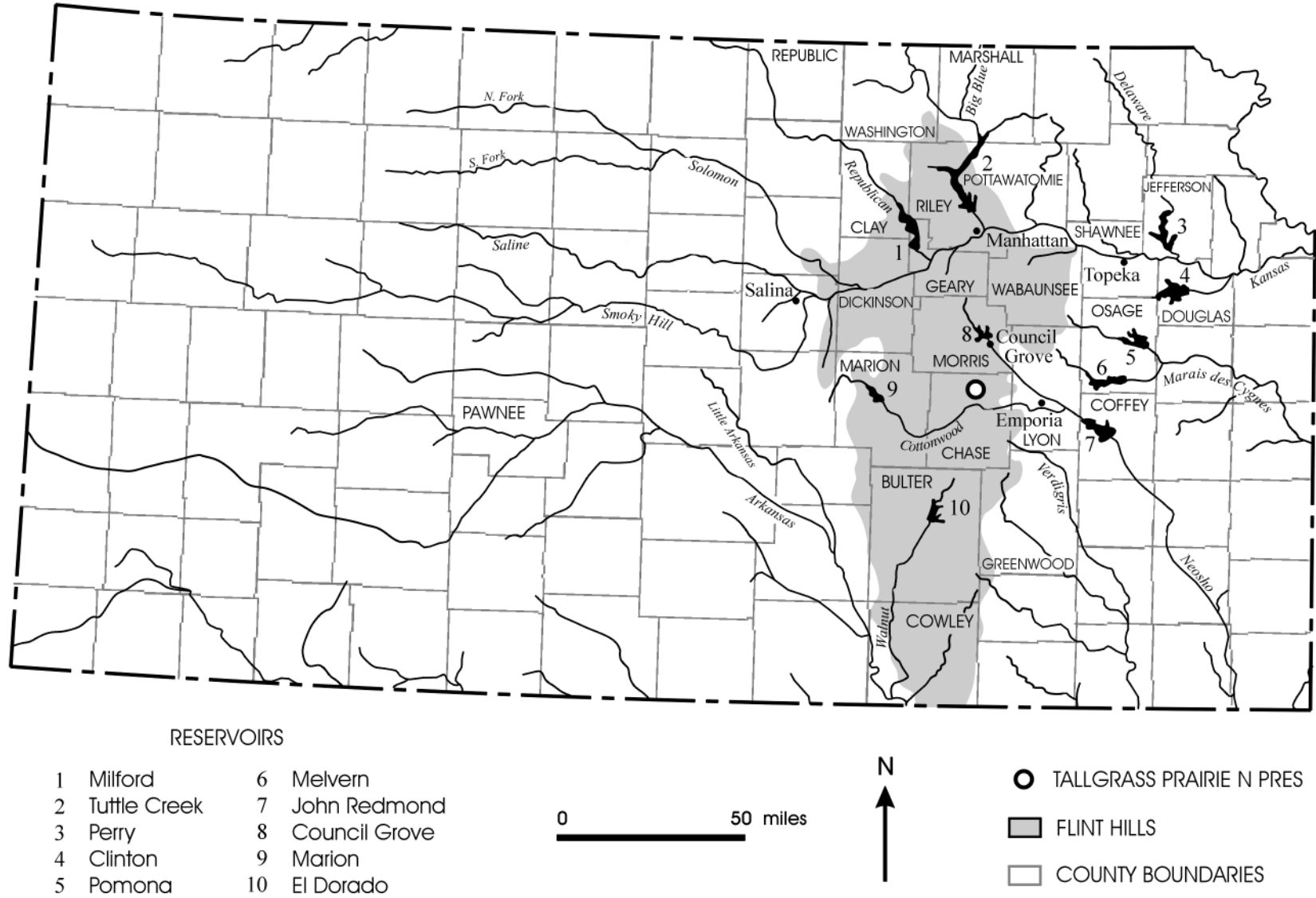


Figure 4. Reservoir areas where archeological research has been undertaken in eastern Kansas.

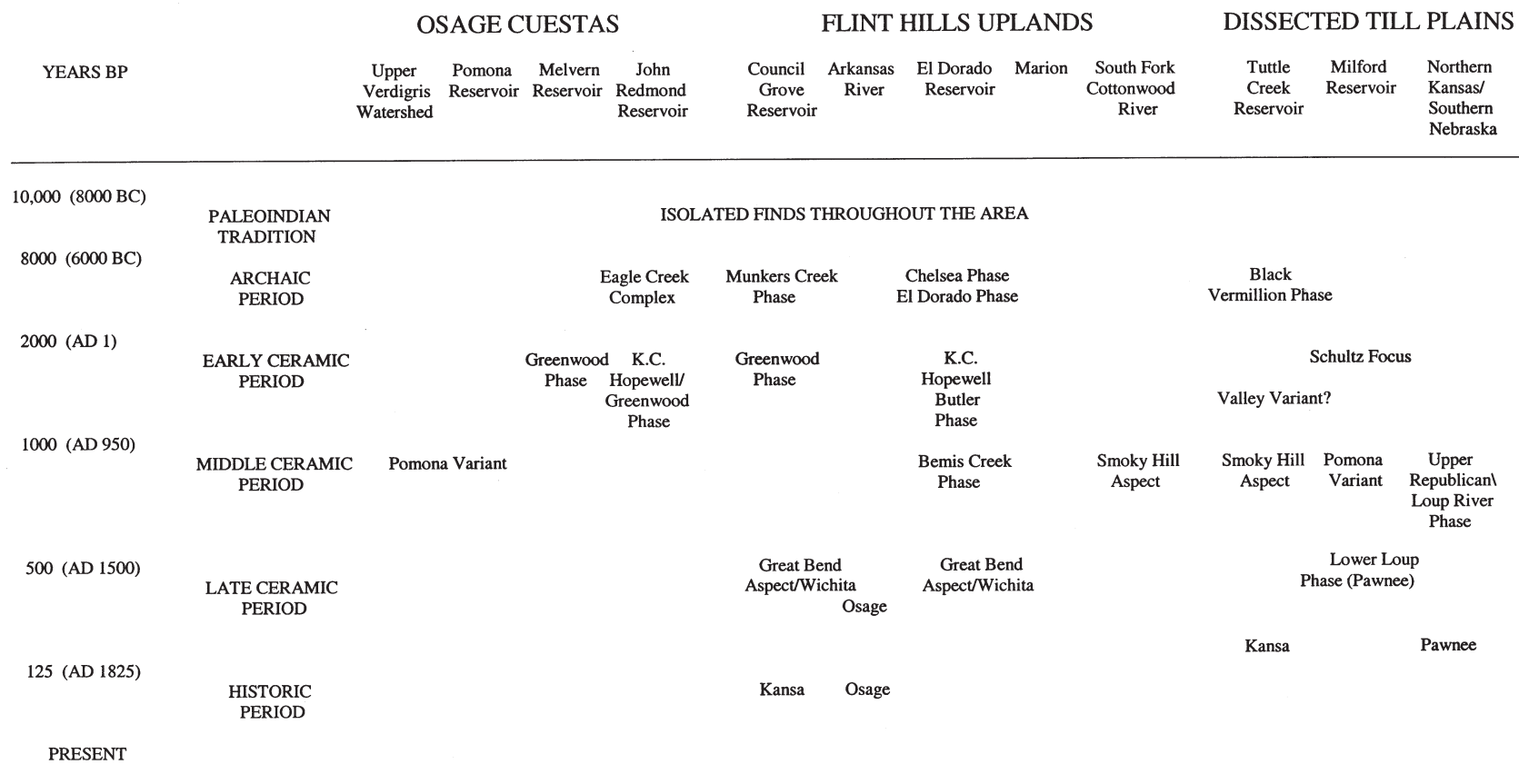


Figure 5. Prehistoric/historic American Indian cultural sequence for the Kansas Flint Hills and adjacent areas.



Figure 6. 14CS104, Tallgrass Prairie National Preserve. View from cairns west across Fox Creek.



Figure 7. 14CS104, Tallgrass Prairie National Preserve. View to the north across Feature 32 following test excavation.



Figure 8. 14CS106, Tallgrass Prairie National Preserve. East facade, Spring Hill Ranch house. View to the northwest.

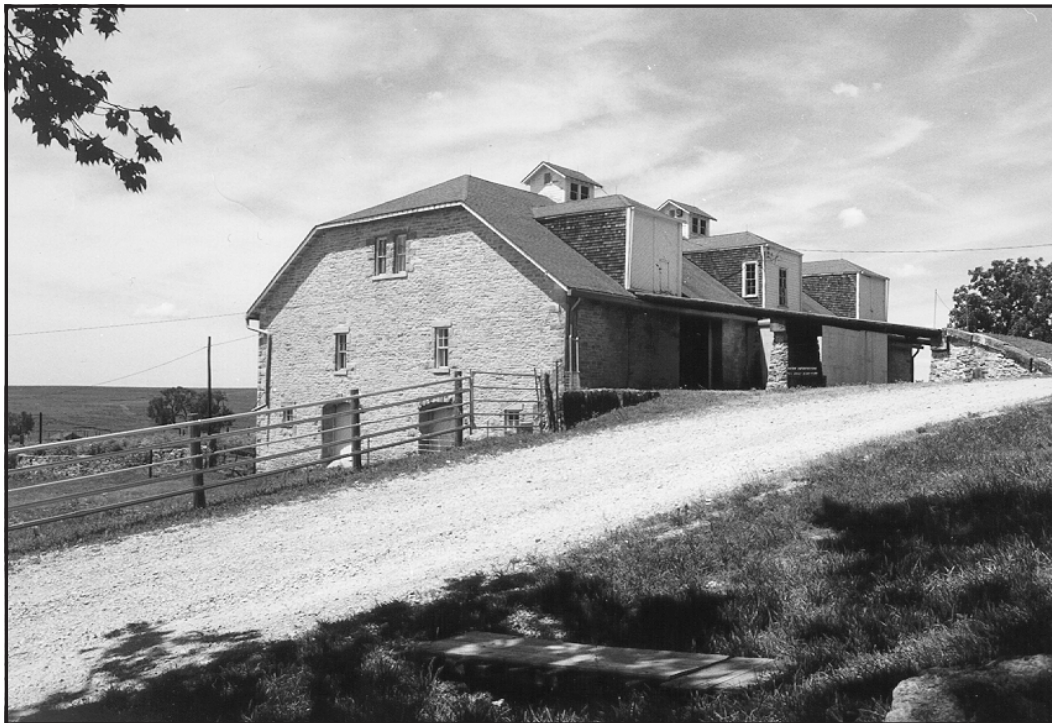


Figure 9. 14CS106, Tallgrass Prairie National Preserve. Three-story barn at the Spring Hill Ranch complex. View to the southwest.



Figure 10. 14CS106, Tallgrass Prairie National Preserve. Poultry house at the Spring Hill Ranch complex. View to the northwest.



Figure 11. 14CS106, Tallgrass Prairie National Preserve. Privy (left) and smokehouse (right) at the spring Hill Ranch complex. View to the northeast.

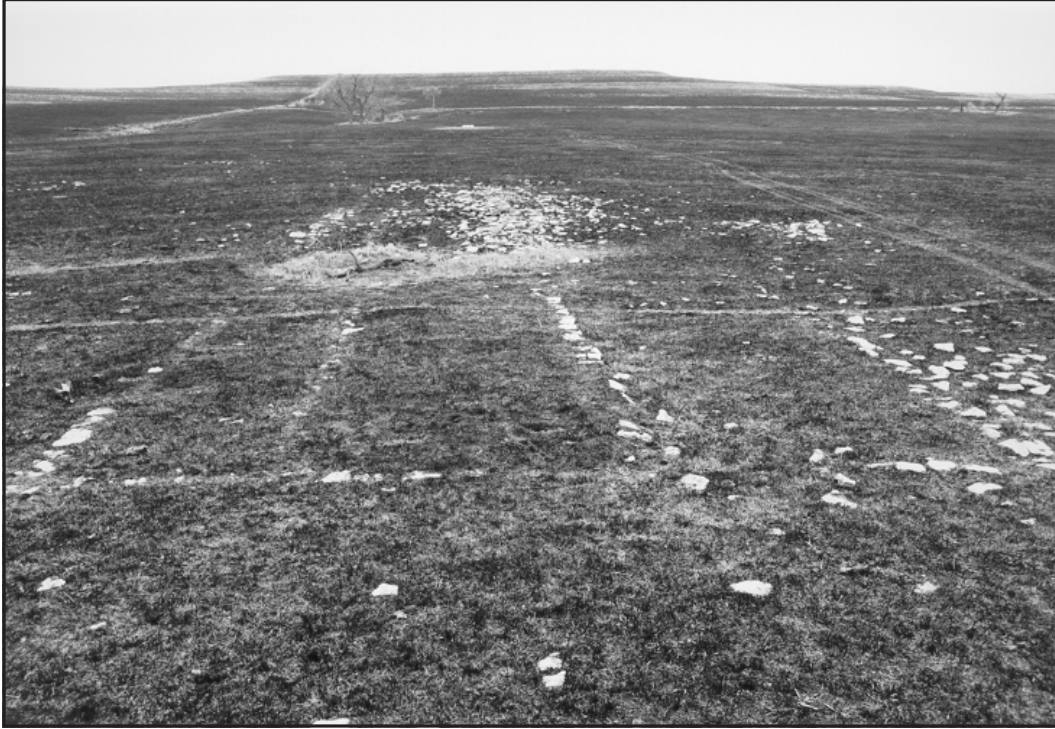


Figure 12. 14CS107, Tallgrass Prairie National Preserve. Barn footings visible in foreground. View to the west.



Figure 13. 14CS110, Tallgrass Prairie National Preserve. Figure stands in structure depression. Rock walls in background. View to the northwest.



Figure 14. 14CS111, Tallgrass Prairie National Preserve. View to the southwest across creek toward standing ruins.



Figure 15. 14CS111, Tallgrass Prairie National Preserve. Northeast corner of standing structure. View to the southwest.



Figure 16. 14CS112, Tallgrass Prairie National Preserve. Lower Fox Creek School. View to the northwest.



Figure 17. 14CS113, Tallgrass Prairie National Preserve. View to the southwest across brick and mortar scatter and mounds. Rail spur lies in background against tree line.



Figure 18. 14CS405, Tallgrass Prairie National Preserve. Figures stand below the cutbank along the south edge of the site. View to the north.



Figure 19. 14CS405, Tallgrass Prairie National Preserve. Flags mark surface artifacts near limestone outcrops. Palmer Creek (right) and unnamed tributary (left) in background. View to the east.