

UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

LATE PLEISTOCENE AND EARLY HOLOCENE SEDIMENTS, SOILS, AND HUMAN
OCCUPATIONS ALONG WILDHORSE CREEK IN THE ARBUCKLE MOUNTAINS OF
SOUTH-CENTRAL OKLAHOMA.

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

MASTER OF ARTS

By LEWIS JAMES DOLMAS

Norman, Oklahoma

2025

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A THESIS APPROVED FOR THE
DEPARTMENT OF ANTHROPOLOGY

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Acknowledgements

I'd like to thank Roger Hamilton, without whose generous donation of his time, knowledge, and lithic materials this thesis would not have been possible; my advisor, Dr. Bonnie Pitblado, who has been there for me as a guide and mentor every step of the way, even prior to my decision to return to OU; Dr. Deb Green, who has taught me everything I now know about geoarchaeology, and who has been the best boss anyone could ask for; Dr. Asa Randall, whose instruction has greatly enriched the way I think about archaeology; and last but certainly not least, my parents, my little sister, and my girlfriend, whose constant support and encouragement has been invaluable to me over the past two years.

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Abstract

The focal area of this study is Wildhorse Creek, a tributary of the Washita River in south-central Oklahoma where an avocational archaeologist, Roger Hamilton, has been collecting lithic tools and debitage for the past 20+ years. Thanks to Roger's meticulous recording of the provenience of his finds, Wildhorse Creek presents a great opportunity to further archaeological knowledge of Paleoindigenous and Early Archaic groups occupying the Southern Plains, as well as the differential preservation conditions affecting the landforms in which the sites these groups left behind can be found.

The results of these investigations evidence a continuous occupation of Wildhorse Creek dating back at least 11,000 radiocarbon years before present (rcybp), as well as the presence of buried landforms of equivalent time depth with the potential to house intact archaeological deposits. Geoarchaeological analyses performed also provide evidence in support of multiple major climatic events on the Southern Plains, including the Late Pleistocene Younger-Dryas cooling event, and the Middle Holocene Altithermal drought period. Lastly, buried soil dates obtained along Wildhorse Creek demonstrate the presence of three known paleosols (Black Mat, Caddo, Delaware), as well as a fourth, new, Middle Holocene paleosol we've termed the Wildhorse Paleosol which appears to bracket the Calf Creek Horizon.

Chapter 1: Introduction

The impetus for this thesis comes from the diligent efforts of an avocational archaeologist, Roger Hamilton, who, over the past 20 years or so, has surface collected lithic tools and debitage along Wildhorse Creek, a tributary of the Washita River, which runs through the foothills of the Arbuckle Mountains in south-central Oklahoma (Fig. 1.1). His lithic collection includes a number of Paleoindigenous and Early Archaic projectile points, pointing to the presence of people in the Arbuckles much earlier than the Late Archaic and Woodland periods, to which the majority of officially recorded sites in the area date (Drass and Powell 1997).



Figure 1.1. Overviews of Wildhorse Creek under normal flow conditions (2025).

The central question of this thesis is why, if Paleoindigenous and Early Archaic projectile points are being found along Wildhorse Creek, there are no recorded sites. This is not just a local problem, but a regional one as well, with the Osage Plains (the Eastern subregion of the Southern Plains) having a notable dearth of Paleoindigenous

and Early Archaic sites, despite collectors in the region regularly finding artifacts dating to those time periods (Hall 1988; 1990; Wyckoff 1992).

In this thesis, I utilize geoarchaeological theory and methods to help better understand the differential preservation of the Late Pleistocene and Early Holocene landforms along Wildhorse Creek that represent the Paleoindigenous and Early Archaic periods, respectively. I aim to provide professional and academic researchers performing archaeological investigations along Wildhorse Creek and other alluvial environments on the Southern Plains with a better understanding of where buried Paleoindigenous and Early Archaic deposits might be located and which survey methodologies might be best suited to locate them.

Looking ahead, Chapter Two provides the basic environmental background necessary to understand the current and past physiography and ecology of the study area, as well as the broader region as a whole. Chapter Three builds upon this with an overview of the culture history of the region from the Paleoindigenous period to the modern day. Chapter Four introduces the geoarchaeological and archaeological theories I apply towards answering my research question, while the following Chapter Five addresses the specific methodologies and data collection protocols used to apply these theories. Chapters Six and Seven present the results of the geoarchaeological investigations and the lithic analysis, respectively. Finally, Chapter Eight synthesizes the findings of the investigations and discusses the potential implications for researchers surveying for sites on Wildhorse Creek and the Southern Plains.

I conclude that, while present and likely containing intact archaeological deposits, landforms of these Late Pleistocene/Early Holocene ages along Wildhorse Creek and

the Southern Plains at large are likely fragmentary and deeply buried, necessitating modified survey strategies in order to locate them. My work supports that of past studies along other alluvial systems within the Southern Plains, evidencing episodes of severe erosion and deposition which have reshaped river channels and buried or destroyed many early landforms.

Chapter 2: Environmental Background

Physiography

To better understand the methods of data collection employed by this thesis, as well as the interpretations of those data, I begin with a brief, chronological overview of the geological and then ecological history and conditions in the area of focus. I will begin both of these subsections at a regional scale and narrow to the specific study area of this thesis.

Regional Physiography of the Southern Plains

Starting off at the widest scale, the study area of this thesis lies within the ecological region of the Southern Plains. The Southern Plains encompass most of Oklahoma west of the Ouachita Mountains, stretching north slightly into Kansas, west slightly into New Mexico, and south into North Texas (Fig. 2.1) (Wyckoff 1992). Geomorphologically, the Southern Plains are broken up into two main subregions: the High Plains, or Llano Estacado, in the west and the Osage (or Rolling) Plains in the East, as well as a small portion of the West Gulf Coastal Plains in the far southeast (Ferring 1990; Wyckoff 1992).

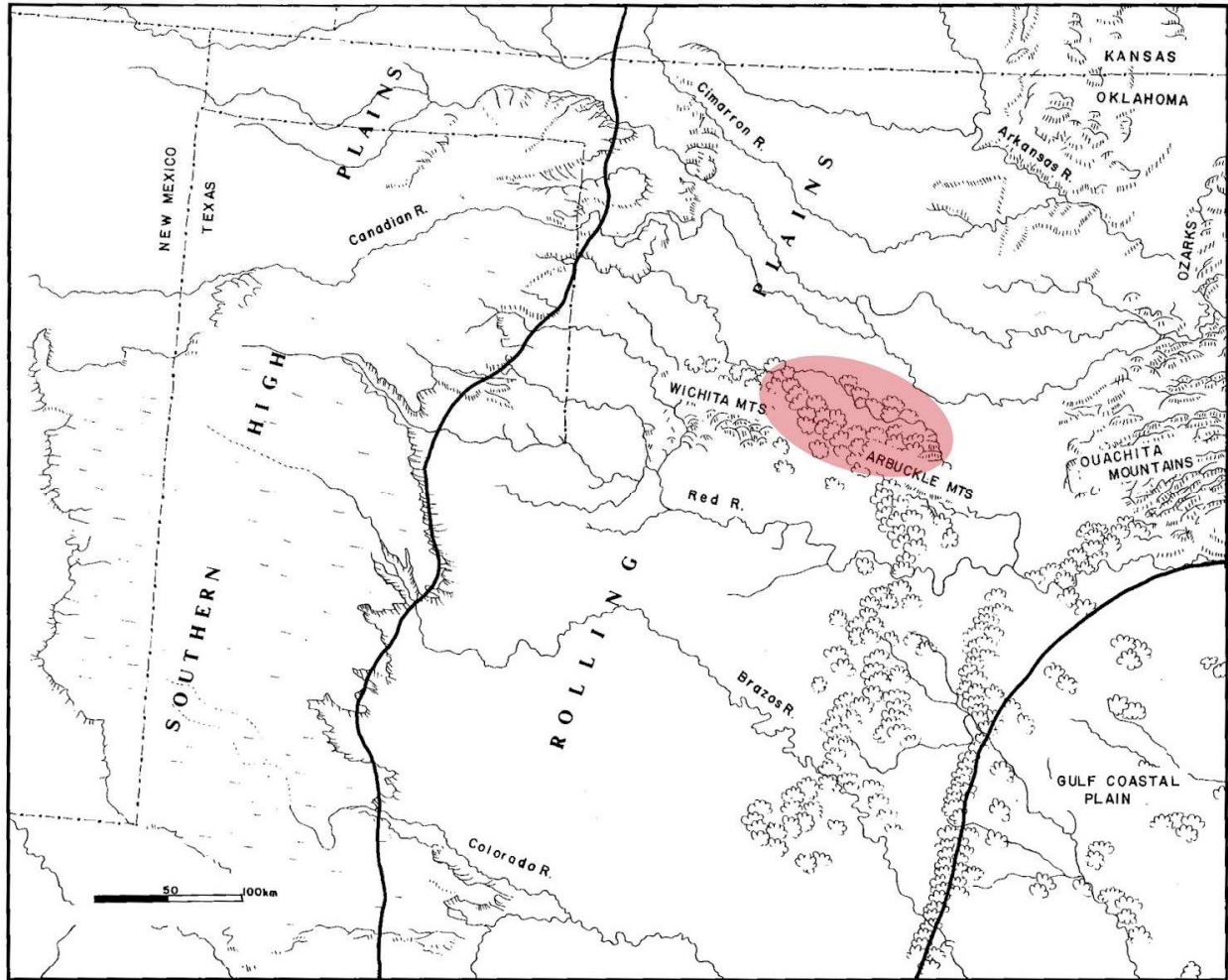


Figure 2.1. Physiographic map of the Southern Plains Region, divided into geomorphological subregions, from east to west: the High Plains, the Osage (Rolling) Plains, and a small portion of the Gulf Coastal Plain. The study area is highlighted in red toward the center of the Osage Plains (adapted from Ferring 1990:254).

The High Plains geomorphological region (Fig. 2.2) makes up the western half of the Southern Plains. It is an upland plateau area, bounded by the Pecos River Valley to the west, where it sits at an average elevation of 1,370 meters above sea level (AMSL), sloping gently towards the Canadian River Valley in the east where it falls to an average

elevation of 460 meters AMSL (Ferring 1990; Wyckoff 1992). Heavily pockmarked by playa lakes and salinas, the High Plains' surface drainages are relatively shallow and generally poorly incised, consisting mostly of small streams and draws (Ferring 1990).

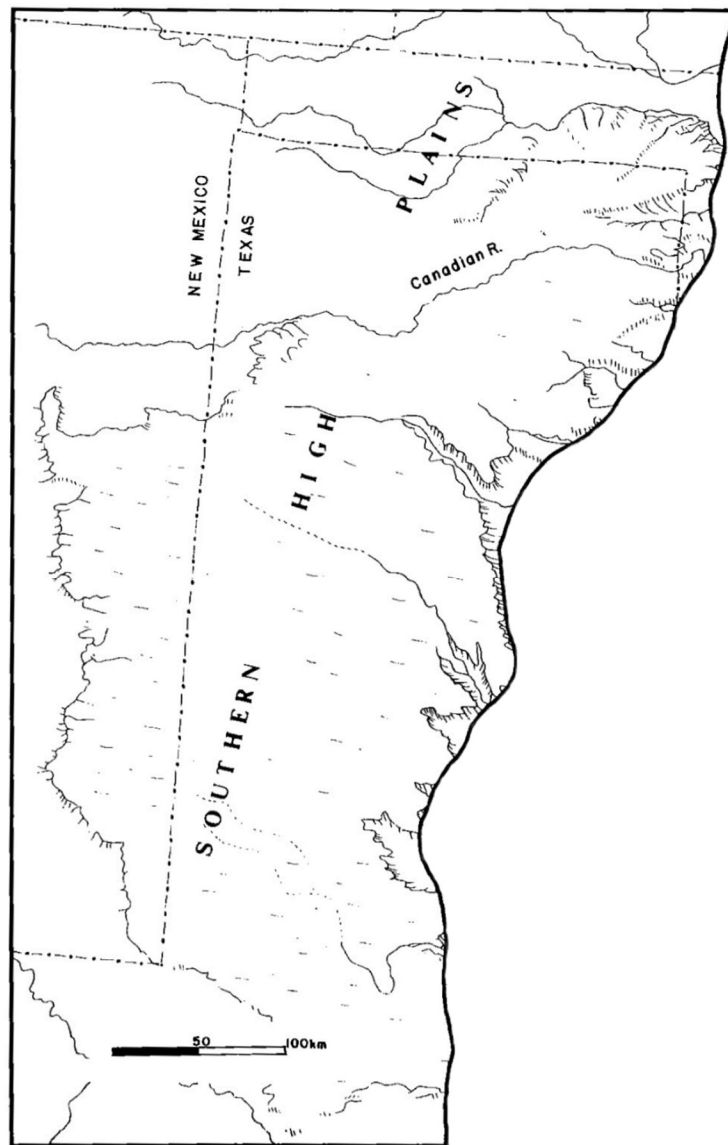


Figure 2.2. Physiographic map isolating the High Plains portion of the Southern Plains (Adapted from Ferring 1990:254)

The eastern half of the Southern Plains is the geomorphological region known as the Osage or Rolling Plains (Fig. 2.3). From here on, I will use the former term. Bounded by the High Plains to the west (460 meters AMSL) and the Ouachita Mountains to the east (250 meters AMSL), the Osage Plains consist of low-relief, rolling hills, broken up near their borders by the rocky uplifts of the Flint Hills in north-central Oklahoma and Kansas, the Wichita Mountains in southwest Oklahoma and Texas, and the Arbuckle Mountains in south-central Oklahoma (Ferring 1990; Wyckoff 1992).

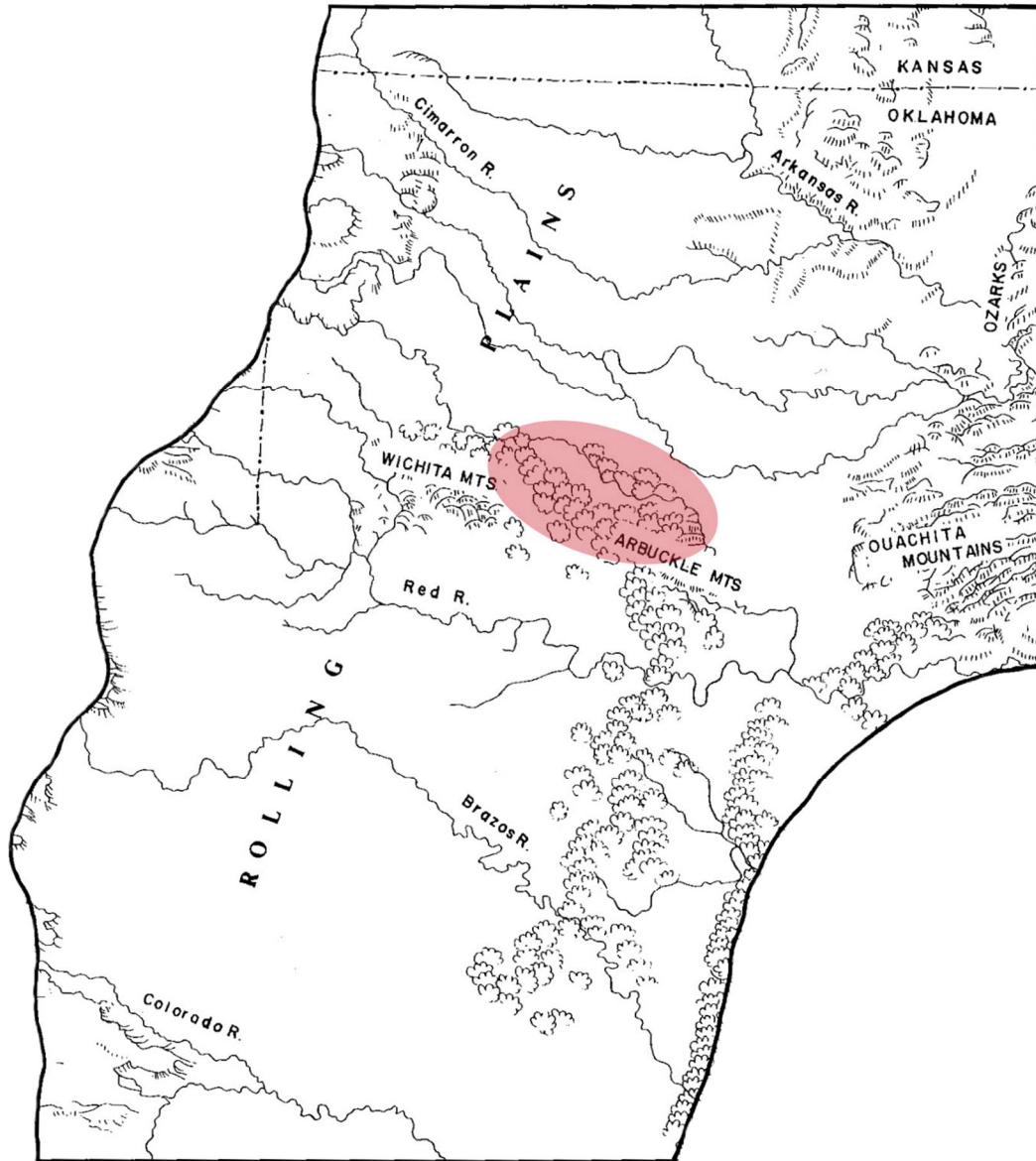


Figure 2.3. Physiographic map isolating the Osage, or Rolling, Plains portion of the Southern Plains with the study area highlighted in red (Adapted from Ferring 1990:254)

The predominately southeasterly flowing drainages of the Osage Plains such as the Canadian, Arkansas, and Washita Rivers, create well-incised valleys, flanked by strongly developed alluvial terraces (Ferring 1990). Additionally, the strong eolian forces

of the region often lead to the formation of dune fields on the northern sides of these valleys (Ferring 1990; Wyckoff 1992).

Local Physiography of the Arbuckle Mountains

Wildhorse Creek, in the northern foothills of the Arbuckle Mountains, lies within the latter of the two main geomorphological regions of the Southern Plains, the Osage Plains (Fig. 2.4). The Arbuckles, located in south-central Oklahoma, just north of the Texas border, are an extremely ancient mountain range, composed of complex folds of shales, limestones, and sandstones, and ranging in age from Ordovician to Pennsylvanian (Drass and Powell 1997).

Study Area



Figure 2.4. Hydrography Map of the study area with Wildhorse Creek on the north side of the Arbuckle Mountains highlighted in red from its headwaters at the Lake Humphrey Dam to its convergence with the Washita River (ESRI 2025).

The Arbuckle Mountains stand in something of a contrast to the rest of the Southern Plains Region. Despite being a very old range, with its peaks long reduced to hills, broken up by large surface outcroppings of cherts and quartzites (Fig. 2.5) (Drass and Powell 1997), these small hills appear massive and rugged in relief against the relatively flat Osage Plains (Wyckoff 1992).



Figure 2.5. Rocky outcroppings in the vicinity of the study area (2025)

Environment

Another key element to understanding the archaeology of a given area, as well as to interpreting erosional and depositional patterns, is knowing the climate and ecology of that area and how it may have changed through time (Wyckoff 1992). I address this topic in the following sections, again in order from large-scale to small-scale.

Southern Plains Environmental History

In the Southern Plains Region, relatively little work has been done to reconstruct paleoenvironments. The exception to this, though somewhat dated, is the research of Texas-based geoarchaeologists Stephen A. Hall and C. Reid Ferring in the 1980s and 1990s. Hall and Ferring found a low-resolution, but consistent sequence across three main lines of evidence: faunal analysis, pollen analysis, and geoarchaeological analysis.

Starting off with the Late Pleistocene, faunal and botanical evidence indicates that, much like other portions of North America, the Southern Plains, ca. 15,000 to

11,000 cal. B.P., were cooler and more moist than at present (Ferring and Hall 1987; Hall 1988). The subsequent Early Holocene, ca. 11,000 to 8,000 cal. B.P., is something of a blindspot for paleoecology studies due to the scarcity of intact buried soils from this period, many of which have been eroded away (Hall 1988). That said, paleobotanical studies do point to the continuation of the relatively moist conditions of the Late Pleistocene, except at the Lubbock Lake site in Texas, which evidences the beginnings of an Early Holocene warming and drying trend (Ferring 1990).

If this warming and drying trend at Lubbock Lake was indeed taking place regionally, it came into full effect soon after. The Middle Holocene, ca. 8,000 to 4,000 cal. B.P., appears to be a period of increased temperatures and significant aridity (Hall 1988). Depositional evidence, such as deeper alluvial channel trenching and increased eolian erosion and deposition, as well as pollen analyses showing decreased diversity among tree species and the eastward spread of the plains biome all point to a period of time that was hotter and drier than the preceding Early Holocene (Hall 1988).

After the peak of Middle Holocene aridity in the Southern Plains, circa 5,000 cal. B.P., signs point to gradual, but steady decrease in temperatures and dry conditions, leading up to a short period, ca. 2,000 to 1,000 cal. B.P., of a distinctly more moist environment (Hall 1982; Hall 1988). Geoarchaeological evidence indicates, however, that this period came to an abrupt end around 1,000 cal. B.P., with alluvial systems across the Southern Plains showing a sudden and immense episode of channel trenching lasting approximately 200 years, likely caused by lowering water tables and reduced plant cover (Hall 1988; Hall 1990). Some evidence points to this shift towards high aridity peaking as late as 600 to 400 cal. B.P., but this is tentative at best (Hall

1988). Regardless, this dryer period continues to prevail at present, though having ameliorated somewhat from its peak over the past 400 to 800 years (Hall 1988).

Local Environmental History

Having addressed broader regional trends in climate of the Southern Plains through time, I will now focus in on more local details, informed in large part by modern and recent historical (1800-present) accounts and understandings of the environment. I begin with brief notes on the subregions of the Southern Plains, then conclude with more detailed observations of the specific study area.

Starting off with the High Plains in the present day, this western subregion receives relatively little rainfall, typically less than 53cm per year, mostly in the form of heavy thunderstorms in the late summer months (Wyckoff 1992). The primary flora on the High Plains is short-grass prairie, broken up only by thin groves of trees along waterways (Fig. 2.6)(Ferring 1990; Wyckoff 1992).



Figure 2.6. Environmental overviews of the High Plains subregion, taken in the vicinity of the Oklahoma-New Mexico border (left) and the Texas Panhandle (right) (2024)

Annual rainfall increases as one moves eastward, away from the boundary with the High Plains, from a low of 53cm per year at that boundary, to a high of over 100cm per year where the plains meet the Ouachita Mountains on the border of modern-day Oklahoma and Arkansas (Ferring 1990; Wyckoff 1992). Compared to the High Plains, rainfall on the Osage Plains falls over a much longer period of the year, from mid-spring to mid-fall, conferring a long growing season of up to 240 days in the more eastern portions of the region (Wyckoff 1992). This higher rainfall and longer growing season enables the flourishing of a mosaic environment of lush, tall and mixed-grass prairies interspersed with small forests (Fig. 2.7)(Wyckoff 1992).



Figure 2.7. Environmental overviews of the Osage Plains subregion, taken in the vicinity of Love County, OK (left) and Caddo County, OK (right) (2024).

The Arbuckle Mountains, near the center of the Osage Plains, not only stand in contrast to the rest of the region geomorphologically as previously noted, but ecologically as well. The Arbuckles are heavily forested, making up a portion of the

ecotone known as the “Cross Timbers,” an area composed of small clearings surrounded by extremely dense, scrubby thickets of post oaks (*Quercus stellata*) and blackjacks (*Quercus marlandica*), with some sumac (*Rhus copallina*) and cedars (*Juniperus virginiana* L.) present at higher elevations (Fig. 2.8) (Drass and Powell 1997).



Figure 2.8. Overviews of dense Cross Timber vegetation in and around the study area (2025).

The resources of this small pocket of land also differ from the rest of the Southern Plains. With Wildhorse Creek flowing year-round through the Arbuckle Mountains to meet the Washita River in the foothills of the range, there is abundant and concentrated support for animal and plant life (Drass and Powell 1997). This relative wealth of water allows the flourishing of flora in the mountains, including species of fruit and berry-bearing trees and shrubs not seen elsewhere in the region (Drass and Powell 1997).

Animal life is rich as well, with the mountains supporting a variety of fauna ranging from larger animals such as whitetail deer, and black bear, prior to the last century, down to wild turkey, rabbits, squirrels, and other small game and birds (Drass and Powell 1997). Although bison likely roamed the open spaces up to the edges of the Arbuckles, it is likely that the dense forests of the Cross Timbers, a serious obstacle for many horseback travelers of the 19th century, including Josiah Gregg and Washington Irving, would have inhibited their movement beyond the foothills, leaving deer and black bear as the largest game typically found within the mountains proper (Drass and Powell 1997).

Chapter 3: Cultural Background

In this chapter, I turn to examine the history of human occupation of the study region. I will first address the culture history of the Southern Plains broadly. I focus on the Paleoindigenous and Early Archaic periods (Table. 1) for their relevance to the research questions of this thesis, but I will also briefly touch on the succeeding Woodland, Plains Village, and Protohistoric/Historic periods. After this, I will provide a brief rundown of the past archaeological studies that have been conducted in the specific study area of Wildhorse Creek and the Arbuckle Mountains.

Protohistoric/Historic	<i>550 - 50 cal. BP</i>
Plains Village	<i>1,100 - 550 cal. BP</i>
Woodland	<i>2,000 - 1,100 cal. BP</i>
Archaic	<i>8,000 - 2,000 cal. BP</i>
Paleoindigenous	<i>>13,500 - 8,000 cal. BP</i>

Table 3.1. General chronology of Southern Plains culture history periods utilized by this thesis in calibrated years before present (Trabert and Hollenback 2021).

Southern Plains Culture History

The Paleoindigenous Period

Paleoindigenous people first settled the region ca. >13,500-8,000 cal. BP (Trabert and Hollenback 2021). For some archaeologists, this means the Clovis Mammoth Hunters and the Folsom and Plains Bison Hunters that followed them, first noted on the Southern Plains at Blackwater Draw and Wild Horse Arroyo, respectively (Hofman et al 1989; Trabert and Hollenback 2021). For many others, this dates back

even further to pre-Clovis sites like Debra L. Friedkin in North Texas (Hofman et al 1989; Trabert and Hollenback 2021, Waters et al 2018). Regardless of which peopling theory and timeline is correct, it is evident that humans' long and storied history on the Southern Plains, dates far back (Bell 1984; Hofman et al 1989; Trabert and Hollenback 2021).

Paleoindigenous groups have largely been cast by archaeologists as big game hunters with a particular propensity towards mammoths and mastodons, and later, *Bison antiquus* (Bell 1984; Hofman et al 1989; Trabert and Hollenback 2021). For a time, this view predominated to the point that one of the leading theories for the cause behind the extinction of Pleistocene megafauna actually became the possibility of overhunting by Clovis groups (Haynes 1999; Martin 1975).

Similarly, archaeologists have lauded Middle and Late Paleoindigenous groups on the Southern Plains for their kill sites, repeatedly utilizing natural landforms such as arroyos and gullies, exemplified at sites like Cooper, Lubbock Lake, or Agate Basin, to corner and kill large numbers of bison (Bell 1984; Trabert and Hollenback 2021). Interestingly, though research on the Northern Great Plains has indicated much more diverse lifeways for these groups, on the Southern Plains, archaeologists still view them largely as obligate big game hunters like the Early Paleoindigenous groups that came before them (Hofman et al 1989; Thulman 2019).

In more recent years, these early conceptualizations of Clovis, Folsom, and other Paleoindigenous groups have come under increasing scrutiny for what David Meltzer, a leader in the field of Paleoindigenous studies, identified relatively early on as a “fallacy of initial predication” (Meltzer 1989). Meltzer and others have argued that, because

these first identified sites were kill sites, that single dimension has become a defining trait, one that has only been strengthened by a desire to make new data conform to these expectations (Bamforth 2022; Meltzer 1989; Trabert and Hollenback 2021).

The logical question that follows is whether this defining trait is accurate. More and more, the prototypical definition of Paleoindigenous groups as obligate big game hunters, roaming the open grasslands of the Late Pleistocene in search of their quarry, seems to be an overly simplistic explanation (Meltzer 2009; Trabert and Hollenback 2021).

Sites such as Domebo Canyon in Caddo County, Oklahoma, as well as a growing number of isolated surface finds, such as the collection of Roger Hamilton which we will be analyzing in later chapters, provide evidence of Paleoindigenous groups existence on the Osage Plains far east of their big game-rich, High Plains hunting grounds (Ferring and Hall 1987; Trabert and Hollenback 2021). Recent studies, although rooted further afield in the Northern Great Plains, have shown that, while big game hunting was likely an integral part of Paleoindigenous foodways, the higher visibility kill sites more often than not represent singular events, divorced from a more diverse reality of everyday life present at the markedly less visible Paleoindigenous residential sites (Bamforth 2022; Trabert and Hollenback 2021)

Why then, if Paleoindigenous groups did indeed lead significant portions of their lives outside the endless pursuit of big game, is evidence of this so difficult to find? Like countless other groups, hunter-gatherer or otherwise, Paleoindigenous residential sites tend to be located near sources of water, positioned on alluvial terraces overlooking the slopes, floodplains, and cutbanks of streams and rivers (Bamforth 2022; Ferring 1990;

Woodward and Huckleberry 2011). As noted in the previous chapter, during the droughts of the Middle and Late Holocene, alluvial environments like these underwent severe episodes of channel trenching and deposition in the face of lowered water tables and receding vegetation (Hall 1988; Hall 1990). I will discuss the underlying mechanics of these events in more detail in the following chapter, but suffice to say, these episodes of alluviation have the ability to erode these terraces and deposit anywhere from centimeters to meters worth of sediment on top of them (Bettis and Mandel 2002; Woodward and Huckleberry 2011).

On the weakly incised alluvial environment of the High Plains, at locations like Lubbock Lake in the Texas Panhandle, this might look like Paleoindigenous sites buried under one to two meters of sediment (Holliday 1985). In the strong alluvial environment of the Osage Plains, however, where Wildhorse Creek and the Arbuckle Mountains lie, this might manifest more similarly to North Texas, where sites along the Trinity and Brazos Rivers are often buried under eight meters of fill or more (Ferring 1990).

The Archaic Period

The Archaic period (ca. 8,000-1,500 cal. BP) which follows the Paleoindigenous is the longest of the archaeological periods on the Southern Plains, lasting over 6,000 years (Bell 1984; Hofman et al 1989; Trabert and Hollenback 2021). It is also one of the least studied, due in large part to its struggles with the same site formation and post-depositional issues just discussed (Bell 1984; Ferring 1990; Trabert and Hollenback 2021).

In many ways, the Archaic can be viewed as a period of change (Trabert and Hollenback 2021). The end of the Pleistocene and the onset of the Holocene, as discussed in the previous chapter, ushered in warming and drying environmental conditions, peaking in the Middle Holocene (Ferring 1990). With this climatic change came a change in fauna--the massive creatures of the Late Pleistocene shrank both in size and in number (it is during this time that Bison evolved into the smaller form we see them in today) (Hall 1982; 1988; Trabert and Hollenback 2021). Archaic cultures adapted accordingly.

For a long time, researchers believed that this adaptation was simply to leave the Southern Plains altogether, a move referred to as the “Altithermal Cultural Hiatus” (Bell 1984; Drass and Powell 1997; Hofman et al 1989; Trabert and Hollenback 2021). Geoarchaeological investigations, and the discovery of more sites, however, have brought this into question. As already noted, Early and Middle Archaic sites, like Paleoindigenous sites, suffer from differentially poor preservation conditions relative to later sites due to the erosional and depositional processes linked to Middle Holocene drought conditions (Ferring 1990). What may have actually happened, is not a reduction in population, but a reduction in mobility.

Archaic groups became increasingly clustered around, and tethered to, resource-rich locations on the Southern Plains marked by permanent, year-round water sources like Pumpkin Creek in Oklahoma, or shallow and accessible aquifers like Mustang Springs in North Texas (Hofman et al 1989; Trabert and Hollenback 2021). Additionally, the diets of Archaic groups became more diverse, with faunal and paleobotanical evidence indicating increased incorporation of small/medium game and plant resources

(Trabert and Hollenback 2021). This diversification was also represented in their toolkits, with increased utilization of local materials for expedient tools and the reserving of higher quality materials for bifaces and projectile points (Fig. 3.4). Big game like bison began to become more of a seasonal resource, with hunts tending to take place in the late summer or early fall when herds were at their largest (Trabert and Hollenback 2021).

By the Late Archaic, the climate had begun to ameliorate, and as a result, site preservation and visibility for this latter portion of the period increased dramatically (Bell 1984; Ferring 1990; Trabert and Hollenback 2021). The general trends of diversification and specialization of foodways continued, but technological changes--the beginnings of pithouses, ceramics, and the bow and arrow--began to usher in the close of the Archaic (Trabert and Hollenback 2021)

The Woodland Period

The characteristics and timing of the Woodland period vary greatly across North America, with some areas, such as the Northern Plains, seemingly persisting in Archaic period lifeways hundreds of years after the beginning of the Woodland period on the Eastern coast (Trabert and Hollenback 2021). On the Southern Plains, the Woodland period began ca. 2,000 cal. BP and lasted around 900 years (Trabert and Hollenback 2021).

In the Central Plains and the Southeast, the Woodland period is known for developments such as monumental mound construction and the production of elaborate ritual goods, both of which are lacking on the Southern Plains (Drass and Powell 1997;

Trabert and Hollenback 2021). Instead, the Southern Plains Woodland period is largely characterized by widespread adoption of Late Archaic technological innovations, namely the bow and arrow and pottery, as well as by the intensification of plant resource exploitation, eventually progressing into the development of domesticates and the beginnings of horticulture (Drass and Powell 1997; Trabert and Hollenback 2021).

The Plains Village Period

The Plains Village, or Late Prehistoric period on the Southern Plains (ca. 550-1,100 cal. BP), began with the introduction of America's big three cultigens--corn, beans, and squash--to the region (Trabert and Hollenback 2021). Woodland groups, which had already been experimenting with, and to some degree relying on their own horticultural products began to adopt these new crops and settle down along the major waterways of the region, forming villages composed of small clusters of square or rectangular pithouses, and later surface structures (Trabert and Hollenback 2021). Though initially small, these villages began to increase in size around 1,000-900 cal. BP, possibly due to the brief drought period during this time, as noted in the previous chapter, prompting an increased reliance on agriculture (Ferring 1990; Trabert and Hollenback 2021).

During the Plains Village period, groups on the Southern Plains also began more intense and sustained participation in trade networks, most notably with their neighbors in the Southwest and Southeast (Trabert and Hollenback 2021). Though bison appear to make up a smaller percentage of faunal assemblages than periods past, it is apparent, both through Southern Plains sites and sites in these neighboring regions,

that Plains groups were likely trading bison products for exotic goods like pottery, obsidian, and turquoise (Trabert and Hollenback 2021). As the period progressed, evidence of fortification also appears, though lack of corroborating evidence of warfare has lead prevailing theories towards the possibility that these structures served more to discourage conflict and protect goods during trade meetings than to fend off any sort of consistent or regular threat of attack (Trabert and Hollenback 2021).

The Protohistoric and Historic Periods

Around the time of European arrival to the Americas, but long before their first contact with Southern Plains groups, demographic changes were already beginning to take place (Trabert and Hollenback 2021). Social networks that had originated among and between Plains Village communities began to take shape as groups came together and boundaries became more concrete, forming what would become the Ancestral Wichita communities in the west and Ancestral Caddo communities in the east (Drass and Powell 1997; Trabert and Hollenback 2021). Apachean groups also began to move into the Southern Plains in the modern day Oklahoma and Texas Panhandles (Drass and Powell 1997).

Though initial contact with Europeans occurred around 1540 AD, sparse resources and hostile interactions with Indigenous communities discouraged incursions, and serious, sustained contact did not occur until Spain acquired the region from France in the 18th century (Trabert and Hollenback 2021). Even then, the violence and brutality that characterized Spanish colonial rule put them at extreme odds with the Indigenous populations of the Southern Plains, and they struggled to maintain any kind of foothold

(Trabert and Hollenback 2021). Plains groups had much steadier relations with the French, for whom they acted as middlemen, enabling and profiting greatly from trade between Southwestern groups and France's Louisiana colonies (Trabert and Hollenback 2021).

These relations persisted until the early 19th century, when the United States began to set their sights on the Plains, setting in motion a century of broken treaties, wars, land grabs, and relocations that eventually transformed the Southern Plains into their current state (Trabert and Hollenback 2021).

Previous Research in the Arbuckles

Homing in now on the specific area of study, there has been little work studying how these archaeological periods are manifested (if at all) within the Arbuckle Mountains. This is due in large part both to the impermeability of the dense, Cross Timber-shrouded hills as well as to the lack of development in the area (Drass and Powell 1997). As such, the vast majority of sites have been reported, at least initially, by collectors and landowners (Drass and Powell 1997).

The most recent and comprehensive survey project in the Arbuckles was Richard Drass and Valli Powell's survey of the Washita River Basin to the east of the study area, conducted during the winter of 1996-97. Drass and Powell surveyed approximately 4.5 square miles of land along the Washita River and its tributaries, in and around the foothills of Arbuckles, in an effort to better understand the types and densities of sites likely to be present in the mountains (Fig. 3.1).

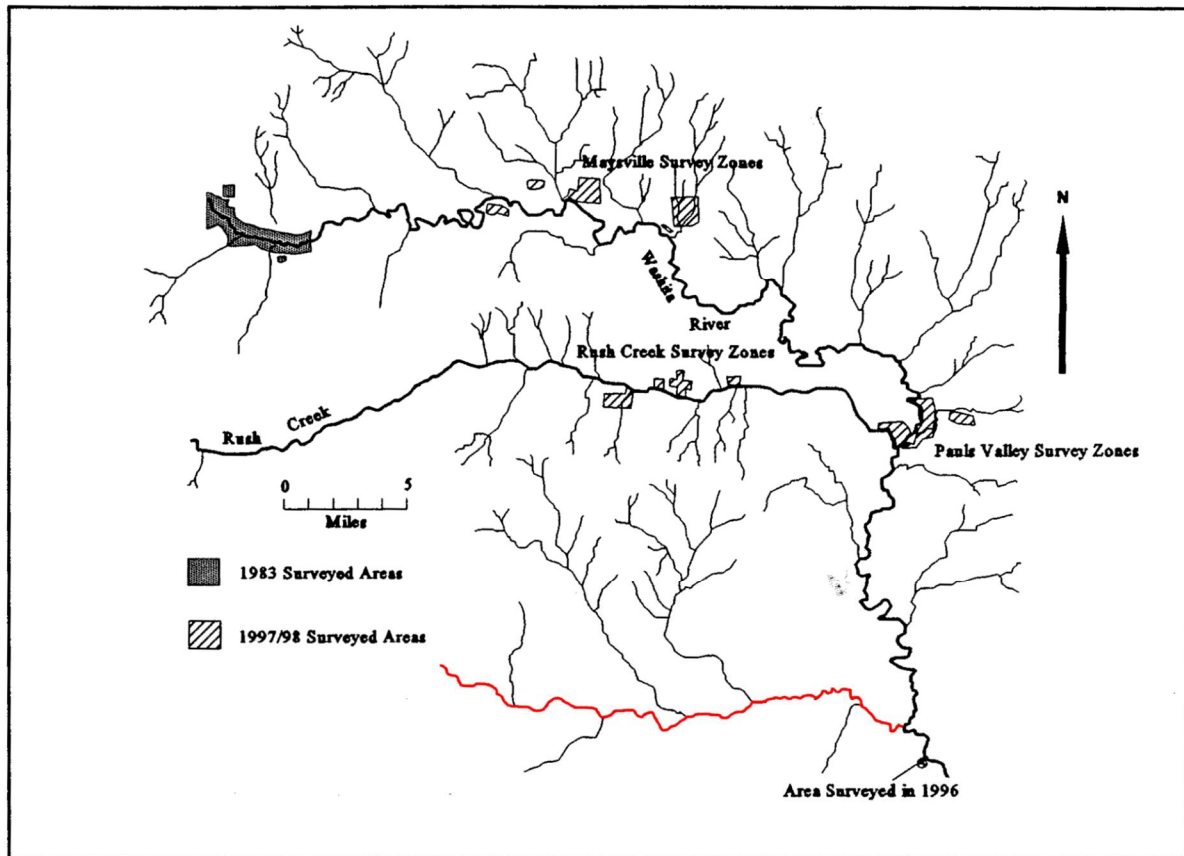


Figure 3.1. Map of Drass and Powell's survey areas with Wildhorse Creek highlighted in red (Adapted from Drass and Powell 1997:2).

This survey recorded, or revisited, a total of 59 sites--13 historic, 24 precontact, and 22 multicomponent sites (Drass and Powell 1997). Starting with sites bearing prehistoric components (n=46), Drass and Powell found sites of three different classes, which they term base camps (n=17), camps (n=28), and workshops (n=1) (1997).

The large majority of precontact sites (over 60%) were classified as "undetermined prehistoric," lacking diagnostic material (Drass and Powell 1997). The next most represented component is the Archaic period, making up approximately 30% of precontact sites. Many of these sites also contain elements from the third most

populous component, the Woodland period, with Drass and Powell noting that repeated occupation of sites seems to be a common occurrence throughout, and transcending these periods (1997). The survey did not identify any Plains Village sites, but some material (two pieces of pottery, a number of triangular arrowheads) evidencing Late Precontact/Plains Village groups was located, and a collector reported a site with evidence of village occupation, but Drass and Powell were unable to gain access to the location (1997). No Paleoindigenous sites were located; however, many of the collectors and landowners whom Drass and Powell interviewed reported isolated finds of Paleoindigenous projectile points (Fig. 3.2)(1997).

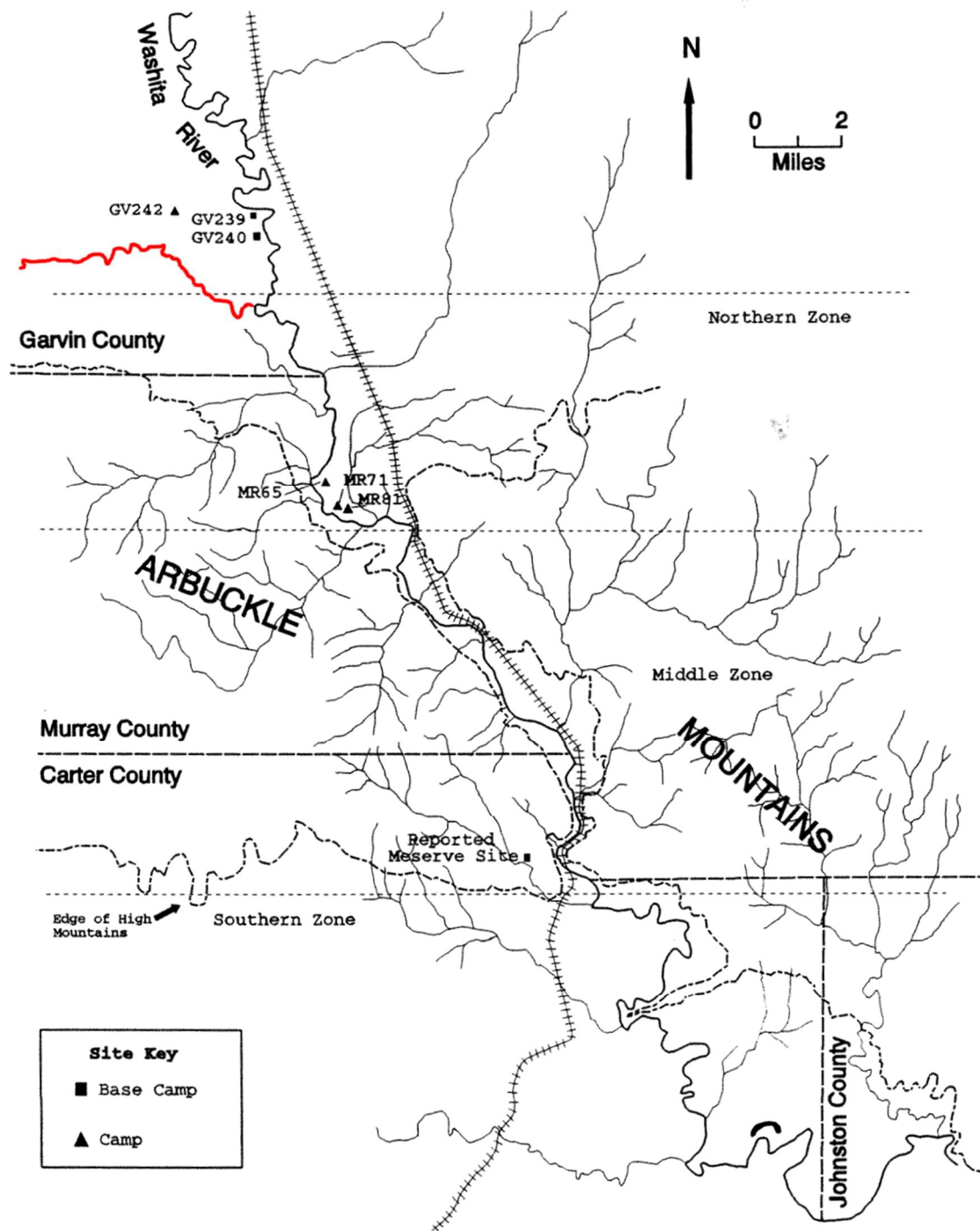


Figure 3.2. Map of potential Paleoindigenous sites reported to Drass and Powell by landowners with Wildhorse Creek highlighted in red (adapted from Drass and Powell 1997: 44).

Regarding the 35 sites with historic components, the majority of these (n=28) were late-19th to early-20th century farmsteads, excepting the presence of six cemeteries, as well as the remains of Fort Arbuckle, a military fort constructed by the US Army in 1850 to protect Chickasaw and Choctaw homesteaders who had been removed to the area around the Arbuckles in the 1830's (Drass and Powell 1997). These historic sites tended to be located on high terraces and ridges overlooking the Washita. It is unclear if this pattern remains for tributaries like Wildhorse, but Drass and Powell noted that early General Land Office (GLO) maps do indicate the potential presence of houses further west and into the mountains (1997).

If the amount of professional archaeological recordation done in the Arbuckles, generally, can be regarded as minimal, then that done along Wildhorse Creek, specifically is virtually nonexistent. Only fourteen sites have been recorded along the totality of Wildhorse Creek, with only nine of those being within my study area. Of these nine sites within the Arbuckles, four lack diagnostic artifacts, three are identified as Woodland period sites, and two are identified as Woodland with possible Late Archaic components.

The most significant and long-running research project along Wildhorse Creek has been conducted by an avocational archaeologist, Roger Hamilton, who, with the guidance of University of Oklahoma Professor Emeritus Don Wyckoff, has for two decades been meticulously cataloguing his survey and surface collection of Wildhorse Creek.

Roger Hamilton's collection from Wildhorse contains projectile points ranging in occupation date from the Early Paleoindigenous period through to the Plains Village and early Historic periods, as well as associated debitage. Though these lithic materials have been removed from their archaeological context by erosion, Roger's detailed provenience recording allows for more information to be gleaned from them than would otherwise be possible.

As I demonstrate in the following chapter, the utilization of geoarchaeological techniques and theory can help reconstruct the post-depositional processes that transported these artifacts from their archaeological context, to their final resting place in the streambed. In doing so, we can access clues as to where those primary contexts (i.e. archaeological sites) might be.

Chapter 4: Method & Theory

Geoarchaeological Theory

What is Geoarchaeology?

To build the research methodology and interpretations necessary to investigate the occupation of Wildhorse Creek by Paleoindigenous and Early Archaic groups, I draw heavily on a particular set of geoarchaeological theories regarding sedimentation, soil formation, and alluvial environments. Before I can address those theories, however, I must first define geoarchaeology itself.

There exist multiple, conflicting definitions of “geoarchaeology” across the archaeological literature. For this thesis, I define geoarchaeology as it was laid out by Karl Butzer, that being “archaeological research using the methods and concepts of the earth sciences” (1982:35). Central to the way Butzer and others see geoarchaeology is the idea that it incorporates geological principles, not just as tools, but throughout all stages of the research process, from the development of research questions, through the investigation, all the way to the interpretation of the results (Butzer 1982; Waters 1992).

This is part of a larger framework that Butzer and others have championed, known as contextual archaeology--essentially the idea that archaeological sites and cultures cannot be understood in isolation, but must instead be situated in relation to the totality of their surroundings, from plants and animals, to climate, landscape, and the sites and cultures they interact with (Waters 1992). Given that the area of focus for my thesis is not a specific site, but the geomorphological landscape (Wildhorse Creek)

within which sites have not yet been delineated, but are known to exist, this contextual, geoarchaeological approach is a prime tool with which to investigate it.

What Can Geoarchaeology Accomplish?

Texas geoarchaeologist Michael Waters defines three major objectives and capabilities of geoarchaeology: to place sites in their relative temporal context (i.e. dating archaeological, or associated, material), to understand the processes behind site formation and preservation (or lack thereof), and to reconstruct the prehistoric landscape in which sites were once situated (Waters 1992). For this project, geoarchaeology is useful in all three of these capacities, but exceptionally so for the latter two.

Concerning the first goal, the relative dating of sites, as Waters notes, this early function of geoarchaeology, accomplished through stratigraphy (a concept I examine momentarily) has largely been superseded by absolute dating techniques such as radiometric methods or luminescence dating (Waters 1992). That said, an understanding of the stratigraphic and depositional contexts from which absolute dating data are drawn is still necessary for interpreting them correctly (Stein 1990; Waters 1992). While this project does not attempt to date specific sites, this concept is still quite relevant to contextualizing the radiocarbon dates utilized to establish the age of past landforms.

Turning to point two, the reconstruction of site formation histories, this aspect of geoarchaeology doesn't just enable researchers to examine a site and understand how it was created and preserved, it also enables examination of the depositional context of

an environment and predict how and where sites in that environment might form, as well as how they might be preserved or destroyed (Waters 1992). This type of study is quite regionally and locally specific, and it allows for the interrogation of assumptions concerning the relative abundance or dearth of particular kinds, or time periods, of sites in a given area. In many cases where scholars have written off the absence of sites as the absence of people, there may have indeed been people, but the sites they created have been destroyed or hidden by the biased sampling patterns of geological processes (Ferring 1992; 2001; Waters 1992). This thesis utilizes the study of these processes to better understand how they might be obscuring the visibility of Paleoindigenous and Early Archaic sites along Wildhorse Creek, as well as in other alluvial environments of the Southern Plains at large.

The same processes that act on sites also act on the greater landscape that they are situated in, which brings us to point three--landscape reconstruction. Understanding the history of erosion, deposition, and weathering that formed the modern landscape we see today can help us turn back the clock and reveal what the past landscape once looked like (Waters 1992). Visualizing past landscapes can help us to better understand how past peoples might have utilized them and, in cases like Wildhorse Creek, where sites are missing, predict where they might be found (Ferring 1992; 2001; Waters 1992).

Geoarchaeological Tools

Having examined the goals of geoarchaeology, I now turn to examine the tools it makes available to achieve these goals. To do this, I must briefly overview key geological processes, namely the formation of sediments and soils, before exploring

how they are used to answer questions of dating, site formation, and landscape reconstruction. Following this, I will outline the specific forces that concern the alluvial study environment of Wildhorse Creek.

Sediments and Soils

Two main geological processes affect landscape change at the time scale archaeologists are interested in, making up two of the biggest elements of the post-depositional process that acts on artifacts, features, and sites after their abandonment--those processes are sedimentation and soil formation (Waters 1992).

If you ask the average person what material archaeological sites are buried beneath, their reply will be simple: “dirt,” but this does not tell the whole picture. That matrix of “dirt” in which sites are embedded is, to geologists and soil scientists, actually composed of two different types of material, sediment and soil, formed by two related, but separate processes.

Sediments

Sediments, as soil scientists define them, are “...the solid inorganic or organic particles accumulated or precipitated by natural or human processes” (Waters 1992:15). In other words, they are any particle that is taken, eroded, weathered, or precipitated from one place, and then deposited someplace else. An example of this might be sand in the desert, eroded by the wind from sandstone cliffs and deposited as dunes miles away, or a volcanic ash that was deposited over the surrounding landscape (Stein 1992; Waters 1992).

There are four main types of sediments: Clastic--sediments that are mechanically weathered and deposited (these sediments make up the majority of those found at archaeological sites); Chemical--sediments that are dissolved into and later precipitated from water, like calcium carbonate; Carbonaceous--organic sediments like leaf litter; and Pyroclastic--volcanic sediments (Stein 1990; 1992; Waters 1992). Humans too can produce sediments, a fifth type some scholars have termed "archaeosediments," citing features like middens and shell mounds (Stein 1990; 1992; Waters 1992).

The main benefit of sediments to archaeology is that, in environments with regular sedimentary deposition, these depositions form a layered, or "stratified" matrix, wherein alternations in patterns of sedimentation generate distinct, observable differences through time (Stein 1990; 2000; Waters 1992). In these situations, different episodes of sediment accumulation form different "strata," broken up by periods of stability or sediment erosion (Stein 1990; Waters 1992). These breaks in the record of deposition are known as "unconformities;" they are of interest to archaeologists because they can convey information about what was occurring in the environment and on that landform in the past, particularly when combined with the study of soil formation (Stein 1990; 1992; 2000; Waters 1992).

When an unconformity is caused by erosion, it is evidenced by an abrupt discordance between the sediments above and below it (Waters 1992) When an unconformity is due to landscape stability, however, it creates the conditions necessary for soil formation (Stein 1992; Waters 1992).

Landscape stability refers to periods of time when neither erosion nor deposition is occurring at a given locale (Waters 1992). The result of this is a solid surface upon

which living organisms such as plants, animals, *and humans* can live, grow, thrive, and die (Waters 1992). It is through processes related to the life cycles of these organisms that soil formation occurs.

Soils

Whereas sedimentation is the translocation of particulate matter from one spot to another, soil formation is physical and chemical weathering which occurs in place (Stein 1992; Waters 1992). Soil is formed through a series of three, or sometimes four, steps. First, organic material is deposited on top of a stable sedimentary surface via the death and decay of plants and animals. Second, that material is broken down into minerals and organic compounds and incorporated into that sedimentary surface as it decomposes. Third and finally, those minerals and compounds that are soluble are carried downwards from the surface, through the layers of sediment by water (Waters 1992). In some cases, such as locales with high water tables, a fourth step occurs in which the precipitates of organic matter do not accumulate in the soil, but are instead flushed out and carried away with the groundwater in a process known as leaching (Waters 1992).

As a landscape remains stable and these processes take place, the precipitation of minerals and organic compounds through the ground physically and chemically transforms sediment into soil. Different minerals and organic compounds concentrate at different depths based on the amount of time the soil has had to develop and the conditions (parent material, topography, climate, and organisms) under which it

developed (Waters 1992). This creates different observable zones of soil formation, known as “horizons” (Waters 1992).

Six major soil horizons exist, but in the context of archaeology, we are mostly concerned with three of them, the A, B, and C horizons. The A horizon is the dark, organic-rich earth within which the immediate precipitates of decaying plant and animal matter accumulate (Waters 1992). Below it is the B horizon, the zone formed by the translocation of soluble compounds and minerals downward from the surface (Waters 1992). The third and final horizon is the C horizon, which is parent material, sediment that has not yet been altered by soil formation processes (Waters 1992). The other three horizons (which may or may not exist in any given profile) are the O horizon--the actual organic matter that accumulates on a stable surface, the E horizon--zones that have undergone intensive leaching by water, and the R horizon--underlying bedrock (Waters 1992).

A well developed soil profile, formed in good conditions and/or over a long period of time, will have a thick B horizon separating the A and C, while a weakly developed soil profile will exhibit a thin or ephemeral B horizon (Waters 1992). In some cases, soils which have had very little time to develop, or developed under poor conditions (such as a hot, dry desert), may not exhibit a B horizon at all, with the A instead being in direct contact with the C (Waters 1992).

These soil horizons are often visible on top of and within the greater stratigraphic profile of a sedimentary deposit. In many cases, after a period of landscape stability and accompanying soil formation, the process of sediment accumulation begins again. If this accumulation is sufficiently intense or long-lived, the soil that had formed may become

buried within the sedimentary stratigraphy (Stein 1992; Waters 1992). In cases where enough sediment accumulates on top of a buried soil to protect it from alteration when the landscape becomes stable again and soil formation processes resume, the soil becomes a “paleosol” (Stein 1992; Waters 1992).

Paleosols are useful resources for archaeologists because they provide what is essentially a preserved snapshot of past conditions (Stein 1992; Waters 1992). Beyond simply serving as an indicator of landscape stability, paleosols can also shine light on past topography and climatic conditions. Because a paleosol was the lived surface at the time it formed, mapping the horizontal extent and variation of paleosols can enable archaeologists to reconstruct past landforms (Waters 1992). Additionally, because the development of soils as well as the minerals and organic compounds they contain are necessarily dependent on the climate that created them, paleosols hold clues to what the climate was like when they formed (Waters 1992). Major climatic shifts can also cause the creation of widespread paleosols across entire localities or regions which, when identified, can be used as stratigraphic markers (Mandel and Bettis III 2001; Waters 1992). An excellent example of this is the Caddo (or Copan) paleosol which formed across large portions of Oklahoma (including Wildhorse Creek) ca. 2000 BP and can be useful in distinguishing Late Archaic, Woodland, and Plains Village sites from those that preceded them (Ferring 1986; 1992).

Just as large organic particles can be dated by radiometric methods, the fine organic particles contained in the A horizon of a paleosol are also dateable (Stein 1992). Because the organic matter in soil is a mix of particles from many different sources, the dates obtained from it are an average, but nevertheless, samples from the

top and bottom of a buried A horizon can provide an important bracketing date of when that horizon began to form and when it was buried, particularly with modern advances in radiocarbon dating, as I will discuss in the Chapter 5 (Stein 1992).

Alluvial Environments

The sedimentary landscape of greatest interest to this thesis is that of the alluvial environment. Oftentimes referred to interchangeably as fluvial environments (a term which more specifically describes riverine landscapes), alluvial environments are any landscape where running water is the main agent of erosion and deposition, ranging in scale from seasonal streams and arroyos, through to massive, transcontinental rivers (Waters 1992).

Alluvial environments are of particular importance to archaeologists because their proximity to running water has made them ideal habitation spots for humanity throughout time, both for hunters and gatherers, as well as agriculturalists (Waters 1992). Additionally, because they remain important spots for humans today, they also happen to be where the majority of archaeological projects conducted under the purview of Cultural Resource Management (CRM) take place (Ferring 1992; 2001). They are also, of course, extremely relevant to this thesis, given that the study area, Wildhorse Creek, is an alluvial environment itself. There are many types of alluvial environment, such as arroyos, alluvial fans, and rivers, but, as Wildhorse Creek is a river, this thesis is concerned only with the latter.

There are four major types of rivers: Straight, Meandering, Anastamosing, and Braided (Fig. 4.1) (Miall 1977; Waters 1992; Ferring 2001). Though portions of rivers

may be straight, rivers that can be categorized on the whole as straight, moving from their headwaters to their terminus in a relatively unwavering line, are exceedingly rare, with most rivers being meandering, anastomosing, or braided (Waters 1992). I will briefly define all three, however, I will focus most heavily on meandering rivers because that is the type that most accurately describes Wildhorse Creek, with the exception of a small portion of the river that has been artificially straightened.

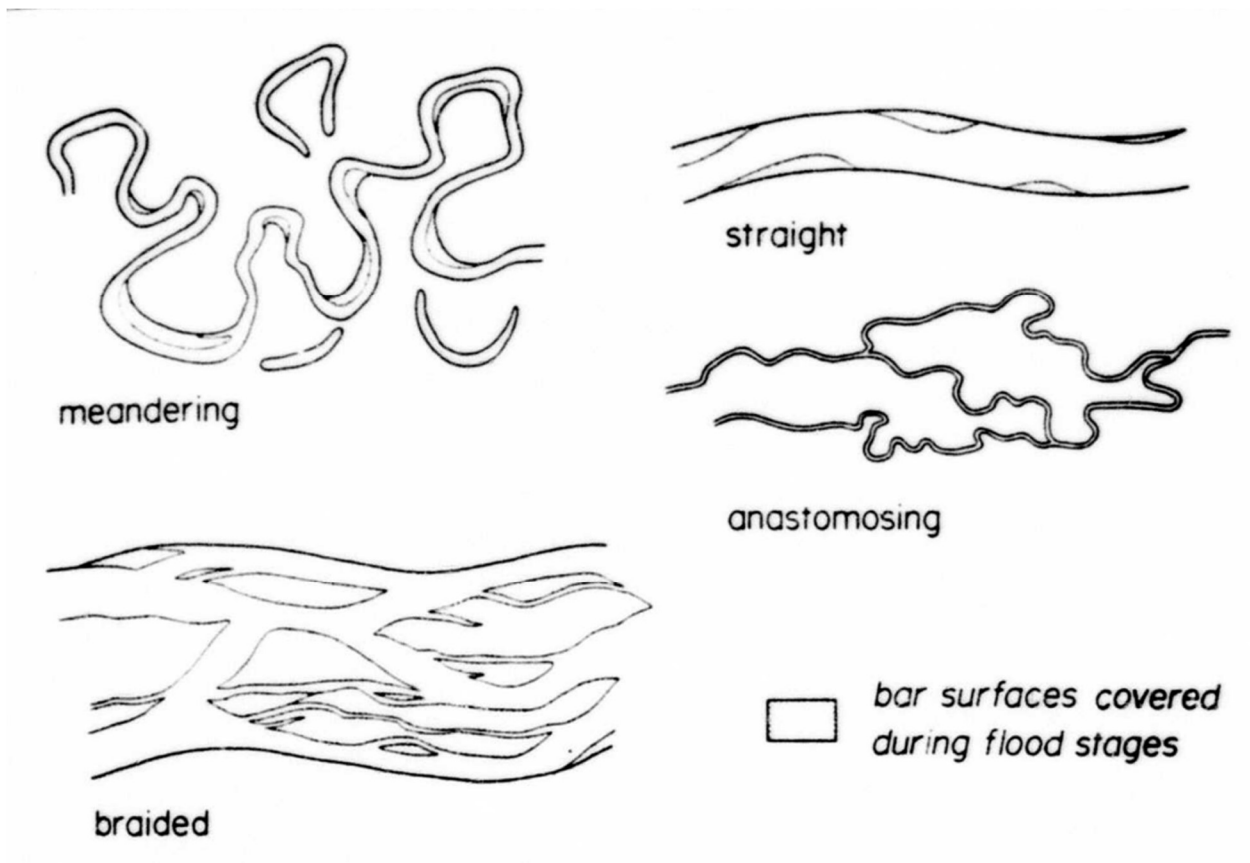


Figure 4.1. Principal river types (From Miall 1977:5)

Braided rivers are characterized by a wide, flat streambed, populated by islands and gravel bars around which the different channels flow (Waters 1992). Anastomosing rivers are similar, being characterized by multiple channels that repeatedly diverge and

come back together, however, they are different in that the channels are usually deeper and migrate over much more extensive floodplain, rather than within a contained streambed (Waters 1992).

Unlike braided and anastomosing rivers, meandering rivers are more sinuous, being confined to a single channel as they wind across a landscape (Waters 1992). Under normal flow conditions (i.e. non-flood rates), this winding powers an erosional process unique to meandering rivers (Fig. 4.2). Weaving back and forth, the water in the river reaches its maximum velocity as it travels down the straightaway approaching the concave bank (or “cut bank”) of each successive meander, eroding away material (Ferring 2001; Waters 1992). As the river rounds each convex bank, it slows, depositing that material which it has eroded, creating a slowly aggrading landform known as a “point bar” (Ferring 2001; Waters 1992). Material eroded from a cut bank does not typically deposit on the point bar immediately opposite it. Instead, it tends to deposit on the next point bar downstream or, in some cases, on point bars even further along (Waters 1992).



Figure 4.2. Normal flow of a meandering river, mapped onto a portion of Wildhorse Creek. (Google Earth, Airbus 4/23/24)

Occasionally (typically once a year or less), meandering rivers exhibit overbank flow, or flooding (Ferring 1992; Waters 1992). In these instances, water inundates the

low-lying valleys immediately adjacent to the river, known as floodplains (Ferring 1992; Waters 1992). As the floodwaters recede, they deposit sediment on top of the floodplains, reworking them, and sometimes burying older soils, then referred to as paleosols (Ferring 1992; 2001; Waters 1992).

When enough deposition accumulates on a floodplain, or when the river downcuts deep enough below it as to place the floodplain out of reach of flooding and sediment aggregation, that floodplain becomes a stable landform known as a terrace (Ferring 2001; Waters 1992). Whether the terrace is created by deposition (fill terrace) or erosion (cut terrace), because its formation depends on the downward migration of the floodplain, the terraces closest to the river are always the youngest, and the terraces furthest from the river are always the oldest (Waters 1992). Terraces are typically numbered T1-Tn, with T1 being the youngest terrace, closest to the river (Waters 1992).

A final process of note along meandering rivers is that of channel abandonment (Fig. 4.3). This happens either via chute cutoff or neck cutoff. In chute cutoff, a new channel begins to erode and the old one is slowly abandoned, forming a “serpentine” lake (Waters 1992). In neck cutoff, on the other hand, the process of erosion causes two successive cutbanks to approach each other. As this occurs, the neck between the two cutbanks narrows, and eventually this increasingly thin partition fails, and the river breaks through, turning the now abandoned loop it has bypassed into an “oxbow” lake (Waters 1992).

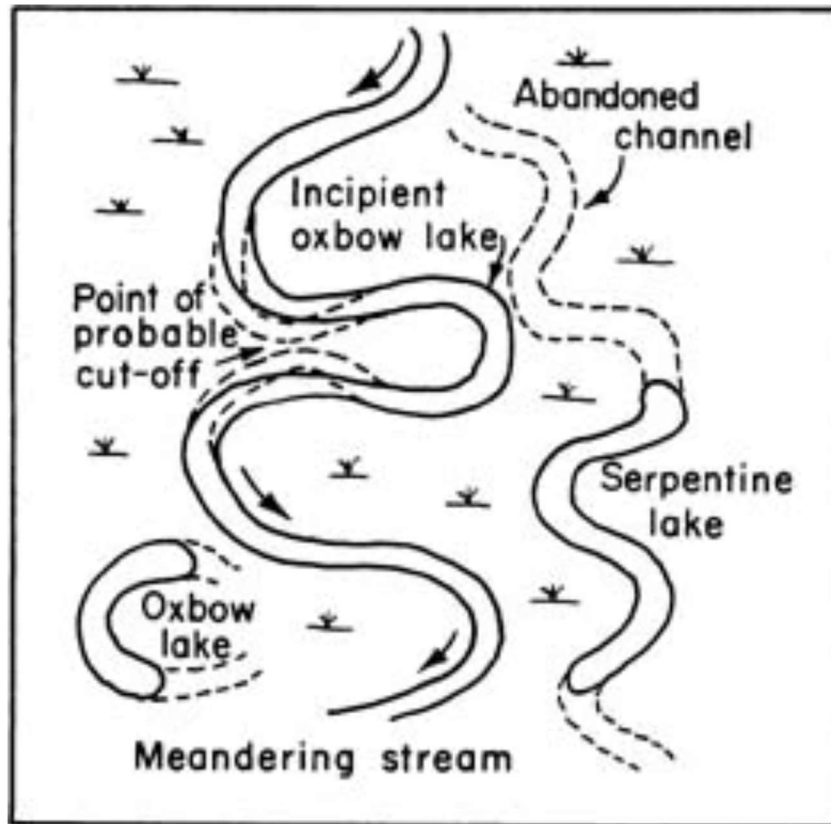


Figure 4.3. Channel abandonment, depicting neck cutoff and the formation of an oxbow lake (left) and chute cutoff and the formation of a serpentine lake (right) (From Tanner 1968:798)

Sites in Alluvial Settings

Archaeological sites can be found in a few different contexts in alluvial settings. For the most part, sites in their primary context occur on terraces or floodplains (Waters 1992). Floodplains, exhibiting regular (if oftentimes infrequent) depositional events, may contain buried archaeological deposits (Ferring 1992; Waters 1992). Between depositional events, floodplains are usable, and in many cases optimal, areas for habitation (Waters 1992). People often set up camp on floodplains during periods of

stability, but eventually, the floodplain would flood again, and sediment would be deposited, burying the archaeological site they created (Ferring 1992; Waters 1992). On the Southern Plains, the massive Late Holocene cutting and filling events discussed in Chapter 2 as evidence for environmental change caused extreme deposition on floodplains across the region (Ferring 1992). Consequently, older floodplain sites in these areas are often buried under massive amounts of alluvium, rendering archaeological surveys that fail to utilize deep testing totally ineffective (Bettis III and Mandell 2002; Hall 1990). Sites along the Trinity River in North Texas are prime examples of this, with some occurring under as much as eight meters of fill (Ferring 1992).

Terraces, unlike floodplains, are generally stable landforms that no longer flood (Waters 1992). For this reason, they commonly house surface sites (Waters 1992). The age of a terrace is functionally when that surface became habitable. Therefore, a Pleistocene terrace, for example, could house surface sites from Paleoindigenous groups, all the way up to the present day, but a Late Holocene terrace could house Late Prehistoric surface sites, but not Paleoindigenous surface sites, because that landform did not exist for people to live on back then (Ferring 1992). Younger terraces can also contain buried sites; however, it should be recognized that when people lived at these sites, they were living on the floodplain of the river, onto which sediment was later deposited, forming the modern terrace (Ferring 1992).

Archaeological sites along meandering rivers may also occur in secondary contexts (Waters 1992). This is due to the previously discussed process of point bar formation. As meandering rivers carve away sediment from cutbanks, they also carve

into any archaeological sites that may be on top of, or buried within that bank (Waters 1992). The artifacts eroded from these sites may then be deposited on point bars along with the sediments they were buried in (Waters 1992). It is in this context that Roger Hamilton found the assemblage of lithic artifacts studied for this thesis.

Summary

Geoarchaeology offers a useful set of practical and theoretical tools that can be used to observe, analyze, and interpret the way the physical environment acts on archaeological sites in alluvial settings like Wildhorse Creek. Analyzing how the biases of geological processes may have preferentially preserved different elements of the archaeological sample available along Wildhorse Creek will enable a better understanding of how people in the past may have utilized the area and enable archaeologists to better predict where signs of their occupation might be found.

Lithics Theory

The second element of this thesis lies in the interpretation of the lithic artifact assemblage found and collected by Roger Hamilton. As just discussed, the artifacts in the assemblage were all found in secondary context, having eroded out of the primary context (i.e. the site) in which they were originally deposited. In the following discussion, I will cover how the lack of primary context limits the interpretation of a lithics assemblage and why, as well as what interpretations can still be made with adequately documented secondary context.

Context and the Interpretation of Lithic Assemblages

Context in archaeology refers to the spatial and temporal associations between an artifact and the environment in which it is found, as well as with the other artifacts within that environment (Butzer 1980). For Karl Butzer, whose contextual and geoarchaeological theories underpinned the previous section, artifacts and context are the two most basic and essential building blocks of archaeology (1980). It is not the artifacts by themselves that inform our understanding of the past, but the relationships between them and their environment (Butzer 1980).

For this reason, understanding the context of a lithic assemblage is incredibly important. Individual lithic tools or pieces of debitage taken by themselves are often not enough to make meaningful and accurate interpretations (Andrefsky 2005; Whittaker 1994). This is why many of the techniques utilized in lithic analysis, such as mass debitage analysis, refitting, or core analysis, go beyond the individual artifact to utilize the relationships *among* the artifacts at a given site (Andrefsky 2005; Whittaker 1994).

The importance of context in making archaeological interpretations is a large part of the reason why archaeologists bemoan looters who remove artifacts from their context (Ray 2016; Whittaker 1994). Even if a looted artifact is tracked down, much less can be learned from it than if it had been documented in place. A projectile point in a bed of bison bones, for instance, tells a much more complete story than that same projectile point on eBay.

But humans aren't the only thing that can remove an artifact from its archaeological context. In the case of Wildhorse Creek, the culprit is the environment. The projectile points and debitage Roger Hamilton collected on the point bars of the

creek have been eroded out of their primary depositional location by the forces of nature. This erosion has stripped these artifacts of their context, and thus the details of their association with place, their association with each other, and their association with any other artifacts that may still be in their sites of origin.

Without context, what can be learned from the Wildhorse lithic assemblage? First, because the forces that removed these artifacts from their primary context and deposited them in the stream bed are natural, studiable, and predictable and, because the secondary context of the artifacts has been documented, some elements of context can be reconstructed (Butzer 1980; Waters 1992). While site-level context is lost to this study, by utilizing geoarchaeological techniques to better understand how these artifacts came to be in the stream bed, loose spatial associations can be made among artifacts deposited in different portions of the creek. Second, utilizing the catch-all spatial association of Wildhorse Creek as a whole, typology can be investigated.

Typological Theory

There are many types of typologies utilized by lithics experts--types based on morphology, types based on use, agglomerative typologies, divisive typologies, and others (Andrefsky 2005). These different typologies and their particular uses in interpreting lithics, but the interest of this thesis lies only on one type of typology, that being chronological.

Chronological typologies are one of the most simple typologies conceptually. When a particular form of artifact is consistently associated with a particular period of time, either through relative or absolute dating techniques, that artifact itself becomes a

useful indicator of time period (Andrefsky 2005; Whittaker 1994). Archaeologists often create regional chronological typologies, wherein the common temporally diagnostic types in a given area are catalogued (Andrefsky 2005). These chronological typologies are useful in that, when matched with the tools in a given lithic assemblage, they can provide archaeologists with a picture of the time period (or periods) over which that assemblage was created (Andrefsky 2005; Whittaker 1994).

In the case of Roger's Wildhorse Creek assemblage, analyzing it through a lens of chronological typology is particularly useful for a couple of reasons. First, because it functions at the artifact level, chronologically typing tools is a means of analysis which remains workable in the absence of site-level context. Second, understanding the array of types present in the assemblage can paint a picture of the occupation history of the Wildhorse Creek area.

Chapter 5: Project Methodology

This chapter addresses the methodology I used to collect geoarchaeological data and lithic typologies. I look first at the geoarchaeology because the bulk of the conclusions of this thesis stem from the results of these investigations. Then, I address the analysis of the lithics assemblage, the presence and composition of which is ultimately what motivated the geoarchaeological investigations of Wildhorse Creek in the first place.

Geoarchaeology

The geoarchaeological aspect of this thesis is composed of two key investigations. The first and foremost of these is the dating of paleosols. Second, is the description of the stratigraphic profiles in which said paleosols were found in order to provide context and help to better understand the past landforms they represent.

In order to access the stratigraphic profiles of landforms along Wildhorse Creek without necessitating the use of mechanical coring and the potential issues that come with it (additional time, equipment expenditures, tracking down and acquiring landowner permissions), I sought out and profiled cutbanks along Wildhorse Creek. Describing profiles via cutbanks posed its own set of issues which will be discussed in depth in the section specifically addressing profile description.

I selected cutbanks opportunistically, based on their accessibility through public lands, or lands for which Dr. Debra Green and Roger Hamilton had pre-existing connections to the landowners who were willing to allow us to traverse their property to

access the river. Of these cutbanks that were available to profile, I selected seven that, together, maximize coverage of Wildhorse Creek.

Buried Soil Dates

The dating of buried soils, as mentioned in the previous chapter, is made possible by the accumulation of organic matter in the surficial A horizons of soils, and the subsequent burial of those horizons, removing them from the process of organic matter deposition (Stein 1992; Waters 1992). The dates I obtained from buried soils provide an absolute age range of the period of landscape stability during which the given soil formed, and therefore the age range during which people could have feasibly occupied that landform (Stein 1992).

These dates are averages because they come from an aggregate of carbon from multiple organisms, but they are still fairly accurate, and, importantly, they err toward the inside of the range of landscape stability (Stein 1992). What this means is that, because the organic matter is a composite of different organisms that died at different times during the soil formation, a date gathered from the top of an A horizon will always be older than when that horizon was buried, and a date gathered from the bottom of that same A horizon will always be younger than when that horizon started forming (Stein 1992). Essentially, with the exception of contamination, a sample should never *overestimate* the date range during which the landscape was stable, only *underestimate* it.

The actual process for acquiring the samples of soil to be dated was relatively simple. First, I scraped back the face of the cutbank using a shovel to remove soil that

had been exposed to the elements and potentially contaminated. Next, using a knife or sharp trowel, I carved a sample of freshly exposed soil out of the profile, directly into a plastic artifact bag (Fig. 5.1). In all cases, I sampled from within the buried A horizon at a distance of at least 5 cm below/above the bordering horizons in order to prevent contamination. In cases where the A horizon was sufficiently deep ($>20\text{cm}$), samples were taken from both the top and bottom of the horizon in order to capture a more comprehensive range of landscape stability.



Figure 5.1. Collecting a sample from the Wildhorse Three cutbank.

Following collection, I took the samples back to the lab where I measured them out into 10g portions. I then re-bagged these sub-samples and sent them to the University of Georgia Center for Applied Isotope Studies (CAIS) for radiocarbon dating (Fig. 5.2).



Figure 5.2. Buried soil samples measured, bagged, and labeled for laboratory analysis.

The CAIS, which specializes in the analysis of microsamples, utilizes Accelerator Mass Spectrometry (AMS) dating, as opposed to standard radiocarbon dating (University of Georgia 2025). Whereas radiocarbon dating detects the radioactivity of ^{14}C in order to produce dates, AMS dating directly measures the ratios of $^{14}\text{C}/^{13}\text{C}$ and $^{13}\text{C}/^{12}\text{C}$ (Harris et al 1987; Lopinot 2016; University of Georgia 2025). This allows for more precise dates to be calculated from significantly smaller samples than traditional radiocarbon dating (as little as $100\mu\text{g}$ of graphitic carbon), significantly increasing the effectiveness of dating material like the organic rich soil samples utilized by this thesis (Lopinot 2016; University of Georgia 2025).

Once received by the CAIS, their protocol calls for samples to be sieved, chemically treated, filtered, and washed to remove any roots, carbonates, or other contaminants, before being combusted to generate carbon dioxide which was then purified and converted to graphite. The carbon isotope ratios of this graphite were then

measured using an accelerator mass spectrometer (Alexander Cherkinsky, CAIS Senior Research Scientist, personal communication, 2025).

The CAIS process returned uncalibrated dates in radiocarbon years before present (1950) (RCYBP) as well as in calibrated years before present (1950) (cal. BP) using the most recent revision (CALIB REV8.2, 2020) of the Stuiver and Reimer calibration program (Alexander Cherkinsky, CAIS Senior Research Scientist, personal communication, 2025; Stuiver and Reimer 1993).

Soil Profiles

The second element of geoarchaeological data gathered were soil profile descriptions. Describing the soil profiles from which dates are obtained is important, not only to understand the context of the dates and the formation history of the landform, but also to ensure that the dates are obtained from layers which are, indeed, buried A horizons (Stein 1992).

I described profiles using the guidelines laid out by the US Department of Agriculture Natural Resources Conservation Service (USDA NRCS) Field Book for Describing and Sampling Soils (2002). I cut back the surface of each cutbank with a shovel to expose fresh, unweathered soil and sediment, after which I measured and described each horizon from top to bottom. Description included depth, Munsell color, plasticity, consistency, texture, grain size, grain sorting, grain rounding, structure, and boundary. After describing the profile, I assigned horizon designations.

I recorded the descriptions on the Oklahoma Archeological Survey Stratigraphic Profile Record form, designed by geoarchaeologist and Assistant State Archaeologist

Dr. Debra Green to help standardize description and ensure all information necessary to painting a complete picture of a stratigraphic profile is captured (Fig. 5.3). Dr. Green assisted and supervised the description of all profiles. In addition, I took photographs of each profile, and drafted simplified, two-dimensional representations of the horizons to aid in interpretation.

SOIL PROPERTIES RECORDING WORK SHEET

Project Name: _____ Date _____
 Location _____ Profile _____

Stratum:	Stratum:	Stratum:
Field Moisture content: Dry Moist Wet	Field Moisture content: Dry Moist Wet	Field Moisture content: Dry Moist Wet
Depth: _____ to _____ cmdb cmbs	Depth: _____ to _____ cmdb cmbs	Depth: _____ to _____ cmdb cmbs
Munsell color: _____ Color name: _____ Mottling? Color _____ Quantity _____ Size _____	Munsell color: _____ Color name: _____ Mottling? Color _____ Quantity _____ Size _____	Munsell color: _____ Color name: _____ Mottling? Color _____ Quantity _____ Size _____
Plasticity: non-sticky slightly sticky sticky non-plastic slightly plastic plastic	Plasticity: non-sticky slightly sticky sticky non-plastic slightly plastic plastic	Plasticity: non-sticky slightly sticky sticky non-plastic slightly plastic plastic
Consistency: Dry: loose v. friable friable hard v. hard Wet: loose v. friable friable firm v. Firm hard v. hard	Consistency: Dry: loose v. friable friable hard v. hard Wet: loose v. friable friable firm v. Firm hard v. hard	Consistency: Dry: loose v. friable friable hard v. hard Wet: loose v. friable friable firm v. Firm hard v. hard
Textural name: S LS SL SCL L CL SiCL SiL Si SiC C SC	Textural name: S LS SL SCL L CL SiCL SiL Si SiC C SC	Textural name: S LS SL SCL L CL SiCL SiL Si SiC C SC
Grain Size: fine medium coarse	Grain Size: fine medium coarse	Grain Size: fine medium coarse
Grain Sorting: poorly-sorted moderately-sorted well-sorted	Grain Sorting: poorly-sorted moderately-sorted well-sorted	Grain Sorting: poorly-sorted moderately-sorted well-sorted
Grain rounding: angular subangular subrounded rounded	Grain rounding: angular subangular subrounded rounded	Grain rounding: angular subangular subrounded rounded
Structure: single grain massive crumbly subangular blocky prismatic columnar Size: v. fine fine medium coarse Grade: weak moderate strong	Structure: single grain massive crumbly subangular blocky prismatic columnar Size: v. fine fine medium coarse Grade: weak moderate strong	Structure: single grain massive crumbly subangular blocky prismatic columnar Size: v. fine fine medium coarse Grade: weak moderate strong
Lower boundary: Sharpness: abrupt clear gradual diffuse Topography: smooth wavy irregular broken/discontinuous	Lower boundary: Sharpness: abrupt clear gradual diffuse Topography: smooth wavy irregular broken/discontinuous	Lower boundary: Sharpness: abrupt clear gradual diffuse Topography: smooth wavy irregular broken/discontinuous
Soil Horizon: O A B Bt Bk C Cr R	Soil Horizon: O A B Bt Bk C Cr R	Soil Horizon: O A B Bt Bk C Cr R
Sediment environment: alluvial eolian colluvial till residuum (bedrock)	Sediment environment: alluvial eolian colluvial till residuum (bedrock)	Sediment environment: alluvial eolian colluvial till residuum (bedrock)
Landform:	Landform:	Landform:
Cultural material:	Cultural material:	Cultural material:
Notes:	Notes:	Notes:

Modified from 1999 Peter W. Birkeland: *Soils and Geomorphology*, Third Edition, Oxford University Press, Oxford

Figure 5.3. Oklahoma Archeological Survey Stratigraphic Profile Record form

The cutbank method of soil profiling was not without challenges. First and foremost was that of safety. All of the profiles examined were well over four meters deep, and therefore well over four meters above the surface of the riverbed. Combined

with the unstable riverbed slump that the ladder was set on and the fact there were only only two researchers present, we deemed it too unsafe to attempt to reach some of the upper layers of soil/sediment. In these cases, I assigned these portions of the profile horizons based on their appearance relative to the horizons which I successfully described.

In one case, the profiling of a cutbank from which I took dates was impossible. In this instance I arrived at the cutbank to discover that a beaver had dammed the river, causing flooding in the exact spot where the cutbank had exposed a series of paleosols (Fig. 5.4). It was possible to get close enough to dig back into the slump and access material for dating, but there was no ground surface available in order to set up the ladder to describe a full profile. In this instance, I was forced to describe the profile visually, from a distance, and this will be noted when it is presented in the following results chapter.



Figure 5.4. Beaver dam at the Wildhorse One locality.

Lithics Analysis

Returning now to the lithics collection that prompted these geoarchaeological investigations, I will first provide a brief overview of the goals of the analysis of this assemblage before diving into the specific data collection protocols. As discussed previously, Roger Hamilton discovered these artifacts in secondary contexts, having eroded into the riverbed of Wildhorse Creek. Given that much of what we can learn from lithics assemblages comes from placing them in relation to one another in their primary contexts, and from cross-comparison with other assemblages, this limits the conclusions that can be drawn (Andrefsky Jr. 2005; Whittaker 1994). There does, however, remain a good deal of valuable information that can be gleaned.

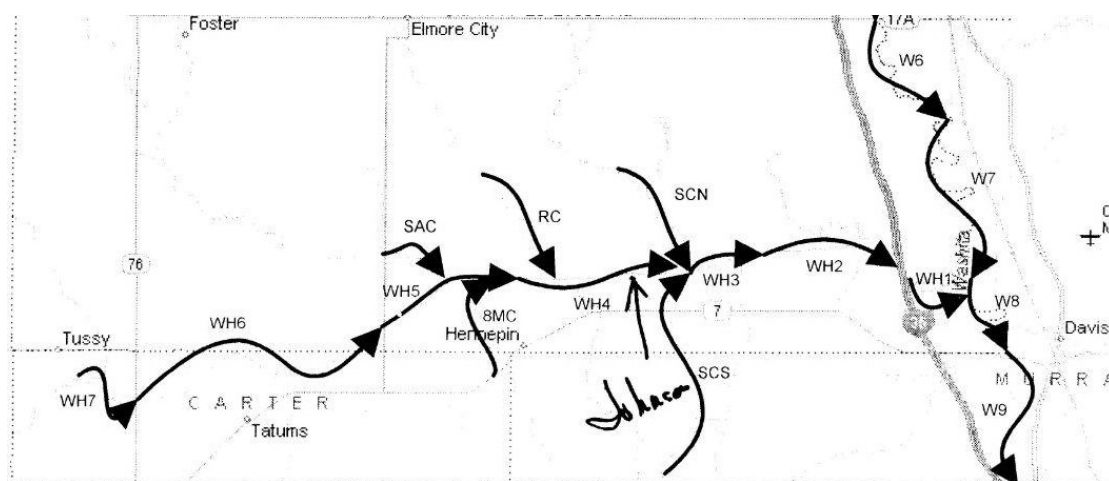
I initially pursued multiple lines of investigation including taking basic measurements, characterizing weathering, and conducting raw material analysis; however, these avenues did not prove fruitful. Fortunately, the first and the largest focus of this analysis did yield results, that being projectile point typology.

Knowing that projectile point styles changed through time, and that different styles are diagnostic of different time periods (Lopinot 2016; Whittaker 1994), by identifying the types present in the Wildhorse assemblage, I developed an understanding of the periods of time during which Wildhorse Creek was used by people. In a moment I will address the specific protocols used to identify artifacts and build a typology, followed by an overview of types, but first, I must briefly cover the collection process itself as it was carried out by Roger Hamilton.

Collection Protocols

The lithics analyzed in this thesis were collected by avocational archaeologist, Roger Hamilton over the past 20 or so years (personal communication, 2024). He performed this collection via regular, non-systematic surface survey of the point bars along Wildhorse Creek. Roger initially recorded the provenience of these finds using a system of numbered point bars. He quickly realized; however, how dynamic this environment was and the speed at which point bars can appear, disappear, and migrate. He thereafter changed to a more consistent recording system (personal communication 2024).

Roger's revised and current provenience system divides Wildhorse Creek into seven subsections based on the smaller tributaries that run into it. These subsections are numbered in order of their distance from the point at which Wildhorse Creek feeds into the Washita River, with WH1 being the closest to that terminus, and WH7 being the furthest (Fig. 5.5).



WH = Wildhorse Creek	SCN = Sandy Creek
-----------------------------	--------------------------

SCS = Squirrel Creek	RC = Rock Creek
8MC = Eight Mile Creek	SAC = Salt Creek
W = Washita River	

Figure 5.5. Roger Hamiltons's provenience map with key. (personal communication, 2024).

The assemblage analyzed for this thesis comprises a subsample that Roger assembled from his much larger collection and that he meant to be representative of the whole, both in terms of projectile point types and ratios of projectile points to debitage. The assemblage totals 318 artifacts--40 projectile points and 278 pieces of debitage. Roger loaned the artifacts to me pre-sorted by provenience, with samples from all subsections of Wildhorse Creek, excluding WH6, which Roger is unable to access, as well as a sample from Wildhorse Creek's largest tributary, Sandy Creek.

In addition to these artifacts, I also include in my typological analysis a further set of 10 projectile points that Roger analyzed and photographed with the assistance of University of Oklahoma Professor Emeritus Don Wyckoff (personal communication, 2024). Preferring me to focus on artifacts he had not yet analyzed, but wanting me to have a complete picture of the cultural material within Wildhorse Creek, Roger did not provide me with these points, but he did furnish the photographs and notes from his and Dr. Wyckoff's analysis, all of which provide provenience and are sufficient to make a typological assessment.

Typological Protocols

Having addressed the collection of the lithic assemblage, I move now to the specific protocols I followed to analyze and type it. The types used in this analysis were drawn from the *Guide to the Identification of Certain American Indian Projectile Points* volumes, authored by Robert E. Bell and Gregory Perino and published between 1958 and 1971 by the Oklahoma Anthropological Society. Though somewhat dated, these guides remain the standard typological assessment tools utilized by the majority of professional archaeologists in the state of Oklahoma to identify projectile points and build typologies for survey reports and site recordation (Roger Burkhalter, personal communication, 2024; Chris Cojeen, personal communication, 2024; John Dockall, personal communication, 2024; Jennifer Haney, personal communication, 2025; Truet Hinson, personal communication, 2024; Haley Rush, personal communication, 2024). Because the results of this thesis are likely to most directly benefit Cultural Resource Management (CRM) professionals performing surveys along Wildhorse Creek or similar environments in the Southern Plains, I felt it pertinent to utilize the same assessment tools that they do.

To ensure the accuracy and contemporaneity of the typology, I also cross-referenced my assessments against the slightly further afield, but more recent publications *Projectile Point Types in Missouri and Portions of Adjacent States* by Jack H. Ray (2016) and *Stone Artifacts of Texas Indians, Third Edition* by Ellen Sue Turner et al (2011), both of which are also utilized by CRM professionals (John Dockall, personal communication, 2024; Truet Hinson, personal communication, 2024; Kary Stackelbeck, personal communication, 2024). I assigned types conservatively, with classifications

that were in doubt being designated “Unknown.” The following are the 14 types recognized in this study.

Typology

Clovis

Age Range: 13,250-12,800 cal. BP (Waters and Stafford 2007)

Description: The Clovis type is the earliest widely-recognized diagnostic type in North America (Turner et al 2011). It is a lanceolate point of considerably varied size, though typically larger, thicker, and heavier than other Paleoindigenous projectile points (Bell 1958; Turner et al 2011). Clovis points are recognized by their distinctive convex bases and a flute extending halfway from the base to the tip of the point or less, as well as heavy grinding on the basal edges (Fig. 5.6) (Bell 1958; Turner et al 2011).

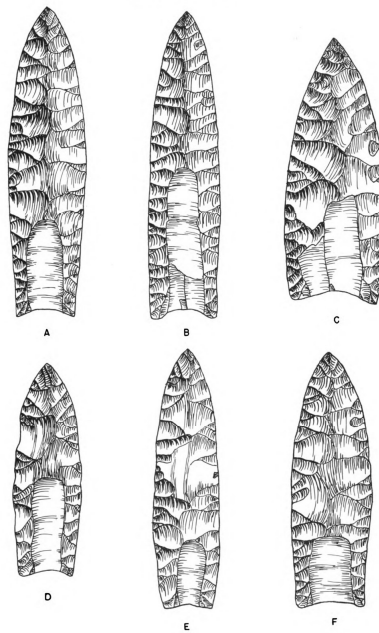


Figure 5.6. Clovis projectile points (Bell 1958:17).

Dalton

Age Range: 12,680-10,400 cal. BP (Thulman 2019)

Description: The Dalton type is a medium-sized lanceolate point of the early-to-middle Paleoindigenous period (Bell 1958). Dalton points have heavily concave bases which are often thinned on one or both sides (Fig. 5.7)(Bell 1958; Turner et al 2011). The basal edges tend to be parallel, sometimes distinctly more so than the triangular point, and are typically ground smooth (Bell 1958; Turner et al 2011).

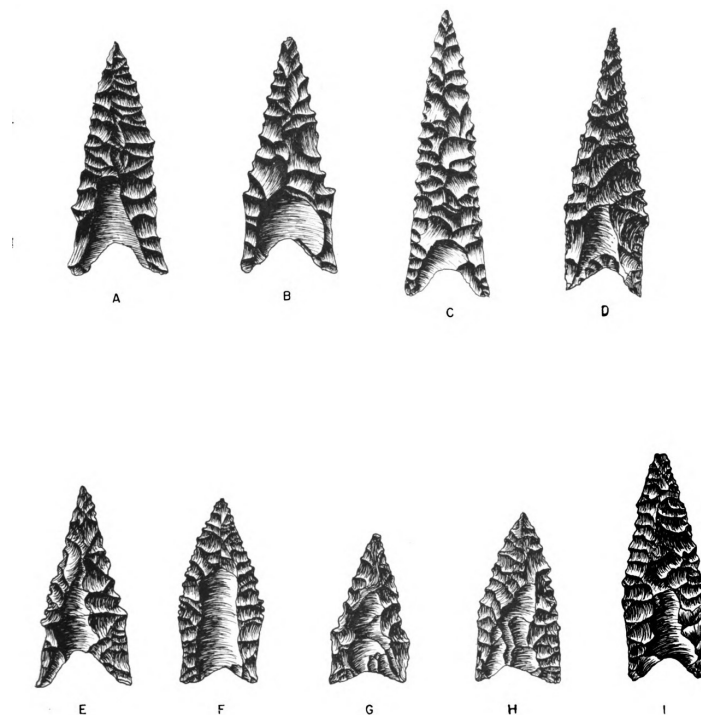


Figure 5.7. Dalton projectile points (Bell 1958:19).

Scottsbluff

Age Range: 9,500-7,000 cal. BP (Bell 1961)

Description: The Scottsbluff type is a late Paleoindigenous period stemmed point belonging to the Cody Complex named for the Horner site near Cody, Wyoming where the type was found in association with types such as the Eden projectile point and the Cody knife (Bell 1961). Scottsbluff points are medium-to-large points with square to rectangular stems, usually ground smooth, and are typically noted for demonstrating a high level of craftsmanship (Fig. 5.8)(Bell 1961). The type is often subdivided into Scottsbluff Type I, being longer and thicker with weaker shoulders, and Scottsbluff Type II, being shorter and thinner with stronger shoulders (Fig. 5.8)(Bell 1961).

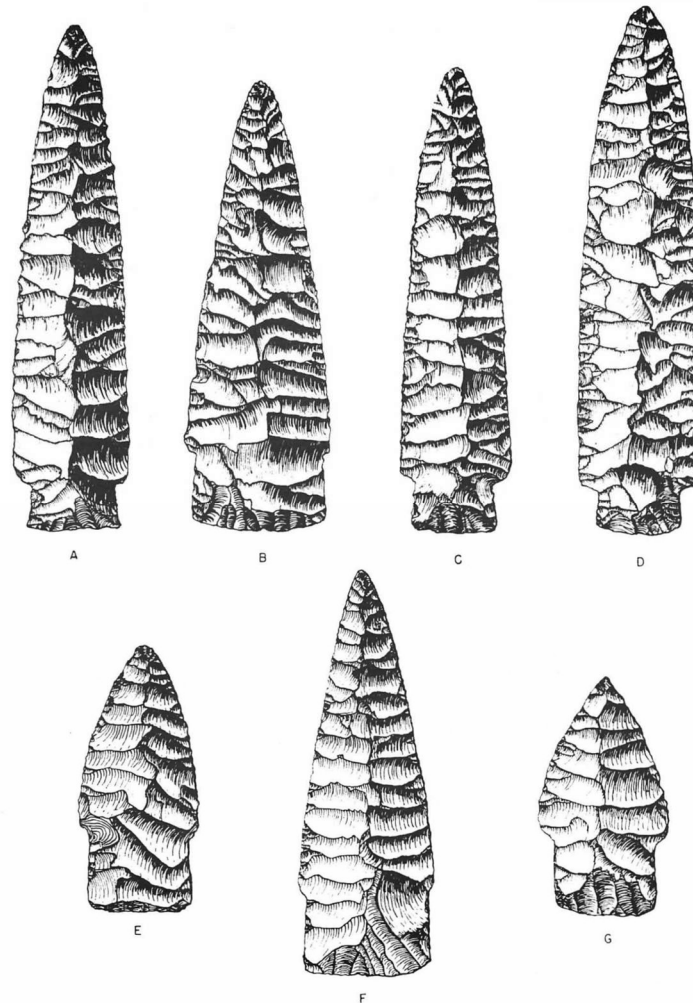


Figure 5.8. Scottsbluff projectile points. The top set (items A-D) represent the longer, thinner Type I, while the bottom set (items E-G) represent the shorter, stouter Type II (Bell 1961:87).

Williams

Age Range: 6,000-1,000 cal. BP (Bell 1961; Turner et al 2011)

Description: The Williams type is a medium-sized corner-notched dart point of the middle-to-late Archaic period (Bell 1961; Turner et al 2011). The notching typically forms an expanding stem with a convex base (Fig. 5.9)(Bell 1961;

Turner et al 2011). It shares some similarities with the Castroville and Marcos types, also noted in this analysis, but has a significantly more rounded profile than those two counterparts (Bell 1961).

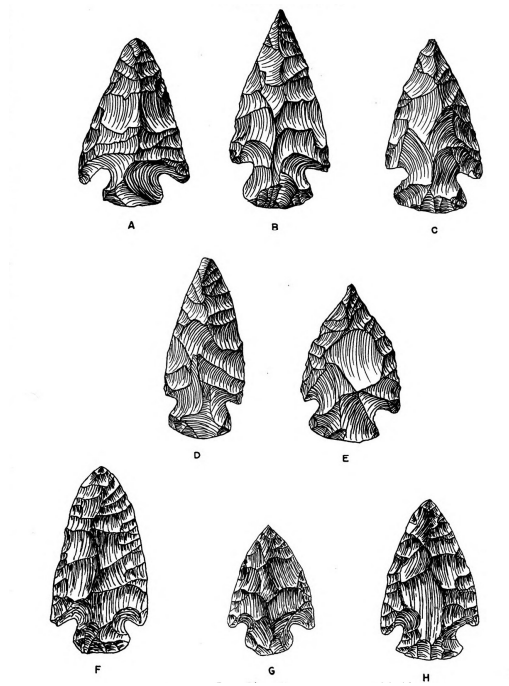


Figure 5.9. Williams projectile points (Bell 1961:97).

Calf Creek

Age Range: 5,500-4,500 cal. BP (Thurmond and Wyckoff 1999)

Description: The Calf Creek type is a large, distinctive dart point made over a relatively short period of time during the middle Archaic period (Perino 1968; Thurmond and Wyckoff 1999). It is noted for having extremely deep basal notches, either directly parallel or at a slight inward angle, creating long “ears” that are often broken on archaeological specimens (Fig. 5.10) (Perino 1968; Thurmond and Wyckoff 1999).

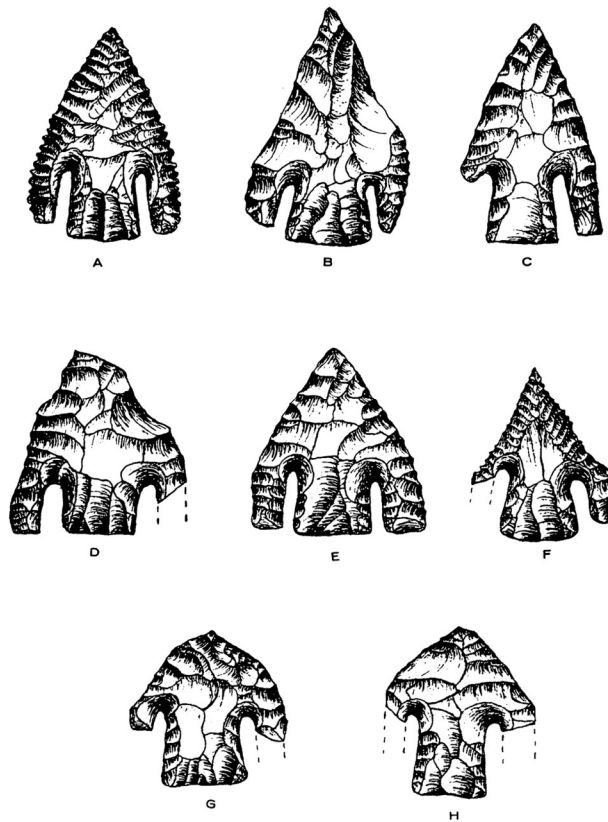


Figure 5.10. Calf Creek projectile points (Perino 1968:15).

Abasolo

Age Range: 5,000-1,400 (Bell 1958; Turner et al 2011)

Description: The Abasolo type is a large, unstemmed, leaf-shaped dart point of the Archaic period (Bell 1958; Turner et al 2011). The base of the point is convex, often rounded to the point of being semicircular, and sometimes thinned (Fig. 5.11)(Bell 1958; Turner et al 2011). The edges are sometimes beveled, or steeply chipped (Bell 1958; Turner et al 2011).

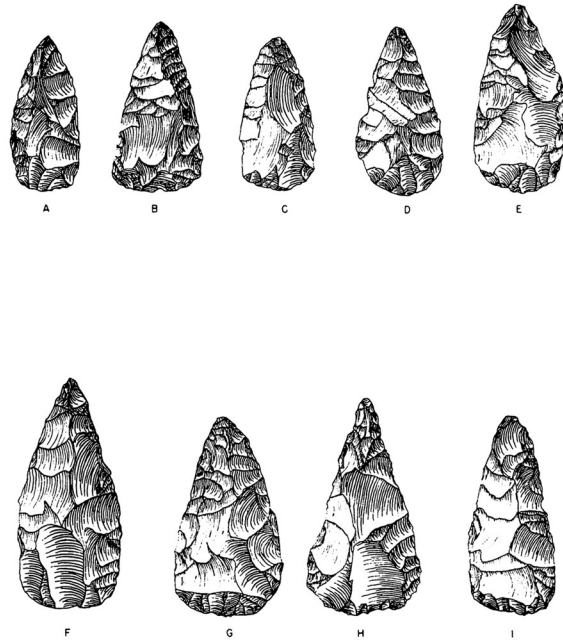


Figure 5.11. Abasolo projectile points (Bell 1958:3).

Langtry

Age Range: 5,000-1,000 cal. BP (Bell 1958; Turner et al 2011)

Description: The Langtry type is an Archaic period dart point of small-to-medium size, noted for its flaring shoulders and strongly contracting stem (Fig. 5.12)(Bell 1958; Turner et al 2011). The base is quite varied, from strongly concave to straight, or rarely convex (Bell 1958; Turner et al 2011). The blades are typically straight and occasionally beveled (Bell 1958; Turner et al 2011)

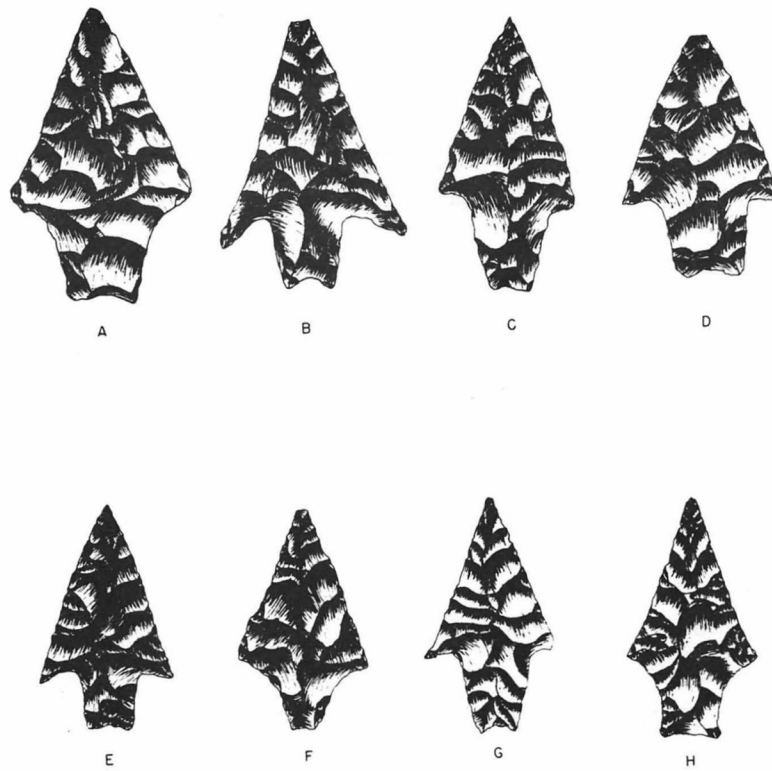


Figure 5.12. Langtry projectile points (Bell 1958:39).

Travis

Age Range: 4,600-4,000 cal. BP (Turner et al 2011)

Description: The Travis type is a medium-to-large sized dart point of the middle Archaic period (Bell 1958; Turner et al 2011). Travis points typically have rectangular to expanding stems with rounded, poorly defined shoulders and straight bases (Fig. 5.13)(Bell 1958; Turner et al 2011). The edges are typically not beveled (Bell 1958; Turner et al 2011).

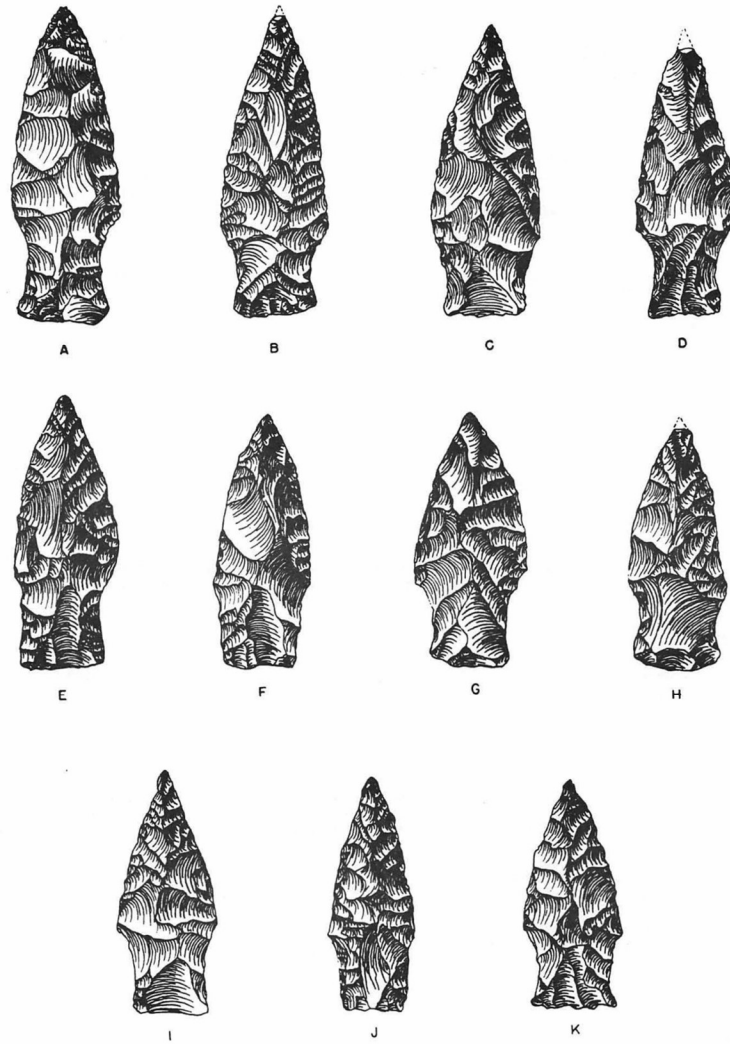


Figure 5.13. Travis projectile points (Bell 1958:95).

Gary

Age Range: 4,000-1,000 cal. BP (Bell 1958; Turner et al 2011)

Description: The Gary type is an Archaic period dart point of extremely varied size found with particularly high frequency throughout Oklahoma, Texas, Arkansas, Louisiana, and Mississippi (Bell 1958; Turner et al 2011). Gary points are often thick and crudely flaked (Fig. 5.14)(Bell 1958; Turner et al 2011). They have strongly contracting stems with pointed to rounded bases and shoulders

with small to moderately flared barbs (Bell 1958; Turner et al 2011). The Gary type is often broken up into different forms such as Dallas, Wells, Waubesa, etc. (Bell 1958; Ray 2016; Turner et al 2011), however, given the lack of strong evidence for chronological distinction among these alternate types, they have not been split here.

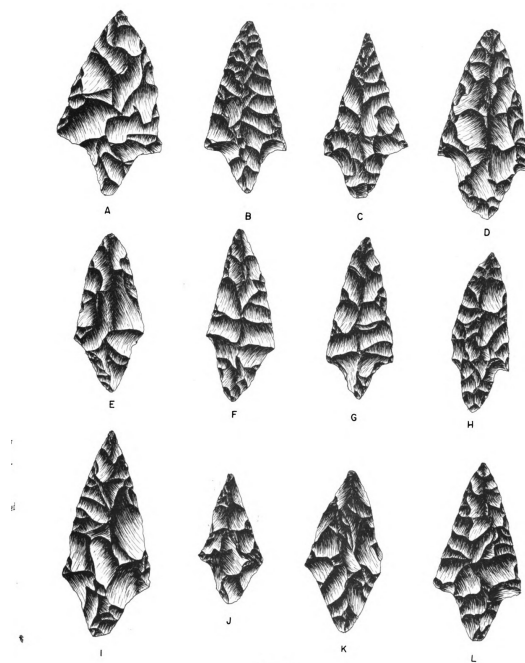


Figure 5.14. Gary projectile points (Bell 1958:29).

Carrollton

Age Range: 4,000-1,000 cal. BP (Bell 1958; Turner et al 2011)

Description: The Carrollton type is a small-to-medium sized dart point of the middle-to-late Archaic period (Bell 1958; Turner et al 2011). Carrollton points are characterized by their roughly rectangular, straight-based stems which are sometimes as long or longer than the point, apparently due to extensive

resharpening (Fig. 5.15)(Bell 1958; Turner et al 2011). Craftsmanship is often crude and irregular (Bell 1958; Turner et al 2011).

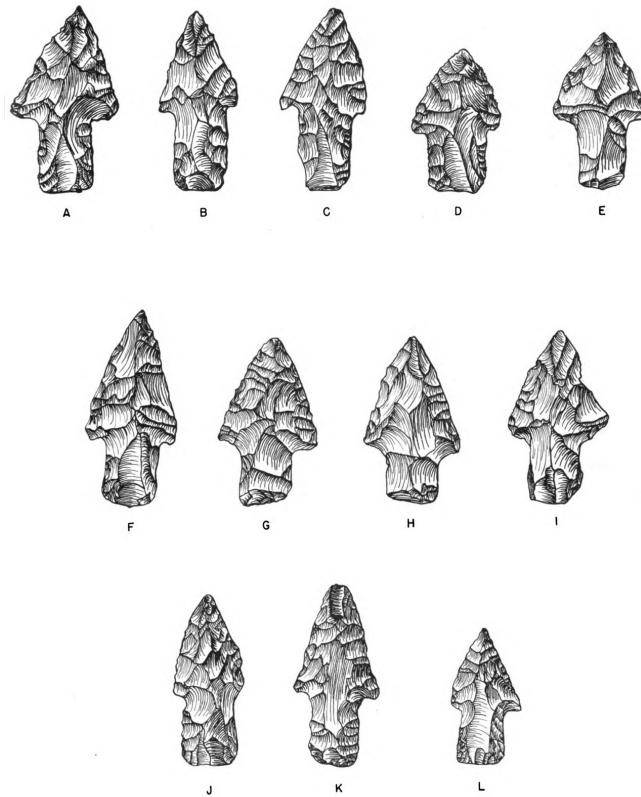


Figure 5.15. Carrollton projectile points (Bell 1958:13).

Castroville

Age Range: 2,800-2,400 cal. BP (Turner et al 2011)

Description: The Castroville type is a basal notched dart point of the late Archaic period (Bell 1958; Turner et al 2011). Castroville points are noted for their pronounced barbs and expanding stems; they also often have highly straight edges which distinguish them from other similar types like the Williams dart point (Fig. 5.16)(Bell 1958; Turner et al 2011).

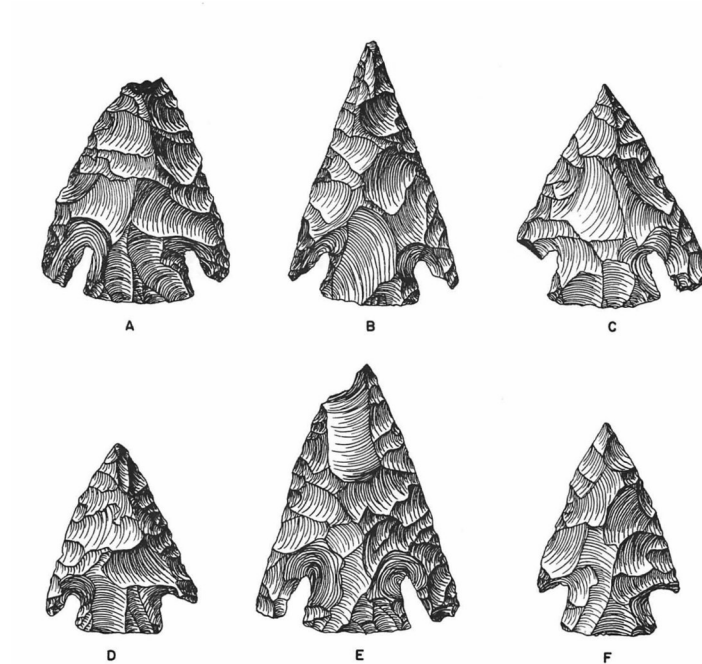


Figure 5.16. Castroville projectile points (Bell 1961:15).

Marcos

Age Range: 2,600-1,800 cal. BP (Bell 1958; Turner et al 2011)

Description: The Marcos type is a corner notched dart point of the late Archaic period (Bell 1958; Turner et al 2011). Marcos points are similar in shape to Castroville points, but can be distinguished by their angular notching, typically at about 45 degrees, which produces a more strongly expanding stem with a narrower neck and a broader, straighter base (Fig. 5.17)(Bell 1958; Turner et al 2011).

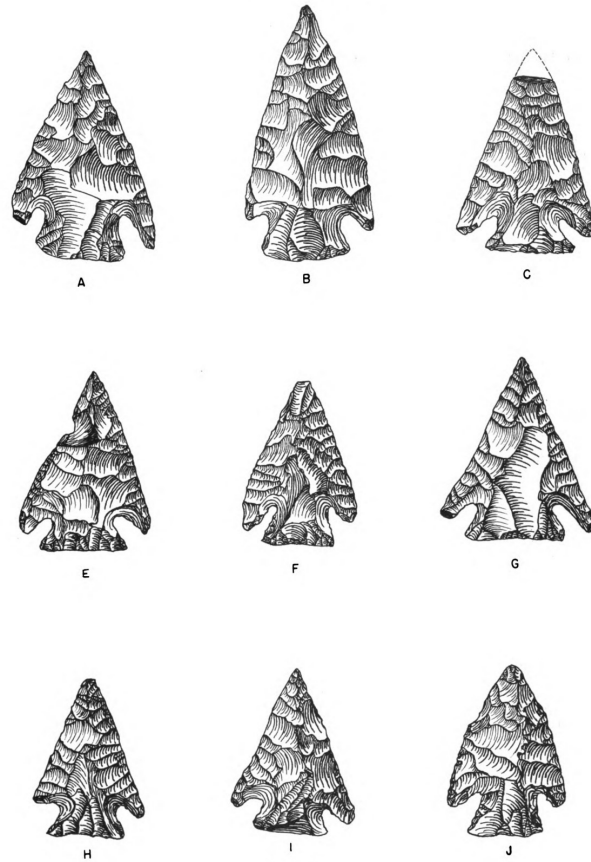


Figure 5.17. Marcos projectile points (Bell 1958:43).

Frio

Age Range: 2,200-1,400 cal. BP (Bell 1961; Turner et al 2011)

Description: The Frio type is transitional Archaic-Woodland period, small-to-medium sized, corner notched dart point (Bell 1961; Turner et al 2011). Frio points are recognized by the bifurcation of their base by a U-shaped notch of varying depth (Fig. 5.18)(Bell 1961; Turner et al 2011). The barbs of Frio points are often weak, but can be stronger on some specimens (Bell 1961). The blade edges are typically straight to convex (Bell 1958; Turner et al 2011).

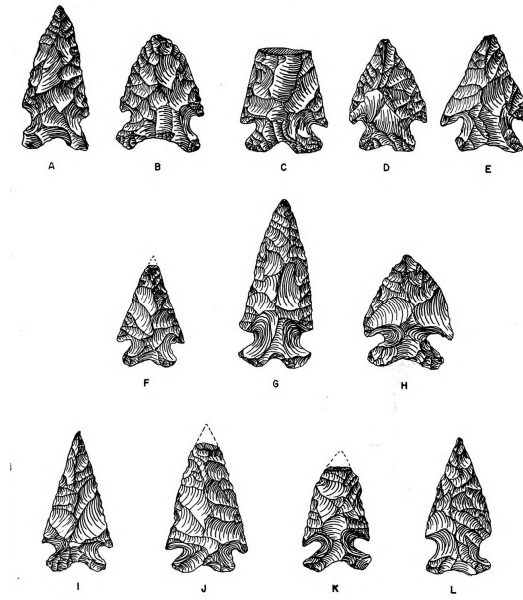


Figure 5.18. Frio projectile points (Bell 1961:49).

Scallorn

Age Range: 1,300-500 cal. BP (Perino 1968; Turner et al 2011)

Description: The Scallorn type is a small arrowpoint of the Plains Village to Protohistoric/Historic Period (Perino 1968; Turner et al 2011). Scallorn points are corner notched with thin necks and flaring stems (Fig. 5.19)(Perino 1968; Turner et al 2011). Bases vary greatly from strongly concave, to straight, to strongly convex (Perino 1968; Turner et al 2011). Blade edges are straight to convex, and are often finely serrated (Perino 1968; Turner et al 2011).

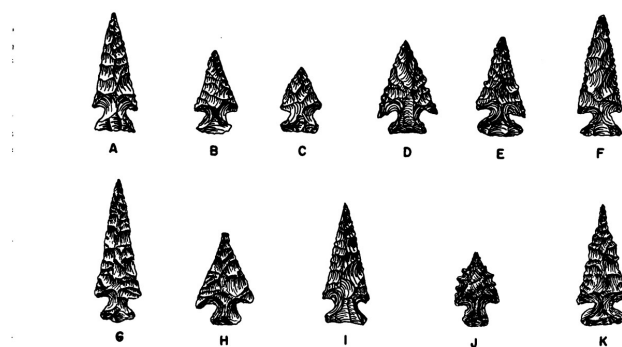


Figure 5.19. Scallorn projectile points (Perino 1968:85).

Chapter 6: Geoarchaeological Results

This chapter presents the results of the geoarchaeological investigations at Wildhorse Creek. It is organized by location of the cutbanks sampled and analyzed (Fig. 6.1), moving from the headwaters, east towards the Washita River with an additional section at the end for Sandy Creek, a major tributary of Wildhorse. Each section covers the description of the cutbank sampled, noting the various horizons and the buried soils from which samples for AMS dating were collected, followed by the presentation of those dates (Table 6.1).

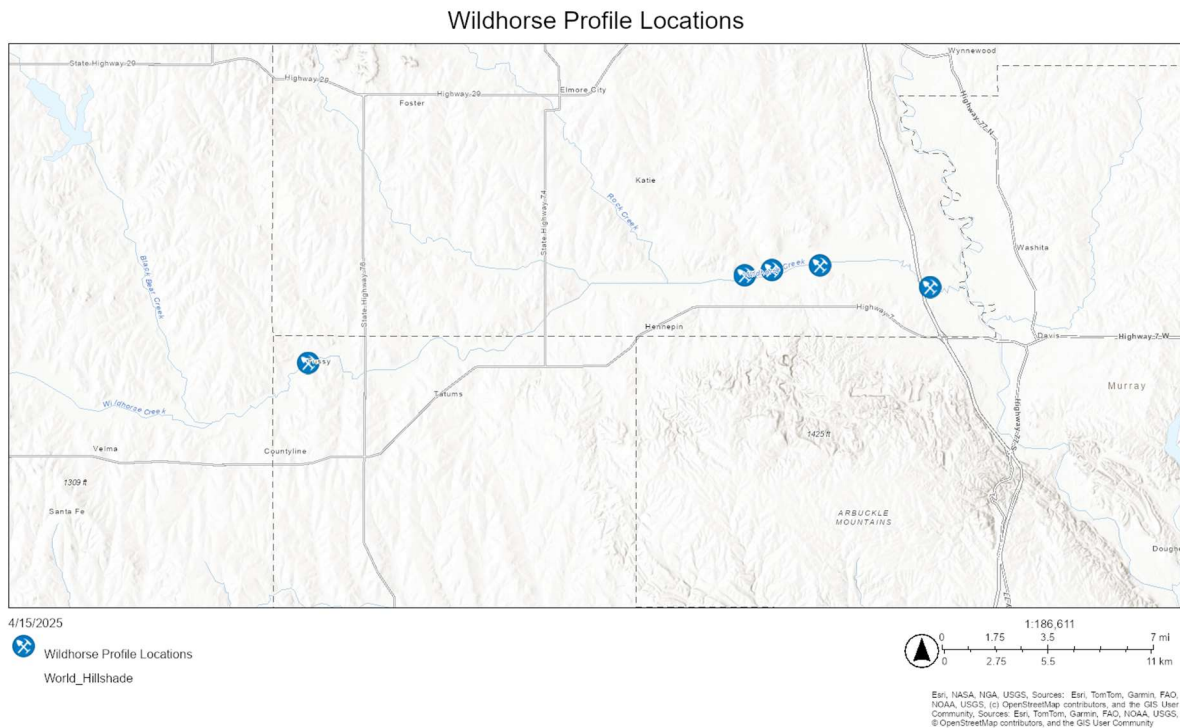


Figure 6.1. Topographic map of Wildhorse Creek displaying the locations of cutbanks profiled

UGAMS#	Horizon	Locality	Depth	Material	¹⁴ C Age, Years BP	±	Paleosol Interval
71884	3Ab	WH7	95cmbs	Soil	1000	20	Delaware
71885	4Abk; top	WH7	155cmbs	Soil	1720	20	Caddo
71886	4Abk; bottom	WH7	330cmbs	Soil	4030	25	Wildhorse Creek
75637	Ab	WH4	75cmbs	Soil	2170	25	Caddo
75638	2Ab	WH4	200cmbs	Soil	4670	30	Wildhorse Creek
75919	Ab	WH4	Not Taken	Soil	1560	25	Caddo
66515	2Ab	WH3 (2023)	100cmbs	Soil	940	20	Delaware
66516	2Ab2; top	WH3 (2023)	120cmbs	Soil	1350	20	Caddo
66517	2Ab2; bottom	WH3 (2023)	200cmbs	Soil	2160	30	Caddo
73341	3Ab; top	WH3	140cmbs	Soil	970	20	Delaware
73342	3Ab; bottom	WH3	210cmbs	Soil	2060	20	Caddo
73343	4Ab	WH3	245cmbs	Soil	3960	25	Wildhorse Creek
73344	5Ab	WH3	315cmbs	Soil	4330	25	Wildhorse Creek
73953	2Ab	WH1	155cmbs	Soil	2510	20	Caddo
73954	3Ab	WH1	305cmbs	Soil	10440	30	Black Mat
75635	Ab; top	SCN1	195cmbs	Soil	1970	25	Caddo
75636	Ab; bottom	SCN1	275cmbs	Soil	2650	25	Caddo
75920	Ab; top	SCN2	240cmbs	Soil	3570	30	Wildhorse Creek
75921	Ab; bottom	SCN2	280cmbs	Soil	4090	30	Wildhorse Creek
75922	Gravel Lens	SCN2	250cm above creekbed	Soil	7210	30	Early Holocene

Table 6.1. Radiocarbon dates from buried soil samples.

Wildhorse Seven Cutbank



Figure 6.2. Overviews of the Wildhorse Seven cutbank and surrounding locale

Dr. Green and I investigated the Wildhorse Seven Cutbank locale on August 23rd, 2024 (Fig. 6.2). It is located in the NE/4 SW/4 SW/4 of Section 5, Township 3 South, Range 5 West in Carter County, at 14N 633869m E 3817915m N (Fig. 6.3). We gained access to this cutbank through a roadside public fishing hole off of Shamrock Road approximately 0.9 miles south of Tussy, Oklahoma.

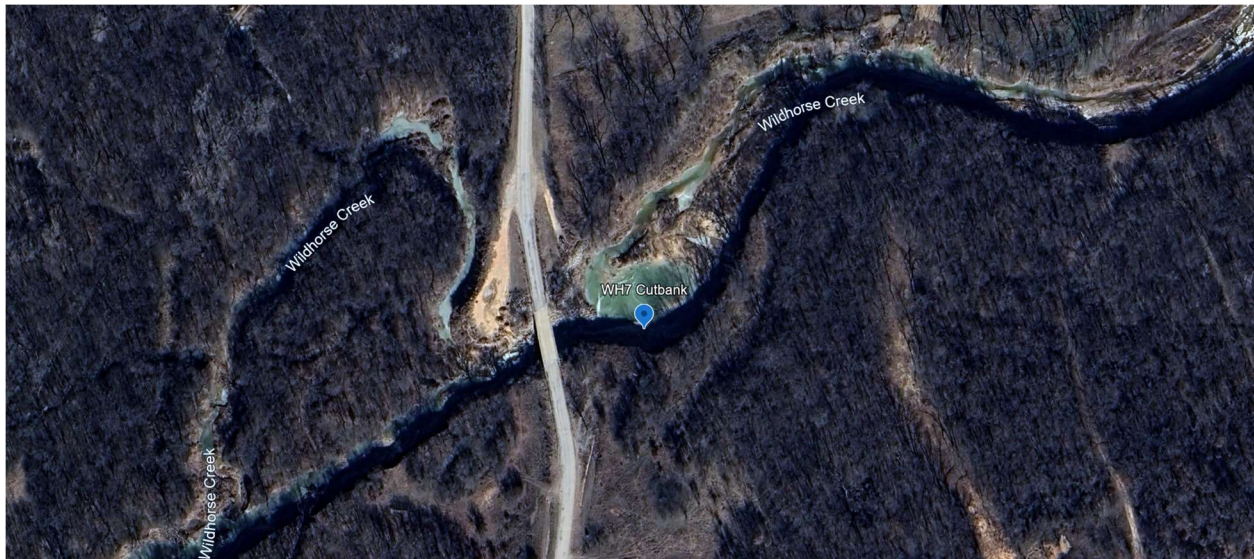


Figure 6.3. 2024 Aerial image of the Wildhorse Seven cutbank location (Airbus 2024)

We described the stratigraphy of the majority of the cutbank down to NRCS standards, with the exception of the top 70 centimeters which we described visually due to safety concerns regarding the stability of the telescoping ladder on the sandy streambed.

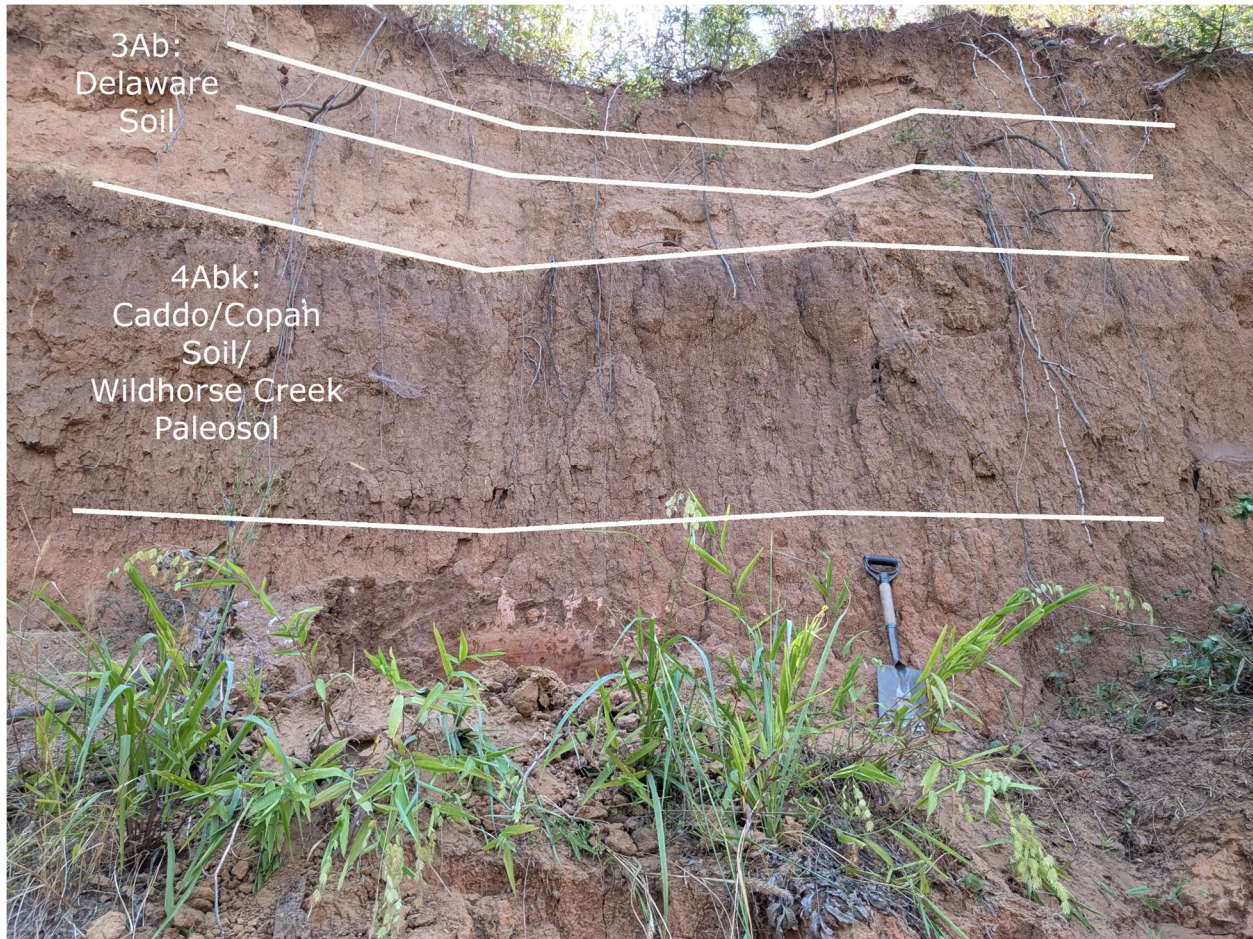


Figure 6.4. Paleosols within the profile of the Wildhorse Seven Cutbank

The top 150 centimeters of the profile show an alternating stratigraphy of Ap-C-Ab-Cb-2Ab-2Cb-3Ab-3Cb horizons (Fig. 6.5). The thin nature of the buried A horizons, as well as the absence of B horizons indicates that these young soils are weakly developed, and likely had only short periods of stability between depositional events. Following these horizons is a ~2 meter thick 4Abk horizon followed by a 3+ meter thick 4Btkb horizon terminating at a layer of slump which blends into the streambed at a bottom depth of 635cmbs. The thickness of this buried 4Abk horizon, as well as the

presence of a strongly developed buried 4Bktb horizon, high in clays and carbonates, indicates that this soil formed over a long period of landscape stability.

The lowest buried soil mantles the Permian-age residuum soil (5Cr). The boundary between the two represents an unconformity, indicating a gap in time marking either an erosional event or non-depositional surface separating the Holocene-age buried soil and the Permian-age sedimentary layer.

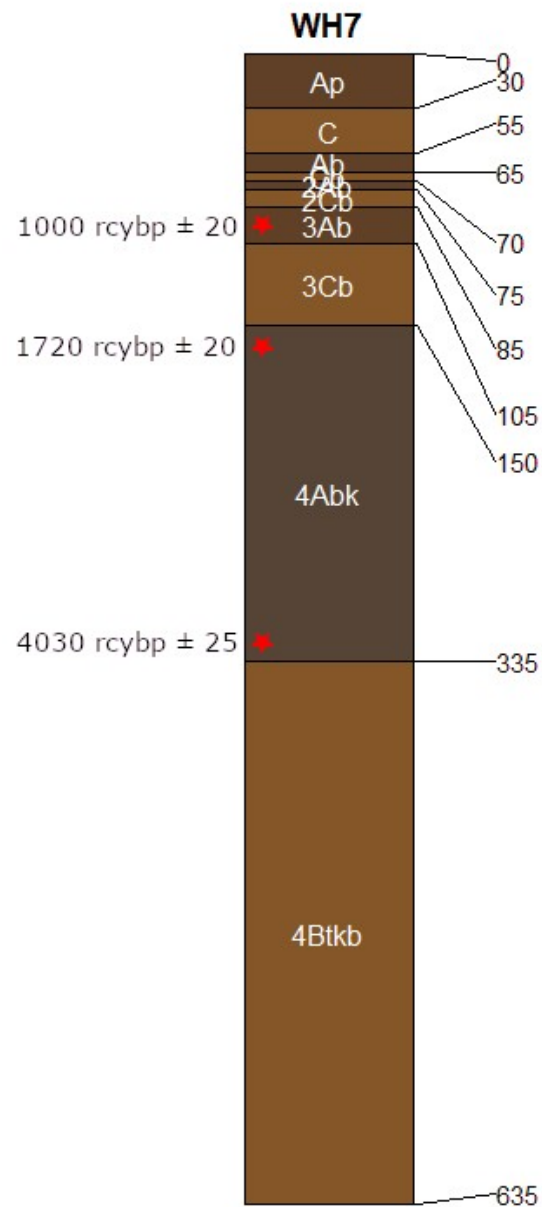


Figure 6.5. The stratigraphy of the Wildhorse Seven cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the dates in radiocarbon years before present (rcybp).

Of the two buried A horizons within this cutbank that were safely accessible, we took three samples for dating (Fig. 6.5). Given its relatively thin nature, only one sample was taken from the center of the third buried A horizon (Ab3) at a depth of approximately 95cmbs. Two samples were taken from the fourth buried A horizon (Ab4), however, one from the top at approximately 155cmbs, and one from the bottom at approximately 330cmbs.

The Ab3 sample returned a date of 1000 rcybp $\pm$ 20 (946-956 cal. BP). This lines up with the Late Holocene Delaware Paleosol seen in other locations across the Southern Plains (Ferring 1990; Hall 1982). The Ab4 samples returned a top end date of 1720 rcybp $\pm$ 20 (1671-1691 cal. BP) and a bottom end date of 4030 rcybp $\pm$ 25 (4547-4572 cal. BP). The top end of this range aligns with the period of stability that enabled the formation of the Caddo/Copan Paleosol across the Southern Plains (Ferring 1990; Hall 1982), but the bottom end extends past this period of stability which is known to have begun around 2,500 cal. BP. This bottom end date also extends into the range of the Calf Creek horizon (Thurmond and Wyckoff 1999), making WH7 one of the areas along Wildhorse with a high potential for Calf Creek Complex sites.

Wildhorse Four Cutbank



Figure 6.6. Overviews of the Wildhorse Four cutbank and surrounding locale

Dr. Green, and Roger Hamilton, and I investigated the Wildhorse Four Cutbank locale on April 1st, 2025 (Fig. 6.6). It is located in the SE/4 SW/4 SE/4 of Section 22, Township 1 North, Range 1 West in Garvin County, at 14N 657026m E 3822931m N (Fig. 6.7). We accessed this cutbank with the help of Roger, who secured the permission of his friend, Jesse, for us to travel to Wildhorse Creek and Sandy Creek through his property.



Figure 6.7. 2024 Aerial image of the Wildhorse Four cutbank location (Airbus 2024)

We were unable to reach Jesse on the day of the investigations to confirm, but, based on his previous conversations with him, Roger understood that Jesse would prefer us not to perform full profiles on his property so we elected to measure and take samples only. Thus, the following profile of the cutbank was described only visually.



Figure 6.8. Wildhorse 4 cut and fill sequence

This section of Wildhorse Creek illustrates a complex cut-and-fill sequence (Fig 6.8). Initially, a feeder channel incised into the Wildhorse Creek terrace; this incision was then followed by sedimentation and subsequent soil formation. The incision formed a gully that was subsequently filled in with sediment. Following this episode of instability, a long period of soil stability and soil formation occurred as observed by the thick buried soil.

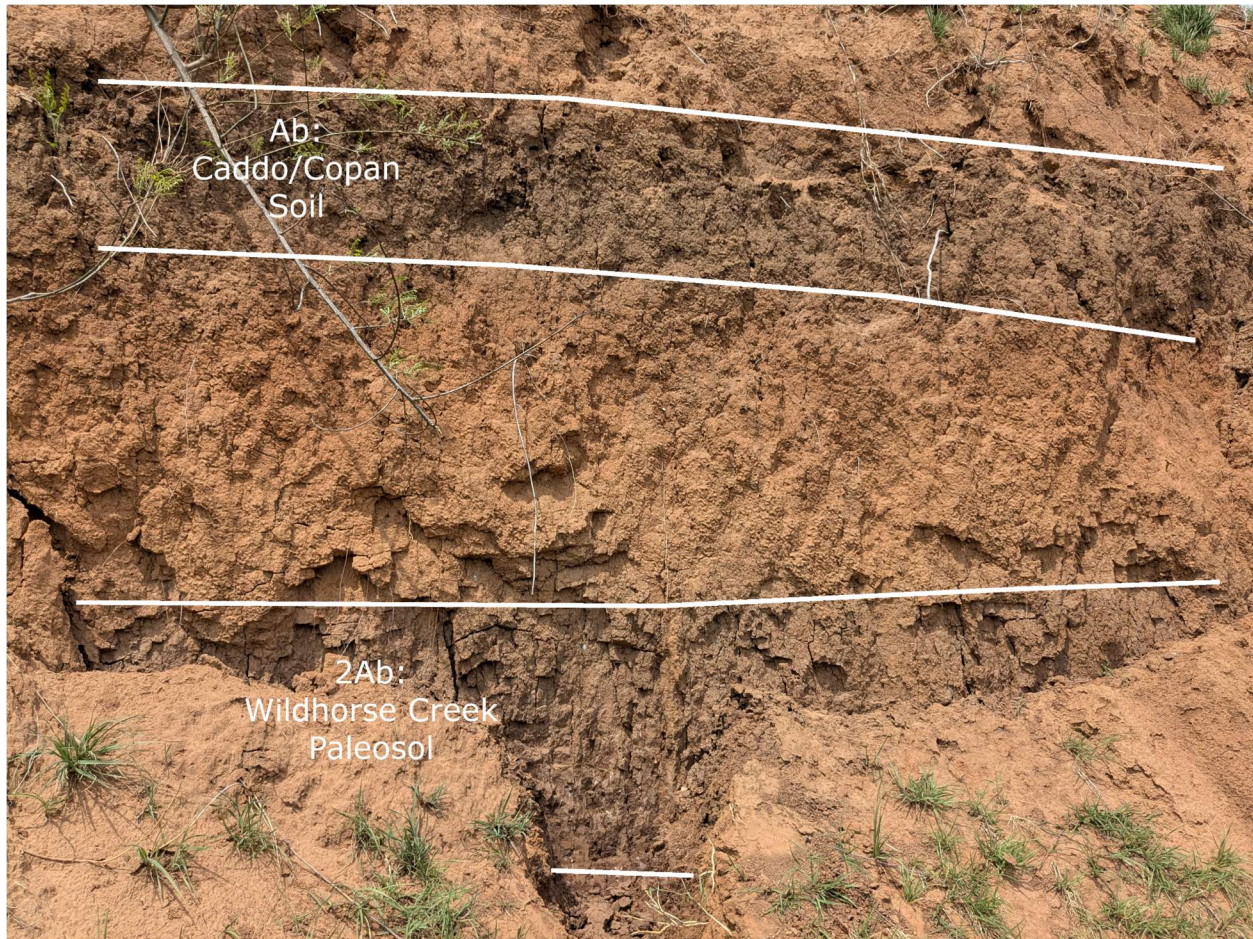


Figure 6.9. The buried A horizons within the profile of the Wildhorse Four cutbank

Outside of the disturbed cut and fill event, the cutbank itself was largely covered by slump, from approximately 220cmbs to the streambed, at least 3 meters below that point. We were able to measure and visually confirm the stratigraphy above the slump to be a sequence of horizons: Ap-C-Ab-Cb-2Ab (Fig. 6.9).

We sampled the centers of both Ab horizons for dates at 75cmbs and 200cmbs, respectively. The upper Ab horizon returned a date of 2170 rcybp $\pm$ 25 (2059-2088 cal. BP) while the lower 2Ab horizon returned a date of 4670 rcybp $\pm$ 30 (5320-5467 cal. BP) (Fig. 6.10). Though vegetation made it impossible to set up tapes to measure depth, we

also took a sample for dating from the buried A horizon within the cut and fill which returned a date of 1560 rcybp $\pm$ 25 (1382-1518 cal. BP).

The upper Ab horizon of the main profile, as well as the Ab horizon within the cut and fill both align with the Late Holocene/Late Archaic Caddo/Copan Paleosol. The lower 2Ab horizon within the main profile, like in the WH7 locale, evidences an earlier period of landscape stability which aligns with the Calf Creek horizon.

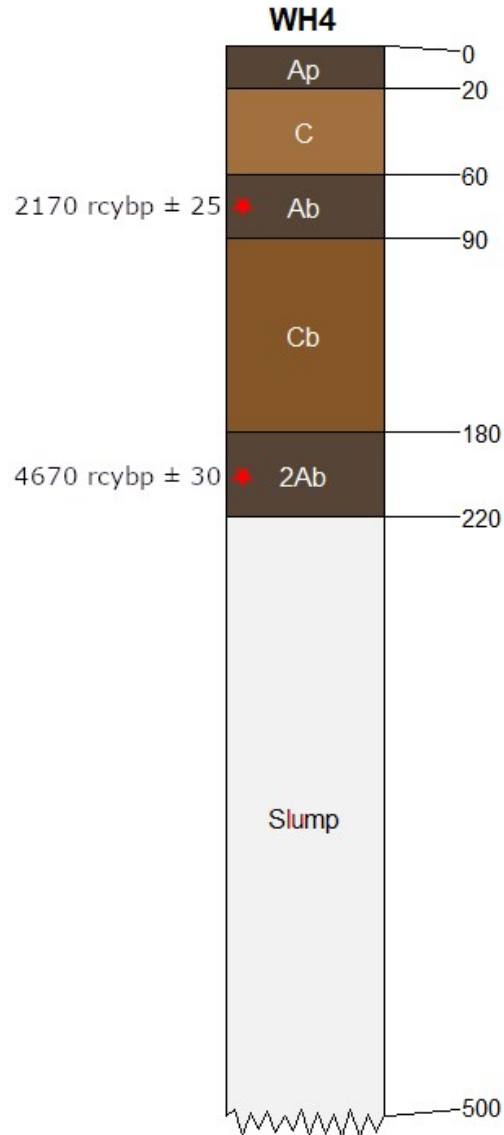


Figure 6.10. The stratigraphy of the Wildhorse Four cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the dates in radiocarbon years before present (rcybp).

Wildhorse Three Cutbank (2023)



Figure 6.11. Overview of the Wildhorse Three (2023) cutbank locale.

Dr. Green investigated this first Wildhorse Three cutbank on October 13th, 2023. It is located in the SW/4 SW/4 SE/4 of Section 23, Township 1 North, Range 1 West in Garvin County, at 14N 658509m E 3823024m W (Fig. 6.12). This cutbank sits approximately half a mile downstream of Sandy Creek. Dr. Green was able to describe the full profile to NRCS standards, to a total depth of 410cmbs.

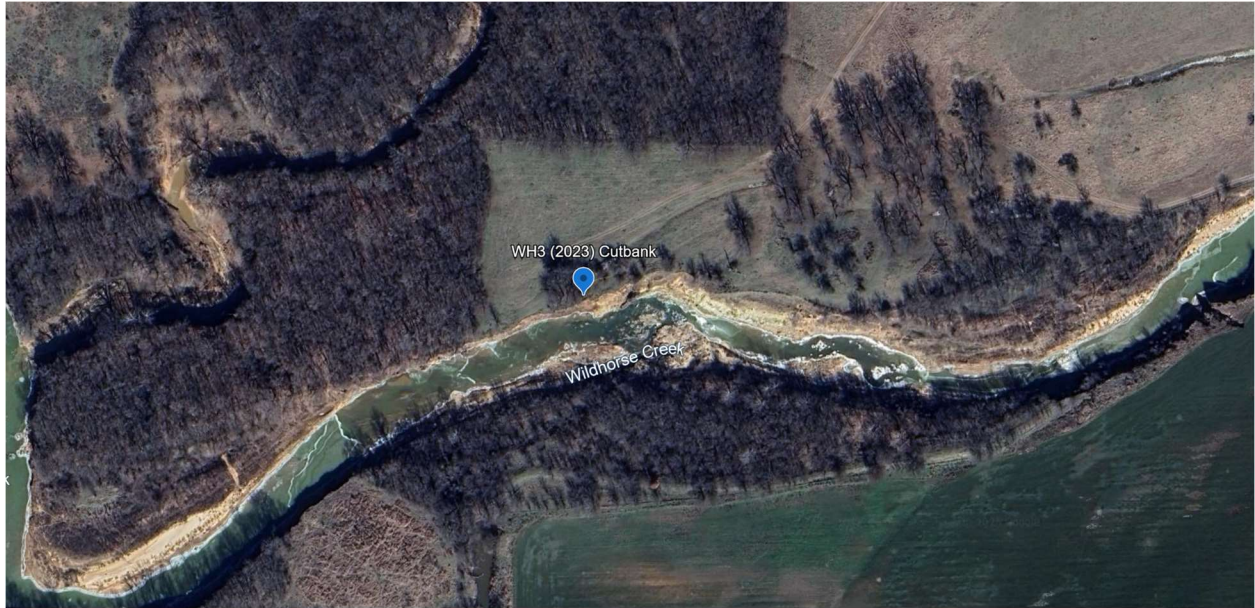


Figure 6.12. 2024 Aerial image of the Wildhorse Three (2023) cutbank location.

The top 83 centimeters of the profile show an A-Bc-Ck stratigraphy, followed by two buried soils: 2Ab at a depth of 83 to 105cmbs, overlain directly on top of the 2Ck horizon, followed by a much thicker 2Ab2 from 115 to 201cmbs, with a strongly developed 2Btkb horizon to a depth of 275cmbs, followed by a 2Ckb horizon terminating at 410cmbs (Fig. 6.13).



Figure 6.13. Paleosols within the Wildhorse Three (2023) cutbank.

Dr. Green collected samples from both buried A horizons (Fig. 6.14). The first sample, from the 2Ab horizon, returned a date of $940 \text{ rcybp} \pm 20$ (792-913 cal. BP). This aligns with the range for the Delaware paleosol, as noted in the WH7 profile. Two samples were taken from the lower 2Ab2 horizon; one from the top at 120cmbs which returned a date of $1350 \text{ rcybp} \pm 20$ (1179-1183 cal. BP) and one from the bottom at 200cmbs which returned a date of $2160 \text{ rcybp} \pm 30$ (2006-2020 cal. BP). This lower 2Ab2 horizon aligns with the Caddo/Copan soil as also previously noted in the WH7 profile, as well as the WH4 profile.

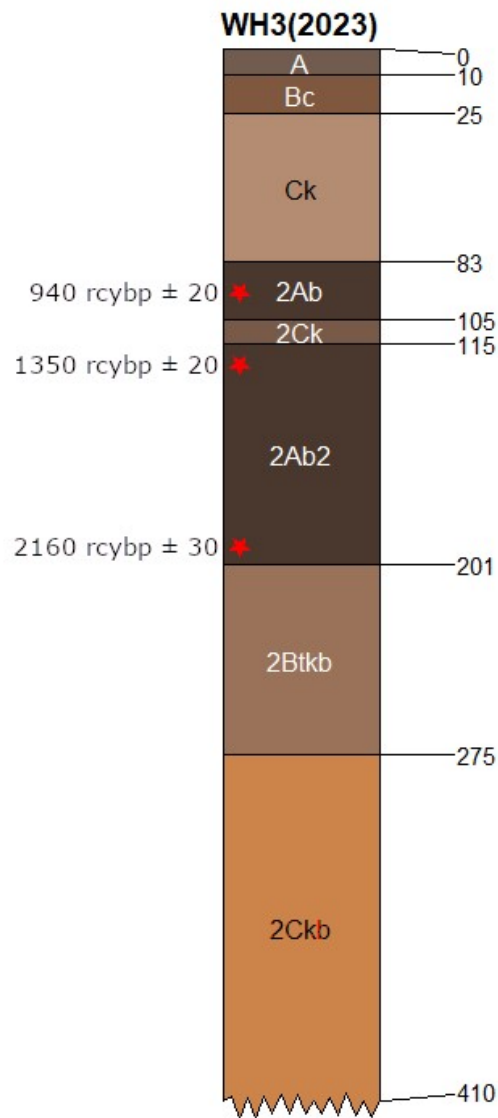


Figure 6.14. The stratigraphy of the Wildhorse Three (2023) cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the date in radiocarbon years before present (rcybp).

Wildhorse Three Cutbank



Figure 6.15. Overviews of the Wildhorse Three cutbank and surrounding locale

Dr. Green and I investigated the Wildhorse Three Cutbank locale on November 1st, 2024 (Fig. 6.15). It is located in the SW/4 NW/4 SW/4 of Section 19, Township 1 North, Range 1 East in Garvin County, at 14N 661019m E 3823554m N (Fig. 6.16). Like the Wildhorse Seven cutbank, we accessed this cutbank through a public fishing hole off of Indian Meridian Road, approximately 1.7 miles north of OK-7.

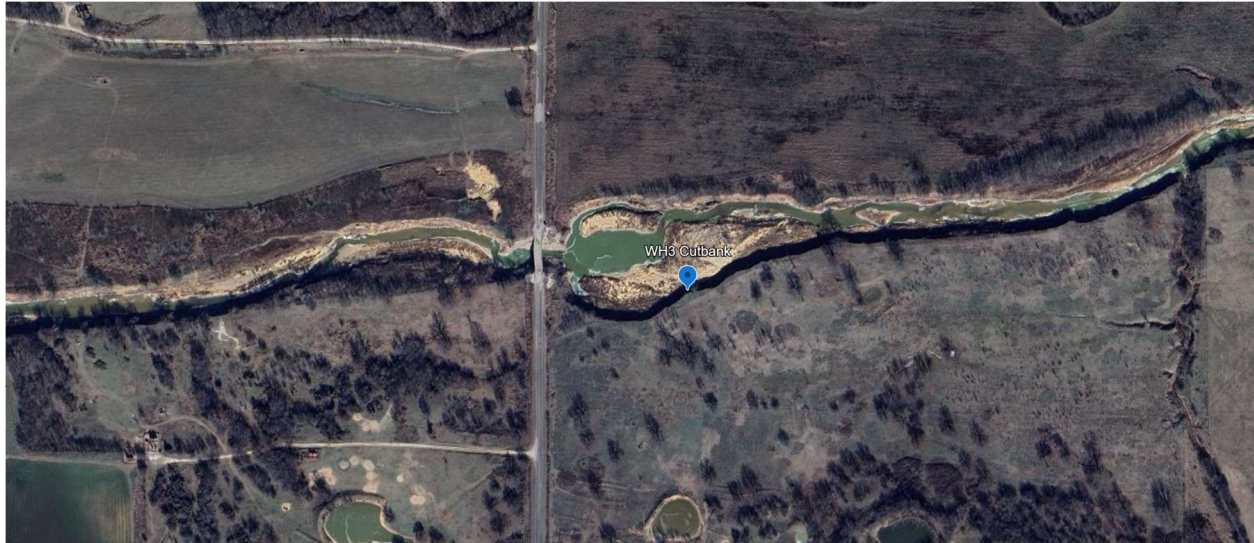


Figure 6.16. 2024 Aerial image of the Wildhorse Three cutbank location (Airbus 2024)

We were able to describe the majority of this profile directly, to NRCS standard, excepting the top 135 centimeters. Even after digging makeshift steps into the side of the cut, we were unable to safely gain enough height for our ladder to reach those top horizons.

Visually, the top stratigraphy of this profile appeared to be a sequence of Ap-C-Ab-Cb-2Ab-2Cb horizons. Similarly to the Wildhorse Seven profile, the thin nature of these young A horizons and the absence of B horizons indicates weak soil development and a relatively short cycle of stability and deposition.

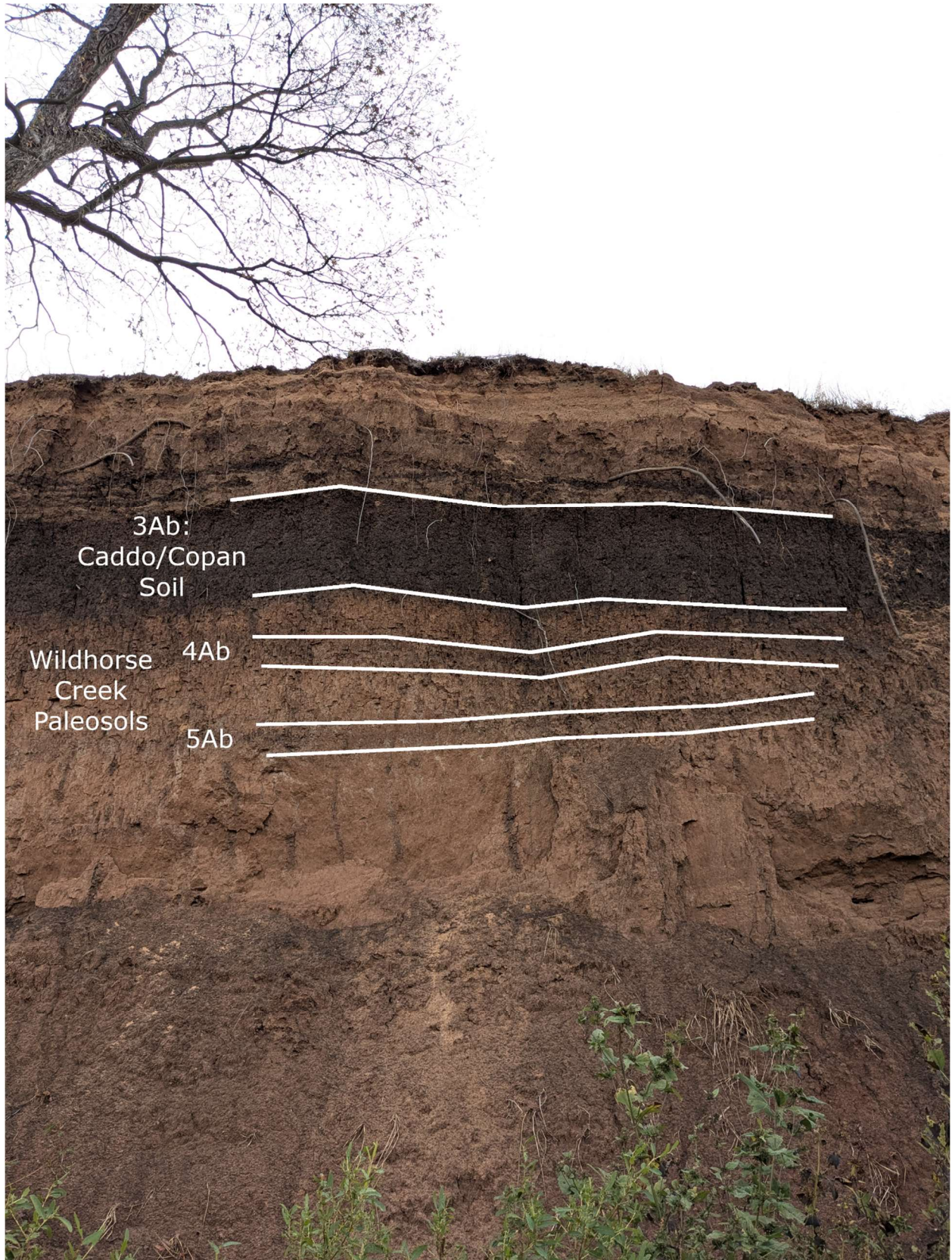


Figure 6.17. Paleosols within the profile of the Wildhorse Three cutbank

Below these horizons, the series described shows much stronger development, alternating 3Ab-3Btb-4Ab-4Btb-5Ab-5Btkb and terminating at the Permian-Age bedrock horizon, R, which continued down below the streambed (Fig. 6.17). The thickness of the horizons, as well as the presence of well-developed B horizons with accumulated clays, and in the last case, carbonates, indicates that each of these soils developed under more sustained periods of landscape stability.

We sampled all three accessible buried A horizons (3Ab, 4Ab, and 5Ab) for dating (Fig. 6.18). Due to the thickness of 3Ab, we were able to take samples from both the top and bottom; 140cmbs and 210cmbs, respectively. For both 4Ab and 5Ab, however, only one sample was taken from the middle of the horizon; 245cmbs and 315cmbs, respectively.

The 3Ab samples returned a date of $970 \text{ rcybp} \pm 20$ at the top (794-872 cal. BP) and $2060 \text{ rcybp} \pm 20$ at the bottom (1942-2069 cal. BP). The 4Ab sample returned a date of $3960 \text{ rcybp} \pm 25$ (4297-4329 cal. BP). Finally, the 5Ab sample returned a date of $4330 \text{ rcybp} \pm 25$ (4845-4961 cal. BP).

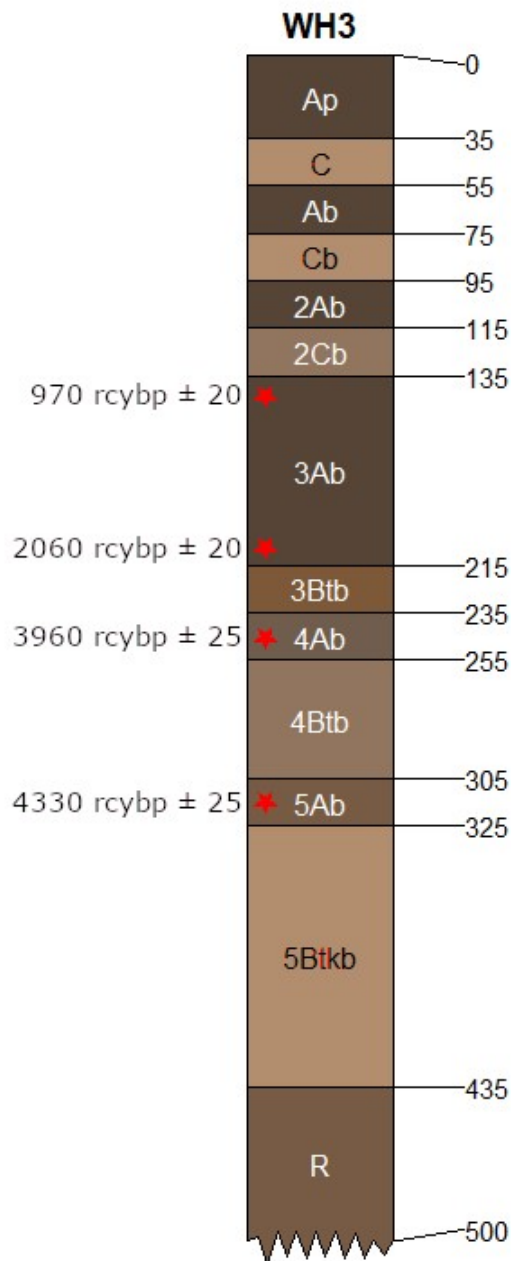


Figure 6.18. The stratigraphy of the Wildhorse Three cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the date in radiocarbon years before present (rcybp).

The presence of a 5Btk horizon in the lower segment of the profile corresponds to a mesic, or moist, environmental episode, punctuated by xeric, or warm, dry conditions, during the formation of this oldest soil event at $4330 \text{ rcybp} \pm 25$. This was followed by two intervals of alluviation and soil development between $3960 \text{ rcybp} \pm 25$ (4Ab) and $970 \text{ rcybp} \pm 20$ (3Ab). The dates of the latter of these two buried soils corresponds with the Caddo/Copan soil.

The overlying sequence of thin buried A horizons in the upper portion of the profile is similar to the WH7 and the WH3 (2023) profiles. These data indicate short periods of alluviation which were punctuated by episodes of landscape stability and soil formation during the late Holocene, beginning sometime around 1000 rcybp . This sequence has been documented in some of the canyons in Caddo county, such as at the Morgan Mammoth site which is buried by over 3 meters of alluvium similarly interrupted by short periods of landscape stability and soil formation (Richmond et al 2023) (Fig. 6.19).



Figure 6.19. Morgan Mammoth Site (Dr. Debra Green, personal communication, 2025).

Wildhorse One Cutbank



Figure 6.20. Overviews of the Wildhorse One cutbank and surrounding locale

Dr. Green, Conrad Aaron (OAS), and I investigated the Wildhorse One Cutbank locale on November 15th, 2024 (Fig. 6.20). It is located in the NW/4 SE/4 NE/4 of Section 27, Township 1 North, Range 1 East in Garvin County, at 14N 666878m E 3822487m N (Fig. 6.21). We accessed this cutbank by parking in the I-35 public right-of-way immediately south of the bridge over Wildhorse Creek and hiking down into the streambed and east approximately half a mile.



Figure 6.21. 2024 Aerial image of the Wildhorse One cutbank location (Airbus 2024)

We were unable to complete a profile for this cutbank, and nearly unable to access it completely due to the presence of a beaver dam which had totally flooded the portion of the streambed adjacent to the cutbank beyond wading depth. Therefore, this cutbank is described completely visually, though approximate depths were able to be assessed safely using an extending ruler.

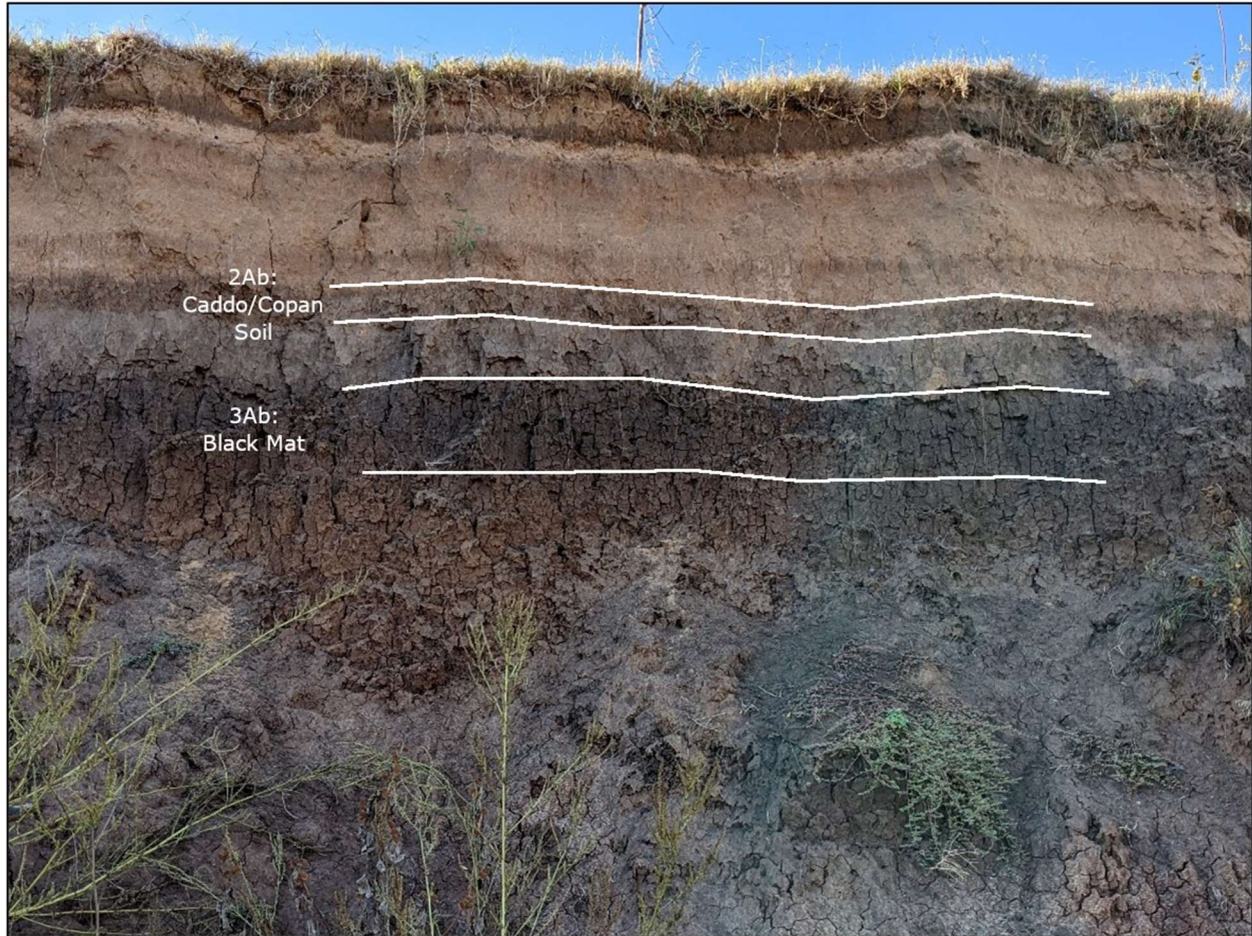


Figure 6.22. Paleosols within the profile of the Wildhorse One cutbank

Visually, the profile appears to contain a relatively weakly developed stratigraphic series of Ap-C-Ab-Cb-2Ab-2Cb horizons, lacking B horizons, down to 300cmbs. Following this series is a single sequence of 3Ab-3Btb-3Cb horizons terminating at 500+cmbs (Fig. 6.22). This soil appears to be fairly well developed as indicated by the high clay accumulation within the 3Btb horizon.

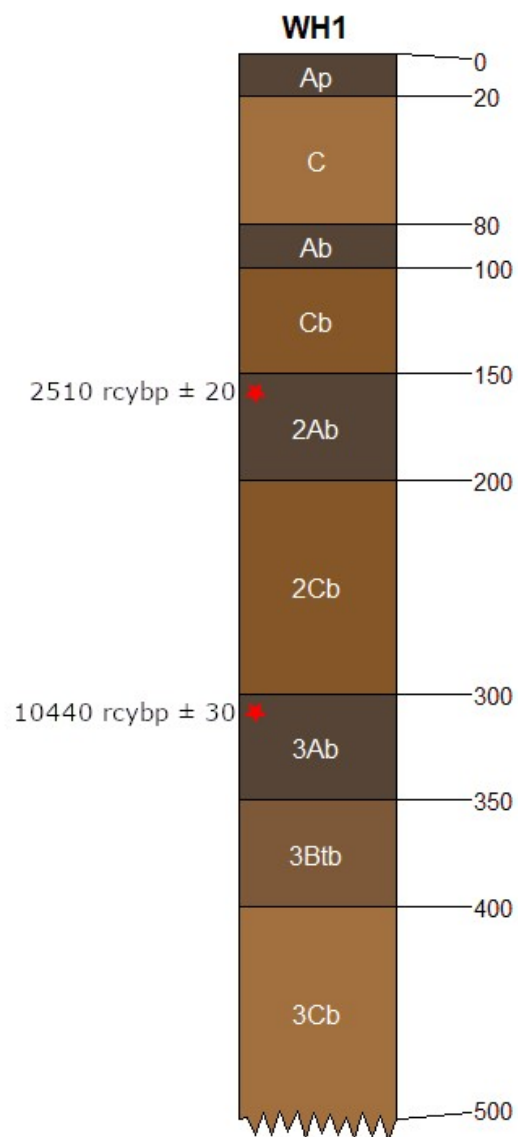


Figure 6.23. The stratigraphy of the Wildhorse One cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the date in radiocarbon years before present (rcybp).

By scaling the slump adjacent to the cutbank, we were able to get close enough to pull two samples from this profile--one from the top of 2Ab at approximately 155cmbs and one from the top of the more strongly developed 3Ab at approximately 305cmbs (Fig. 6.23).

The 3Ab sample returned a date of 2510 rcybp $\pm$ 20 (2495-2598 cal. BP). This date range, like other locales of the project, aligns with the Caddo/Copan paleosol noted across Oklahoma and Southern Plains.

The 3Ab sample returned the oldest date of the project at 10440 rcybp $\pm$ 30 (12103-12119 cal. BP). This radiocarbon age places the 3Ab horizon squarely within the time frame of the Younger-Dryas cooling episode 10,900 to 9,800 rcybp (Haynes 2008). Known as the “black mats,” these buried soils contain a high volume of organic carbon which give them their dark gray to black coloration. The 3Ab documented at WH1 is characteristic of these black mats.

Sandy Creek Cutbanks



Figure 6.24. Overviews of the Sandy Creek locale

Dr. Green, Roger Hamilton, and I performed this final cutbank investigation along Sandy Creek, one of the largest tributaries of Wildhorse, and one from which Roger regularly finds eroded archaeological material (Fig. 6.24). The first cutbank accessed, SCN1, is located in the NW/4 SW/4 SE/4 in Garvin County, at 14N 658450m E 3823202m N. The second cutbank accessed, SCN2, is located in the SE/4 NE/4 SW/4 of Section 23, Township 1 North, Range 1 West at 14N 658318m E 3823415m N (Fig. 6.25). These cutbanks were investigated in the same trip as the cutbank described in Wildhorse Four on April 1st, 2024. Like that cutbank, these ones were also accessed through the property of Roger's friend Jesse.

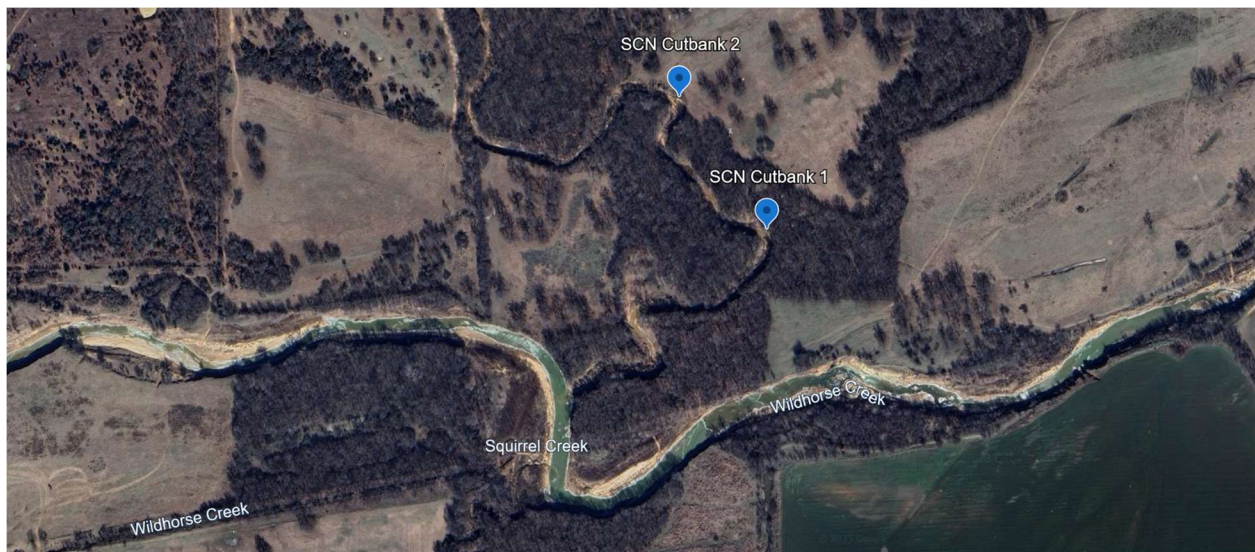


Figure 6.25. 2024 Aerial image of the Sandy Creek cutbank locations (Airbus 2024)

As with the Wildhorse Four cutbank, we chose not to physically profile these cutbanks in order to oblige Jesse's preference as the landowner. Because of this, the following descriptions were generated through visual inspection only.



Figure 6.26. Sandy Creek Cutbank One

Beginning with SCN1, a portion of the profile from 275cmbs to 400cmbs was covered by slump and therefore inaccessible due to our no-dig parameters. The base horizon of the profile, beyond the slump at 500+ cmbs, appeared to be sandstone

bedrock (R) (Fig 6.26). Above the slump was a sequence of Ap-Bw-C-Ab horizons (Fig. 6.27).



Figure 6.27. The paleosol within the profile of Sandy Creek Cutbank One.

We sampled the top and bottom of the buried A horizon for dating at approximately 195cmbs and 275cmbs, respectively (Fig. 6.28). The top of the horizon returned a date of 1970 ± 25 (1829-1859 cal. BP) while the bottom of the horizon returned a date of 2650 ± 25 (2738-2782 cal. BP). This date range is again consistent with the Caddo/Copan soil documented in other areas of the Southern Plains.

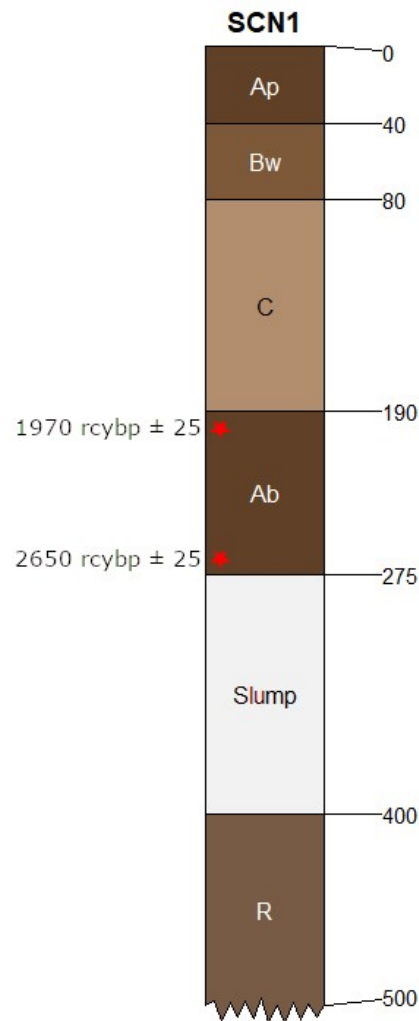


Figure 6.28. The stratigraphy of the SCN1 cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the dates in radiocarbon years before present (rcybp).

Moving to SCN2, this represents a complete stratigraphic sequence, unobscured by slump, of Ap-Bw-C-Ab-Btb-C horizons, followed by a gravel deposit which directly abuts the base of the profile, R, again sitting at 500+ cmbs (Fig 6.29).



Figure 6.29. Sandy Creek Cutbank Two.

We sampled three points along this profile, the top and bottom of the Ab horizon at 240 and 280cmbs, respectively, as well as the gravel lens, measured at 250cm above the creekbed, and estimated at approximately 440-450cmbs (Fig. 6.29)

The top of the Ab horizon returned a date of 3570 rcybp $\pm$ 30 (3726-3747 cal. BP) while the bottom returned a date of 4090 rcybp $\pm$ 30 (4446-4476 cal. BP). The gravel lens returned a date of 7120 rcybp $\pm$ 30 (7943-8043 cal. BP) (Fig. 6.30).

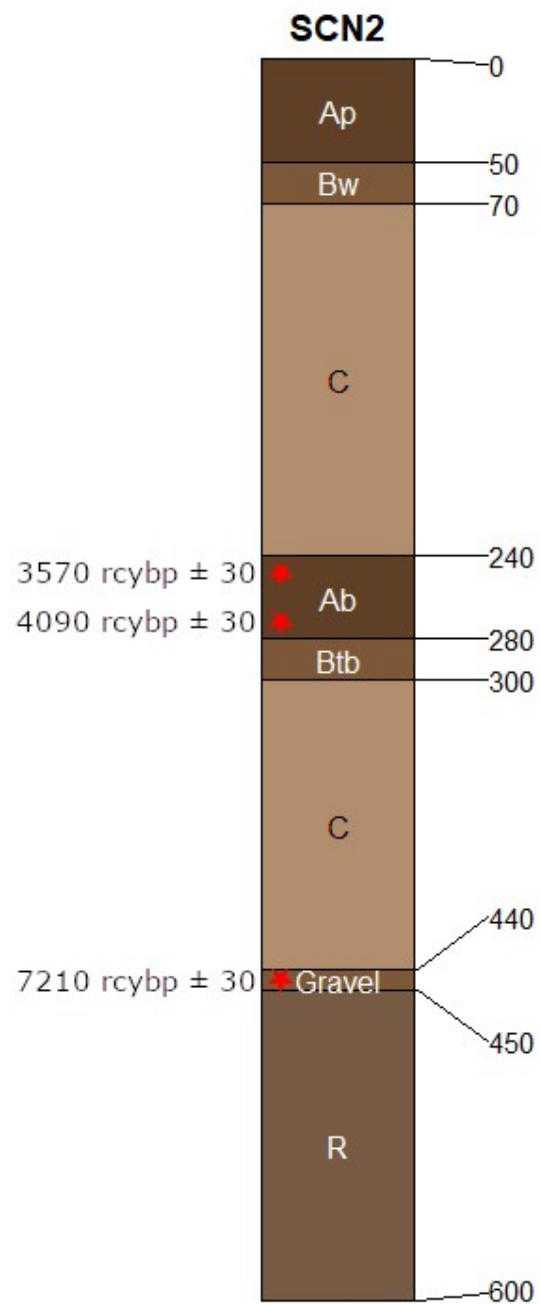


Figure 6.30. The stratigraphy of the SCN2 cutbank profile with horizon depths in centimeters on the right as well as the locations from which dated samples were drawn denoted by red stars, accompanied by the dates in radiocarbon years before present (rcybp).

The presence of the gravel deposit represents an episode of erosion and channel change during the Early Archaic period (Fig. 6.31). Prior to $7210 \text{ rcybp} \pm 30$, a significant flood event occurred, resulting in a change to the channel of Sandy Creek and a deposition of high energy, lateral accretion deposits (i.e. gravels). This event was followed by fine grained, low energy vertical deposition punctuated by stability and soil formation between 4090 and $3570 \text{ rcybp} \pm 30$. A second period of alluviation and landscape stability occurred between 2650 and $1970 \text{ rcybp} \pm 25$ forming the Caddo soil noted in the SCN1 profile.



Figure 6.31. The gravel lens at SCN2 sitting directly on top of the sandstone bedrock.

Chapter 7: Lithics Results

This chapter presents the results of the documentation and analysis of the subsample of Roger Hamilton's lithic collection from Wildhorse Creek. I begin by summarizing trends across the assemblage before providing a brief overview of each projectile point type identified, the count, and the provenience(s) of each projectile point.

Typological Trends

Of the 40 projectile points I analyzed from Roger's collection, I matched 32 to the typology presented in Chapter Five. Eight points were unidentifiable due to partial or total fracturing of the base. Among the 32 identifiable points, I identified 13 different types. Within the additional 10 points from Roger's collection for which I had photographs, only one additional type was identified that was not otherwise present in the assemblage I physically analyzed.

The range of types represented in the assemblage shows a near continuous use of Wildhorse Creek from the early Paleoindigenous period all the way through to the beginning of the post-contact period (Fig. 7.1). The oldest points were two Clovis points (13,250-12,800 cal. BP) from Roger's photographs and the youngest were three Scallorn points (1,300-500 cal. BP), represented both in photographs and in the physical assemblage (Bell 1961; Waters and Stafford 2007).

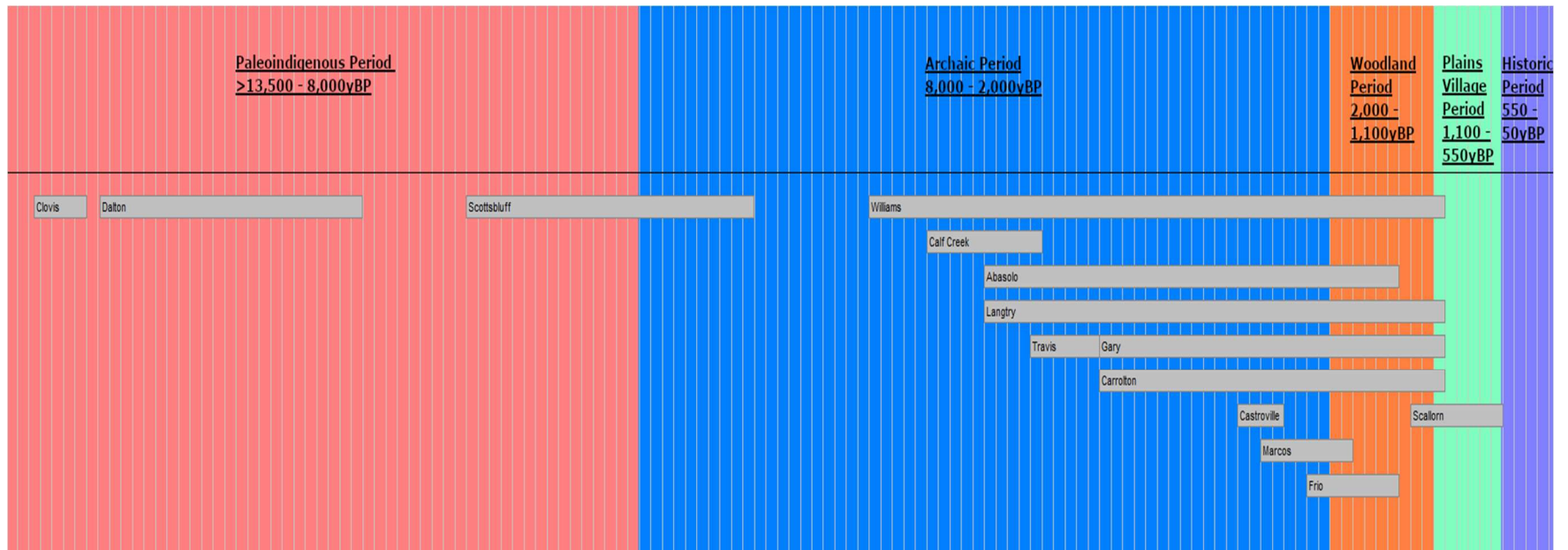


Figure 7.1. Relative timeline of types represented in the Wildhorse Creek assemblage, divided by archaeological time period

Overall, the Archaic period had the greatest representation with 30 points (~71% of identified points), the Paleoindigenous period followed with eight points (~19% of identified points), and later periods, Woodland, Plains Village, and Historic, had the fewest with four (~10% of identified points). Sample sizes were not large enough to seek statistically significant differences in point types by provenience.

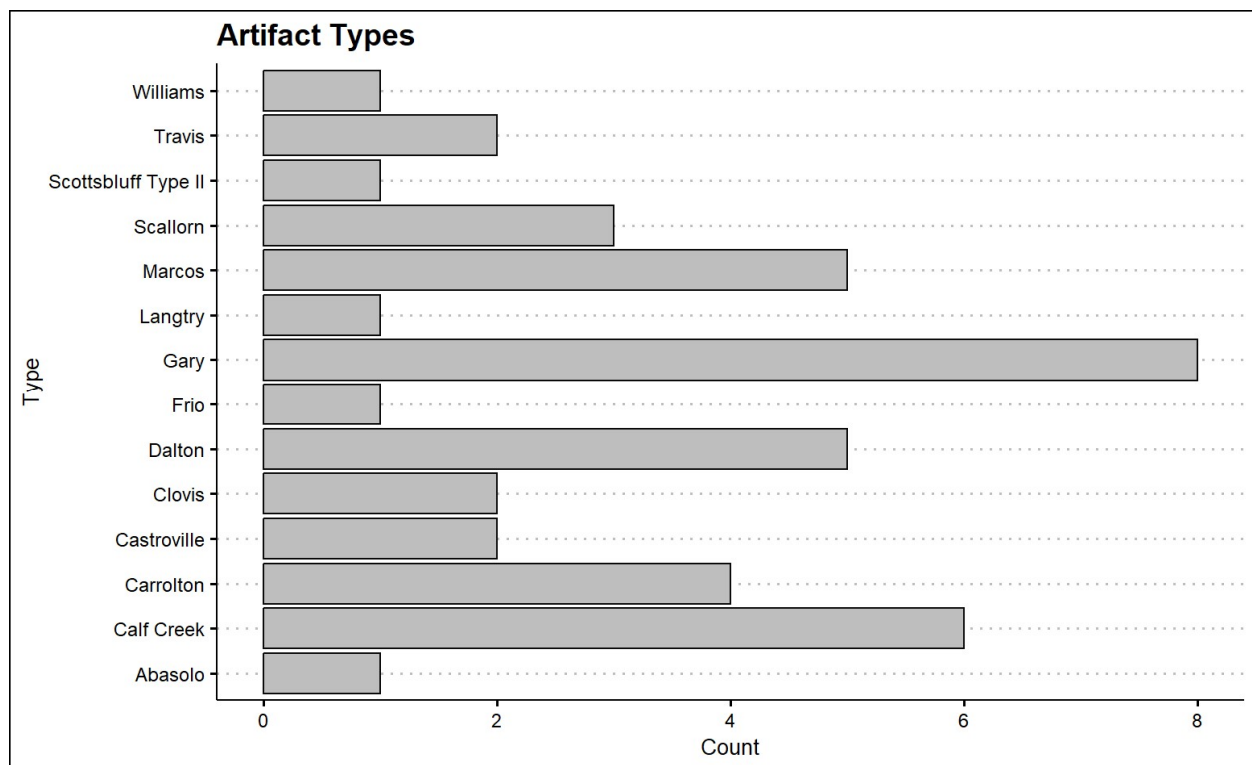


Figure 7.2. Distribution of identified points by type

Unsurprisingly given their common occurrence in the state, middle-to-late Archaic Gary points made up the largest contingent of any given type, with eight points identified in the assemblage (Fig. 7.2). Other Archaic types--Calf Creek (six points) and Marcos

(five points)--also had good representation in the collection (Fig. 7.3). Of particular note, the early-to-middle Paleoindigenous type, Dalton, had a high occurrence, with five points identified between the physical assemblage and Roger's photographs (Fig. 7.3).

Types

Clovis

Age Range: 13,250-12,800 cal. BP (Waters and Stafford 2007)

Count: 2

Localities: WH3



Figure 7.3. Clovis projectile points from Roger's photos, found in the Wildhorse Three locality.

Dalton

Age Range: 12,680-10,400 cal. BP (Thulman 2019)

Count: 5

Localities: WH1, WH2, WH3, WH5



Figure 7.4. Sample of Dalton points from Roger's photos (left) and the analyzed assemblage (right), found in the Wildhorse Three and Five localities, respectively.

Scottsbluff

Age Range: 9,500-7,000 cal. BP (Bell 1961)

Count: 1

Localities: WH1



Figure 7.5. Scottsbluff Type II projectile point from the analyzed assemblage, found in the Wildhorse One locality.

Williams

Age Range: 6,000-1,000 cal. BP (Bell 1961; Turner et al 2011)

Count: 1

Localities: WH7



Figure 7.6. Williams projectile point from the analyzed assemblage, found in the Wildhorse Seven locality.

Calf Creek

Age Range: 5,500-4,500 cal. BP (Thurmond and Wyckoff 1999)

Count: 6

Localities: WH1, WH2, WH3, WH4



Figure 7.7. Sample of Calf Creek projectile points from the analyzed assemblage (left) and Roger's photos (right), found in the Wildhorse Three and Wildhorse Two localities, respectively.

Abasolo

Age Range: 5,000-1,400 (Bell 1958; Turner et al 2011)

Count: 1

Localities: WH4



Figure 7.8. Abasolo projectile point from the analyzed assemblage, found in the Wildhorse One locality.

Langtry

Age Range: 5,000-1,000 cal. BP (Bell 1958; Turner et al 2011)

Count: 1

Localities: WH5



Figure 7.9. Langtry projectile point from the analyzed assemblage, found in the Wildhorse Five locality.

Travis

Age Range: 4,600-4,000 cal. BP (Turner et al 2011)

Count: 2

Localities: WH2, WH7

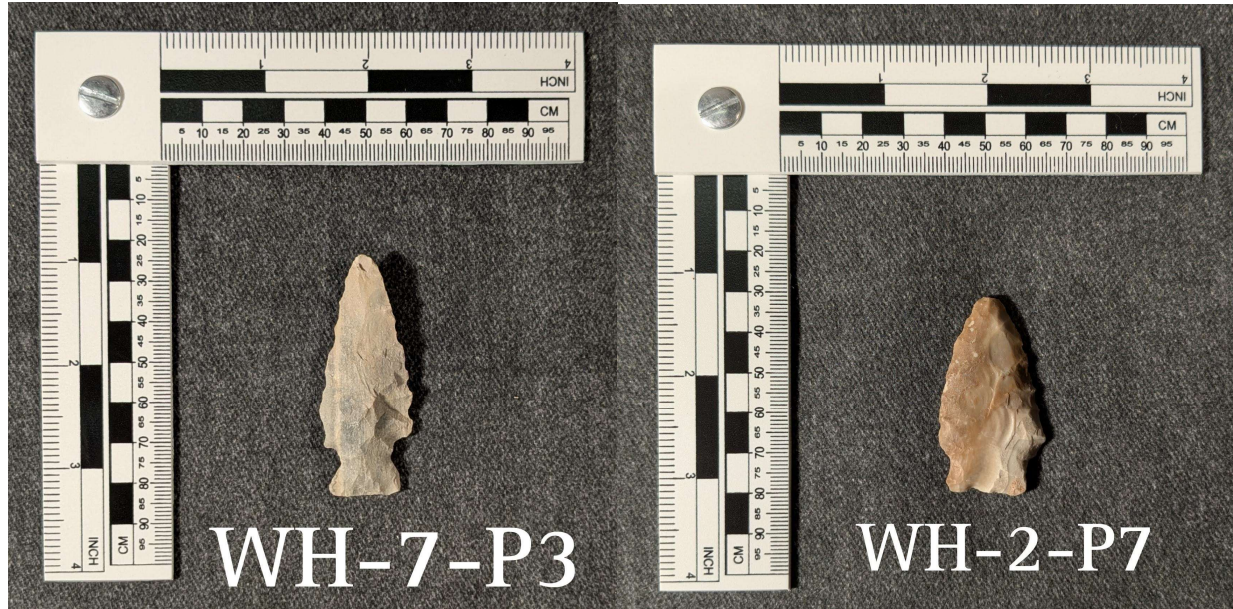


Figure 7.10. Travis projectile point from the analyzed assemblage, found in the Wildhorse Seven locality.

Gary

Age Range: 4,000-1,000 cal. BP (Bell 1958; Turner et al 2011)

Count: 8

Localities: WH1, WH2, WH3, WH4, WH5

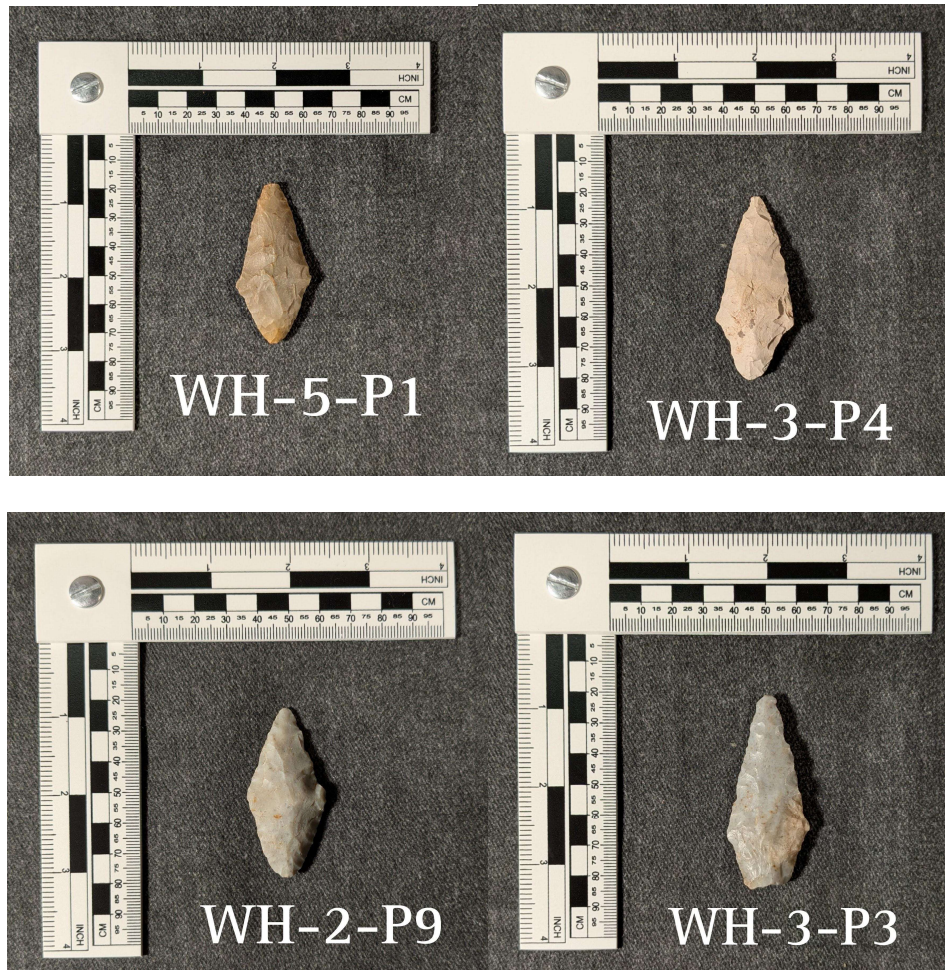


Figure 7.11. Sample of Gary projectile points from the analyzed assemblage found in the Wildhorse Two, Three, and Five localities.

Carrollton

Age Range: 4,000-1,000 cal. BP (Bell 1958; Turner et al 2011)

Count: 4

Localities: WH2, WH4, WH7, Sandy Creek

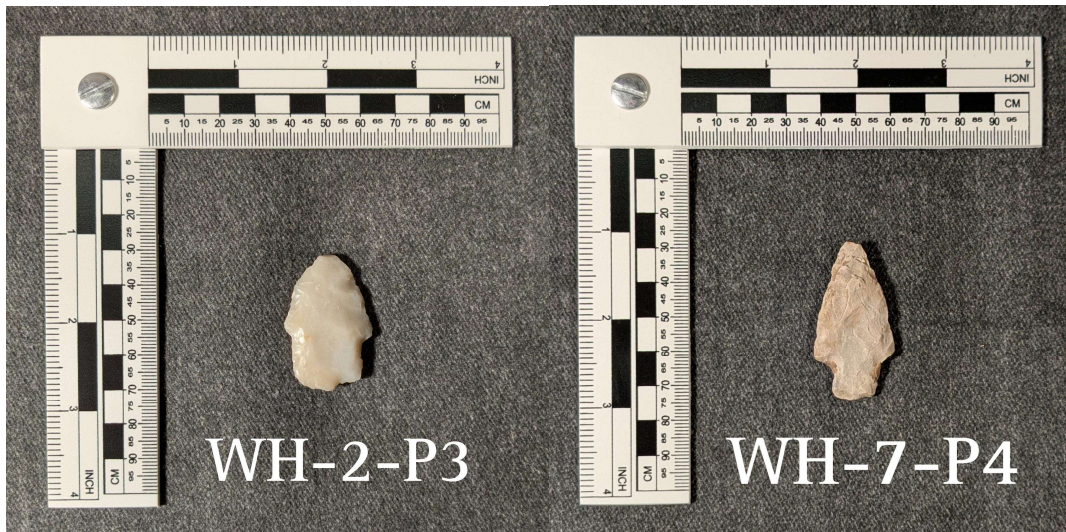


Figure 7.12. Sample of Carrollton projectile points from the analyzed assemblage, found in the Wildhorse Two and Seven localities.

Castroville

Age Range: 2,800-2,400 cal. BP (Turner et al 2011)

Count: 2

Localities: WH2

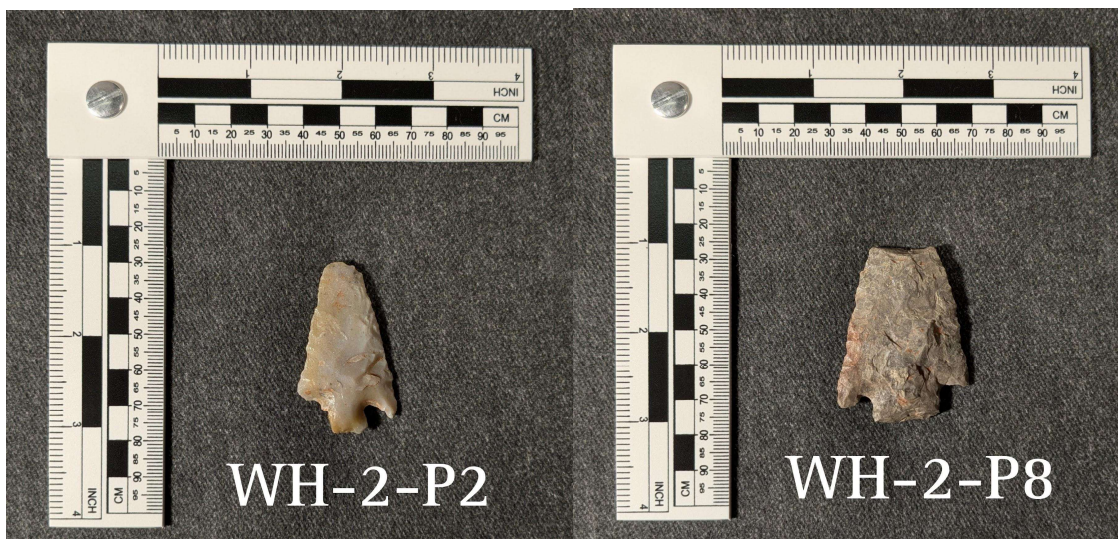


Figure 7.13. Sample of Castroville projectile points from the analyzed assemblage, found in the Wildhorse Two locality.

Marcos

Age Range: 2,600-1,800 cal. BP (Bell 1958; Turner et al 2011)

Count: 5

Localities: WH2, WH3, WH4, WH7

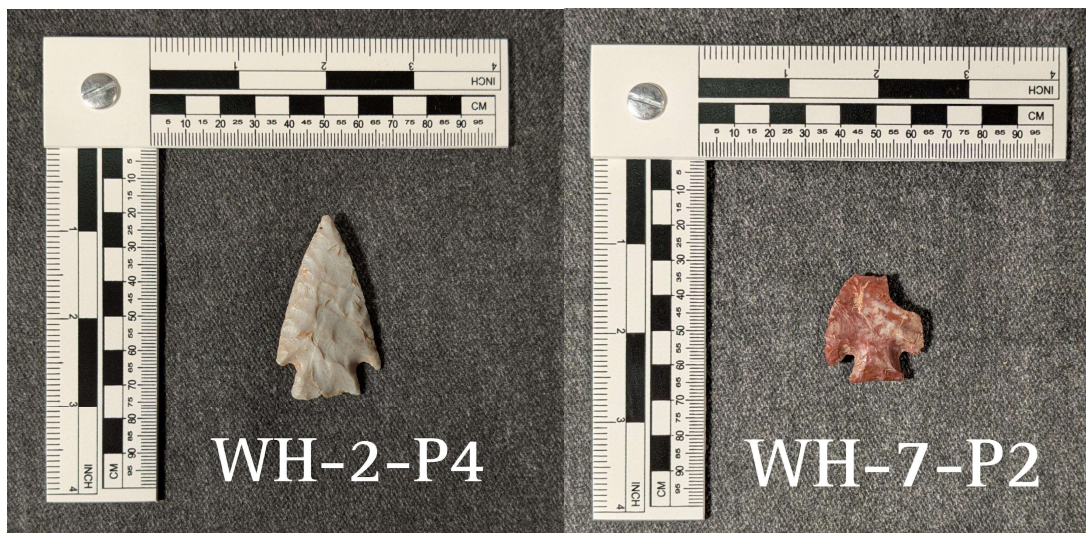


Figure 7.14. Sample of Marcos projectile points from the analyzed assemblage, found in the Wildhorse Two and Seven localities.

Frio

Age Range: 2,200-1,400 cal. BP (Bell 1961; Turner et al 2011)

Count: 1

Localities: WH1

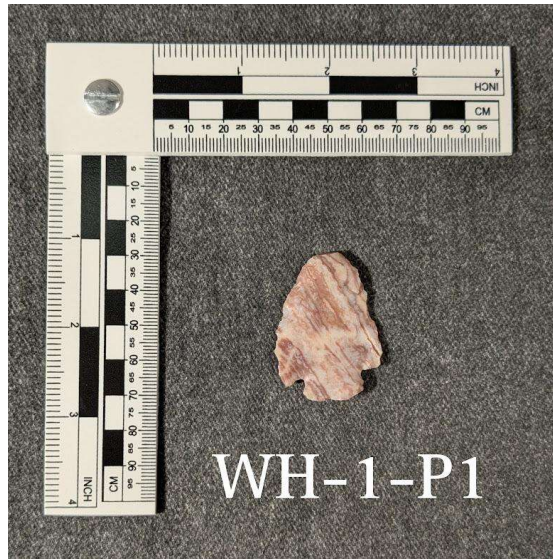


Figure 7.15. Frio projectile point from the analyzed assemblage, found in the Wildhorse One locality. Recurved base has been obscured by fracturing of the stem, but is visible on close inspection.

Scallorn

Age Range: 1,300-500 cal. BP (Perino 1968; Turner et al 2011)

Count: 3

Localities: WH2, WH7, Sandy Creek

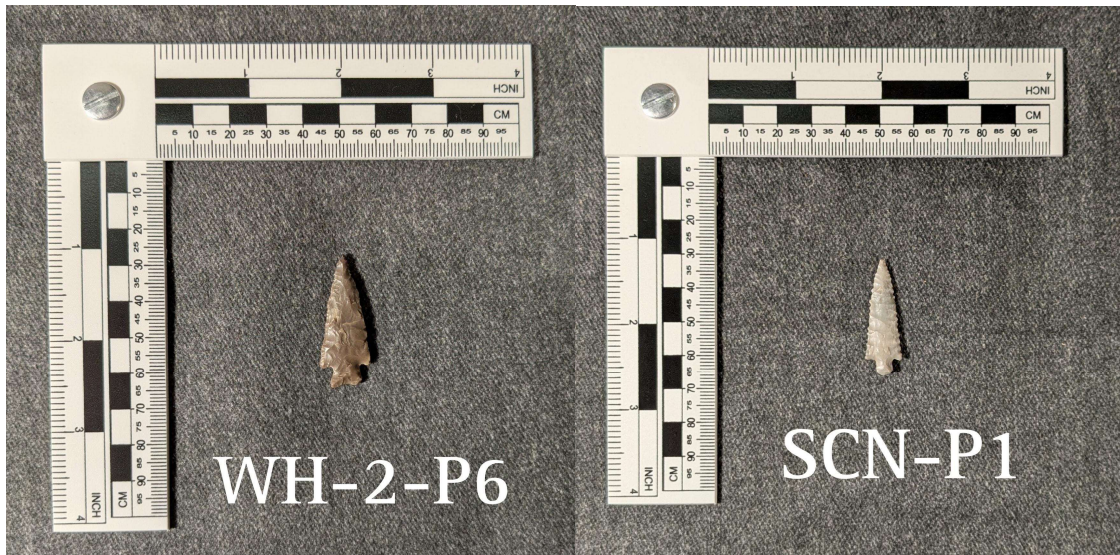


Figure 7.16. Scallorn projectile points from the analyzed assemblage, found in the Wildhorse Two and Sandy Creek localities.

Chapter 8: Discussion and Conclusions

In this thesis, I set out to investigate Paleoindigenous and Early Archaic occupations of Wildhorse Creek, both to increase understanding of the local archaeological record, as well as to contribute to a broader, regional discussion concerning the visibility of sites of these early ages on the Southern Plains. Through lithic artifacts found by Roger Hamilton, I sought to document the occupational history of the river and the presence of Paleoindigenous and Early Archaic groups along it. In tandem with this, I utilized geoarchaeological methods to better understand why sites of this age might not be visible to archaeologists, both along the Wildhorse Creek and across the Southern Plains as a whole.

In this final chapter, I elaborate on the results of these investigations, discussing how the Paleoindigenous and Early Archaic record along Wildhorse Creek is representative of patterns noted at other locales across the Southern Plains. I will then conclude with recommendations for survey protocols to more reliably detect sites of Paleoindigenous and Early Archaic ages on the Southern Plains in project areas similar to Wildhorse Creek.

Detecting Ancient Landforms on the Southern Plains

The lithic typology generated from Roger Hamilton's collection clearly demonstrated the continuous occupation of Wildhorse Creek dating as far back as the Early Paleoindigenous Period. With Roger having found projectile points as old as Clovis (13,250-12,800 cal. BP), not to mention a significant number of Middle to Late Paleoindigenous types such as Dalton (12,680-10,400 cal. BP) and Scottsbluff (9,500-

7,000 cal. BP) as well as Early to Middle Archaic points like Williams (6,000-1,000 cal. BP) and Calf Creek (5,500-4,500 cal. BP), it is apparent that Wildhorse Creek was occupied beginning at a far earlier date than recorded sites indicate.

The geoarchaeological investigations along Wildhorse Creek revealed that there are, indeed, still extant Paleoindigenous/Early Archaic-age paleosols buried in the terraces along the river. Only one such landform was detected, buried over three meters below the surface at the Wildhorse One cutbank locality (WH1), but its presence is significant, particularly when combined with the information from the other cutbanks (Fig. 8.1).

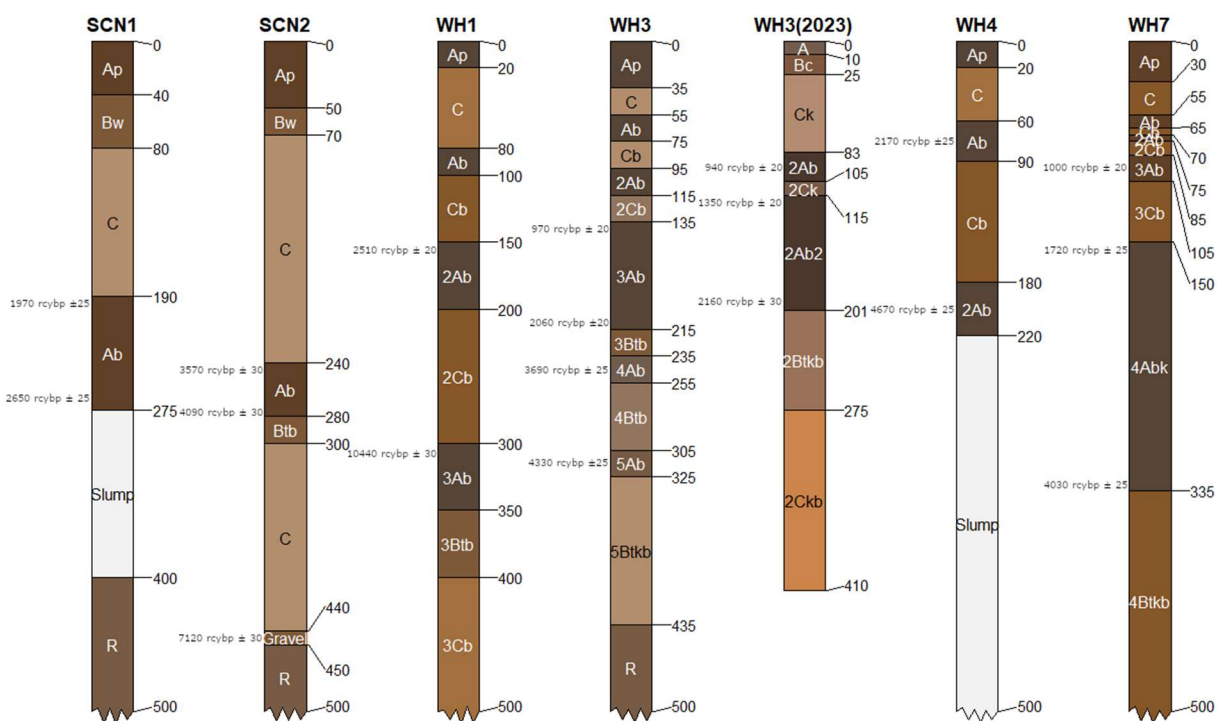


Figure 8.1. Side-by-side comparisons of the five different cutbank profiles along Wildhorse Creek and Sandy Creek with dates from buried soils noted in rcybp.

The oldest paleosol in the Wildhorse One profile dates to 10,440 rcybp $\pm$ 30, or 12,103-12,119 cal. BP, the middle Paleoindigenous/Late Pleistocene, aligning with the Younger Dryas Black Mats. The next oldest buried soil in the Wildhorse One profile, 100cm above it (150-200cmbs), dates to 2,510 rcybp $\pm$ 20, or 2,495-2,598 cal. BP, the Late Archaic/Late Holocene Caddo paleosol. All but one of the other profiles exhibit a similarly dated Caddo paleosol, in many cases starting at a similar depth, around 150cmbs, but no other profiles exhibit the Black Mat paleosol beneath it. Given all seven of these profiles' relatively close proximity along the same river, this begs the question, what could be the cause for this?

The presence of the Caddo soil immediately above significant unconformities representing erosional and depositional events provides further evidence for the Middle Holocene Altithermal drought period on the Southern Plains, first noted by C. Reid Ferring and Stephen Hall, as discussed in Chapter 2 (Ferring 1990; Hall 1982; 1988; 1990). As noted, the channel trenching events that were brought on by the Altithermal drought resulted in widespread erosion, deepening of river channels, and significant alluviation with large amounts of sediment being deposited over freshly eroded terraces (Ferring 1990; Hall 1990). That the Black Mat paleosol remains extant only at Wildhorse One, close to the terminus with the Washita, aligns with Vance Holliday's investigations in Southern Kansas, where he notes that Pleistocene soils preserve better closer to major river valleys (Holliday 1997).

It is likely that, similar to other locales across the Southern Plains, the Middle Holocene drought and resulting channel trenching eroded away many of the paleosols along Wildhorse Creek that represented the Early Archaic and Paleoindigenous periods

that preceded them (Ferring 1990; Hall 1982; 1988; 1990; Holliday 1985; 1997). This has left a geoarchaeological record which still exists, as evidenced by the Wildhorse One profile, but exists, first, in a fragmentary manner, and second, deeply buried under the mass amounts of sediment deposited by the alluviation which followed the channel trenching events.

Fragmentary records such as these are not uncommon in alluvial environments on the Southern Plains (Ferring 1992; Waters 1992). The dynamic nature of these environments can cause stark differences in the preservation of buried soils not just over the course of a given river, but even over extremely short distances such as from one bank to the other (Ferring 1992; Waters 1992). This is evidenced extremely well by an instance I noted when analyzing the Sandy Creek cutbank. Seen in Figure 8.2, where Sandy Creek terminated into Wildhorse Creek, the opposite banks of the creek exhibited two stratigraphic profiles so distinct from one another that they could be noted visually from a distance of over 100m. The reason for this appeared to be that one bank was affected much more heavily by an erosional event, or events, than the other.



Figure 8.2. The outflow of Sandy Creek into Wildhorse Creek. Note the thick, dark soil horizon (likely the Caddo/Copan Paleosol) present in the terrace on the right but absent in the terrace on the left.

Though this example likely shows the differential preservation of a Late Archaic soil, the possibility that similar conditions could affect the Paleoindigenous/Early Archaic record are not at all far-fetched, particularly when considering the severity of the erosional events these landforms likely underwent during the Middle Holocene (Ferring 1990; Hall 1990; Holliday 1997).

The Wildhorse Creek Paleosol

Though the time period it represents was not the focus of this study, I would be remiss not to focus at least briefly on the newly noted paleosol covered in Chapter 6, which Dr. Debra Green and I have termed the “Wildhorse Paleosol.” The Wildhorse Paleosol appears in four out of the seven investigated profiles, and represents a period of landscape stability roughly 3,500 to 4,500 radiocarbon years before present.

The consistent presence of a brief, Middle Archaic period of landscape stability has not been noted elsewhere on the Southern Plains, and in many places has likely been obliterated by the effects of Altithermal drought previously discussed. The presence of extant landforms of this age, in combination with the high occurrence of Middle Archaic artifacts in Roger’s collection, such as those of the Calf Creek horizon, make Wildhorse Creek a prime location for potential future studies into this poorly understood time period.

Conclusions and Recommendations for Future Studies

This thesis reinforces what other geoarchaeological studies on the Southern Plains have found, which is that the Paleoindigenous and Early Archaic record within alluvial environments in the region is likely to be fragmentary and deeply buried, having been significantly affected by the Middle Archaic Altithermal channel trenching that came after (Ferring 1990; Hall 1988; Holliday 1997). That record, however, as evidenced by Roger’s lithic collection and the dated buried soils in his collection area, does exist.

The biggest upshot of this thesis is the necessity for deep testing when surveying along waterways on the Southern Plains. Shovel testing alone is unlikely to reach the depths of Paleoindigenous and Early Archaic landforms such as the three meter deep example from the Wildhorse One profile. Discussions I've personally had with consultants working in the area reinforce this. One Principal Investigator informed me that soil cores his company put in on a floodplain approximately half a mile west of the Wildhorse Seven profile uncovered a buried soil beginning at 170-180cmbs, potentially representing the Caddo or Wildhorse paleosols noted in this thesis (Andrew Gourd, personal communication, 2025).

Additionally, the results of this thesis show that landforms can vary greatly across short distances in alluvial environments. What this means for those conducting cultural resource surveys is that just because a landform isn't present in one spot, doesn't mean that it doesn't exist a few hundred, or even a few dozen meters away (Fig. 8.2). With this in mind, if surveys in alluvial environments on the Southern Plains seek to locate Paleoindigenous and Early Archaic sites, it would be prudent to augment shovel testing with bucket augers, or even mechanical coring in order to test to the depths that these landforms are likely to be located at, particularly in higher probability areas, closer to major river valleys.

Lastly, the Wildhorse Creek watershed has a high potential for intact buried deposits of Middle Archaic age not noted elsewhere in Oklahoma or the Southern plains, making it a potential prime location for researchers seeking to investigate Middle Archaic cultures like the Calf Creek Horizon.

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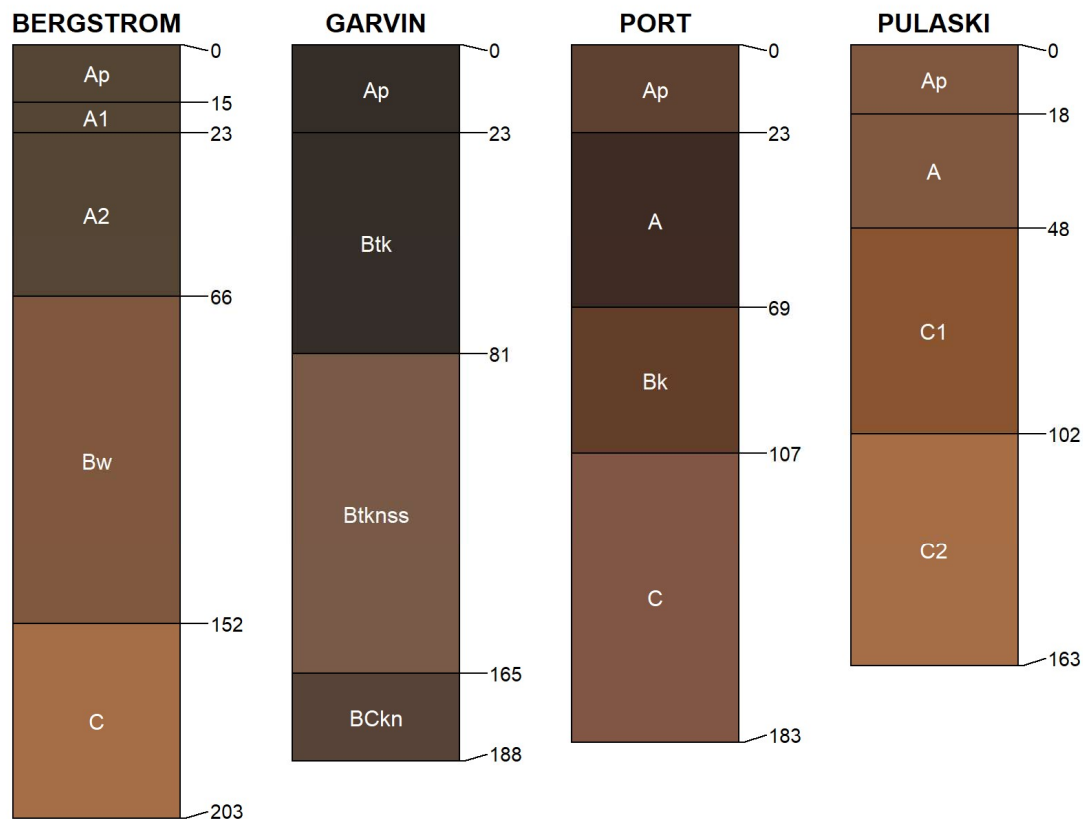
Appendix A
Stratigraphic Records

Profile	Stratum	Horizon	Depth (cmbs)	Textural Name	Munsell Color
WH7	I	Ap	0-30	-	-
	II	C	30-55	-	-
	III	Ab	55-65	-	-
	IV	Cb	65-70	-	-
	V	2Ab	70-75	-	-
	VI	2Cb	75-85	-	-
	VII	3Ab	85-105	Clay Loam	7.5YR 3/4
	VIII	3Cb	105-150	Loamy Sand	7.5YR 4/6
	IX	4Abk	150-335	Sandy Loam	7.5YR 3/2
	X	4Btkb	335-635+	Sandy Loam	7.5YR 4/6
WH4	I	Ap	0-20	-	-
	II	C	20-60	-	-
	III	Ab	60-90	-	-
	IV	Cb	90-180	-	-
	V	2Ab	180-220	-	-
WH3 (2023)	I	Ap	0-10	Loam	5YR 4/2
	II	Bc	10-25	Sandy Loam	5YR 4/4
	III	Ck	25-83	Loamy Sand	5YR 6/4
	IV	2Ab	83-105	Clay Loam	5YR 2.5/2
	V	2Ck	105-115	Loamy Sand	5YR 4/3
	VI	2Ab2	115-201	Sandy Clay	5YR 2.5/2
	VII	2Btkb	201-275	Clay Loam	5YR 5/4
	VIII	2Ckb	275-410+	Loamy Sand	5YR 6/8

WH3	I	Ap	0-35	-	-
	II	C	35-55	-	-
	III	Ab	55-75	-	-
	IV	Cb	75-95	-	-
	V	2Ab	95-115	-	-
	VI	2Cb	115-135	-	-
	VII	3Ab	135-215	Sandy Clay Loam	7.5YR 3/2
	VIII	3Btb	215-235	Clay	7.5YR 4/4
	IX	4Ab	235-255	Clay	7.5YR4/2
	X	4Btb	255-305	Sandy Clay	7.5YR 5/3
	XI	5Ab	305-325	Clay	7.5YR 4/3
	XII	5Btkb	325-435	Sandy Clay	7.5YR 6/4
	XIII	R	435-500+	Residuum (Bedrock)	-
WH1	I	Ap	0-20	-	-
	II	C	20-80	-	-
	III	Ab	80-100	-	-
	IV	Cb	100-150	-	-
	V	2Ab	150-200	-	-
	VI	2Cb	200-300	-	-
	VII	3Ab	300-350	-	-
	VIII	3Btb	350-400	-	-
	IX	3Cb	400-500+	-	-
SCN1	I	Ap	0-40	-	-
	II	Bw	40-80	-	-

	III	C	80-190	-	-
	IV	Ab	190-275	-	-
	V	R	400-500+	-	-
SCN2	I	AP	0-50	-	-
	II	Bw	50-70	-	-
	III	C	70-240	-	-
	IV	Ab	240-280	-	-
	V	Btb	280-300	-	-
	VI	C	300-440	-	-
	VII	Gravel	440-450	-	-
	VIII	R	450-600+	-	-

Appendix B
Reported Soil Series
(From USDA-NRCS)



BERGSTROM SERIES (from USDA-NRCS 1997)

The Bergstrom series consists of very deep, well drained, moderately permeable soils that formed in calcareous silty alluvial sediments. These soils are on nearly level to very gently sloping bottomlands and terraces of major streams. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, thermic Cumulic Haplustolls

TYPICAL PEDON: Bergstrom silty clay loam - cultivated. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 6 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, very friable; few roots; few earthworm casts; strongly effervescent; moderately alkaline; abrupt smooth boundary. (4 to 8 inches thick)

A1--6 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable; few roots; few fine pores; few earthworm casts; strongly effervescent; moderately alkaline; gradual smooth boundary. (3 to 18 inches thick)

A2--9 to 26 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky and granular structure; hard, friable; few fine pores; strongly effervescent; moderately alkaline; clear smooth boundary. (5 to 22 inches thick)

Bw--26 to 60 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky and granular structure; hard, friable; few fine pores; few films and threads of calcium carbonate throughout; few powdery lime masses in lower part; violently effervescent; moderately alkaline; clear smooth boundary. (16 to 32 inches thick)

C--60 to 80 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 5/6) moist; structureless; hard, friable; contains a few thin strata and lenses that are more clayey or more sandy; a few strongly cemented calcium carbonates concretions; calcareous; moderately alkaline.

GARVIN SERIES (from USDA-NRCS 2018)

The Garvin series consists of deep, moderately well drained, very slowly permeable soils. These level to very gently sloping soils formed in loamy and clayey alluvium sediments of Pleistocene age. These soils occur on narrow to broad nearly level alluvial plains in the Grand Prairie (MLRA 85), and the Central Rolling Red Prairies (MLRA 80A). Slope ranges from 0 to 1 percent. Mean annual air temperature is about 17.2 degrees C (63 degrees F), and mean annual precipitation is about 940 mm (37 in).

TAXONOMIC CLASS: Fine, smectitic, thermic Udertic Haplustolls

TYPICAL PEDON: Garvin silty clay loam-cultivated, at an elevation of 313 m (1026 ft).

(Colors are for dry soil unless otherwise stated.)

Ap--0 to 23 cm (0 to 9 in); very dark gray (10YR 3/1) silty clay loam; black (10YR 2/1) moist; weak medium granular structure; very hard, very firm; many fine roots; few fine and medium pores; exchangeable sodium percent is less than 1; neutral; clear smooth boundary. (Thickness of the Ap horizon is 0 to 30 cm [0 to 12 in])

Btk--23 to 81 cm (9 to 32 in); black (10YR 2/1) silty clay; black (10YR 2/1) moist; moderate fine subangular blocky structure; very hard, very firm; common fine roots; few fine and medium pores; few shiny pressure faces below 50 cm (20 in); few fine calcium carbonate concretions; few films of calcium carbonate;

exchangeable sodium percent is 4; strongly effervescent; moderately alkaline; gradual wavy boundary. (Thickness of the A horizon is 38 to 114 cm [15 to 45 in])

Btknss--81 to 165 cm (32 to 65 in); reddish brown (5YR 5/3) clay loam; reddish brown (5YR 4/3) moist; weak medium blocky structure; very hard, very firm; few fine roots; few fine pores; few shiny pressure faces on peds; few slickensides that do not intersect; common vertical cracks filled with black (10YR 2/1) silty clay; 5 percent by volume of fine soft bodies and concretions of calcium carbonate; exchangeable sodium percent is 28; calcareous; strongly effervescent; moderately alkaline; gradual smooth boundary. (Thickness of the Bk horizon is 36 to 89 cm [14 to 35 in])

BCKn--165 to 188 cm (65 to 74 in); dark reddish gray (5YR 4/2) clay; dark reddish brown (5YR 3/2) moist; massive; very hard, very firm; few fine roots; few fine pores; 5 percent by volume of fine and medium soft bodies and concretions of calcium carbonate; exchangeable sodium percent is 27; calcareous; strongly effervescent; moderately alkaline.

PORT SERIES (from USDA-NRCS 2004)

The Port series consist of very deep, well drained, moderately permeable flood plain soils that formed in calcareous loamy alluvium of Recent age. These nearly level to very gently sloping soils are on narrow flood plains in the Central Rolling Red Prairies

(MLRA-80A) and the Central Rolling Red Prairies (MLRA 78C). Slopes range from 0 to 3 percent. Mean annual precipitation is 32 inches. Mean annual temperature is 63 degrees F.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, thermic Cumulic Haplustolls

TYPICAL PEDON: Port silt loam--cultivated. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 9 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; soft, very friable; neutral; clear smooth boundary. (0 to 11 inches thick)

A--9 to 27 inches; dark reddish brown (5YR 3/3) silt loam, dark reddish brown (5YR 2/2) moist; moderate coarse granular structure; slightly hard, friable; neutral; gradual smooth boundary. (10 to 30 inches thick)

Bk--27 to 42 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; hard, firm; few thin strata of darker material; common masses and films of calcium carbonate; strongly effervescent; moderately alkaline; diffuse smooth boundary. (0 to 25 inches thick)

C--42 to 72 inches; reddish brown (2.5YR 5/4) silt loam, reddish brown (2.5YR 4/4) moist; massive; hard, firm; few thin strata of dark reddish brown silty clay loam; common masses and films of calcium carbonate; strongly effervescent; moderately alkaline.

PULASKI SERIES (from USDA-NRCS 2016)

The Pulaski series consists of very deep, well drained, moderately rapidly permeable flood plain soils that formed in loamy alluvial sediments of Holocene age. These nearly level to very gently sloping flood plain soils are on small tributaries in the Cross Timbers (MLRA-84A). Slope ranges from 0 to 3 percent. Mean annual temperature is 16.1 degrees C (61 degrees F), and mean annual precipitation is 864 mm (34 in).

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, nonacid, thermic Udic Ustifluvents

TYPICAL PEDON: Pulaski fine sandy loam-cultivated, at an elevation of 260 m (850 ft). (Colors are for dry soils unless otherwise stated.)

Ap--0 to 18 cm (0 to 7 in); reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; soft, very friable; moderately acid; clear smooth boundary. (Thickness of the Ap horizon is 0 to 30 cm [0 to 12 in])

A--18 to 48 cm (7 to 19 in); reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; slightly hard, very friable; moderately acid; gradual smooth boundary. (Thickness of the A horizon is 10 to 51 cm [4 to 20 in])

C1--48 to 102 cm (19 to 40 in); yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few thin strata of darker colored fine sandy loam in lower part; slightly acid; gradual smooth boundary. (Thickness of the C1 horizon is 41 to 104 cm [16 to 41 in])

C2--102 to 163 cm (40 to 64 in); reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive, slightly hard, very friable; common thin strata of loamy fine sand; slightly acid.