

THE SEEDS OF ETHNOGENESIS: AN INDIGENOUS ARCHAEOLOGY OF CENTRAL
GREAT PLAINS VILLAGE FORMATION

by

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ABSTRACT

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The Seeds of Ethnogenesis: An Indigenous Archaeology of Central Great Plains Village
Formation

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In this dissertation, I investigate the appearance of maize farming and subsequent social changes in the Central Great Plains by incorporating Indigenous perspectives in the archaeological record of the past one thousand years and evaluating the radiocarbon dataset used to create archaeological and cultural chronology. I explore the history and utility of Indigenous archaeologies as a theoretical framework for archaeological practice and why this approach is necessary for interpreting the results of my analyses. Oral traditions belonging to the Arikara and Pawnee Nation's regarding social change, ethnogenesis, and population movement are presented and evaluated for interpreting the appearance of maize farming and permanent settlement patterns between the 11th and 17th centuries C.E. I present a new chronometric hygiene protocol for evaluating radiocarbon data and construct robust OxCal produced Bayesian statistical models of Central Plains archaeological taxa to investigate the temporal relationships between the Late Plains Woodland, Early Plains Village Period, and Late Plains Village Period. These analyses indicate that maize horticultural practices appeared on the Central Plains in central Nebraska during the 12th century C.E., rather than in the 10th century C.E. in Northeastern Kansas. Pawnee and Arikara oral traditions are shown to corroborate the patterns of social change and changing subsistence practices evidenced by archaeological investigation.

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CHAPTER I: INTRODUCTION

Since the early 20th century, archaeologists have wondered about historical connections between the Central Plains' nations, such as the Pawnee, Lakota, Comanche, Apache, etc., in the United States and that region's archaeology (Dunlevy 1936; Strong 1935; Wedel 2010, 1959). However, they have paid scant heed to what those nations know about their history (but see Blaine 1979). Traditional histories speak to both deep local histories and to connections between the nations of the central Plains and regions around them, connections that have mattered over centuries (see, for example, Echo-Hawk 2000), and these histories have essential and largely unexplored implications for making sense of the changes archaeologists have documented. However, showing how these histories can illuminate the archaeological record demands rigorous attention to chronology, the lynchpin of all archaeological comparative analysis (Bronk Ramsey 2008). For example, the Pawnee and the Arikara remember people's movements up the Missouri River to the Central Plains and link these movements to critical historical developments (see Chapter 5). Archaeologists have argued for similar connections, mainly linked to the Mississippian center of Cahokia at the confluence of the Missouri River and the Mississippi River and have supported this in part by showing similarities between Plains and Mississippian pottery and other artifacts (McNerney 1987; Wedel 1943). However, widely accepted archaeological chronologies often date central Plains sites with Mississippian-style artifacts earlier than the Mississippian communities said to be the sources of those styles (compare Steinacher and Carlson [1998] with [Emerson 2002]). Without a modern chronology, we cannot assess regional and extra-regional relations.

This dissertation weaves together Indigenous accounts of the history of the Caddoan-speaking people of the central Great Plains with a novel approach to the chronology of the

archaeological record of that history, with three emphases. First, it discusses the development of Indigenous approaches to archaeology as a general background to the substantive questions about the Central Plains (Chapter II). Second, it summarizes the histories of the Pawnee, Arikara, and Wichita and their occupation of the Central Plains. It also provides background on the archaeological evidence for the transition to maize agriculture there, emphasizing the chronological evidence (Chapters III and IV). This section focuses particularly on *chronometric hygiene*, which is the process of controlling/eliminating known sources of error in radiocarbon dates. Finally, it analyzes new and existing chronological information and considers how the analysis results fit with traditional histories (Chapters V and VI).

More specifically, the analytic sections of this dissertation assess the following questions:

1. How is the radiocarbon library for the Central Plains region from the Late Woodland to the Plains Village Pattern affected by a new Chronometric Hygiene Protocol?
2. What does a “clean” dataset inform us about temporal and geographic patterns of the development/appearance of maize farming and social transformation? Will Bayesian analysis of subregional datasets prove critical in examining the spread of maize farming and horticultural practices across the Central Plains compared to significant cultural developments in the broader Central Plains region, such as the advance of the Plains Village Pattern and the conclusion of Late Plains Woodland lifeways?
3. How do Pawnee and Arikara oral traditions contribute to interpreting the archaeological record under a new Central Plains chronology? Will a new chronology for Central Plains tradition phases reflect ancestral Pawnee and Arikara migration routes as documented in their oral traditions?

4. How do our interpretations change to understand the relationship between Central Plains farming populations and the Mississippian World?

CHAPTER II: INDIGENOUS ARCHAEOLOGIES

Indigenous archaeologies, as fields of study in archaeological investigation and interpretation, have only existed in archaeology for the past three decades (Nicholas 2001; Watkins 2005). Due to legal victories by the Indigenous Nations residing in the United States of America over the United States federal government, Indigenous archaeology results from cultural and sovereign perseverance. Indigenous peoples have a long and conflicted relationship with anthropology and archaeology that has stemmed from initial investigations of Indigenous cultures in the 19th century by Western scholars. Archaeology and Anthropology's contemporary Indigenous perspectives are deeply rooted in this history, and Indigenous Archaeologies are the academic manifestation of these Indigenous perspectives.

This chapter explores the colonial nature of archaeological science, legal victories that produced an environment for Indigenous archaeologies, the key figures in creating and developing Indigenous archaeologies, criticisms of the approach, the future of this theoretical and methodological practice of archaeological method and interpretation, and how this dissertation uses Indigenous Archaeology. Unlike other archaeological theories and methods, Indigenous archaeologies are more than a collective group of scholars seeking to change the archaeological thought and practice “status quo” or incorporate innovative ideas and perspectives into the archaeological interpretation. They are a reaction to centuries-long colonial practices and the mischaracterization of Indigenous values and histories.

What are Indigenous archaeologies? Why is the term “*Indigenous*” capitalized? Why is the word “*archaeologies*” pluralized? How are Indigenous archaeologies different from other pursuits in contemporary archaeological theory and practice? These are essential questions to

answer at the outset of this chapter because they are necessary for understanding the framework of this scholarship.

Indigenous archaeologies are defined by Nicholas (2008: 1660) as “... an expression of archaeological theory and practice in which the discipline intersects with indigenous values, knowledge, practices, ethics, and sensibilities and through collaborative and community-originated or -directed projects, and related critical perspectives”. Indigenous archaeologies are inherently a collaborative approach in which archaeologists work *with* Indigenous communities, values, and ontologies to interpret the archaeological record (Atalay 2006, 2012; Nicholas 2001, 2008, 2006; Silva 2018; Supernant et al. 2020; Watkins 2000a, 2003, 2005, 2018). Indigenous archaeologies are not theoretical and methodological pursuits only to be practiced by Indigenous peoples, but to all archaeologists who include Indigenous peoples and their ontologies into their research to provide more holistic interpretations of the pre-colonial past (Atalay 2012; Nicholas 2006; Supernant et al. 2020; Watkins 2010). Indigenous archaeologies’ methods and theories are meant to be practiced by everyone in archaeology and anthropology.

Indigenous is capitalized per Gregory Youngings (2018) *Elements of Indigenous Style: A Guide for Writing By and About Indigenous Peoples*. There is no glorious or moral reason for capitalizing Indigenous; it is merely a proper noun and needs to be capitalized as such (Younging 2018). Indigenous archaeologies scholars are mostly correcting this change in grammar, although it has not quite trickled down to the rest of the archaeological literature (Supernant et al. 2020). However, *Sapiens* (Weeber 2020) recently published a public outreach article expressing the need to change their grammar in archaeological literature to non-Indigenous authors and researchers when discussing Indigenous archaeologies, peoples, and culture.

The term “*Indigenous archaeologies*” is pluralized to encompass the wide variety and diversity of Indigenous beliefs and practices throughout the globe (Atalay 2006; Supernant et al. 2020). Early academic works centered on Indigenous archaeologies in the 1990s and early 2000s used “indigenous archaeology,” which did not capitalize *indigenous* or pluralized *archaeology*. This is merely an artifact of the early scholarship that investigated Indigenous archaeologies, which have been redefined as the method and theory have developed, especially after 2010 (Atalay 2012; Nicholas and Watkins 2018; Supernant et al. 2020; Watkins and Nicholas 2018). Early works discussed in this chapter will refer to Indigenous archaeologies as indigenous archaeology, and I will use the terms interchangeably depending on the wording in the text under discussion. Just be aware that “indigenous archaeology” is now “Indigenous archaeologies” in the contemporary archaeological method and theory.

What makes Indigenous archaeologies different from other archaeological theoretical pursuits? Indigenous archaeologies are a collaborative method for interpreting the archaeological record (Atalay 2006, 2012; Gover 2019a; Nicholas 2006; Nicholas and Watkins 2018; Supernant et al. 2020; Watkins 2003, 2010, 2018; Watkins and Nicholas 2018). The term *collaborative* is a critical aspect of Indigenous archaeologies. Archaeologists employing Indigenous archaeologies’ methods and theories collaborate with Indigenous communities in their research, which is different from ethnoarchaeology, which some archaeologists have assumed Indigenous archaeologies stem from (Echo-Hawk 2000, 2018; McGhee 2008).

Unlike Indigenous archaeologies, which are collaborative practices, ethnoarchaeology was more concerned with studying living people, using ethnography to identify living analogies for interpreting archaeological traces (Binford 1980; Johnson 2019; Kelly 2013). Ethnoarchaeology was primarily concerned with developing macro-scale models of human

behavior to understand past peoples' prehistoric lifeways by studying contemporary societies' material and non-material culture (Kelly 2013). Frequently, archaeologists using ethnoarchaeological practices studied modern peoples who were not descendants of the archaeological cultures they were studying. For example, in his famous work, *The Lifeways of Hunter-Gatherers: The Foraging Spectrum*, Robert Kelly (2013) relied on ethnographic work that he conducted in Madagascar to support his behavioral ecology models that explained variability in hunter-gatherer societies across the globe. Although Kelly (2013) stated that ethnographic analogy was not as valuable as archaeological data to test the archaeological theory, ethnography still played a crucial component in his research. Fundamentally, how do the contemporary practices of Madagascar bushman in an industrialized and globalized world help archaeologists understand past societies in an environment solely constituted by hunters and gatherers in North America? How accurate and precise could such an analogy be (Wylie 1985)? In archaeological research, the use of ethnographic analogy is not illogical or erroneous for interpreting the archeological record, but the analogical inference must be assessed for credibility and strengthened with other sources of data (Kokkov 2019; Wylie 1985), such as the incorporation of descendant community knowledge.

However, Louis Binford's (1980) *Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation* provides an excellent example of the overreaching explanations of past human behavior through ethnoarchaeological approaches. Using ethnographic data collected during his time with the Nunamiut Eskimo, Binford created hunting and gathering models to explain hunting-gathering populations' global behavior through time and space (Binford 1980). In the Binford (1980) and Kelly (2013) examples, these archaeologists used ethnographic analogies to explain the lifeways and practices of cultures that

were not ancestral to their ethnographic case studies and existed in a different socio-political and cultural context.

However, ethnoarchaeological works have employed ethnographic records from anthropological accounts in the 19th century on Indigenous cultures in the continental United States to interpret archaeological data of their descendant communities. Wilson (1977) used ethnographic accounts of Mandan and Hidatsa pottery-making industries to interpret ceramic assemblages of the Middle Missourian archaeological cultures before the 17th century, which provides a more potent ethnographic analogy than what Binford (1980) and Kelly (2013) utilized in explaining cross-cultural behaviors and practices in the prehistoric record. Although Wilson used a more compelling ethnographic analogy, he maintained complete control over how the history of the Mandan and Hidatsa ceramic industries was interpreted and presented.

Fundamentally, the ethnoarchaeological approaches employed by these three scholars were not collaborative but very much single-sided, with the archaeologists and ethnographers having all the power: “power” being defined as having total control over research in all aspects from conception to publication and dissemination. This is a hallmark of ethnoarchaeology. All the power still resides with the archaeologists because they treated their ethnographic participants as research subjects rather than equal partners in academic research. *Who* has power is the crucial aspect of Indigenous Archaeologies in archaeological theory and method, which separates the practice from other archaeological approaches. In traditional archaeological paradigms such as the New Archaeology, archaeologists were in control of all the power in interpreting the archaeological record, and Indigenous people were excluded from archaeology. In Indigenous archaeologies, power is shared between the archaeologists and the Indigenous communities through collaboration. The Indigenous peoples are not the subject of research but

are research partners (Colwell 2016). Additionally, if an Indigenous person becomes an archaeologist, they are still accountable for working collaboratively with their own or other Indigenous communities.

However, power in archaeological research was not willingly given from archaeologists to the Indigenous; it was fought for by Indigenous peoples, especially in the United States Government's legal courts. Without legislation and court decisions in the United States Government, Indigenous archaeologies would not have an environment where they could be present today. We must discuss The American Indian Movement (AIM), the American Indian Religious Freedom Act of 1978 (AIRFA), and the Native American Graves Protection and Repatriations Act of 1990 (NAGPRA) because these three events laid the foundations for Indigenous archaeologies to develop and exist in an American context because they gave power to the Indigenous peoples and Native governments in the United States.

Through the Courts of the Conquerors

The foundations for Indigenous archaeologies were laid by the American Indian Movement (AIM). AIM was a militant American Indian civil rights organization founded in 1968 by Dennis Banks, Clyde Bellecourt, Eddie Benton Banai, and George Mitchell in Minneapolis, Minnesota (Busacca 2007; Fine-Dare 2002; Horton 2017; Johansen 2013; Watkins 2000a). The AIM was primarily concerned with Indigenous values, beliefs, and practices being recognized by the United States government as valid expressions of culture and becoming protected under federal law (Echo-Hawk 2000; Horton 2017; Watkins 2000a). The primary goals of the American Indian movement encompassed a broad spectrum of Indigenous demands such as the protection of legal rights, revitalization of traditional culture, economic independence from

the United States, sovereignty over tribal areas and lands, and the restoration of lands that the United States government illegally seized (Busacca 2007; Horton 2017; Johansen 2013). Their goal of revitalizing traditional Indigenous cultures created social and political momentum for the American Indian Religious Freedom Act (AIRFA) 1978 (Fine-Dare 2002; Watkins 2005). Without AIRFA, we would not have had the Native American Graves Protection and Repatriation Act of 1990; therefore, Indigenous archaeologies would not have existed in the 1990s.

The American Indian Religious Freedom Act of 1978 was pivotal in Indigenous religious rights and protections (Vecsey 1991). Before this act, American Indian religions and sacred ceremonies were prohibited by federal law in the United States (Vecsey 1991). Before 1978, Indigenous peoples were not free to practice their Indigenous religions in the United States. Therefore, objects and locations critical in Indigenous religious practices were not protected and not given statuses equal to other sacred items in the United States (Echo-Hawk 2018; Fine-Dare 2002; Vecsey 1991; Watkins 2000a, 2005). The passage of this act allowed Indigenous peoples in the United States to practice their religions freely, protected their sacred spaces and objects, and set aside rules and regulations for federal agencies, such as the U.S. Forest Service and U.S. Department of the Interior, to allow Indigenous ceremonies and religious practices to be conducted on Federal Land (Vecsey 1991). By recognizing and protecting Indigenous expressions of worship at the federal level, this act set the stage for the Native American Graves Protection and Repatriation Act, which seriously impacted archaeology and museum practices in the United States.

Indigenous archaeologies are the result of the Native American Graves Protection and Repatriation Act of 1990, or NAGPRA, which was the fruit of the American Indian Movement

of the 1960s and 1970s (King 2012:28) and the American Indian Religious Freedom Act (Echo-Hawk 2000; Roger C. Echo-Hawk 2018; Fine-Dare 2002; Vecsey 1991; Watkins 2000a).

NAGPRA is a federal law that created a process through which Indigenous human remains, funerary and sacred objects, and items of cultural ancestry are to be repatriated to culturally affiliated groups or direct descendants (Sebastian 2002). Two elements of this law directly affect federal agencies, federally funded museums, and archaeologists working on federal or tribal property. First, the law requires museums, universities, and other organizations receiving federal funding to inventory their collections and report the cataloged inventory to affiliated tribes (Sebastian 2002). The culturally affiliated tribes then can claim human remains and objects if they choose (Sebastian 2002). Second, the law created a process for consultation with federally recognized Indigenous Tribes regarding the disposition of archaeologically excavated human remains, sacred and funerary objects, or other material items of cultural heritage recovered during an archaeological investigation on federal or tribally owned land (Sebastian 2002). This law effectively allowed Indigenous Tribes of the United States to dictate what happens to Indigenous objects of cultural patrimony (material culture with sacred and religious contexts) residing on or excavated from federal property and within federally funded museums.

As a result of the legislation, archaeologists and museum personnel needed to work closely with the Indigenous nations whose past they wished to study. From the relationships built between these groups post-NAGPRA, Indigenous ways of thinking about the past became more widely respected and employed to interpret the archaeological record. The archaeological theory and practice of interacting with Indigenous knowledge, practices, ethics, and sensibilities to interpret the past through collaboration with Indigenous nations became Indigenous archaeologies (Nicholas 2008; Watkins 2000a). As a result of NAGPRA, a federal law, by 2019,

all fifty State governments enacted their versions of NAGPRA to extend Indigenous cultural material and practice protections to state-owned lands and state-funded museums and institutions (Supernant et al. 2020). However, some states' versions of NAGPRA, such as Texas, have been mostly ineffective in protecting and repatriating Indigenous material and ancestral lands (Baxter 2020; Chang and Nowell 2020).

NAGPRA was challenged in 1996 over the discovery of the Ancient One along the Columbia River near Kennewick, Washington. Eight scientists, Robson Bonnichsen, C. Loring Brace, Dennis J. Stanford, Richard Jantz, Douglas Owsley, George Gill, C. Vance Haynes Jr., and Gentry Steel, sued the U.S. Army Corps of Engineers for access to the Ancient One's remains so that they could be further studied and halt the repatriation of the ancestor by the Corps of Engineers under NAGPRA (Kelly and Thomas 2016). There were five critical issues in the lawsuit: (1) does NAGPRA apply to the Ancient One, (2) what are the legal meanings of "Native American" and "indigenous," (3) can the Ancient One be biologically or culturally linked to a modern Indigenous Nation, (4) does NAGPRA apply to ancient populations that may not be linked to modern Indigenous Nations, and (5) can both scientific study and repatriation of remains be accommodated or are they mutually exclusive (Thomas 2001:234).

In 2001, the judge ruled that the Ancient One was not covered under NAGPRA because he was not Native American (Kelly & Thomas 2017:329). The judge further stated that even if the Ancient One were to be Native American, the bones could not be culturally affiliated with any modern tribe (Kelly & Thomas 2017:329-333). In 2015, DNA tests of the Ancient One proved his genetic relationship to the modern Indigenous Nations in the area surrounding his recovery, who had oral traditions expressing their deep connection to the area in their history (Rasmussen et al. 2015; Tchekmedyian 2017). Soon after, President Obama signed legislation

that the Ancient One be returned to the Tribes of eastern Washington, which was subsequently reburied in 2017 (Tchekmedyian 2017).

The passage of NAGPRA fundamentally changed archaeological and museum landscapes, changing the power dynamics in both fields. American Indian Nations of the United States were given power and authority over their material heritage that resided on or excavated from federal property and housed in federally funded museum institutions. The reaction from archaeologists and museum professionals in the United States was supportive and unsupportive. Those in both professions felt that the passage of NAGPRA would empty museum collections and prevent future archaeological excavations (Colwell 2017). However, archaeologists and museum professionals' alarmist attitudes in the early 1990s were proven unjustified (Colwell 2017; Echo-Hawk 2000; Fine-Dare 2002).

NAGPRA created an environment where archaeologists and museum professionals were legally bound to work with Indigenous nations to repatriate cultural objects. Through consultations with Indigenous peoples, museum professionals, and archaeologists, dialogues were opened, relationships formed between all parties, and Indigenous scholars began to investigate archaeological material and content more critically. Most importantly, Indigenous ontologies became legitimized through legislation verifying the Indigenous material past's religious and cultural significance.

But why were Indigenous values and beliefs about the past not primarily represented in the archaeological literature before the 1990s, and why were many archaeologists and museum professionals terrified by the passage of NAGPRA? Why did it take federal legislation to get many archaeologists to work with Indigenous leaders on a continental scale? In large part, the answers to these questions are due to the colonial nature of archaeological science in the United

States, which hampered the ability of Indigenous archaeologies to exist in archaeological research before the passage of NAGPRA.

Colonial Anthropology and Indigenous Mistrust

Audra Simpson (2007), a Mohawk anthropologist, said, “To speak of indigeneity is to speak of anthropology and colonialism.” Anthropology and its subdiscipline of archaeology, in the United States, are inherently colonial sciences. Beginning in the Enlightenment period, affluent Western men from Europe traveled the globe seeking to explore the world and study the variety of cultures within (Atalay 2006; Nicholas 2006). The discipline of Anthropology was born from these early explorers and their interactions with Indigenous peoples.

It should be noted that the pervasiveness of colonialism and racism have transformed over the last century (Tuhiwai Smith 2012:23-28). Attitudes and perspectives in social sciences like Anthropology and Archaeology reflect the values of individual scholars and the values of the larger society of which those scholars are a part. This is not to excuse or apologize for the scientific discourses that occurred in the past that are distasteful today. However, it is essential to identify the intellectual habits of archaeology and anthropology inherited from these researchers that are harmful to Indigenous people today so that the field can continue to change positively.

Anthropology, as an academic discipline, has, from its onset, been involved in the desire, representation, collection, interpretation, and theft of Indigenous people and their culture. As an extension of anthropology, archaeology has been the scientific method of colonialism used to study Indigenous peoples' deep past from a Western ontology and worldview.

The greatest offenders in archaeological colonialism are the British, who plundered Mediterranean cultures, most notably Egypt and Greece, for objects to be displayed in the British

Museum (Äikäs and Salmi 2019). However, American archaeologists in the 19th and 20th centuries were not exempt from colonial approaches in studying Indigenous cultures of the United States and North America (Äikäs and Salmi 2019; Watkins 2000a, 2003, 2005). Early professional archaeologists in the United States relied heavily on 19th-century anthropologists' ethnography to create cultural histories of the archaeological record in North America (Colwell 2017; Colwell-Chanthaphonh 2010; Johnson 2019). As previously discussed, ethnography-reliant research and ethnoarchaeology are not collaborative approaches. Indigenous peoples were not included in the review of archaeological literature regarding their history by American archaeologists. As Kent Flannery (1967) stated, American archaeologists during the 20th century were not interested in “the Indian behind the artifact,” suggesting that American Archaeologists during the early and mid-19th century were more concerned with the descriptive emphasis and classification of material culture than with the Indigenous people that produced them; i.e., they were more interested in the system of the Indian behind the artifact.

In response to colonial attitudes and archaeological research, Indigenous peoples in the United States became heavily critical of archaeological science and mistrustful of archaeological interpretations (Colwell 2017; Echo-Hawk 2000, 2018; Watkins 2000a). A key figure in criticizing archaeology's colonial nature was Vine Deloria Jr., a Standing Rock Sioux, Native American author, theologian, historian, and activist for American Indian rights (Deloria 1997). His first book, published in 1969, titled *Custer Died for Your Sins: An Indian Manifesto*, addressed stereotypes of Indians and challenged White Americans to reevaluate United States history and the country's abuses of Native Americans (Vine Deloria 1969). One chapter of this book was titled: “Anthropologists and Other Friends” which recommended to Native Americans that they not cooperate with anthropologists because he believed they sought to further their

academic careers by exploiting Native Americans (Vine Deloria 1969). Furthermore, Vine Deloria thought anthropologists and archaeologists to have compiled useless knowledge that did not represent American Indian history accurately or respectfully and noted that not a single anthropologist or archaeologist came forward to defend Indigenous peoples during the termination hearings (Vine Deloria 1969). He also directly blamed American anthropologists for the destitute environment in which Indigenous communities found themselves by stating, “behind each policy and program with which Indians are plagued, if traced completely back to its origin, stands the anthropologist” (Vine Deloria 1969:81). It should be noted that Vine Deloria’s sister, Ella Cara Deloria, was an anthropologist who was a student of the famed Franz Boaz (Deloria et al. 1979). Yet her career of incorporating Indigenous perspectives in Anthropology did not dissuade Vine Deloria Jr. from being an outspoken opponent of Anthropological science.

Custer Died for Your Sins: An Indian Manifesto was not Vine Deloria’s only literary criticism of American archaeology and anthropology. His book *Red Earth, White Lies* directly attacked archaeological theory and interpretations of North America's pre-colonial history (Deloria 1997). He charges that the “overkill hypothesis” was racist by proclaiming that early Indigenous populations were partially responsible for overhunting North American megafauna because no such parallel of Pleistocene extinction existed on a similar scale in Eurasia, which also experienced a sudden arrival of human hunters (Deloria 1997). He also likens the Bering Strait hypothesis to “academic folklore” because archaeological migration theories of human arrival in the Americas do not corroborate Native American oral traditions. After all, Indigenous oral traditions do not have stories of intercontinental migration (Deloria 1997). Deloria was also vehemently opposed to archaeological research by Indigenous peoples (Echo-Hawk 2018). However, archaeologists did not take Vine Deloria’s comments about American archaeological

research in this book lying down. John Whittaker stated in his book review of *Red Earth, White Lies* that the book was “A wretched piece of Native American creationist claptrap that has all the flaws of the biblical creationist he disdains ...at the core is a wishful attempt to discredit all science because some facts clash with belief systems” (Whittaker 1997). Professional archaeologists did not receive Deloria’s views of American archaeology well, as represented in this book. Even though this book was published after the passage of NAGPRA, its contents still demonstrate an inherent distrust of archaeological research by Indigenous scholars.

The purpose of summarizing the colonial nature of American archaeology and the perspectives of Indigenous peoples of archaeology is to illustrate the overarching relationship between white Euro-American archaeologists and American Indian peoples. Anthropologists and American archaeologists were not concerned with Indigenous perspectives of their past or including Indigenous ontologies in archaeological interpretations. On the opposite end of the spectrum, prominent Indigenous scholars such as Vine Deloria Jr. were actively proclaiming archaeology as a racist science and deterring Indigenous peoples from engaging in or pursuing careers in the field. Archaeologists were mainly unwilling to work with Indigenous peoples, and Indigenous peoples were vehemently against working with archaeologists they saw as practicing a racist science (Watkins 2000a). So, before the passage of NAGPRA 1990, fundamentally, there was no environment in which a collaborative approach to archaeological practice and theory, such as Indigenous archaeologies, could be fostered and sustained. The passage of NAGPRA forced individuals from both communities to work with one another in repatriation projects for Indigenous cultural heritage, thus laying the groundwork for the theories and methodologies of Indigenous archaeologies to develop.

The 1990s: Forced Collaboration

The early 1990s saw archaeologists and Indigenous scholars working with one another to repatriate objects in academic and museum institutions to the descendant communities to which those objects belonged (Colwell 2017; Deloria 1997; Dumont 2002; Echo-Hawk 1992, 2000; Roger C. Echo-Hawk 2018; Watkins 2000a; Zimmerman 1990, 1992). Roger Echo-Hawk and Dr. Larry Zimmerman are vital figures who demonstrate how Indigenous knowledge and perspectives of the past work with and not against archaeological science.

Roger Echo-Hawk is a citizen of the Pawnee Nation of Oklahoma and received his Bachelor's degree in history from the University of Colorado Boulder in 1990 with an academic emphasis on Pawnee history (Echo-Hawk 2018). In 1994, Roger received his Master's degree in history, emphasizing ancient Indian history, from the University of Colorado Boulder. His Master's thesis committee included Phillip J Deloria, the son of Vine Deloria Jr. (Jolie 2014). Sitting on his thesis committee was Dr. Douglas Bamforth, an archaeology professor in the Department of Anthropology at the University of Colorado Boulder (Jolie 2014). In the early 1990s, Roger was hired by the Native American Rights Fund (NARF), headquartered in Boulder, Colorado, to spearhead repatriation projects resulting from the passage of NAGPRA (Jolie 2014).

Dr. Larry Zimmerman is a North American archaeologist who taught at the University of South Dakota from 1974 to 1996 and was chair of the American Indian and Native Studies Department at the University of Iowa from 1998 to 2001 (Lippert 2014). Zimmermann is best known for his social justice work relating to archaeology and professional archaeologists' treatment of Indigenous beliefs and practices (Lippert 2014). He is highly regarded for his dedication to Native American and Indigenous issues relating to archaeology (Lippert 2014).

Together, Zimmerman and Echo-Hawk collaborated on repatriation projects related to museum collections housed by the Nebraska State Historical Society that were ancestral to the Pawnee Nation of Oklahoma (Watkins 2000a). Their work in identifying cultural relationships between archaeological, cultural materials and descendant communities of objects residing in archaeological museum collections resulted in scholarship that increased archaeological knowledge of the past but also reintroduced past histories and practices of descendant communities (Echo-Hawk 1992, 2000, 2018; Jolie 2014; Lippert 2014; Zimmerman 1990, 1992). By working together, rather than in opposition to one another, they published works such as “Pawnee Mortuary Traditions” (Echo-Hawk 1992), “Archaeological Evidence for Pawnee Claims for Human Remains and Burial Offerings in the Central Plains” (Zimmerman 1990), and “Archaeology, Reburial, and the Tactics of a Discipline’s Self-Delusion” (Zimmerman 1992).

By working together on repatriation projects brought on by NAGPRA, Echo-Hawk and Zimmerman produced academic articles that furthered archaeological knowledge of the past. Zimmerman showed the archaeological community that incorporating an Indigenous understanding of history into archaeological research benefited archaeological interpretations. At the same time, Echo-Hawk illustrated to the Pawnee Nation and other Indigenous Nations that archaeological information and excavation can rediscover forgotten Indigenous accounts and practices.

Before the development of the term, both Zimmerman and Echo-Hawk were practicing Indigenous archaeologies because the term had yet to be developed. Remember, a fundamental aspect of Indigenous archaeologies is the collaborative nature in which the method is practiced and employed (Nicholas 2008).

However, the reception to Zimmerman and Echo-Hawk's collaboration and subsequent scholarship was not well-received. His archaeology colleagues lambasted Zimmerman for supposedly supporting the “radical” side, to which he replied, “ I think being yelled at by colleagues and Indians is good for the soul” (Lippert 2014). Unlike Zimmerman, however, Roger Echo-Hawk was not quite finished with his educational pursuits and was not tenured in an Academic Department (Jolie 2014).

Early professionals engaging in Indigenous archaeologies methods and practices, such as Zimmerman and Echo-Hawk, were met with open criticism from archaeologists and Indigenous scholars for their collaborative archaeological research approaches. However, future scholars in Indigenous archaeologies could not refine or develop the system without their exploratory work. NAGPRA created the environment where Indigenous archaeologies could be founded, and early collaborative repatriation projects provided the landscape in which the methodologies and theories could be further developed. The year 2000 proved to be a critical year in which Indigenous archaeologies became cemented in archaeological practice.

2000 - 2009: Indigenous Archaeology

In 2000, two publications called for professional American archaeologists to incorporate Indigenous ontologies into archaeological research as a critical component of the archaeological method. These were the article “Ancient History in the New World: Integrating Oral Traditions and the Archaeological Record in Deep Time” (Echo-Hawk 2000), published in the flagship journal of the Society for American Archaeology *American Antiquity*, and the book *Indigenous Archaeology: American Indian Values and Scientific Practice* (Watkins 2000a). Both works

illustrated the benefits collaboration between Western archaeology and Indigenous history could have in archaeological interpretations of North America's past.

Echo-Hawks' 2000 article in *American Antiquity* was vital because it called for scholars to analyze Indigenous oral traditions as critically as any other historical text. Stemming from his Master's thesis research, Echo-Hawk (2000) states that within Indigenous oral traditions, there are pieces of information that describe actual events, such as human migration stories into the North American continent as evidenced by Pawnee and Arikara oral traditions about a time of monsters, cold, and darkness in deep time (Echo-Hawk 2000). Echo-Hawk relates this period to the Ice Age, which these oral traditions mention. During the late Pleistocene, the climate was much colder, and megafauna, much larger than contemporary North American animals, were present (Echo-Hawk 2000). He also goes on to relate archaeological cultures, such as the Central Plains tradition, to events and places mentioned in Pawnee and Arikara oral traditions (Echo-Hawk 2000). He called for archaeologists and Indigenous scholars to collaborate in critically analyzing Indigenous oral traditions so that places, events, and histories mentioned in oral traditions could be incorporated into archaeological research to provide more holistic interpretations of the North American human past. Although Echo-Hawk called for collaboration between Indigenous scholars and professional archaeologists, he did not call this approach "Indigenous archaeology". Joe Watkins, however, did so in his book *Indigenous Archaeology: American Indian Values and Scientific Practice* (2000).

Joe Watkins is a tribal citizen of the Choctaw Nation of Oklahoma and one of the first Native American archaeologists to attain a Ph.D. (Thompson 2014; Watkins 2000a). From 1993 to 2003, Watkins worked as an archaeologist for the Bureau of Indian Affairs while concurrently serving as an instructor at the University of Oklahoma, Indiana University, the University of

Nevada- Reno, and Flinders University in Australia, where he taught courses in archaeological ethics and Native American consultation (Thompson 2014). His book, *Indigenous Archaeology*, was the result of his dissertation research that instructed archaeologists to incorporate Indigenous knowledge into archaeological investigations (Thompson 2014; Watkins 2000a). He remains one of the prominent archaeologists working with and advocating for Indigenous archaeologies today, as we will see later in this chapter.

Indigenous Archaeology was vital because it highlighted the relationship between Indigenous peoples and archaeological science and recognized Indigenous archaeologies as methodological and theoretical approaches to an archaeological investigation (Watkins 2000a). At the conclusion of his book, Watkins (2000:166) states, “With the growth of ethnic and nationalistic awareness, archaeologists are being forced to reexamine the relationship between the treatment of the cultural materials and human remains of Indigenous populations and that of the dominant societies. While disconcerting to the individual archaeologist, such examination strengthens the discipline by allowing the development of alternative means of viewing the past”. In this book, Watkins provided a name for the methodology that Echo-Hawk and Zimmerman had advocated in archaeological research since the early 1990s.

Throughout the early 2000s, work continued developing and advocating Indigenous archaeologies as a legitimate practice in archaeology. After the publication of his article in 2000, Echo-Hawk largely disappeared from archaeological literature until 2018, which we will get to later. Still, Watkins continued publishing on Indigenous archaeologies and expanded upon his book's content, published in 2000. Watkins published the articles “Through Wary Eyes: Indigenous Perspectives on Archaeology” (2005) and “Beyond the Margin: American Indians, First Nations, and Archaeology in North America” (2003). Both articles reflect on the

contentious relationships between archaeological science and Indigenous perspectives and advocate for collaborative archaeological inquiry approaches and developing Indigenous histories through Indigenous archaeology.

Building upon Watkins' concept of Indigenous archaeology, other archaeologists such as George Nicholas and Anishinabe-Ojibwe archaeologist Sonya Atalay incorporated this approach into their research.

During this time, Nicholas published such works as "The Past and Future of Indigenous Archaeology: Global Challenges, North American Perspectives, Australian prospects," (2001) "Decolonizing the Archaeological Landscape: the Practice and Politics of Archaeology in British Columbia," (2006) and the book chapter "Native Peoples in Archaeology in The Encyclopedia of Archaeology" (2008). In recognizing the future of archaeological research by and collaborative scholarship with Indigenous peoples to provide archaeology that served everyone. "Decolonizing the Archaeological Landscape" (Nicholas 2006) illustrated the need for Canadian archaeologists to incorporate Indigenous perspectives of the past in their research, and the book chapter "Native Peoples in Archaeology" (Nicholas 2008) defined Indigenous archaeologies quoted at the outset of this chapter.

Sonya Atalay advocated for adopting Indigenous archaeologies by professional archaeologists alongside Nicholas and Watkins. Their article "Indigenous Archaeology as Decolonizing Practice" (2006) called for archaeologists and Indigenous peoples to move beyond polarizing arguments that pit science against religion and unite as equal partners in cultural stewardship. Atalay (2006) also highlighted that Indigenous and local groups had stewardship responsibilities of cultural heritage, not just archaeologists. Furthermore, Atalay (2006) promoted that Indigenous archaeology was a decolonial practice because archaeology was not

just about material culture but about people and understanding the daily lives of past people and to understand better the archaeological record of Indigenous heritage required Indigenous perspectives that are not informed by western worldviews.

Atalay (2007) expanded Indigenous archaeologies utility beyond the North American continent. This article demonstrated how the theories and methodologies of Indigenous archaeologies are relevant to archaeologists who are not working on native land or sites related to Indigenous heritage and called for further investigation into collaborative methods in heritage management in archaeological settings (Atalay 2007). Atalay (2007) developed a set of best practices in Indigenous archaeologies methodologies and theories.

Whereas the 1990s saw scholars exploring collaborative approaches and realizing that combining archaeological science with Indigenous beliefs and knowledge provided better and more holistic interpretations, the early 2000s marked the development of Indigenous archaeologies structure in methodological and theoretical approaches in conducting archaeological research. A title was finally given to the method by which archaeologists utilized both archaeological science and Indigenous knowledge: Indigenous archaeology (Watkins 2000a), A definition was provided that adequately explained the approach: “ ... an expression of archaeological theory and practice in which the discipline intersects with indigenous values, knowledge, practices, ethics, and sensibilities and through collaborative and community-originated or -directed projects, and related critical perspectives.” (Nicholas 2008: 1660)

2010 – 2019: Indigenous archaeologies

The past decade saw *indigenous archaeology* (Watkins 2000a) become *Indigenous archaeologies* (Nicholas and Watkins 2018) and the introduction of new scholars adopting and

promoting the approach. Scholars such as Watkins, Nicholas, and Atalay are still publishing on Indigenous archaeologies during this time and are collaborating on co-authored works (Atalay 2010, 2012; Nicholas and Watkins 2014, 2018; Watkins 2010; Watkins and Nicholas 2018); and Echo-Hawk (2018) reemerges in the literature. However, we also see a new generation of Indigenous scholars and quantitative-based computational modeling approaches to Indigenous archaeologies.

Whereas the previous two decades of Indigenous archaeology were more focused on the theoretical praxis of Indigenous archaeology through highly charged and emotional discourse, the decade between 2010 and 2019 demonstrated the successful weaving together of Western scientific archaeology with Indigenous knowledge and host community concerns (McNiven 2016). Indigenous archaeologies illustrate a hybridized approach that does not require archaeologists of European descent to become “more native” or for Indigenous people to become more “Western” or “academic” (McNiven 2016:36). From 2010 to 2019, the Indigenous archaeologies literature categorically demonstrated that the discipline is grounded in a cross-culturally sensitive, inclusive, and applicable approach to archaeology (McNiven 2016; Wylie 2015).

At the beginning of the decade, Nicholas (2010) also introduced a book that was less focused on presenting data and theory grounded through Indigenous archaeologies approaches. Instead, the edited volume *Being and Becoming Indigenous Archaeologists* highlighted thirty-seven Indigenous archaeologists from across the globe, allowing each author to tell their story about how they became archaeologists in their own words (Nicholas 2010). The contributors of this volume reflect on their experiences as archaeologists in an inherently colonial field and navigating their dual roles as Indigenous people within their home communities and as

archaeologists within the academic profession. The significance of this edited volume lies in its potential to inspire future generations of Indigenous archaeologists and how it humanized and validated the lived experiences of Indigenous archaeologists across the globe.

Additionally, during this time, reflections of decades-long collaborative projects between non-Indigenous archaeologists and Indigenous professionals in Indigenous-led research emerge (Cipolla 2013; Cipolla and Quinn 2016; Cipolla et al. 2019; Gonzalez 2016; Gonzalez et al. 2018). Reflections on ongoing Indigenous-led field school projects, such as “Theory in Collaborative Indigenous Archaeology: Insights from Mohegan” (Cipolla et al. 2019:139) demonstrate how rewarding long-term relationship building can be when archaeologists “move beyond simply seeking approval from Indigenous communities or consulting with them.” Gonzalez et al. also demonstrated successful collaborative partnerships in archaeological field school development between the University of Washington and the Confederated Tribes of Grand Ronde (2018). Collaborative Indigenous archaeologies create and foster an environment for dialogue and debate, bringing together Indigenous worldviews and traditional archaeological thought.

Furthermore, this era of Indigenous archaeologies included embracing quantitative approaches to unlocking deeper insights into the complex narratives of Indigenous histories and cultures. One of the primary proponents of adopting quantitative approaches in Indigenous archaeologies is Kisha Supernant, a Canadian anthropological archaeologist who is a descendant of the Northern Alberta Cree and Metis communities (Supernant et al. 2020). Her contributions to Indigenous archaeologies are centered on introducing quantitative modeling approaches in Indigenous archaeological analysis. Two of Supernant’s articles, “Intervisibility and Intravisibility of Rock Feature Sites: a Method for Testing Viewshed Within and Outside the

Socio-Spatial System of the Lower Fraser River Canyon, British Columbia” (2014) and “Modeling Metis Mobility? Evaluating Least Cost Paths and Indigenous Landscapes in the Canadian West” (2017) utilized Geographic Information Systems (GIS) computational modeling of viewshed analyses and least-cost-path analyses to predict population movements of Metis populations in the past and to understand the significance of the built environment of the Metis.

Whereas the use of Indigenous archaeologies in the '90s produced exploratory works in the practice and development of Indigenous archaeologies as a system of archaeological inquiry, and Indigenous archaeologies in the 2000s were more concerned with developing best practices, theories, and methodologies, scholarship in the 2010s developed multifaceted applications towards Indigenous archaeologies that utilized Indigenous knowledge, archaeological evidence, and statistical-computational approaches—demonstrated the interdisciplinary capabilities of Indigenous archaeologies in investigations of the archaeological record. Fundamentally, Supernant’s interdisciplinary works provided statistical data to support the validity of Indigenous knowledge used as evidence in archaeological inquiry. Supernant, Cipolla, and McNiven did not argue that Indigenous knowledge was the only way to understand the archaeological record; instead, they demonstrated the necessity of including Indigenous knowledge in archaeological approaches, just as Watkins (2010) had advocated at the turn of the decade.

The Far Ends of the Spectrum

However, some scholars oppose the utility and validity of aspects inherent to Indigenous archaeologies and scholars that are pushing Indigenous archaeologies beyond the scope of their original collaborative spirit. Despite the inherent challenges, both archaeological science and Indigenous archaeologies are strengthened by a collaborative approach – as illustrated by two

non-collaborative examples on either end of the spectrum. I identify two archaeologists, Robert McGhee and Paulette Steeves, as the primary case studies for review regarding their attitudes towards Indigenous archaeologies.

Let us begin by discussing a critic of Indigenous archaeologies, Robert McGhee, who had reservations about the approach in the early 2000s. McGhee's (2008) article, *Aboriginalism and the Problems of Indigenous Archaeology*, made it clear to the archaeological community that he believed evidence from Indigenous archaeological research was, at best, anecdotal and Indigenous archaeologies were flawed concepts adopted by archaeologists, the Western public, and Indigenous peoples. He referred to Indigenous oral traditions as akin to religious beliefs that could not be integrated with other sources of archaeological data (McGhee 2008). McGhee also raised the issue that non-Indigenous archaeologists were merely pandering to Indigenous archaeologists and communities so that they may have access to Indigenous partnerships rather than believing in the intellectual merit of Indigenous archaeologies (McGhee 2008). Overall, this article was a direct criticism of Watkins (2000, 2005), Echo-Hawk (2000), and Atalay (2006, 2007), who he believed were intimidating non-Indigenous archaeologists into forcefully accepting Indigenous ontologies in archaeological research.

The reaction to McGhee (2008) was fierce and primarily focused on his comments regarding the lack of intellectual merit for Indigenous Archaeology. Non-Indigenous archaeologists such as Stephen Silliman came to the defense of Indigenous archaeologies in criticizing McGhee's lack of understanding of the approach (Silliman 2008, 2010). Silliman stated in his review of McGhee (2008), "Unfortunately, McGhee's (2008) article makes neither sufficiently informed nor a substantive contribution, opting instead to mischaracterize the burgeoning field of Indigenous archaeology" (2010:217). Going further, Silliman argued that

McGee was actively working against Indigenous archaeologists' postcolonial aims, who were merely seeking to integrate, repair, and move beyond the colonial nature of American archaeology (Silliman 2010). In response to Silliman (2010), McGee (2010) reaffirmed his position on Indigenous archaeologies as being nothing more than a social project without any intellectual foundations. However, McGee retired in 2008, and his 2010 response to Silliman was his last official archaeological publication. His contemporary attitudes toward Indigenous archaeologies remain unknown beyond his 2008 and 2010 publications.

However, McGhee did believe in genuine collaborative methodologies with descendant communities when he stated, “These actions [meaning things we should do] include getting to know Indigenous individuals as acquaintances, rather than as contemporary avatars of an ancient ideal; dealing with the past as a place inhabited by real people and real communities, rather than the abstract entities postulated by both processual paradigms and Aboriginalist belief; and working cooperatively with Indigenous people toward this goal, engaging them in archaeological research and learning from their genuine knowledge of their societies and the historical processes that have formed them” (McGhee 2008:595). He also did offer a valid concern when he pointed out that non-Indigenous scholars could merely be pandering to Indigenous communities while not engaging in Indigenous Archaeologies to gain access to information.

Jumping from one side of the spectrum where an archaeologist believed in the futility of aspects of Indigenous archaeologies, we move now to an archaeologist who has taken Indigenous archaeologies to a radical extreme beyond its initial collaborative nature. Paulette Steeves is a Cree-Metis citizen who received her Ph.D. in Anthropology from Binghamton University in 2015 (Steeves 2015b). Her dissertation work, the source for her article “Decolonizing the Past and Present of the Western Hemisphere (The Americas)” (Steeves 2015a), argued that

Indigenous populations had been in the Americas for over 130,000 years and that there was no migration event from Eurasia. Indigenous people in the Americas had always been in North and South America and were not descendants of African hominids (Steeves 2015a). Steeves' work is not a collaborative approach between Indigenous knowledge and archaeological data but solely focused on Indigenous perspectives of ancestry and was highly critical of archaeological science, which she describes as actively erasing and denying Indigenous people's beliefs and practices (Steeves 2015a, 2017, 2018, 2019). To Steeves, archaeological science and Indigenous ontologies cannot work in harmony but are active opponents, directly contrasting with Indigenous Archaeologies as a collaborative approach. Steeves also proclaims that her thesis was the first to use the Indigenous method and theory in anthropology (Steeves 2015b). Steeves' approach represents the worst fear that McGee (2008) presented, in that practitioners of Indigenous Archaeologies were going to force Indigenous ontologies onto archaeological research. Steeves is an outlier in Indigenous Archaeologies, as most practitioners of Indigenous Archaeologies promote the practice as complementing archaeology; it is not in direct opposition to archaeological science. (Atalay 2012, 2007; Nicholas and Watkins 2014; Supernant 2017; Supernant et al. 2020; Watkins 2000, 2010)

These two scholars represent opposite perspectives on Indigenous archaeologies. We have Robert McGee (2008, 2010), who criticized the approach for being academically meritless. Then we have Paulette Steeves, whose works (2015a, 2015b, 2017, 2018, 2019) disconnected with the collaborative nature of Indigenous archaeologies to proclaim that Indigenous knowledge of the past is the only evidence needed for understanding Indigenous deep-time histories. Both of these archaeologists are fundamentally wrong. Indigenous archaeologies provide critical information for holistic interpretations of the past and require both archaeological data and

Indigenous knowledge. Indigenous knowledge is not superior to archaeological data, nor are archaeological data superior to Indigenous knowledge; they are complementary.

2020 and into the Future

At the outset of 2020, Kisha Supernant, Jane Eva Baxter, Natasha Lyons, and Sonya Atalay published an edited volume about Indigenous archaeologies titled *Archaeologies of the Heart* (Supernant et al. 2020). The content of this edited volume illustrates the answer to the petitionary nature of Indigenous archaeologies and how Indigenous archaeologies apply to all theories and methodologies in archaeology science (Armstrong and Anderson 2020; Atalay 2020; Conkey 2020; Graesch et al. 2020; Hodgetts and Kelvin 2020; Hoffmann 2020; Lindstrøm 2020; Lyons and Supernant 2020; Macarty 2020; Rizvi 2020; Supernant et al. 2020; Surface-Evans 2020; Tringham 2020; Van Gelder 2020; Welch 2020). This volume primarily deals with abstract and moral rationales for engaging Indigenous archaeologies rather than providing case studies for its utility.

A volume on methodologies rather than theory was also published in Indigenous archaeologies. Dr. Emily van Alst, a Lakota descendant, and I co-edited a volume, *Indigenizing Archaeology*, that focuses on the “*how to*’s” of Indigenous archaeologies grounded in Western science and Indigenous cultural and traditional knowledge (Van Alst and Shield Chief Gover 2024). The work features eleven early and up-and-coming Indigenous archaeologists representing the Plains Cree, Nipmuc Nation, Pomo, Ohkay Owingeh Pueblo, White Mountain Apache, Wendat, Crow, Potawatomi, Red Lake Ojibwe, Pee-Dee, Lakota, and Pawnee. Van Alst and I recognized that previous works of Indigenous archaeologies were primarily grounded in theory rather than method. This volume’s content is aimed at and written for college students,

tribal historic preservation officers, NAGPRA officers, and tribal archaeologists. This is the first edited volume in archaeology to be authored solely by archaeologists of Indigenous descent.

Geroge Nicholas, in collaboration with Joe Watkins, expands upon *Being and Becoming Indigenous Archaeologists* (Nicholas 2010), with a new edited volume: *Working as Indigenous Archaeologists: Reckoning New Paths Between Past and Present Lives* (Nicholas and Watkins 2024). This volume includes fifty-eight autobiographical chapters by Indigenous archaeologists worldwide. *Working as Indigenous Archaeologists* (Nicholas and Watkins 2024) serves as a “sequel” to *Being and Becoming Indigenous Archaeologists* (Nicholas 2010) but highlights new Indigenous archaeologists and works since the 2010 book.

Moving away from edited volumes and towards more novel approaches in Indigenous archaeologies, the post-2020 era of the discipline has increased the application of radiocarbon data in quantitative approaches in regional datasets in coalescence with Indigenous histories. Two articles in particular: “Refined Radiocarbon Chronologies for Northern Iroquoian Site Sequences: Implications for Coalescence, Conflict, and the Reception of European Goods” (Birch et al. 2021) and “The role of radiocarbon dating in advancing Indigenous-led archaeological research agendas” (Birch et al. 2022) reveal how independent radiocarbon-based chronologies in archaeology can be utilized to construct Indigenous histories in collaborative research agendas. These collaborative research groups used radiocarbon chronologies to reconstruct past population movements in the aspect of the Muscogee tradition (Birch et al. 2022) and to illustrate the inherent variability of local and regional variability of Iroquoian settlements (Birch et al. 2022). These two works were not the first to incorporate Indigenous history in Bayesian-produced radiocarbon chronologies; Iain McKechnie (2015) did so on a localized dataset in Western Vancouver Island. However, McKechnie’s (2015) approach merely

utilized Indigenous oral histories to construct chronologies and was not necessarily a collaborative research project.

Additionally, Indigenous Archaeologies have begun to become intertwined with social justice activism and initiatives. Kisha Supernant has been very active in unmarked grave locations and identification on residential boarding school grounds in Canada (Austen 2021). Nicholas Laluk and Benrita Burnette advocate that community-based collaborative research projects with the Ndee (Apache) support and ensure community healing (2021). Furthermore, Indigenous Archaeologies exemplify Sovereignty-Based Social Justice that dismantles settler-colonial power structures and, therefore, emphasizes the role of Indigenous Communities in achieving academic and pedagogical equality (Laluk et al. 2022). Additionally, Indigenous Archaeologies approaches in archaeology have been equated to “humanizing” archaeological practice through a collaborative methodology with descendant communities (Wylie 2015, 2022).

The development of Indigenous archaeologies was laid in social activist movements of the 1970s, legislation, and early collaborations in repatriation projects in the '90s. Joe Watkins gave name to the collaborative approach between archaeological science and Indigenous knowledge. He and other scholars, such as George Nicholas, Sonya Atalay, and Kisha Supernant, developed a distinct archaeological practice within the field. Indigenous archaeologies have critics in archaeologists such as Robert McGee and its exploiters such as Paulette Steeves. The method does have its flaws (Gover 2019a; Nicholas and Watkins 2018; Watkins and Nicholas 2018), however, continuing to refine and develop the approach will hopefully lead to more widespread adoption by the archaeological community.

A Pawnee Approach to Archaeology

One of the most critical outcomes of developing Indigenous archaeologies was the push for research done for, by, and with communities (Nicholas 2008). I apply all three to my study of the Pawnee past in this dissertation.

The seemingly most straightforward metric for an Indigenous Archaeologies approach is how this dissertation research is “by” Indigenous people. I am an enrolled Tribal Citizen of the Pawnee Nation of Oklahoma, conducting scholarship on ancestral Pawnee material culture and history. My name is Rawati’aku (He also gives) of the Raktahčû’rîsâru’ (Shield Chief) family, belonging to the Pahukstâtu,’ Ckîri, Pâri (Pumpkin Vine Clan, Wolf Band, Pawnee Indians). However, I firmly believe that merely being a citizen of an Indigenous Nation is not enough to fulfill the “by” aspect of an Indigenous Archaeologies approach. Being active within the Indigenous community is critical in this aspect. In this regard, I have kept active connections with and commitments to the Pawnee Nation.

As such, I sought to serve the Pawnee Nation community from abroad. In official capacities, I was elected to the Museum of the Pawnee Nation Board of Directors in January 2017, the Pawnee Nation Cultural Center Planning Committee in 2020, and the Pawnee Nation Constitution Revision Committee in 2021. Outside of official appointments, I have given talks on my research to the Pawnee community in person and online during the COVID-19 pandemic, been a resource to the Pawnee Nation Cultural Resources Division on NAGPRA and THPO projects, have been invited to and have participated in repatriation and reburials of Pawnee ancestors, led a documentary project interviewing Tribal elders and knowledge keepers during the summer of 2020, and attended Pawnee Languages classes and Pawnee ceremonies in Pawnee, Oklahoma. Not only am I enrolled as a citizen of the Pawnee Nation of Oklahoma, but I

am also actively engaged in Pawnee culture. Most importantly, I am seen by the people of the Pawnee Nation as an authority and active citizen within the Nation. As such, this dissertation research is conducted *by* an Indigenous person beyond the basic qualifications of having a Tribal Enrollment Card or by the quantity of my “Indian” blood.

The next metric for how this dissertation research is grounded in an Indigenous Archaeologies approach is how it is “*with*” Indigenous people. Throughout my graduate career, I have regularly communicated with the Pawnee Nation Cultural Resources Division regarding my dissertation research and other projects. Having their support has been critical, and I would not be pursuing this research if I did not have the backing of the Pawnee Nation. My primary contacts have been the two Tribal Historic Preservation Officers for the Pawnee Nation, first John-Michael Knifechief until his departure in 2018, and second Matt Reed, who replaced John-Michael. Additionally, I communicate with the director of the Pawnee Nation Cultural Resources Division, Herb Adson, and the NAGPRA officer, Martha Only-A-Chief. Roger Echo-Hawk, who does not hold an official position within the Nation but is the unofficial Tribal Historian, has supported me throughout this research and my career. These individuals support my research and approve of the Pawnee knowledge and information presented in this dissertation. They have provided me with guidance throughout this research and feedback on interpreting the data presented in Chapter 4.

Additionally, the Pawnee Nation has been involved with ongoing field projects directed by K.C. Carlson and Douglas Bamforth on an ancestral Pawnee and Arikara town in modern-day Lynch, Nebraska. During both field seasons, Pawnee citizens were invited to visit the site, 25BD1, engage with the archaeologists conducting excavation, and participate in the archaeology. Although the research project at 25BD1 comprises a small aspect of this

dissertation, the conversations between the project directors and the Pawnee Nation CRD surrounding the excavation of 25BD1 and the broader impacts and implications of the research have secured Pawnee collaboration.

The last metric is how this research is “*for*” Indigenous people, specifically the Pawnee. A primary driving factor behind this research is further illustrating the necessity and value of incorporating Indigenous oral traditions into archaeological research questions and data. I am also doing this research to show the Pawnee community that archaeological data does not inherently oppose traditional knowledge. Scholars of European descent author most literature on Pawnee history (Hyde 1988; Parks 2001a, 2001b; Weltfish 1965); however, I intend to join Roger Echo-Hawk (2018) in providing a Pawnee voice to Pawnee history in public literature. Furthermore, the current view on Pawnee history is typically written about and portrayed beginning in the 18th century with the presence of the written accounts of Euro-Americans about the Pawnee (Hyde 1988). Pawnee history goes back much further than the 1700s, and Pawnee oral traditions and the archaeological record unequivocally support that. One research goal is to determine if Pawnee history extends by several centuries using oral traditions in collaboration with archaeological data. I believe it is essential that the Pawnee Nation breaks away from the notion that what it means to be traditionally Pawnee is who we were in the 19th century during westward expansion and the Indian Wars. This dissertation research will show that Pawnee history is far more robust and will challenge Pawnee people to think about what it means to be “Pawnee” in a new light based on archaeological data.

Additionally, I hope that the Pawnee Nation Cultural Resources Division will use the data produced for this research and the resulting analyses for NAGPRA claims and section 106 work by the Tribal Historic Preservation Officer and in any other capacity toward projecting our

Nation's sovereignty and land claims back in our ancestral homelands in the Central Plains by the Pawnee Nation government. This research lays the groundwork for other Indigenous scholars seeking to interweave their oral histories with archaeological data to benefit their communities.

Conclusion

Although Indigenous archaeologies as a field of study in archaeology are relatively new in comparison to other archaeological approaches, the past decade has seen an upsurge of Indigenous scholars conducting archaeological research guided by Indigenous ontologies (Armstrong and Anderson 2020; Atalay 2012; Conkey 2020; Gover 2019a; Kelley et al. 2022; Steeves 2015a; Supernant 2017; Taylor et al. 2021; Watkins and Nicholas 2018). Within the vast scope of Indigenous Archaeologies, this dissertation represents the Pawnee approach to Indigenous Archaeologies, guided by Pawnee ontologies about the past and present of the Pawnee people. There is no singular approach to employing Indigenous archaeology. As Joe Watkins explains, "American Indians do not have any singular way of dealing with archaeology and archaeologists, but rather have adopted various processes to suit their particular situations" (Watkins 2000: 169). Therefore, my Pawnee framework for conducting an Indigenous Archaeologies approach is well within the boundaries of the practice. Chapter two will further detail the specific Pawnee knowledge I am using to investigate the archaeological record.

Chapter III: THE PAWNEE, ARIKARA, & WICHITA AND THEIR ORAL TRADITIONS

Introduction

Indigenous populations in North and South America predominately documented their history through oral communication and transmission. Written or physical, historical documentation is mainly non-existent in Pre-colonial Indigenous cultures, with the notable exceptions of Maya stelae (Demarest 2005), Aztec codices (Smith 2011), and Inka khipu's (Morris and Hagen 2012). However, the oral transmission of history comes in two forms: oral history and oral traditions (Echo-Hawk 2000). Echo-Hawk defines the two forms: "Oral history is best defined as the verbal memoirs of firsthand observers, while oral traditions are verbal memoirs that firsthand observers have passed along to others." (2000: 270). Essentially, oral histories are primary sources, and oral traditions are secondary sources. Oral histories are unavailable since this research focuses on the period between C.E. 500 and C.E. 1650. For this dissertation research, I must utilize Pawnee and Arikara oral traditions about migration, population movements, and ethnogenesis.

However, incorporating Indigenous oral tradition data into archaeological investigation and interpretation is a relatively new development within the field, one that has primarily occurred since the turn of the 21st millennium (Echo-Hawk 2000; Schaafsma 2004; Watkins 2005, 2003; Whiteley 2002). As mentioned in Chapter 1, Roger Echo-Hawk and Larry Zimmerman pioneered the use of oral traditions in NAGPRA cases in the 1990s (Echo-Hawk 1992; Zimmerman 1990, 1992), but the application of Indigenous oral traditions as credible sources of historical documentation in archaeological research and peer-reviewed scholarship was mainly absent from the literature until 2000. However, the validity and utility of Indigenous

oral traditions in the early 2000s, and even today, has been met with skepticism and, at worst, abject refusal.

The Validity of Oral Traditions as Real Histories

This section will present the criticisms of using Indigenous oral traditions in archaeological research practices. Then, I will present the counterarguments to those criticisms and explain why those academics who negate the validity of Indigenous oral traditions are wrong. Although it would be easier for me to merely disregard these criticisms and label their authors as engaging in racist rhetoric that privileges Euro-American written documentation over Indigenous oral documentation, I will present the archaeological data that corroborates Indigenous oral tradition narratives.

An early opponent to the validity of incorporating Indigenous oral traditions and histories into archaeological research in the early 2000s was Dr. Ronald J. Mason. Mason's publication in *American Antiquity* outlines the arguments for and against using Indigenous oral traditions in archaeological research and interpretations (2000). The article aims to dissuade archaeologists from using oral traditions in research as they "are more often than not roadblocks than bridges to archaeologists aspiring to know "what happened in history." (Mason 2000:264). However, Mason conveniently lists the pro and con arguments for using oral traditions in archaeological research circulating in the literature in the '90s (Mason 2000). The following is the list of pro and con arguments presented in "Archaeology and Native North American Oral Traditions" (Mason 2000:242):

- Pro arguments for the use of North American Indigenous oral traditions:
 1. Oral tradition is as valid as other information about the past and deserves equal status.
 2. Who should know their history as well as, let alone better, than those who know it, even if they never wrote it down?
 3. Oral traditions, being “emic” phenomena, are extraneously unchallengeable and must be accepted as independent information.
 4. Much of the past survives exclusively in the spoken word.
 5. Oral traditions and Western historiography access uniquely different kinds of knowledge and thus address parallel realities, each as valid as the other.
 6. Archaeology and oral traditions overlap and, together, offer a richer view of the past than either alone.
 7. Archaeology, a product of Western civilization, is ethnocentric and must be balanced if not replaced by “alternative histories.”

- Con arguments for the use of North American Indigenous oral traditions:
 1. Dependent on memory and oral transmission, oral traditions are untrustworthy.
 2. By its nature, the genre is more an artifact of contemporary culture than a record of the past.
 3. Oral traditions are closed belief systems, beholden to authority and impervious to external challenge.
 4. All or parts of oral traditions may be considered sacred, only partly or not accessible to outsiders; guardians of such lore determine what may be released and how it may be used.

After listing the pro and con arguments, Mason analyzes each argument, but in analyzing the “pro” arguments, he seeks to invalidate them (Mason 2000). The crux of this article seeks to delegitimize the nature in which oral traditions are transmitted and the security of that knowledge being preserved over time (Mason 2000). However, he does so without providing scientific data to support this claim. However, he can show disparities in the “Navajo-Hopi” drama, which investigates two oral histories and one oral tradition of a historical event between the Navajo and Hopi in the late 19th century (Mason 2000). Yet, in Mason’s discourse, he does not mention or provide examples in which written documentation was disproven to be historically accurate. He upholds written documentation and the archaeological process as infallible compared to

Indigenous oral traditions, which he compares to being akin to religion: “you believe oral tradition or you don’t” (Mason 2000:263). However, written histories have also been shown to be inaccurate compared to oral traditions through archaeological investigation, such as accounts of the Battle of the Little Bighorn (Scott 2013).

However, Mason’s fourth con: “All or parts of oral traditions may be considered sacred, only partly or not at all accessible to outsiders; guardians of such lore determine what may be released and how it may be used” (Mason 2000:242) has been confirmed in my personal experience. I have had to refrain from pursuing research concerning locations of sacred Pawnee Animal Lodges as the sacred knowledge on the Animal Lodges is not information I am allowed to know. Even though the information had been previously published (Parks and Wedel 1985), it was made clear to me by Pawnee knowledge keepers that the previous research was conducted without permission from the Nation; I did not have the proper authority to know that information and that the knowledge was not meant for everybody, even within the Pawnee community. This personal example elicits the crux of the approaches of Indigenous Archaeologies; if the research is not *for*, *by*, and *with* Indigenous communities, the research need not be done.

So, I do not see Mason's point as a con; rather, this sentiment illustrates the need for collaborative research approaches and relationship-building with descendant communities. Indigenous people and their culture are not freely available resources that archaeologists and scholars can access at a whim. It is relatively ignorant of Mason to expect that Indigenous people share their knowledge with people outside of their community for the sake of “scientific” inquiry and discovery. So, my response to Mason in this regard is if the Indigenous community is unwilling to share their knowledge, is the research worth pursuing other than to satiate the personal need to know of some archaeologist?

Even though Mason (2000) ultimately dismisses the validity of oral traditions in archaeological approaches, he does mention the need for systematic evaluation of oral traditions to identify information within the narratives. Mason is aligned with Echo-Hawk (2000), who calls for treating Indigenous oral traditions like any other source of historical data; they must be evaluated through rigorous processes for validation. Echo-Hawk does not call for the outright acceptance of all Indigenous oral traditions as factual, merely that within these histories, some of which have fantastical themes, contain “kernels” of historical data that can be utilized in archaeological research (Echo-Hawk 2000, 2018; Whiteley 2002).

Peter M. Whiteley, in his article “Archaeology and Oral Tradition: The Scientific Importance of Dialogue” (2002), does an incredible job of illustrating the commonalities in both Echo-Hawk’s (2000) and Mason’s (2000) arguments (2002). In this, Whiteley characterized Echo-Hawk (2000) as having a more humanities approach compared to Mason’s archaeology as a “hard” science perspective (2000). More importantly, Whiteley also reaffirms the need not wholly to accept Indigenous oral traditions are 100% factually based but that they “contain a great deal of consistently reported information, with strong internal standards of verifiability” (2002:412) that should be given the same academic evaluation as written historical account (2002). Sadly, the academic discourse surrounding Indigenous oral traditions' utility continued beyond the new millennium's turn.

The rejection of Indigenous oral traditions as valid sources of historical data prominently “reared” its head with Robert McGhee’s “Aboriginalism and the Problems of Indigenous Archaeology” (2008). I provided a summary of McGhee’s (2008) argument in Chapter 1, but for this chapter's purposes, McGhee falls into the same fallacy that Mason (2000) espoused. Both Mason (2000) and McGhee (2008) incorrectly assume that proponents of utilizing Indigenous

Oral Traditions call for outright acceptance of Indigenous Oral Traditions as completely factual and negate the need for archaeological research. This kind of response may stem from Vine Deloria (1997), who did outright reject the necessity of archaeology, but that is not the narrative being promoted by Echo-Hawk (2000) and others (Colwell 2017; Colwell-Chanthaphonh 2010; Croes 2010; Roger C. Echo-Hawk 2018; Silliman 2008, 2010; Wilcox 2010). Indigenous oral traditions do not replace archaeological investigation, nor are they entirely factual, but inherent in these histories are historical data that can be beneficial in archaeological investigation and interpretation (Atalay 2012; Colwell 2017; Colwell-Chanthaphonh 2010; Echo-Hawk 2018, 1992, 2000; Croes 2010; Crowell and Howell 2013; Silliman 2008, 2010; Nicholas 2001, 2006; Watkins 2010, 2005, 2000).

The purpose of this dissertation research is to utilize the oral traditions of the Pawnee and Arikara, which is aligned with Echo-Hawk's (2000) call for treating these histories as I would any other source of information in archaeological or historical literature. I am not promoting Indigenous oral traditions as the "end all, be all" for understanding the past or saying that Indigenous knowledge is inherently superior or more valid than other forms of knowledge production and keeping. I agree with Whiteley that "Oral traditions and other forms of encoded cultural representations, like ritual dramas and placenames, contain genuinely historical components that are readily usable in interpreting the past, as well as containing more strictly mythological elements" (2002: 412-413). As such, I will use Pawnee and Arikara Oral Traditions to identify place names and relative events regarding ethnogenesis and migration sequences to analyze the Central Plains' archaeological record. They will be treated like any other sources of historical information through critical evaluation, as Echo-Hawk (2000) proposed, and their relationship to the archaeological record will be investigated.

Tribal Background: The Pawnee and Arikara During European Colonization

The two Indigenous Nations whose oral traditions will be utilized in this research are the Pawnee and the Arikara. However, the Pawnee and Arikara oral traditions mention the Wichita, so I also consider them here. Historically, the Pawnee, Arikara, and Wichita were Plains Indian Nations that resided across the Great Plains (**Figure 1**). All three nations belong to the Northern Caddoan Language family (Parks 1979, 2001b) and have oral traditions which speak to their shared ancestry with one another (Dorsey 2012; Echo-Hawk 2000, 2018; Gover 2019a; Hyde 1988; Parks 1996, 2001a, 2001c; Weltfish 1965). The Pawnee core homeland was in Central Nebraska to North-Central Kansas, with hunting territories extending to the Rocky Mountains Front Range in Colorado and Eastern Wyoming (Dorsey 2012; Echo-Hawk 2000, 2018; Walter R. Echo-Hawk 2018; Gover 2019a; Hyde 1988; Parks 2001a, 2001c; Roper 2006a; Wedel 2010; Wedel and Robison 1939; Weltfish 1965). The Arikara settled along the Missouri River, usually on bluffs, in South Dakota, with hunting territories westward as far as Wyoming and Montana (George A. Dorsey 2012; Parks 1996, 2001c; Wood 1955). The southernmost Nation of the Northern Caddoan speakers was the Wichita, whose territory was in southern Kansas, Oklahoma, and northern-eastern Texas, with hunting territory extending into Eastern Colorado and Western Texas (Blakeslee and Hawley 2006; Newcomb Jr. 2001; Vehik 2006). In the 19th century, these three Nations experienced territorial contraction due to American westward expansion and the removal of Eastern Nations westward to the Great Plains, as seen in Figure 1 (Hyde 1988; Newcomb Jr. 2001; Parks 2001a, 2001c; Vehik 2006).

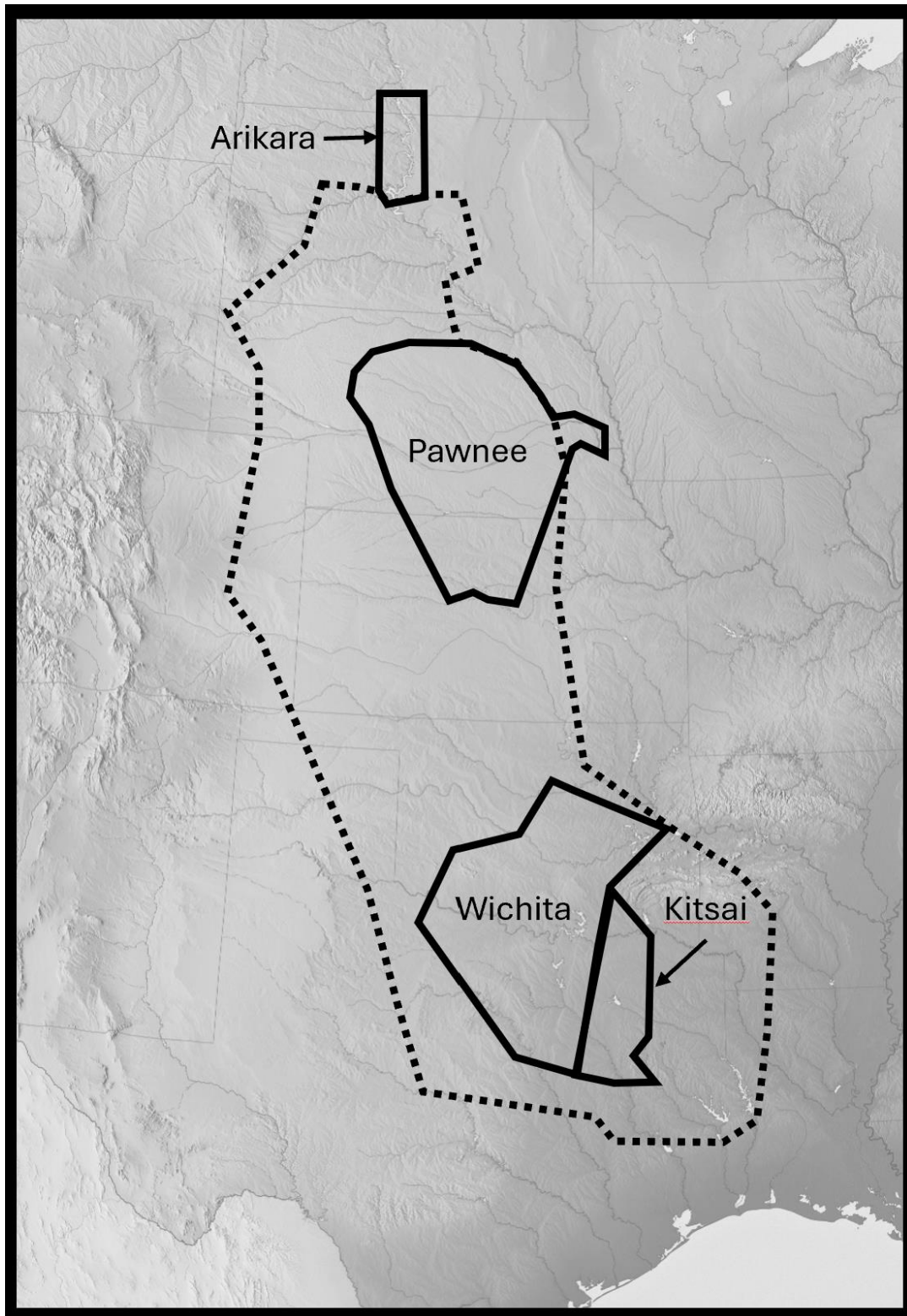


Figure 1. Map of Approximate Boundaries of Northern Caddoan Language-Speaking Nations. The solid line represents the approximate boundaries of investigated Tribes during the early 19th Century (Smithsonian Institute 2001:ix). The dashed line represents the approximate boundaries of the Northern Caddoan Language Family territory in C.E. 1650 (Paullin 1932). Base map courtesy of shadedrelief.com.

The Pawnee, Arikara, and Wichita were traditionally semi-sedentary agriculturalists who farmed corn, squashes, and beans in the spring and fall and then hunted bison in the summer and winter (George A. Dorsey 2012; Hyde 1988; Newcomb Jr. 2001; Parks 2001a, 2001c; Vehik 2006). All three resided in large towns comprised of lodges with populations in the hundreds to thousands (Newcomb Jr. 2001; Parks 2001a, 2001c). The Pawnee and Arikara lived in earthlodges, though wooden palisades fortified Arikara towns, while Pawnee towns had earthen/sod embankments (George A. Dorsey 2012; Parks 2001a, 2001c; Roper 2006a; Wedel 2010). However, the Wichita lived in more dispersed and unfortified communities of grass lodges (Hyde 1988; Newcomb Jr. 2001; Roper 2006a; Vehik 2006). During the bi-annual bison hunts, all three would shelter themselves in temporary structures such as tipis or "side-dwellings," which could be easily broken down and reassembled (George A. Dorsey 2012; Hyde 1988; Newcomb Jr. 2001; Parks 2001a, 2001c; Roper 2006a; Weltfish 1965).

Politically, the Arikara consisted of a loose confederation of bands that each had their village, although, in some instances, a band could include up to three villages (George A. Dorsey 2012; Parks 2001c). The number of bands that made up the Arikara is unclear; the estimate of band numbers before the seventeenth and eighteenth-century epidemics range from eighteen to forty-two (Parks 2001b). The Pawnee were comprised of four bands: Kitkehaki (Little Earthlodge Village), Čawî' (Beg, to ask for), Pîtahâwirâta (Man going downstream), and the Ckiri (Wolf) (Hyde 1988; Parks 2001a; Roper 2006a). The Kitkehaki, Čawî', and Pîtahâwirâta are known as the "South Bands," whereas the Ckiri are referred to as the "North Band." The Kitkehaki, Čawî', and Pîtahâwirâta would each comprise one village, but sometimes two, whereas the Ckiri made up thirteen to seventeen villages which were socially and politically allied (George Amos Dorsey 2012; Hyde 1988; Parks 2001a; Weltfish 1965). The Wichita are

comprised of six once autonomous tribes: Taovaya, Tawakoni, Iscani, Wichita proper, Waco, and the Kitsai (Newcomb Jr. 2001). Each of the tribes that made up the Wichita had its bands, and each band had its towns, though Wichita towns were not as densely concentrated as Pawnee and Arikara towns (Hyde 1988; Newcomb Jr. 2001; Parks 2001a, 2001c; Roper 2006a; Vehik 2006).

In the latter half of the 19th century, the Pawnee, Arikara, and Wichita were relocated to reservations and reorganized. The Pawnee were removed from their reservation in Nebraska to a reservation in Oklahoma in 1874 (Hyde 1988) and became the Pawnee Nation of Oklahoma. The Arikara coalesced with the Mandan and Hidatsa to become the Three Affiliated Tribes and were placed on a reservation at Fort Berthold, North Dakota, in 1870 (Parks 2001c). Confederate rebels removed the Wichita from their reservation in Texas in 1863. They fled to Kansas, where they lived until 1867, when they were again removed to a reservation in Oklahoma (Newcomb Jr. 2001). The Wichita are now known as the Wichita and Affiliated Tribes.

A primary research question for this dissertation, which will be further discussed in Chapter 3, is the occupation history of the Pawnee and Arikara in the Great Plains. How long have these populations resided in their post-contact homelands? Did ancestral populations migrate to the Great Plains from elsewhere? When did the ethnogenesis of these Nations occur? To investigate these questions about the cultural history of the Pawnee and Arikara homelands, I turn to Pawnee and Arikara oral traditions to investigate what the Nation says about their history.

Pawnee and Arikara Oral Traditions

What do the Pawnee and Arikara say about their past in their oral traditions? Below is a list of Pawnee and Arikara oral traditions related to population movements, migration, and ethnogenesis.

Table 1. List of Pawnee and Arikara Oral Traditions investigated.

ID	Tribe of Origin	Themes	Narrative	References
1	Arikara	Migration	"In 1890, George Bird Grinnell recorded an oral tradition from an Arikara named Fighting Bear that referred to a location in Oklahoma "down by the Cross Timbers about 2 days south of the Big Timber" as the place where the Arikaras separated from the Pawnees."	Echo-Hawk 2000:281-282 [Grinnell ca. 1890:]Journals # 315]
2	Arikara	Migration	"Mother-Corn led them away on through the country to what is known as the Republican River, in Kansas, where there is only one mountain", and at this location, the Arikara settled and "had their ceremonies."	Echo-Hawk 2000:282 [Dorsey and Murie 1904a: 16]
3	Pawnee	Shared Ancestry	"Virtually every early writer who has dealt with these tribes [Pawnee and Arikara] states that at one time they were in close contact with, if not identical to, each other....According to Dunbar, the Skidi stated that they were more closely related to the Arikara than to the South Band Pawnee. Dunbar cites a Pawnee tradition to the effect that the Pawnee drove the Arikara from a once common settlement on the Platte River."	Wood 1955:27 [Dunbar, <i>The Pawnee Indians: Their History and Ethnology</i> . 1880, p. 254]
4	Arikara	Migration	"Gilmore set down a long narrative from a priest named Four-rings. He told of the coming of Mother Corn and her teachings, and "once upon a time when our people dwelt at the Place of the Four Holy Lodges [near the Grand River in South Dakota], a priest dressed a stalk of corn in the manner in which a woman is dresses and took it down to the shore of the Mysterious River...and placed it in the current, asking it to travel back down the course of the river along which our people migrated into this land."	Echo-Hawk 2018:139-140 [Lewis Henry Morgan, <i>The Indian Journals</i> 1859-62, University of Michigan Press, 1959, p. 164]

ID	Tribe of Origin	Themes	Narrative	References
5	Pawnee	Shared Ancestry	"The Pawnees also claim that the "Uricarees" of the Northern Missouri River are another branch of the original Pawnee Nation. They speak the same language and have the same manners, customs, habits, and legends as to their origin and claims themselves as part of the old Pawnee Nation, which at one time was master of the plains from the Red River on the North to the Gulf on the South."	Echo-Hawk 2000:282 [Wheeler, D.H., Letter to E.B Taylor, September 15. 1866]
6	Pawnee	Migration	"The Traditions of the three of the bands, Xau-I, Kit-ke-hak-I and Pit-a-hau-e-rat, coincide in stating that the Pawnees migrated to the Platte River region from the south, and secured possession of it by conquest." This migration occurred at a time" so remote that they have failed to retain any of its details, except in a very confused form." The Pawnees were accompanied in this northward movement by the Wichitas, who ultimately "left them long ago and wandered away to the south..."	Echo-Hawk 200:282 [Dunbar, <i>The Pawnee Indians: Their History and Ethnology</i> . 1880, p. 251]
7	Pawnee	Migration	"Grinnell also reported another tradition stating that the Pawnees moved northward from Missouri or Arkansas into the Central Plains, hunting buffalo, and the Wichitas "accompanied them part way on their journey, but turned aside when they had reached southern Kansas, and went south again." According to another Pawnee tradition, the Pawnees and Wichitas separated during an eastward movement of Pawnee ancestors to the Mississippi River."	Echo-Hawk 2000:282 [Peters ca. 1960s; also see Grinnell 1961:224-225 [1889]]
8	Pawnee	Shared Ancestry	"Murie and Dorsey titled the story they heard from Coosah as "The Four Gods in the West." This narrative, they noted, was said to belong to "the altar originally in possession of the Kwarahkis, from which band... the Kitkehahki, Pitahaurat, and Chaui are supposed to be descended." In the introduction of the 1906 book, Dorsey had written that "the Pawnee themselves are firm in the belief that the Chaui, Pitahaurat, and Kitkehahki originally formed a single band or division known as the Kwarahkis." This ancestral group, the Kwarahkis, exited "long before the advent of the whites;" they dwelt in those days "near the present site of Nemaha, in the southeastern corner of Nebraska, near the Missouri River."	Echo-Hawk 2018:53-54 [Full reference in Echo-Hawk 2018:211-212]

ID	Tribe of Origin	Themes	Narrative	References
9	Pawnee	Migration	"Dunbar made it clear in his work that the Skidi Pawnees and their Arikara cousins were the first to migrate northward, but he made no attempt to give a definite date to this movement, merely expressing the opinion that these tribes preceded the other Pawnees by about one century. He then quoted the latter of group of three Pawnee tribes as stating emphatically that the Skidis were the remnant of a once separate people who had been conquered by the Pawnees and incorporated into the tribe."	Hyde 1951:8
10	Pawnee	Ethnogenesis	"In the 1904 version of the federation origin story, after the first girl and boy received their celestial gifts, the people began to increase, and the boy became Closed Man, the leader. Other people appeared in the world, and Evening Star "told this man to get the people together" and they would learn the ceremonies to go with all their sacred bundles. The story said that Closed Man and his people then dwelt on the Flat River (Platte River), and the other people could be found in various directions from there. The tradition did not provide much information on the Skidi communities of that time, though it mentioned that one settlement held "four large-sized lodges"; the people of that time seemed to be residing in small settlements scattered across the region. Closed Man now led his people to a new location, "crossing the Loup River" to build "their village on Beaver Creek." This was the founding of Turikaku. This might have been the vicinity where the Pawnee would later build their last earthlodge city in the Central Plains, a location near Genoa, Nebraska. Beaver Creek was also known among the Pawnees as Wild Licorice Creek, named for the wild licorice plant and its many burrs."	Echo-Hawk 2018:73-74 [Full reference in Echo-Hawk 2018:193-194]
11	Pawnee	Migration	"Bert Peters, a Skidi / Kitkahahki Pawnee, began with a time when these people dwelt in the Southwest in houses made of "mud and stone." Setting forth, the people journeyed "east until they came to a great river." Setting forth, the people journeyed "east until they came to a great river." At this place the people halted and built towns and planted crops, living in that region for some years, though "[n]o one knew how long they there..." They eventually continued to move northward along the "big river," where they occasionally "stopped and planted crops & build villages" for an unknown period - they story has ancestors of the Skidi and Wichita peeling off from the main group. The main group kept "traveling north" until they "finally reached the spot where the Missouri River meets the Mississippi. Here they stayed for some time, planting crops and building a village. No one knows how long they stayed there, but many seasons passed before they moved on." They then moved up the Mysterious River to "the land where three rivers flowed to the Missouri. They liked the land and the surrounding territory because it contained much game of all kinds. Also, here, the Skidi again joined the Pawnee group, making four tribes in the Pawnee Nation as it is today: the Skidi, Chawi, Kit-Kahawki, and those down the stream, the Pitahawirat."	Echo-Hawk 2018:138-139 [Full reference in Echo-Hawk 2018:244-246]

ID	Tribe of Origin	Themes	Narrative	References
12	Pawnee	Ethnogenesis	"Nobody knows where we came from, but the old men told us that Tirawa first created a girl, then a boy. They met and then they went together ever after that. They grew to be a woman and man. They wandered over the country a long time, until the woman gave birth. The baby was a boy. The man at this time had a grass lodge, and had bow and arrows...One beautiful morning, the little fellow went out of the lodge. He saw marks upon the ground. He went in and told his father that he had seen marks upon the ground...The next day the boy went out and saw the same marks upon the ground. He followed the marks, for this time the boy had his bow and arrows. At last he came upon a bird. It was a meadow lark...For many days, the boy followed the bird, trying to catch it, but the bird would move on. At last they came to a steep bank of earth. The bird flew up against it and the boy humped and fell into a lodge. The lodge inside was like an earth lodge. There were four men sitting at the west end of the lodge. There was a boy sitting at the entrance, who was a meadow lark. The bird was the errand boy for the four old men. Around the lodge were many parfleches filled with dried buffalo meat. Around the wall were many sacred bundles. On each bundle were dried bladders filled with seeds. The old man called the boy, and one of the old men said: "My son, your father and mother came from the heavens; they are not to stay upon the earth very long. Tirawa put us here to watch over you all the time; he gave us all things to give you, so you can go back to your home, and make things that you are to see while you are here. The bird we sent to bring you here; he is our errand boy." So the old man sang many songs, they had unwrapped one of the bundles hanging upon the wall. The boy listened and learned the songs. Every day and night the old man taught the boy what he was to do when he went home. Also, he taught him when he should pray, to say: "You, Kurahoos, who sit with your words and songs in the west, help me to have plenty of buffalo and good crops; the buffalo are here, and when you leave us, the buffalo shall follow you; there are very bad people nearby, how have been keeping the buffalo from going upon your land." The boy watched the movements and listened to the saying of the old men. Once the old men sang all night. By daylight the old men talked to the boy and said: "All you have heard we have told you, for we were commanded by Tirawa to tell you: now you must go. Carry this bundle upon your back; you will find seeds done up in the bundle; you are to make something to dig with; you will get the shoulder-blade from the buffalo, dry it, and tie it to a wooden handle that you shall make...The father and mother were both glad to see him; they had given up searching for him. The boy had been gone for several years, although it seemed only a few days to him. There had also been born a girl so that the boy had a sister...the boy told his father that the buffalo were coming, that they were to kill the buffalo for their food. The boy also said: "I also have seeds that we are to put in the ground, and they will grow, so that we shall get something to eat." ... For several years this was done, then, at last seeds were given to all the people, and each was to plant, and keep the seeds when the harvest should be gathered. People were glad, so they prepared their fields and planted many seeds. They now became very numerous. The young man taught the songs to the people. Now the people scattered, some going in different directions. For a	Dorsey 2012:20-23 [Told by Well-Fed- Captured- Girl, wife of White- Eagle]

ID	Tribe of Origin	Themes	Narrative	References
			long time they were separated, but at last they came together again." Also, he taught him when he should pray, to say: "You, Kurahoos, who sit with your words and songs in the west, help me to have plenty of buffalo and good crops; the buffalo are here, and when you leave us, the buffalo shall follow you; there are very bad people nearby, how have been keeping the buffalo from going upon your land." The boy watched the movements and listened to the saying of the old men. Once the old men sang all night. By daylight the old men talked to the boy and said: "All you have heard we have told you, for we were commanded by Tirawa to tell you: now you must go. Carry this bundle upon your back; you will find seeds done up in the bundle; you are to make something to dig with; you will get the shoulder-blade from the buffalo, dry it, and tie it to a wooden handle that you shall make...The father and mother were both glad to see him; they had given up searching for him. The boy had been gone for several years, although it seemed only a few days to him. there had also been born a girl so that the boy had a sister...the boy told his father that the buffalo were coming; that they were to kill the buffalo for their food. The boy also said: "I also have seeds that we are to put in the ground, and they will grow, so that we shall get something to eat." ... For several years this was done, then, at last seeds were given to all the people, and each was to plant, and keep the seeds when the harvest should be gathered. People were glad, so they prepared their fields and planted many seeds. They now became very numerous. The young man taught the songs to the people. Now the people scattered, some going in different directions. For a long time they were separated, but at last they came together again."	
13	Pawnee	Ethnogenesis	"The people now increased so, that a man went far out into the country to hunt game. This man, while hunting, met another man. They talked together, and they found out that they could understand one another. This hunter told Closed-Man that he had met another man who could understand their language, and Closed-Man told the hunter that he always had understood there were other people in the world. At one time, Bright-Star came to Closed-Man, again, in a vision, and told him that the people that had been created by other gods were now numerous. These other gods, when they had created these people, had also given them bundles. So these people had the bundles, but the ceremony they did not know. So Bright-Star told this man to get the people together, and that a man would be sent to them, who would teach them the different ceremonies of the different bundles...(At this time Closed-Man and his people were upon the Platte River.) When this was told him he journeyed towards the north, crossing the Loup River. They made their village on Beaver Creek. Here they selected a place where the people were to get together...After this ceremony, each band of people was told to come to the priest with their bundle. Songs and ceremonies were taught them, and then they were sent out into the world. If they wished, they could remain with Closed-Man. But now they scattered out.	Dorsey 2012:10-13 [Told by Roaming- Scout]

Analyzing the Oral Traditions

The thirteen presented oral traditions contain historical information on three kinds of data: population movement, settlement pattern, and ethnogenesis. **Figure 2. Map of Approximate Locations of Significance and Migration Routes from Oral Traditions Presented in Table 1. Base map courtesy of shadedrelief.com.** On page 54, a visual representation of the locations described in the oral traditions, as well as approximate migration routes, is provided.

Oral traditions 1, 2, 4, 6, 7, 9, and 11 refer to the ancestral Pawnee, Arikara, and Wichita population movement that we can use to build a relative chronology of migration events. The Arikara, Pawnee, and Wichita used to be one people who migrated to the east from the “land of the stone houses.” As they journeyed eastward, the ancestral Arikara separated from the larger Pawnee and Wichita ancestral groups in Oklahoma. The ancestral Arikara migrated northward and settled in Northern Kansas and Southern Nebraska along the Republican River. The ancestral Pawnee and Wichita continued eastward until reaching the Mississippi River; upon reaching the Mississippi River, the group traveled north along the Mississippi River. However, at this point, there are conflicting oral traditions about the separation of the ancestral Ckiri and Wichita from the ancestral group.

Oral traditions 8 and 11 suggest that the ancestral Ckiri and Wichita groups diffused from the South Band group or Kawarahkis simultaneously. Oral traditions six and seven suggest that the Ckiri split off by themselves, and the ancestral Wichita continued their migration along the Mississippi with the Kawarahkis. However, the former oral tradition is the only one in which the ancestral Wichita are mentioned as being with Ckiri upon the Ckiri's arrival to the Central Plains. But, as the contemporary Wichita Nation is a Federation of multiple Tribes, the difference

between the narratives may be speaking to movements and separations of different ancestral tribal groups that would later comprise the Wichita and Affiliated Tribes.

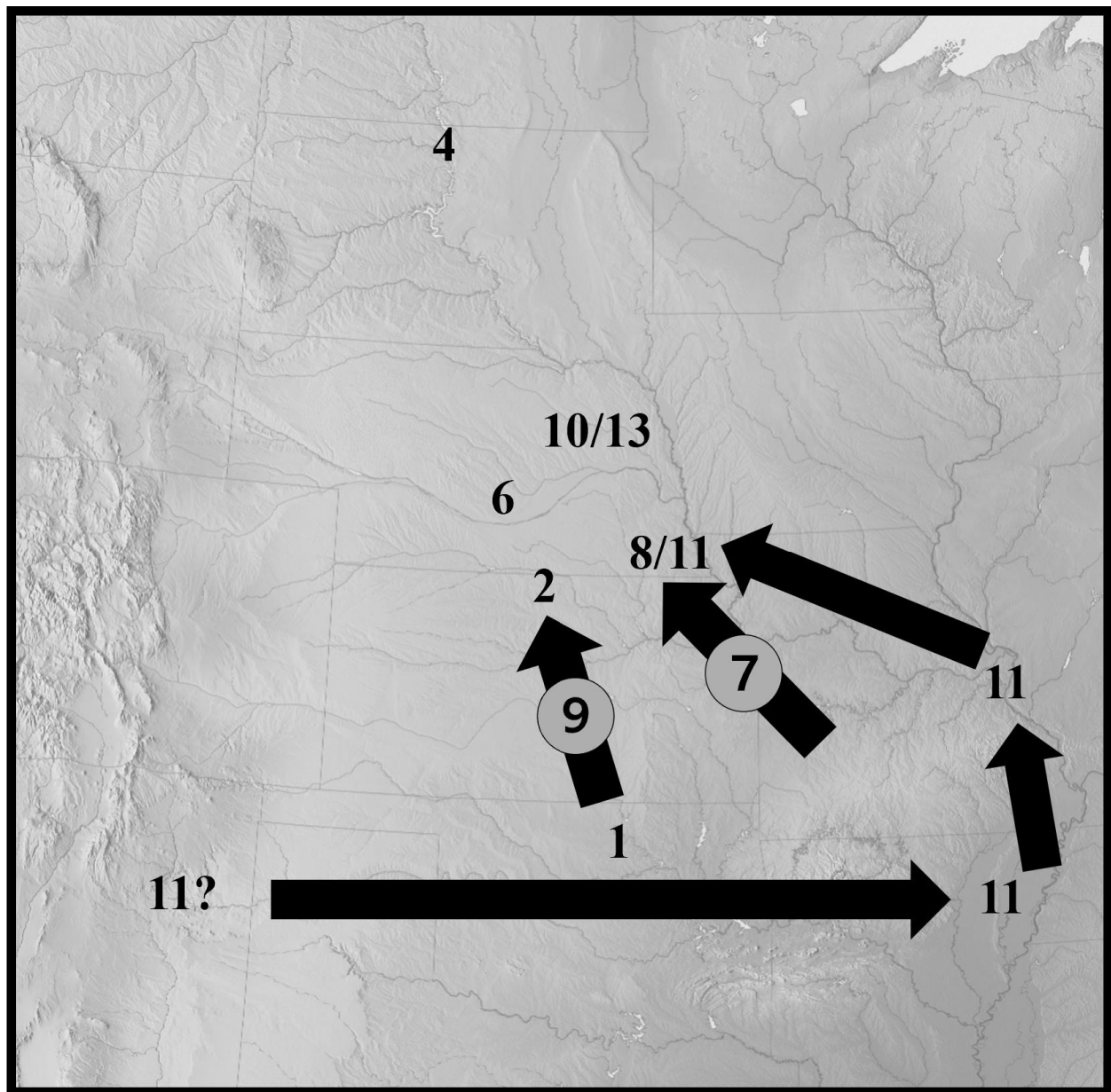


Figure 2. Map of Approximate Locations of Significance and Migration Routes from Oral Traditions Presented in Table 1. Base map courtesy of shadedrelief.com.

After separating from the Kawarakhis and Wichita along the Mississippi River, the ancestral Ckiri moved into Nebraska and Kansas with the Arikara before the Kawarakhis and

Wichita migrated into the region. Sometime after the Ckiri arrived in the Central Plains, the ancestral Arikara migrated North into South Dakota. During this time, the Kawarahkis and ancestral Wichita traveled northward along the Mississippi River until they reached where the Missouri River flows into the Mississippi River, near modern-day St. Louis. From there, the Kawarahkis and ancestral Wichita migrated along the Missouri River northward until reaching Nebraska and Kansas. Once there, the Kawarahkis warred with the Ckiri and won; the Kawarahkis settled in Nebraska and Kansas along the Platte and Republican rivers, while the ancestral Wichita separated from the Kawarahkis and headed south.

Oral traditions 10, 11, and 12 describe settlement patterns before the Pawnee began to build and live in earth lodges. Before the earth lodge villages, the Pawnee lived in grass lodge hamlets. Additionally, the oral traditions suggest that the ancestral Pawnee began constructing earth lodges when they were in Nebraska and Kansas. These oral traditions about the difference in residential structures suggest that, archaeologically, there should be a settlement pattern that immediately precedes the appearance of earth lodges in Nebraska and Kansas.

The oral traditions that speak to ethnogenesis are 8, 10, 13, and 14. Oral traditions 8 and 14 are specific to the South Band Pawnee as being one “people” when they arrived in Nebraska and settled near Nemaha. The ethnogenesis of the Ckiri is described in oral traditions 10, 12, and 13. These oral traditions state that the Ckiri Federation of Clans occurred along Beaver Creek in central Nebraska and provided the directionality of the Ckiri villages to Turíkaku. Since these oral traditions also describe where ethnogenesis occurred and resulted in a change of settlement pattern, there should be archaeological evidence to confirm whether they are accurate.

An overlapping theme with the oral traditions regarding changes in settlement patterns and ethnogenesis is the significance of corn and bison (Chamberlain 1982; Dorsey 1997, 2012,

2018; Echo-Hawk 2000, 2018; Hyde 1988; Weltfish 1965). Specifically, oral tradition 12 suggests that the ancestral Pawnee began to practice maize-based agriculture after arriving in Nebraska and Kansas (Dorsey 2018:10-14; 20-21). Oral tradition eleven states that throughout the migration eastward to the Mississippi River and northward along the Missouri River, the people would settle and plant crops before continuing their journey (Echo-Hawk 2018:138). However, corn/maize is not explicitly mentioned in the oral traditions regarding a time before the Pawnee were in the Central Plains. The importance of corn is intrinsically linked to Pawnee oral traditions of earth lodges and identity in Nebraska. Additionally, oral tradition twelve highlights the connection between agriculture and the need for bison hunting so farming equipment can be created from bison parts.

Conclusion

Archaeologists can develop hypotheses and research questions by examining oral traditions for information that can be used to identify places, changes in residential architecture, and relative chronologies of events. From the oral traditions presented in this chapter, archaeologically, we should expect to see: (1) an archaeological culture with horticulture developing near the Republican River, (2) a northward expansion of that archaeological culture into central Nebraska and then into South Dakota, (3) an additional non-local archaeological culture arriving in Southeastern Nebraska and Northwestern Kansas, (4) a transition in settlement pattern from grass lodges to earth lodges and the appearance of maize-based agriculture and an increased reliance in bison hunting in central Nebraska, and (5) population increase and settlement dispersion across the Central Plains resulting from maize-based agriculture and bison hunting. By evaluating Pawnee and Arikara oral traditions as I would any data source, I have

developed a set of expectations for the archaeological history of the Central Plains that can be examined.

Chapter IV: BAYESIAN ANALYSIS OF TWO CLOUDS OF DATA

In the previous chapter, I explored how Pawnee and Arikara oral traditions provide insights into expectations for migration and ethnogenesis. These narratives offer historical and geographical knowledge that have shaped the Pawnee, Arikara, and Wichita Nations. This chapter transitions from the qualitative depth of oral histories to the quantitative rigor of high-precision Bayesian modeling and archaeological research. By integrating oral histories with advanced statistical methods and available archaeological data, I construct a more precise and nuanced understanding of past Pawnee and Arikara behaviors and interactions, enhancing our comprehension of pre-contact population and social dynamics.

Background: The Central Plains Archaeological Record

Existing archaeological data indicate that central Plains communities became at least seasonally sedentary by CE 500, and some communities began growing maize around CE 900, with evidence for maize dependence increasing after that time (Bamforth 2021:195-218). Using the information about settlement patterns, subsistence strategies, and architecture from the oral traditions in Chapter 2, the period from C.E. 500 to C.E. 1600 is identified as pertinent. Central Plains archaeologists have developed a reasonably detailed culture history for this interval, which recognizes six principal named archaeological cultures: Late Plains Woodland, Central Plains tradition, Oneota tradition, Initial Coalescent Variant, Extended Coalescent Variant, and Lower Loup phase (Bamforth 2021b; Henning 1998, 2001; Johnson 2001, 1998; Johnson and Johnson 1998; Krause 2001; Steinacher and Carlson 1998; Wedel 2001). I particularly emphasize the period from C.E. 900 to C.E. 1400 to examine the appearance of maize horticulture in the region, the subsequent adoption of maize agriculture in the Plains Village

pattern, and the connection to Pawnee and Arikara history. The archaeological cultures that will be given the most significant attention are the Late Plains Woodland, Central Plains tradition, Central Plains Oneota, and Initial Coalescent Variant.

Lehmer organized the post-Woodland archaeology of the central and northern Plains into three “traditions” associated with the rise of maize agriculture, differentiated in time and space based on patterns in architecture, community organization, pottery, and other artifacts (1954a:139-154). In the Dakotas, he defined the Middle Missouri tradition (MMt), characterized by long-rectangular houses, often with gabled roofs, and pottery with straight or S-shaped rims and, often, simple-stamped exteriors (Lehmer 1954a:140-143). MMt towns tended to be large, with houses built in fairly orderly rows and were often fortified with a ditch and palisade defenses (Lehmer 1954a:140-143). On the central Plains, he defined the Central Plains tradition (CPt), characterized by square houses with four center posts and pottery with straight or collared rims and cord-marked exteriors (Lehmer 1954a:143-147). Central Plains communities were smaller than those to the north, with houses arranged irregularly and without fortifications (Lehmer 1954a:143-147). In his view, these traditions merged (“coalesced”) into a third tradition that he labeled “Coalescent” after 1500 CE (Lehmer 1954a:147-154). Coalescent towns were large and often fortified like MMt towns but included houses with a round floor plan and a superstructure supported by four posts, similar to CPt houses (Lehmer 1954a:147-154). This general taxon includes the large towns described by Europeans during the 18th century. He also notes a handful of Oneota sites in parts of the central Plains, marked especially by shell-tempered pottery with distinctively Midwestern designs (Lehmer 1954a:147,150,156). Archaeologists since Lehmer have accepted this basic scheme, dividing the three significant traditions into units that they usually label phases. On the Central Plains, phases primarily have a geographic

meaning. My emphasis here is on the Central Plains and Coalescent traditions (see Johnson [2007] and Mitchell [2013] for more detail on the MMt).

Archaeologists have refined Lehmer's original taxonomy to incorporate new data and interpretations for the archaeological record in the Central Plains (Gover 2019a; Grange 1968; Lehmer 1971; Lehmer and Caldwell 1966; Shield Chief Gover et al. 2021; Wedel 2001; Wedel and Krause 2001). Archaeological cultures under this classificatory scheme are differentiated primarily by pottery morphology/style, architecture, settlement pattern (including fortification presence and design), subsistence strategy, and geographic location (Adair 1996, 2012; Roger C. Echo-Hawk 2000, 2018; Grange 1968; Johnson 2001, 1998, 2007; Johnson and Johnson 1998; Krause 1969, 2001; Roper 2000, 2006b, 2008; Shield Chief Gover et al. 2021; Steinacher and Carlson 1998; Wedel 2001; Wedel and Krause 2001; Zimmerman 1990).

Plains Woodland

The Plains Woodland culture (or Early Ceramic period) has traditionally been separated into three distinct periods: Early, Middle, and Late. The Late Plains Woodland existed from C.E. 500 to C.E. 1000 (Adair 1996, 2012; Johnson 2001; Johnson and Johnson 1998). However, the Pomona variant in southeastern Kansas has been presented as a continuation of local Plains Woodland Complexes with a temporal span of C.E. 950 to C.E. 1350 (Adair 2012; Johnson and Johnson 1998). The Late Plains Woodland represents a formative or transitional period from mobile hunting and gathering to increased sedentism, small group settlements, increased reliance on maize agriculture, and the adoption of the bow and arrow (Adair 2012). The Late Plains Woodland period is comprised of twelve taxonomic phases: Grasshopper Falls, Wakarusa, Deer Creek, Greenwood, Hertha, Butler, Bemis Creek, Keith, Sterns Creek, Loseke Creek, Lake City,

and Wood Chapel (Adair 1996, 2012; Johnson 2001; Johnson and Johnson 1998). However, it has been postulated that there are too few spatial, temporal, and formal data to justify the existence of twelve defined taxa that divide Late Woodland components into separate units rather than acknowledging local variation and holistic internal change over time (Adair 2012), especially between southern Plains Woodland components that are defined by plainer undecorated pottery vessels (Bamforth 2021:158,188). Pottery styles North of the Loup River, such as the Loseke Creek phase in Northeastern Nebraska, are distinctly different, and particularly are more frequently decorated (Bamforth 2023:25; Keehner 2015:3-5, 10, 62-63).

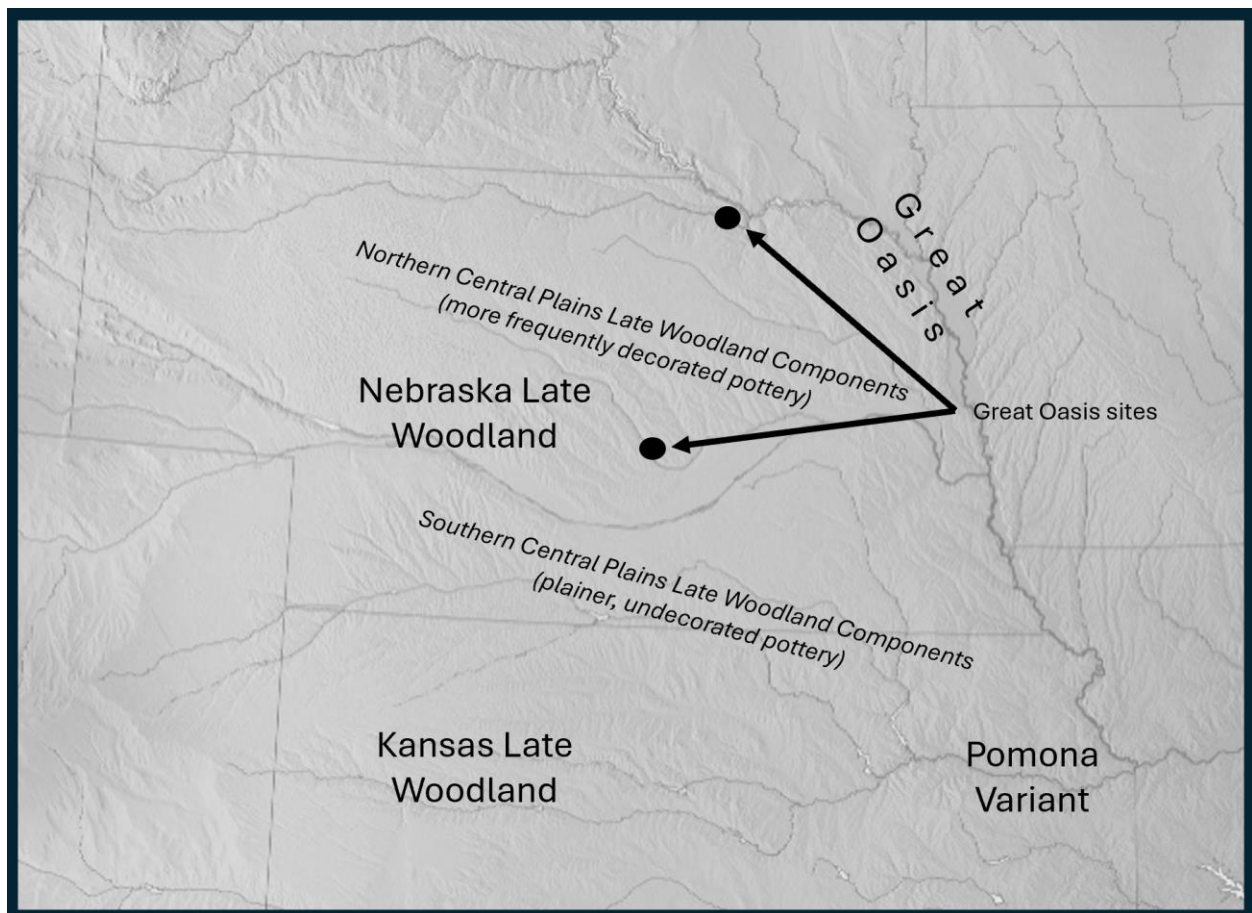


Figure 3. Map of Discussed Late Woodland Period Archaeological Cultures (Adair 1996, 2012; Johnson 2001; Johnson and Johnson 1998). Base map courtesy of shadedrelief.com.

Another variant, Great Oasis, is distinct from these and is variably classified as Late Woodland or early Plains Village (Alex and Tiffany 2000; Bamforth 2021b:220-221). Great Oasis occupations are marked by a distinctive ceramic assemblage and, more important for present purposes, unambiguous evidence of maize horticulture. Great Oasis maize farmers lived in small communities scattered from northwestern Iowa through southeastern South Dakota and eastern Nebraska (Bamforth 2021b:220-222). They are very poorly known outside Iowa, but limited excavation in Nebraska leaves no doubt that maize was present in the Central Plains by CE 1000 (Bozell and Rogers 1989).

Central Plains tradition (CPT)

The subsequent Central Plains tradition (Middle Ceramic period) is characterized by small, scattered, semi-permanent hamlets made up of square-shaped earthen houses (Bamforth 2021a, 2021b; Roper 2006b; Steinacher and Carlson 1998; Wedel 2001). These hamlets are found along the significant rivers and their tributaries in Nebraska and Kansas. Central Plains tradition hunting camps have been uncovered in Southeastern Wyoming and Northeastern Colorado (Page 2009; Roper 2006b; Scheiber 2006; Scheiber and Reher 2007; Steinacher and Carlson 1998; Wedel 2001). The existence of the Central Plains tradition has traditionally been accepted as having been from C.E. 900 to C.E. 1450 during the Middle Ceramic Period (Roper 2006b; Steinacher and Carlson 1998; Wedel 2001), but recent Bayesian analysis of the radiocarbon chronology of the Central Plains tradition radiocarbon record by myself and others (2021; also see Roper 2014) has proposed a period from C.E. 1200 to C.E. 1400 (Shield Chief Gover et al. 2021). Our (2021) analysis excluded wood charcoal radiocarbon samples under Roper's (2014) proposed Chronometric Hygiene protocol. Generally, the Central Plains tradition

Central Plains Oneota (CPO)

The Oneota tradition spans from the Western shores of Lake Michigan to Eastern Nebraska and is considered a “bridging culture” (Henning 2001:345) that links the eastern Woodlands to the Plains through the Prairie Peninsula which is the extension of prairie grassland into Wisconsin, Illinois, Indiana, and Ohio (Henning 1998, 2001; Logan 2010; Shield Chief Gover et al. 2021). For this research, I am investigating the Central Plains Oneota in Eastern Nebraska and Western Iowa (Henning 1998, 2001; Logan 2010; Shield Chief Gover et al. 2021), which existed in the region from C.E. 1200 to C.E. 1400 during the Middle Ceramic Period (Henning 2001; Shield Chief Gover et al. 2021). Central Plains Oneota communities focused on maize and bison. Archaeologists recognize an Oneota site primarily based on very distinctive ceramic assemblages and architecture comprising wigwams and rectangular longhouses (Theler and Boszhardt 2017). The current consensus is that the Oneota Tradition did not emerge on the Plains or along the Plains-prairie periphery but instead appeared in eastern Wisconsin and expanded westward (Henning 1998, 2001). Later Central Plains Oneota communities, including Colonial-era migrants, are ancestral to Dhegihan Siouan-speaking Nations such as the Ponca, Omaha, Kansas, Osage, Quapaw, and even the Ioway (Henning 1998, 2001).

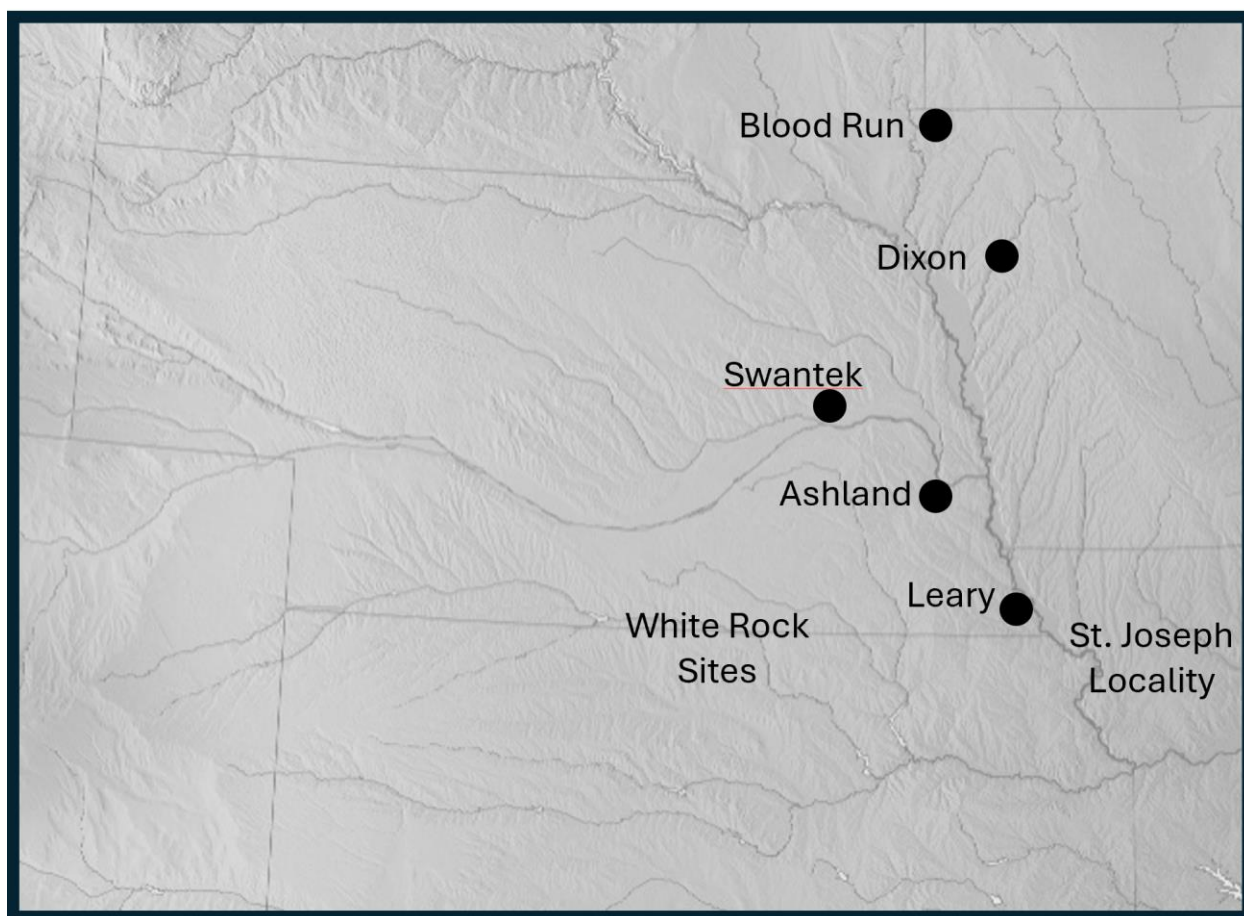


Figure 5. Map of significant Central Plains Oneota Archaeological Sites and Localities (Henning 1998; Pugh 2010). Base map courtesy of shadedrelief.com.

Initial Coalescent Variant (ICV)

The Initial Coalescent Variant represents the adoption of a subsistence strategy heavily reliant on maize agriculture and bison hunting and the centralization of dispersed populations into densely populated and permanent earth lodge towns (Blakeslee 1993; Fox 1980; Gover 2019a; Johnson 2001, 1998, 2007; Krause 2001). It also represents the beginning of the Late Ceramic Period in the Central Plains which overlaps with the Middle Ceramic Period for approximately 150 years (Johnson 2001, 1998, 2007). The Initial Coalescent Variant comprises three phases: Anoka, Cambell Creek, and Arzberger (Bamforth 2021b; Gover 2019a; Johnson 2001, 1998, 2007, 2007; Shield Chief Gover et al. 2021; Tiffany et al. 2011). The Anoka phase

represents the earliest expression in northeastern Nebraska along Ponca Creek, with Cambell Creek and Arzberger phases being located in Southern South Dakota along the Missouri River (Gover 2019a; Johnson 2001, 1998, 2007, 2007; Shield Chief Gover et al. 2021; Tiffany et al. 2011). Traditionally, the period of the Initial Coalescent Variant was believed to have been from C.E. 1300 to C.E. 1500 (Gover 2019a; Johnson 2001, 1998, 2007; Tiffany et al. 2011), but recent investigations of the Anoka phase Lynch Site (25BD1) and the surrounding Ponca Creek sites indicate that it appeared in the mid to late 13th century C.E. (Shield Chief Gover et al. 2021). The Initial Coalescent Variant is believed to be ancestral to Northern Caddoan speakers, particularly the Pawnee and Arikara (Echo-Hawk 2018; Gover 2019a; Johnson 2007).

Extended Coalescent Variant (ECV)

The Extended Coalescent Variant was the first of two archaeological cultures that arose from the Initial Coalescent Variant. Existing from C.E. 1400 to 1650 during the Late Ceramic period, the Extended Coalescent Variant is found along the Missouri River in South Dakota and practiced maize-based agriculture supplemented by seasonal bison hunting (Gover 2019a; Johnson 1998, 2007; Krause 2001; Lehmer 1971). Extended Coalescent Variant sites comprise large, permanent, sometimes fortified earth lodge towns located on high ridges or high and flat terrace tops along the Missouri River (Gover 2019a; Johnson 1998, 2007; Krause 2001). The earliest Extended Coalescent Variant site is the Demery site (39CO1), located in northern South Dakota and dated between AD 1400 to AD 1450; later, ECV sites were found throughout southern South Dakota beginning in AD 1450 (Johnson 2007). Later sites are found in Northern South Dakota, representing the migration of pre-contact Arikara northward along the Missouri River (Gover 2019a; Johnson 1998, 2007; Krause 2001). The Extended Coalescent Variant

transitions into the Post-Contact Coalescent (Johnson 2007), which is not being investigated in this research, and therefore a description shall not be included. However, the Extended Coalescent Variant and the Post-Contact Coalescent Variant are unambiguously ancestral to the modern Arikara (Gover 2019a; Johnson 2007).

Lower Loup phase

The Lower Loup phase is the second of the two archaeological cultures that arose from the Initial Coalescent Variant. Originally, the Lower Loup phase was categorized under the Coalescent Tradition (Lehmer 1954a:150-151, 1954b:147-149), but no one seemed to pay attention, and it is largely written about as a phase independent from an overarching archaeological tradition. Lower Loup phase sites are found in Central Nebraska into Central Kansas and east to the Missouri River (Bamforth 2021b; Gover 2019a; Grange 1968; Roper 2000, 2006a; Wedel 2010). Lower Loup sites are large, permanent, earthen embankment fortified, earthlodge towns on bluffs or flood-free terraces along rivers or stream valleys (Gover 2019a; Grange 1968; Parks 2001a; Roper 2000, 2006a; Wedel 2010; Zimmerman 1990). The Lower Loup phase represents pre-European contact Pawnee settlements. The subsistence strategy of the Lower Loup phase mirrors that of the “historic” Pawnee: maize-based agriculture supported by bison hunting. Lower Loup sites differ from Colonial-era Pawnee sites primarily in the absence of Euro-American trade goods (Parks 2001a; Roper 2006a; Wedel 2010).

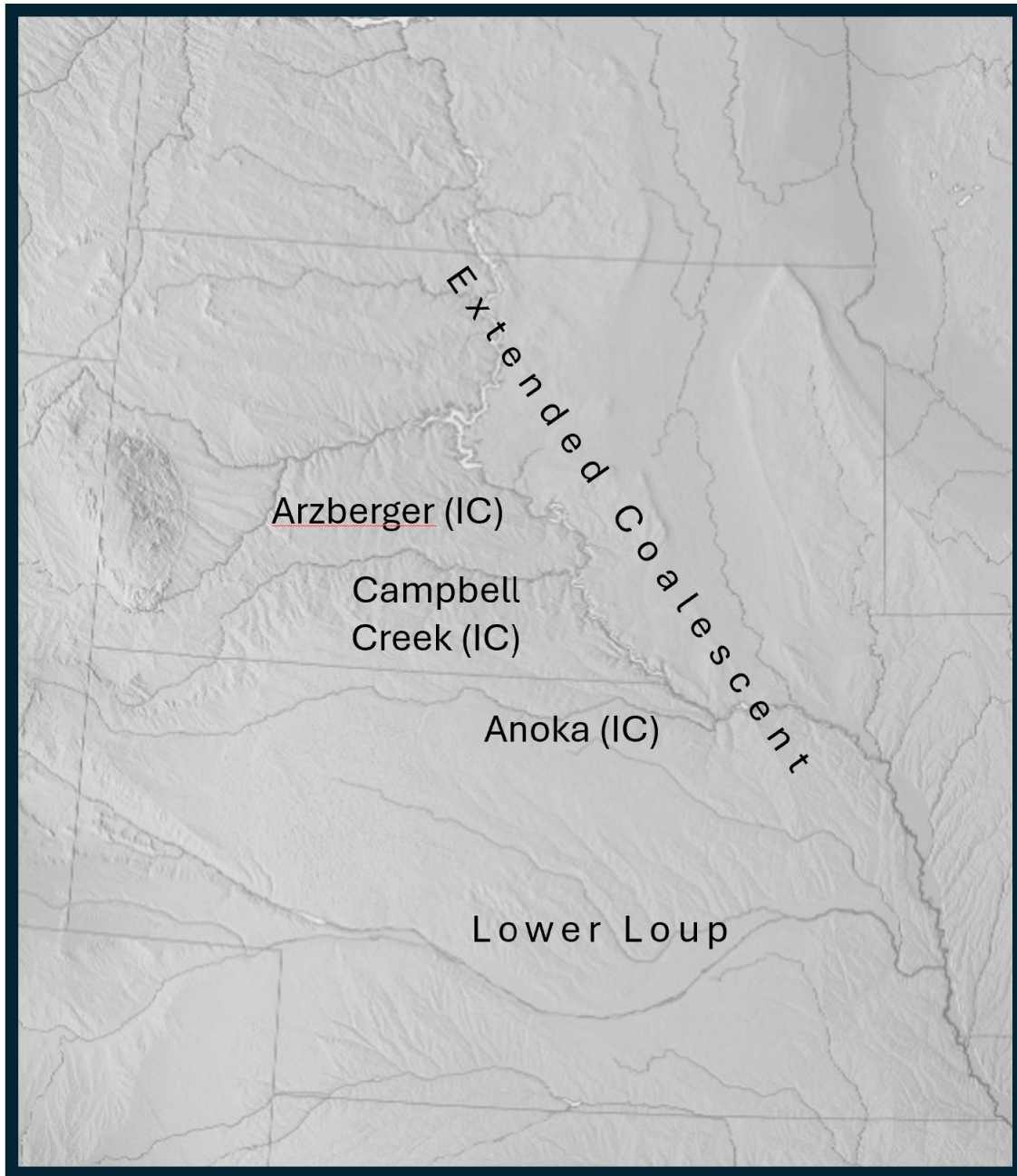


Figure 6. Map of approximate locations of Late Plains Village Archaeological Taxa (Johnson 1998, 2007; Krause 2001).
Base map courtesy of shadedrelief.com.

Complex Regional Connections

The Central Plains' archaeological cultures did not exist in a vacuum, nor were they isolated from the rest of the continent. This is especially true during the middle and late ceramic periods. To the southeast of the Central Plains was the Caddoan Mississippian culture, to the east was the Middle Mississippian culture, and to the northeast was the Oneota Complex. The Middle Mississippian and Caddoan Mississippian chiefdom cultures had considerable geographical influence and significant population centers such as Spiro and Cahokia. However, understanding how these groups interacted with and influenced ancestral Central Plains populations and cultures is critical in investigating Pawnee and Arikara history in the archaeological record.

Cahokia and the Middle Mississippians

The city of Cahokia is located along the Mississippi River in East St. Louis, Illinois, across the river from modern-day St. Louis proper (Benson et al. 2009; Butler 2021; Iseminger 2010; Pauketat 2009). The Missouri River joins the Mississippi River just north of Cahokia (Iseminger 2010). Local communities coalesced into the largest and most complex community known north of Mexico rapidly between CE 1050 and 1100 during the Lohman Phase (Benson et al. 2009; Butler 2021; Iseminger 2010; Pauketat 2009). Archaeological research in and around Cahokia documents rapidly increased population density, social complexity and political power, craft specialization, divisions of labor, and monumental architecture that archaeologists associate with Mississippian Chiefdom cultures (White et al. 2019). Cahokia's rapid population increase implies in-migration from the region around it, with a population peak at approximately CE 1100. This center was connected to a substantial midcontinent area by the early 1100s, documented by a handful of communities that appear to have been like colonies, a wide

distribution of items made at Cahokia, and local imitation of Cahokian artifact styles. Population in the Cahokia area declined during the Stirling Phase (CE 1100 to 1200) as these connections developed. Conflict increased throughout the Midwest after CE 1200 (during Cahokia's Moorhead Phase, CE 1200 to 1275), evident by the construction and repair of fortifications at Cahokia itself, and the area was almost entirely abandoned by 1350 (Benson et al. 2009; Butler 2021; Iseminger 2010; Pauketat 2009; White et al. 2019).

Connections between Cahokia and the central Plains are clear and underscore the importance of regional interaction. The earliest Central Plains tradition phase to appear was the Steed-Kisker phase located in northeastern Kansas along the Missouri River (Gover 2019a; Roper 2006b, 2012, 2014; Roper and Adair 2011, 2012; Steinacher and Carlson 1998; Wedel 2001). The material assemblage of Steed Kisker phase sites includes Cahokian objects such as Ramey Incised ceramic vessels, a ceramic assemblage dominated by vessels made with Cahokian-like decoration, and at least a few houses built in styles identical to those developed at Cahokia (Bamforth 2021; Roper 2006b: 112). This underscores important chronological issues that I return to in Chapter 4. Traditionally, archaeologists had argued that the Steed-Kisker phase existed from C.E. 950 to 1400 (Steinacher and Carlson 1998), which would require people in the Kansas City area to be producing Cahokian-style material culture before it appeared at Cahokia itself and to have continued producing it decades after Cahokia disappeared.

Spiro and the Caddoan Mississippians

Spiro Mounds was another major Mississippian center belonging to the Caddoan Mississippian culture (Mayes 2016). Located in Eastern Oklahoma next to Fort Smith, Arkansas, along the Arkansas River, a tributary of the Mississippi River, Spiro and the Caddoan

Mississippian chiefdom culture was the only Mississippian chiefdom culture to have existed west of the Mississippi River (Mayes 2016; Ray 2018). The core area of the Caddoan Mississippian culture was eastern Oklahoma, eastern Texas, western Arkansas, and western Louisiana (Mayes 2016; Ray 2018), but its northern frontier extended into southeastern Kansas and southwestern Missouri (Ray 2018). The Caddoan Mississippian Culture is named after the Caddo Nation, the primary descendants (Mayes 2016; Perttula and Walker 2012; Ray 2018). The Caddo language belongs to the Caddoan Language family but became linguistically separated from the Northern Caddoan language family around three thousand years ago (Parks 1979, 2001b).

Like Cahokia, Spiro was an urban center with social stratification, craft specialization, divisions of labor, and monumental architecture (Mayes 2016; Perttula and Walker 2012; Ray 2018). Spiro existed from C.E. 900 to C.E. 1450, with the height of Spiro's population density and residential construction occurring during the Harlan phase (C.E. 1050 to 1250) (Perttula and Walker 2012). After C.E. 1250, Spiro dramatically decreased in population size and new construction (Perttula and Walker 2012; Ray 2018). Archaeological evidence suggests Caddoan Mississippian influence in the Central Plains tradition through Spiroan fired-clay effigy pipes and some aspects of ceramic decoration in Upper Republican and Nebraska phase sites (McNerney 1987; Steinacher and Carlson 1998). The Upper Republican phase of the Central Plains tradition is located along the Republican River in Southern Nebraska and Northern Kansas (Bamforth 2021a, 2021b; Gover 2019a; Roper 2006b; Steinacher and Carlson 1998; Wedel 2001). Under the traditional chronology, the Upper Republican phase is one of the earliest expressions of the Central Plains tradition, existing from C.E. 1000 to C.E. 1350 (Gover 2019; Steinacher and Carlson 1998). This suggests that the appearance of the Spiroan material culture

present in Upper Republican phase sites results from regional interaction with Spiro during the Harlan phase.

Oneota and the Upper Midwest

The Central Plains Oneota is the westernmost extension of the Oneota Cultural Complex (Shield Chief Gover et al. 2021). The Oneota cultural core is located in southern Wisconsin and is a significant Upper Mississippian culture complex (Henning 1998, 2001; Krus et al. 2022; Logan 2010; Pugh 2010). The Oneota Tradition emerged in the 11th century C.E. from local Woodland populations influenced by Cahokian Mississippian pressure and was established by 1250 C.E. (Krus et al. 2022; Theler and Boszhardt 2017). However, Oneota sites do not appear in the Central Plains until after C.E. 1200 (Logan 2010; Shield Chief Gover et al. 2021 and represent a westward movement of the Oneota culture into the Central Plains, not a local development (Krus et al. 2021; Pugh 2010).

Central Plains Oneota populations interacted with local Central Plains tradition and Initial Coalescent Variant populations (Logan 2010; Pugh 2010; Shield Chief Gover et al. 2021). The Anoka phase of the Initial Coalescent Variant is typified by a ceramic assemblage that blends locally made pottery with Central Plains tradition and Oneota designs (Shield Chief Gover et al. 2021; Tiffany et al. 2011). However, unlike Central Plains tradition maize horticulturalists with a more generalized subsistence strategy, Oneota populations, who were also maize horticulturalists, had a subsistence strategy that also emphasized bison hunting that probably included long-distance bison procurement (Shield Chief Gover et al. 2021).

Connecting the Archaeology to Oral Traditions

By examining oral traditions and the archaeological record, connections between the Central Plains tradition and the Mississippian world can be identified beyond recovered material culture. Oral traditions one and two (Chapter 2 pg. 43) describe population diffusion of ancestral Arikara from the other Northern Caddoan speaking groups in Oklahoma and migration to the Republican River in Northern Kansas and Southern Nebraska. Archaeologically, one of the earliest localities of the Central Plains tradition appears along the Upper Republican River (Gover 2019a; Roper 2014; Steinacher and Carlson 1998; Wedel 2001) with material culture from the Southeastern Ceremonial Complex (Steinacher and Carlson 1998:246). Pawnee oral traditions six, seven, eight, nine, ten, and eleven (Chapter 2 pgs. 43-45) refer to the Pawnee and Wichita migrating East to the Mississippi River, North to the Missouri River, and Northwest along the Missouri River into Kansas and Nebraska. This migration trajectory would have brought ancestral Pawnee and Wichita within the Middle Mississippian world and Cahokia (Benson et al. 2009; Butler 2021; Iseminger 2010; Pauketat 2009; White et al. 2019). The Steed-Kisker phase is the other earliest expression of the Central Plains tradition (Gover 2019a; Roper 2006b; Steinacher and Carlson 1998; Wedel 2001); Cahokian material culture has been recovered from these assemblages (Roper 2006b: 112).

When the archaeological evidence is weaved together with Indigenous oral traditions, there is little doubt migrating ancestral Northern Caddoan populations interacted with the Mississippian world (Bamforth 2021c:233-236,274; Shippee 1972; Steinacher and Carlson 1998:254-255; Wedel 2001:181, 1943). The specific form of interaction is unclear, such as the potential presence of loan words between Dhegihan Siouan and Northern Caddoan languages which is beyond the scope of this research, but there is no doubt that Central Plains tradition

populations, especially in the Southeast of the Central Plains, interacted with Mississippian communities. However, the current chronology of the Central Plains tradition and phases for Spiro and Cahokia suggest that ancestral Pawnee and Arikara populations were established in the Central Plains before the height of Spiro and Cahokia's influence (Benson et al. 2009; Butler 2021; Iseminger 2010; Pauketat 2009; Perttula and Walker 2012; Ray 2018; Roper 2006b; Steinacher and Carlson 1998; Wedel 2001; White et al. 2019). Therefore the presence of Mississippian material culture in Central Plains tradition sites has been interpreted as evidence for regional interaction between the Central Plains and the Mississippian world (McNerney 1987; Roper 2006b; Steinacher and Carlson 1998; Wedel 2001). As such, it is unlikely that the depopulation and subsequent abandonment of Cahokia and Spiro contributed to ancestral Pawnee and Arikara populations, culture, and identity formation. However, these relationships are entirely dependent on chronology and the accuracy and precision of radiocarbon data, which has been called into question.

Chronology in Question: A Southern Cloud of Dates

The archaeological chronology in the Central Plains is constructed on a radiocarbon data set, recently called into question (Roper 2014). Archaeologists working in the Central Plains region use the current radiocarbon data to construct regional chronologies containing radiocarbon dates that, according to Roper (2014), are likely to be inaccurate, imprecise, and generally unrepresentative of the actual time when events took place on the landscape.

Roper (2014) assessed the current radiocarbon data set for the Central Plains tradition and revealed some very unsettling realities for its chronology. Roper brought forth a most concerning conclusion in the imprecision and inaccuracy of radiocarbon dates from unidentifiable wood

charcoal samples. The use of unidentifiable wood charcoal samples issue was not an entirely new revelation; archaeologists have understood that carbon-14 charcoal samples can be problematic since the 1960s (Dean 1978:226; Ralph 1971; Renfrew 1973:51; Satterthwaite and Ralph 1960:167). The term “Old Wood” problem was explicitly defined by Schiffer (1986:324) to describe those age determinations on charcoal likely did not accurately date the target event (Cook and Comstock 2014; Roper 2014). The problem in using charcoal samples for radiocarbon analysis is that the wood produced from the charcoal can be “old wood,” either wood that died before the event archaeologists hope to date or the inner rings of logs that similarly predate target events. Radiocarbon dates from old wood charcoal samples skew the dates to make distributions appear older than they are in time (Roper 2014; Roper and Adair 2011). Additionally, age determinations from freshwater mussel shells are entirely removed from analysis due to the freshwater reservoir effect, which cannot be corrected (Philippsen 2013). Roper (2014) developed a chronometric hygiene protocol for the Central Plains to develop a more precise and accurate chronology for the Central Plains tradition’s radiocarbon data set, as shown in **Table 2**. Roper’s protocol was built upon one Dr. Donald Blakeslee introduced in the ’90s, shown below in **Figure 7**.

Table 2. Chronometric Hygiene Protocol Sample Classes (Roper 2014).

CLASS	C-14 SAMPLE	CONFIDENCE LEVEL
1A	Corn (Kernels, cobs, cupules), seeds, nuts, grass, or bone	Very High
1B	Food Residue scraped from pottery vessels	Medium
2A	Bark, outer rings of timber, short-growth twigs	High
2B	Structural Timbers of unknown sampling strategy	Low
2C	Unidentifiable Lumps of Charcoal	Very Low

Table 1. Criteria for the Rejection of Radiocarbon Dates

-
1. A standard deviation greater than 150 years.
 2. Samples of juniper or shell.
 3. Date more than 250 years different from a second date from the same site.
 4. All Gakushuin dates.
 5. One set of Geochron dates (see Table 2).
 6. Wisconsin dates with sample numbers above Wis-2300.
-

Figure 7. Blakeslee's Chronometric Hygiene Protocol (Blakeslee 1997:307 [Table 1]).

Under Roper's chronometric hygiene protocol, which builds upon Blakeslee's (1997:307), there are two criteria for evaluating radiocarbon datasets (2014). The first evaluation criteria set forth automatically eliminates radiocarbon dates that fall under the following three categories: (1) radiocarbon dates from the Gakushuin laboratory (Blakeslee (1994) documented severe problems with these dates), (2) radiocarbon dates with a 1-sigma standard error (standard deviation) of 100 or greater, which are too imprecise to resolve events and processes at the time scales at issue here, and (3) radiocarbon dates from mussel shell (Roper 2014). The second criterion consists of grouping radiocarbon dates by sampling strategy and assigning those groups a confidence level for accuracy and precision in developing radiocarbon-based cultural chronologies (Roper 2014). These five categories for carbon-14 samples are assigned confidence levels that should be considered when using the data for constructing regional chronologies (Roper 2014).

Accuracy and precision in chronology are essential in archaeology for investigating social and behavioral change across time and space. Roper (2014) identified a potential problem in how archaeological chronologies are constructed in the Central Plains and executed a simple comparative analysis of Central Plains tradition sites in Kansas. Myself and colleagues (2021) applied Roper's chronometric hygiene protocol to the entire Central Plains tradition, Central Plains Oneota, and Ponca Creek Anoka phase Initial Coalescent Variant sites and argued that the

Central Plains tradition began 250 years later than previous work has often suggested (Roper 2006b; Steinacher and Carlson 1998; Wedel 2001). However, the results are aligned with what Roper (2014) suggested for pushing back CPT occupations in Kansas and Tiffany and Lensing (2014) for pushing back the occupation of the Nebraska phase. The analysis also observed that the entirety of the Central Plains Oneota radiocarbon library comprises wood charcoal dates (Shield Chief Gover et al. 2021). The transition from the Middle to the Late Ceramic Period in the Central Plains represents the transition from hunting-gathering to agriculture. In 500 years, the region saw mobile hunting and gathering groups become sedentary in large towns reliant on a maize-based and bison-hunting subsistence economy. Knowing precisely when this transition occurred is critical to how archaeologists interpret the conditions for this change and how influential neighboring cultures, such as the Caddoan Mississippian, Middle Mississippian, and eastern Oneota, were in this process, and there are severe problems with the existing corpus of dates.

If we take Roper's (2014) analysis at face value, the Steed-Kisker radiocarbon dates indicate that it appeared no earlier than the late 1100s and disappeared by CE 1250. If correct, the people representing the Steed-Kisker phase likely included families leaving the American Bottom and Cahokia and traveling up the Missouri Valley. Additionally, the Central Plains tradition's appearance would coincide with Spiro's depopulation rather than its rise. Suppose the same "Old Wood" issue (Roper 2014) exists in the Oneota dataset. In that case, the arrival of Oneota populations may be one hundred to two hundred years later than currently believed, altering most of what we understand about Oneota populations' impacts on the Central Plains. Most importantly, delaying the appearance of ancestral Pawnee and Arikara populations in the Central Plains could indicate that these Nations are descended from Mississippian cultures.

However, there is a critical issue in Roper's (2014) analysis of the radiocarbon data. Roper's radiocarbon dataset includes some radiocarbon dates that have not been normalized or corrected for isotopic fractionation (2014). Roper (2014) identifies non-normalized data as being erroneous due to the "Old Wood" problem when, in reality, their non-compliance with accepted radiocarbon data is the result of not being corrected for isotopic fractionation (Morlan 2022; NOSAMS 2020; Taylor 1987; Toom 1992).

Correcting for isotopic fraction is called normalization, and the amount of fractionation that occurs during photosynthesis depends on the photosynthetic pathways used by a given plant (Morlan 2022). However, the issue of isotopic fractionation is not specific to flora but also to the fauna that eats the flora and the carnivores that eat the herbivores (Morlan 2022). C3 plants such as trees, shrubs, temperate zone grasses, and most flowering plants discriminate against the heavier carbon isotopes more strongly than C4 plants such as buffalo grass (*Bouteloua*), maize (*Zea*), and grasses that are arid region adapted (Morlan 2022). The correction for isotopic fraction is based on the ratio between C-12 and C-13, which is called $\delta^{13}\text{C}$ and is expressed in part per thousand (parts per mil) to a standard known as Pee Dee Belemnite or PDB (Morlan 2022). C3 plants generally have C-13 ratios near -25 parts per mil, whereas C4 plants have C-13 ratios between -10 to -12.5 parts per mil, and every part per mill difference from -25 parts per mil is equivalent to 16 years (Morlan 2022). Therefore, any radiocarbon date that has not been normalized can offset the targeted dated event from a decade to over a hundred years, making these data unreliable.

Non-normalized radiocarbon dates cannot be corrected for isotopic fractionation after they have been measured (Morlan 2022; Taylor 1987) and are removed from radiocarbon analyses in contemporary archaeological practice (Bronk Ramsey 2008, 2009a; Morlan 2022;

Taylor 1987; Toom 1992). The issue of non-normalized radiocarbon data present in the Great Plains archaeological radiocarbon datasets was brought forth by Dennis Toom in 1992. Still, the issue of non-normalized dates he presented has gone unnoticed in Central Plains archaeological literature, and non-normalized sample data have continued to be utilized in constructing cultural chronologies from radiocarbon data age ranges (Adair 1996, 2012; Blakeslee 1993, 1994; Gover 2019a; Johnson 2007; Roper 2014; Roper and Adair 2011, 2012). Thus, previous radiocarbon chronologies that utilized non-normalized radiocarbon data (Gover 2019a, 2019b; Roper 2014) and time spans for archaeological cultures based on radiocarbon age-determination analyses (Adair 2012; Johnson 2001, 1998, 2007; Roper 2006b, 2012; Roper and Adair 2012; Steinacher and Carlson 1998; Wedel 2001) are incorrect. Our understanding of the temporal relationships of archaeological cultures in the central plains needs to be critically reevaluated.

Background: Bayesian Statistical Analysis

To investigate the accuracy of the investigated oral traditions and their relationship to the archaeological record, I utilize Bayesian statistical analysis of radiocarbon dates. Bayesian statistical analysis of radiocarbon dates and chronologies is currently the preferred method in refining archaeological cultural and site chronologies (e.g., Bayliss 2015; Birch et al. 2021, 2022; Bronk Ramsey 2008, 2009a, 2009b; Buck and Juarez 2017; Buck and Meson 2015; Manning 2006; Needham et al. 1997; Sharon et al. 2007). In archaeological research projects, Bayesian chronological models are statistical models that integrate relative and absolute chronological information (Bayliss 2009, 2015; Bronk Ramsey 2008, 2009a; Buck and Juarez 2017; Buck and Meson 2015).

Over the past three decades, Bayesian statistical methods have been produced specifically for the archaeological research communities because Bayesian statistics method focus on *degrees of belief* that allow archaeologists an explicit method for collating information such as expert opinion, prior knowledge, and prior scientific data (Bronk Ramsey 2008, 2009a; Buck and Juarez 2017; Buck and Meson 2015). Prior knowledge and prior scientific data are both comprised of two types of prior information: uninformative and informative (Buck and Meson 2015). An uninformative prior is a prior that has as little impact on the results as possible such as knowledge needed for mathematical and statistical purposes, whereas, an informative prior is highly subjective prior knowledge and is used to bring together formal scientific data in an intelligible way (Buck and Meson 2015:571-572). In Bayesian statistics, degrees of belief are represented as probability statements that describe the true, but unknown, state of a problem (Buck and Juarez 2017). Bronk Ramsey describes the theorem as:

$$p(t | y) \propto p(y | t) p(t)$$

“where t is the set of parameters and y the observations or measurements made. $p(t)$ is the prior or the information about the parameters (mostly events) we have apart from the measurements. $p(y | t)$ is the likelihood for the measurements given a set of parameters. $p(t | y)$ is the posterior probability, or the probability of a particular parameter set given the measurements and the prior. In a Bayesian analysis, we have to express the information we have about the chronology in these terms” (2009a: 338).

For verifying the success of an OxCal-produced model, Bronk Ramsey (2009a) suggests that the A_{model} and $A_{overall}$ must be greater than sixty percent for the models I apply to the data to be reasonable. The thresholds of these indices were chosen to approximate the 5% confidence level of a chi-squared test (Bronk Ramsey 1995). Both indices represent an agreement between the data and the chosen model. The $A_{overall}$ index represents the agreement of all the measurements within the model, whereas the A_{model} index accounts for the agreement

between model parameters (Bronk Ramsey 2009a). When evaluating the performance of a Bayesian statistical model, the Amodel is the preferred value (Bronk Ramsey 2009a).

To avoid confusion between archaeological taxonomic classifications and OxCal commands, I am employing Bayliss's (2015) protocol: Command Query Language v4 keywords are in **bold**, highest posterior density distributions are in *italics*.

Using a Bayesian statistical modeling theoretical framework, I develop models to investigate specific archaeological site occupation chronologies and entire archaeological culture chronologies. Through a Bayesian approach, I incorporate prior knowledge regarding Central Plains archaeological taxa (discussed below) to constrain radiocarbon data to set parameters for Bayesian statistical models. Therefore, I can precisely identify the beginning, length (or 'span'), and end of site occupations and archaeological cultural chronologies to identify events described in the selected Pawnee and Arikara oral traditions.

The use of Bayesian statistical analysis of radiocarbon data in conjunction with Indigenous oral traditions has been done before (Birch 2022; Birch et al. 2021, 2022; McKechnie 2015). Iain McKechnie utilized oral traditions from Nuu-chach-nulth Elders and radiocarbon data from archaeological sites from the Broken Group Island archipelago in Barkley Sound to develop a settlement pattern chronology (McKechnie 2015). The analysis demonstrated parallel and comparable results between the archaeological record and the oral traditions of the local Indigenous groups (McKechnie 2015).

Whereas McKechnie's analysis was constrained to an Island off the coast of Vancouver (2015), Birch and their colleagues have focused their analysis on the Great Lakes region of the United States and Canada (Birch 2022; Birch et al. 2021). Both of

these case studies targeted late pre-contact and contact time periods of Indigenous history (Birch 2022; Birch et al. 2021). However, Birch and their colleagues' investigation of Iroquoian oral histories and radiocarbon data to construct precision Bayesian-produced chronologies produced enhanced chronological resolution to investigate relational histories (Birch et al. 2021). Birch and their colleagues illustrated how radiocarbon dating and Bayesian-produced radiocarbon chronologies derived from Indigenous oral traditions and oral histories are not only a collaborative methodology in archaeology but are also advancing Indigenous-led archaeological research (Birch et al. 2022).

Testing for Old Wood in A Northern Cloud of Dates

Although Roper (2014) included non-normalized radiocarbon dates in their analysis, their results did identify the presence of “Old Wood” samples in the radiocarbon data set. Before identifying the presence of non-normalized radiocarbon dates in the Central Plains dataset, I presented a preliminary analysis of applying Roper’s Chronometric Hygiene protocol to the entirety of the radiocarbon data set for the Central Plains tradition at the Plains Anthropological Conference in Bloomington, Indiana, to recreate Roper’s (2014) study on the Central Plains tradition phase assemblages outside of the Kansas River basin (Gover 2019b).

I created two Bayesian statistical models for the seven Central Plains tradition phases. Each model was a **Phase** Model where each Central Plains tradition phase was grouped as its own sequence and was constructed to be “overlapping” so each sequence is analyzed independently from one another within the model. Model 1 included all radiocarbon dates with 1-sigma standard errors less than 200 and did not include radiocarbon dates from the Gakushuin Laboratory or samples run on Juniper: N = 292, Nebraska phase n = 72, Upper Republican phase n = 50, Smoky Hill phase n = 81, Solomon River phase n = 14, Steed-Kisker phase n = 48,

Itskari phase $n = 24$, and St. Helena phase $n = 3$ (Gover 2019b). Model 2 included protocolled radiocarbon dates selected following Roper's Chronometric Hygiene protocol (2014): $N = 63$, Nebraska phase $n = 7$, Upper Republican phase $n = 4$, Smokey Hill phase $n = 38$, Solomon River phase $n = 0$, Steed-Kisker phase $n = 11$, Itskari phase $n = 3$, and St. Helena phase $n = 0$ (Gover 2019b). Applying the Chronometric Hygiene protocol reduced the usable Central Plains radiocarbon dataset to 21.5 % of the existing set of dates ($n=63$). Two of the seven Central Plains tradition phases contained zero usable radiocarbon dates in their radiocarbon dataset. The phases outside Kansas had their usable radiocarbon data reduced to single digits (Gover 2019b). Because of this, I was unable to recreate Roper's (2014) site analysis for southern CPT sites by comparing unaffiliated wood charcoal sample dates against AMS dates on samples from bone or maize because Central Plains tradition site assemblages in Nebraska, Colorado, Iowa, and Missouri have been dated with wood charcoal dates or with AMS dates on bone or maize, not with both (Gover 2019b). To holistically test the accuracy and precision of the radiocarbon chronology of the Central Plains archaeological cultures, I concluded that we need to redate northern Central Plains tradition sites outside of the Kansas River Basin that have C14 datasets comprised solely of wood charcoal dates and test existing dates against new dates based on AMS dates from bone and maize from the same assemblages.

For the Northern Cloud dataset, I selected, in consultation with Dr. Douglas Bamforth, thirteen sites across Nebraska to be dated: 25SM09 (Bill Packer), 25RH70 (Rulo), 25PT111 (Swantek), 25HW10 (Jensen Brothers), 25HW9 (Bert Mortensen), 25HW6 (Coufal), 25HT3 (Redbird), 25DX1 (Peterson), 25DK1 (Bobier), 25CU25 (Young), 25CD10 (Ferber), 25CD3 (Wiseman), and 25CD1 (Schulte). Some of these were previously dated and offered data for comparison with more modern assays (25SM9, 25RH70, 25PT111, 25HW9, 25HW6, and

25CU25). However, only five of the previously dated sites had unidentifiable wood charcoal samples for comparative analysis; 25HW9 had been dated with a single AMS date sampled from bone collagen. Others are in areas of the northern central Plains with no adequate chronological information, particularly central Nebraska (25SM9, 25HW10, 25HW925HW6) and northeastern Nebraska (25HT3, 25DX1, 25DK1, 25CD10, 25CD3, and 25CD1). 25CD10 and 25SM9 are Great Oasis sites; the former is undated, and the latter is dated only by charcoal and offers opportunities for direct comparison of dates on different materials and better chronological control on the age of early maize on the central Plains. 25CU25 was selected because it represented a Lower Loup phase hunting camp in Central Nebraska with bison bone in its assemblage with an occupation represented by three wood-charcoal radiocarbon dates. Additionally, before this analysis, the Lower Loup phase radiocarbon dataset did not include a single AMS radiocarbon date. We redated a Lower Loup assemblage to identify the temporal relationship with its ancestral archaeological cultures: Initial Coalescent Variant and Central Plains tradition.

Our analysis included sites belonging to the following archaeological cultures: Central Plains tradition, Extended Coalescent Variant, Late Woodland (Great Oasis), Central Plains Oneota, and Lower Loup phase. The distribution of sampled archaeological sites is shown in Figure 2 on page 68. Central Plains tradition sites included 25CD1, 25CD3, 25DK1, 25DX1, 25HW10, 25HW6, 25HW9, and 25RH70. These sites represent three Central Plains tradition phases: (1) St. Helena: 25CD1, 25CD3, 25DK1, and 25DX1; (2) Itskari: 25HW6, 25HW9, and 25HW10; (3) Nebraska: 25RH70. The Extended Coalescent Variant site was represented by 25HT3, Lower Loup phase by 25CU25, Central Plains Oneota by 25PT111, and Late Woodland by 25SM9 and 25CD10. The scope of our sampling strategy went beyond just dating Central

Plains tradition assemblages for research purposes, which will be discussed in Chapter 4. It is also critical to know that the sampling strategy was developed before the problem of including non-normalized radiocarbon dates in analyses was identified.

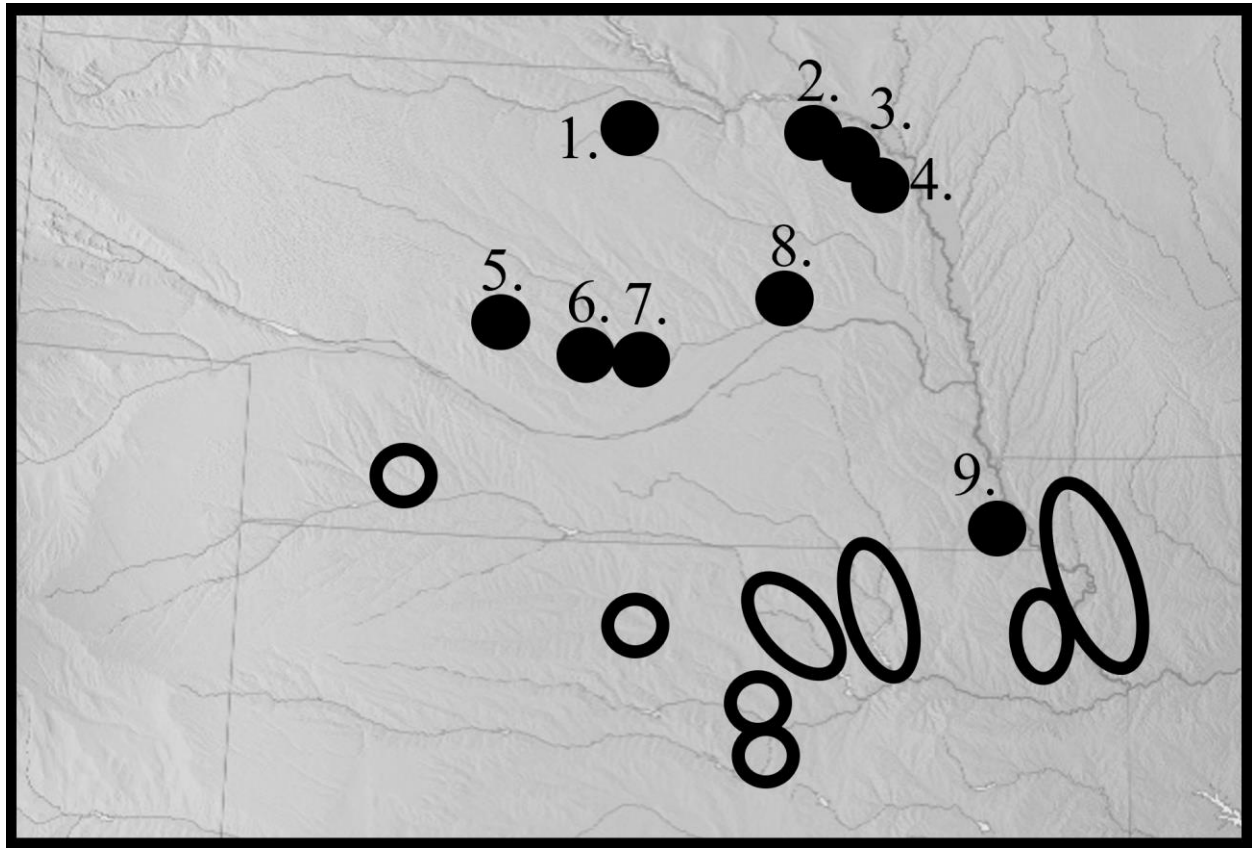


Figure 8. Approximate Location of the thirteen Central Plains sites selected for analysis. Site numbers: (1.)25HT3, (2.)25CD1, 25CD3, & CD10 (3.)25DX1, (4.)25DK1, (5.)25CU25, (6.)25SM9, (7.)25HW6, 25HW9 & 25HW10 (8.)25PT111, and (9.)25RH69. Black-Filled Points demarcate site locations for this research, while Open Points demarcate approximate areas investigated by Roper 2014. Base map courtesy of shadedrelief.com.

Many of these sites were excavated long ago before archaeologists understood the importance of retaining potentially datable material. However, past excavators uniformly saved samples of bison bone, either in the form of tools or of “representative” unmodified bone. To eliminate issues of old wood, we selected fifty-seven bone samples to be analyzed at the University of California Irvine Accelerator Mass Spectrometry Laboratory in Irvine, California.

Sample selection employed Near Infrared (NIR) Spectroscopy to identify bone samples from the selected site assemblages with sufficient collagen for Accelerator Mass Spectrometry

(AMS) dating. NIR has proven helpful in quantifying collagen content in archaeological bone (Sponheimer et al. 2019). Ph.D. candidate of Anthropology at the University of Colorado Boulder, Christina Ryder, operated the NIR device from the Nutritional and Isotopic Ecology Laboratory at CU Boulder and conducted the NIR data analysis. Utilizing NIR led to a 100% sample success rate for the fifty-seven submitted bone samples.

Bayesian Analyses of Sampled Sites

To analyze the radiocarbon data collected from the selected thirteen archaeological sites across Nebraska, I conducted Bayesian statistical analyses of the radiocarbon dataset using OxCal version 4.4 (Bronk Ramsey 2009a), which operates the Markov Chain Monte Carlo sampling techniques (Bronk Ramsey 2009a), with the IntCal20 calibration curve (Reimer et al. 2020) to produce single-sequence models (Bronk Ramsey 2009a) for each site. Markov Chain Monte Carlo sampling techniques are used in Bayesian statistics for calculating complex probability distributions to provide possible solution sets of the parameters of a given model in OxCal (Bronk Ramsey 2009a:353). The OxCal model structures and OxCal code for these models can be found in the APPENDICES A. OxCal Code. Each archaeological site was analyzed as a single **sequence** model because the radiocarbon data for each site represents a phase of activity within a single archaeological site (Bronk Ramsey 2009a).

Data Analyses

Radiocarbon data collected from the selected thirteen sites for this dissertation were used for three primary purposes: (1) to provide chronological data for previously undated site assemblages in single-site OxCal-produced radiocarbon chronologies, (2) to test for the presence of “old wood” affected radiocarbon samples in already dated site assemblages in single-site

OxCal-produced radiocarbon chronologies, and (3) to incorporate these data into a regional, chronological analysis that is presented in Chapter V: COMPARING CHRONOLOGICAL MODELS through OxCal-produced radiocarbon chronologies.

Previously Un-dated Sites Sampling

I will present the first group of results from archaeological sites that had not been previously dated before this analysis. The un-dated sites belong to four archaeological cultures: Central Plains tradition St. Helena phase: 25DX1, 25CD1, 25CD3, and 25DK1; Central Plains tradition Itskari phase: 25HW10; Great Oasis: 25CD10; and Extended Coalescent Variant: 25HT3. Four St. Helena sites were selected for dating as Gover (Gover 2019a, 2019b) identified that this CPt phase dataset only contained unidentifiable wood charcoal radiocarbon dates. 25HT3 was analyzed as it represents the only Extended Coalescent Variant site in Nebraska, and 25HW10 was analyzed because bone samples were available for sampling from the repository where it is curated.

The total number of samples analyzed for this analysis is thirty-three out of fifty-seven samples submitted. 25CD10 (n=4), 25DX1 (n=4), 25CD1 (n=5), 25CD3 (n=4), 25DK1 (n=5), 25HW10 (n=4), and 25HT3 (n=7).

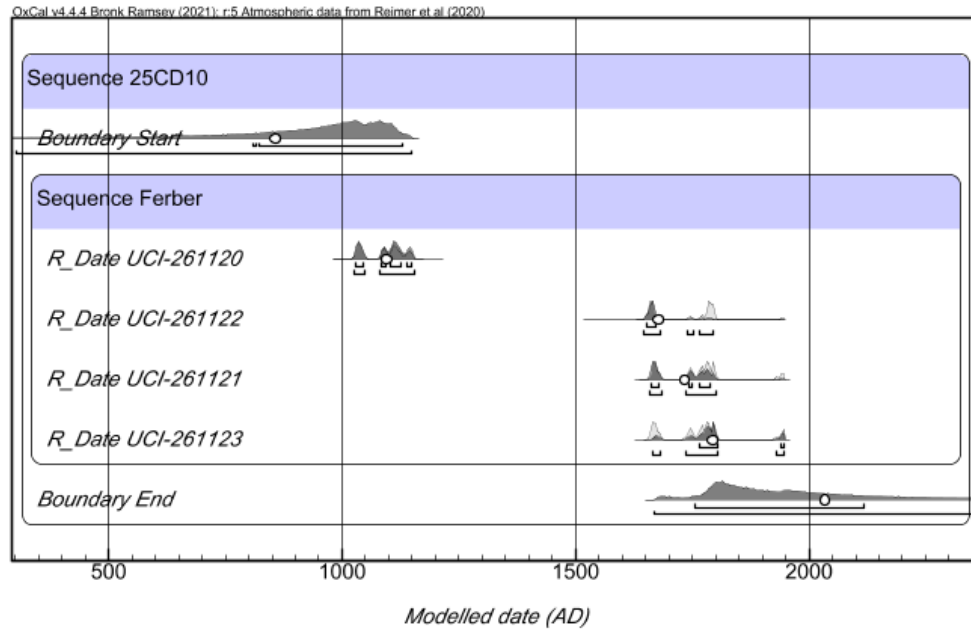


Figure 9. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Ferber 25CD10. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

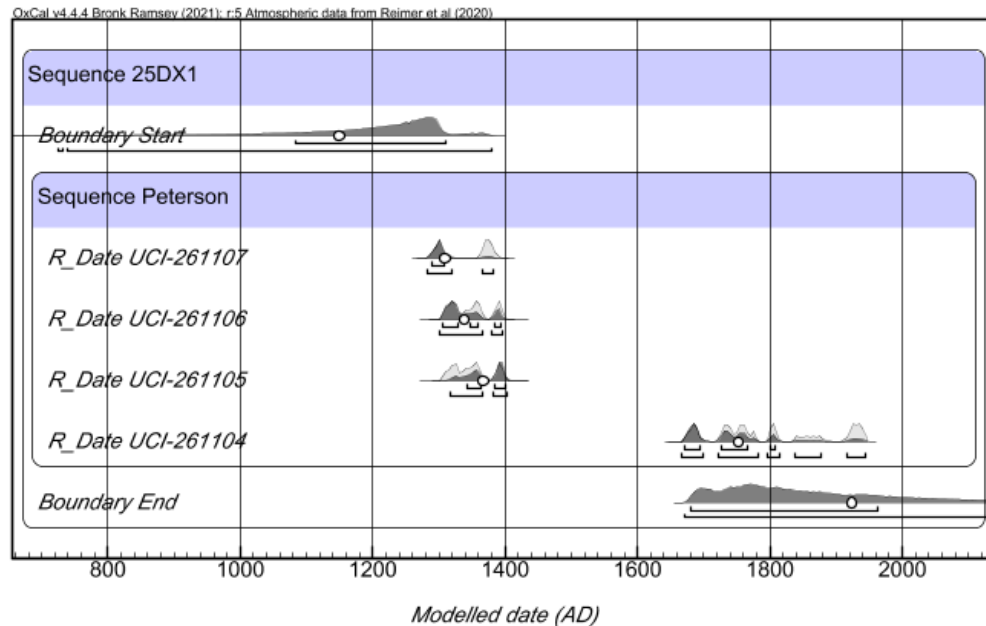


Figure 10. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Peterson 25DX1. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

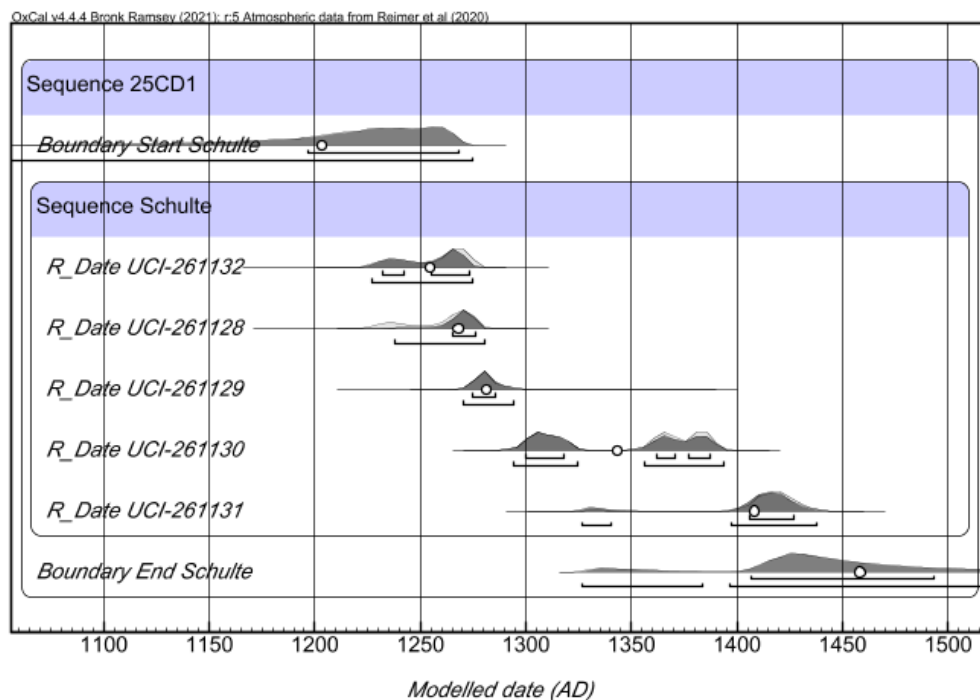


Figure 11. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Schulte 25CD1. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

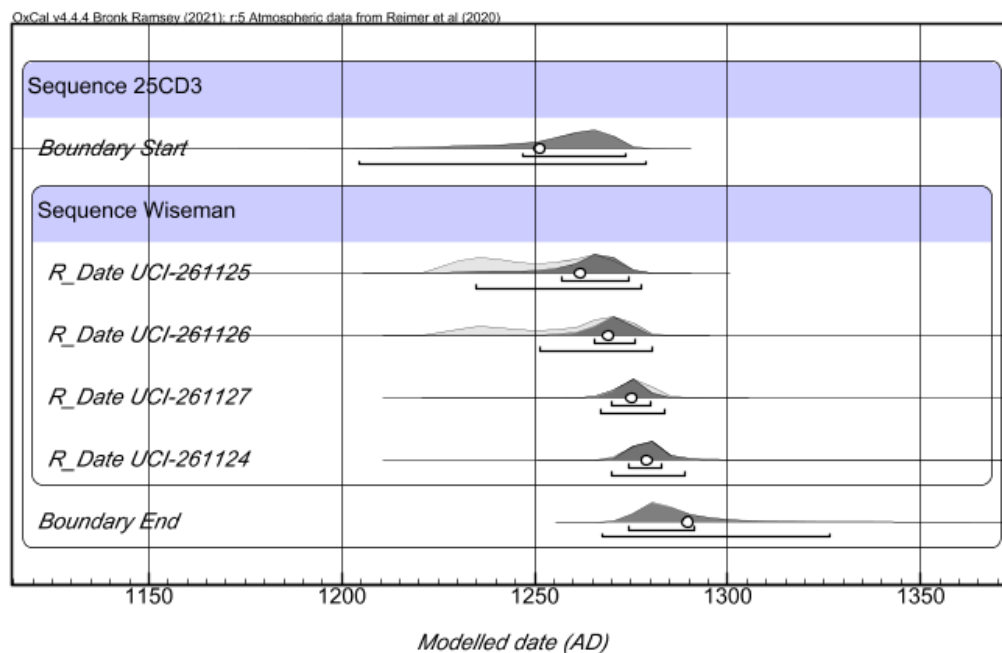


Figure 12. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Wiseman 25CD3. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

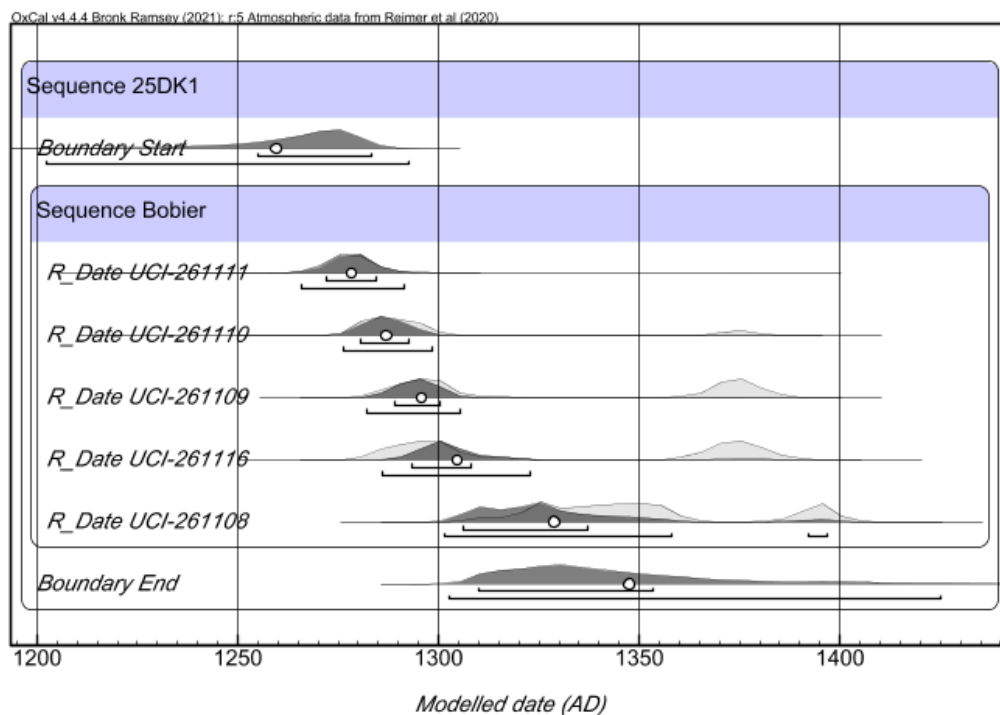


Figure 13. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Bobier 25DK1. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

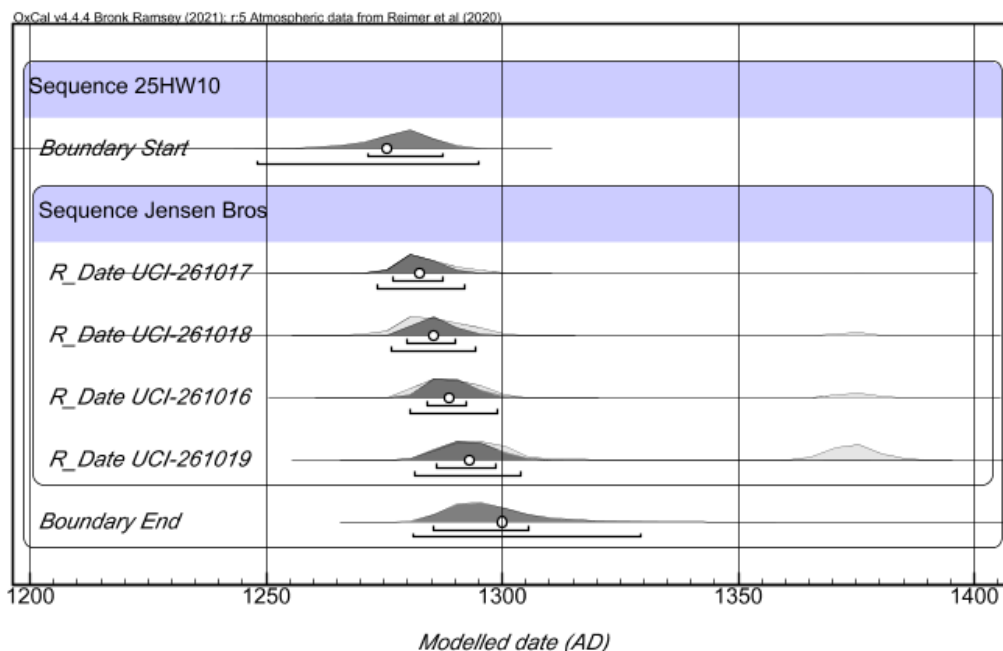


Figure 14. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Jensen Brothers 25HW10. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

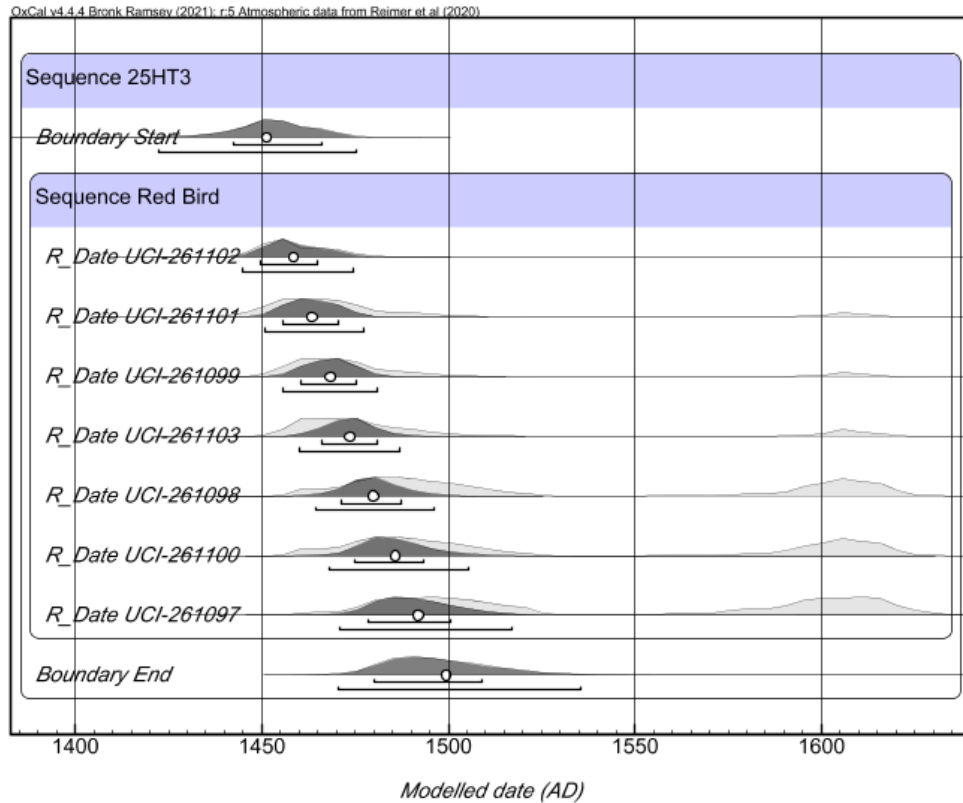


Figure 15. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Red Bird 25HT3. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

Table 3. Posterior Probabilities from the Bayesian Models for the Estimated Start and End Date Ranges for Selected Previously Un-Dated Sites.

Culture	Site	68% Probability		95% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
Great Oasis	Ferber 25CD10	811-1130	1755-2118	3-1150	1670-2937	89.6	89.1
CPT St. Helena	Peterson 25DX1	1084-1309	1681-1962	1283-1383	1671-2659	92.4	92.6
CPT St. Helena	Schulte 25CD1	1196-1268	1407-1493	1051-1274	1326-1624	99.8	98.7
CPT St. Helena	Wiseman 25CD3	1247-1273	1274-1291	1204-1279	1267-1326	129.9	127.3
CPT St. Helena	Bobier 25DK1	1255-1283	1310-1353	1202-1292	1302-1425	101.1	101.6
CPT Itskari	Jensen Bros. 25HW10	1271-1287	1285-1305	1248-1295	1281-1329	133.3	131
ECV	Red Bird 25HT3	1442-1466	1480-1509	1422-1475	1470-1535	181.4	174.9

Previously Un-dated Sites Results

Sites 25CD3 (**Figure 12**), 25DK1 (**Figure 13**), 25HW10 (**Figure 14**), and 25HT3 (**Figure 15**) suggest a single occupation of their respective sites. The posterior probabilities for the start and end dates of the 25HW10 and 25HT3 Bayesian models fit within the understood time range of their archaeological culture designations (Johnson 2001, 1998, 2007; Steinacher and Carlson 1998; Wedel 2001). The St. Helena phase sites 25CD3 and 25DK1 appear earlier than what is currently understood for the St. Helena phase chronology (Steinacher and Carlson 1998; Wedel 2001). This will be explored further in Chapter 5.

Sites 25CD10 (**Figure 9**), 25DX1 (**Figure 10**), and 25CD1(**Figure 11**) suggest multiple occupations at their respective sites. The estimated age ranges for samples UCI-261122, UCI-261121, and UCI-261123 from 25CD10; and UCI-261104 from 25DX1 are well outside of the time frame for their accepted archaeological cultures (Johnson 2001; Johnson and Johnson 1998; Steinacher and Carlson 1998; Wedel 2001) and flagged by the OxCal program in their output table as having the “may extend out of range” warning. Therefore, these samples most likely do not represent the targeted archaeological culture but represent later occupations from a different archaeological culture and will be removed from analyses in Chapter 5. However, the three targeted sample results from 25DX1 also appear earlier than what is currently understood for the St. Helena phase chronology (Steinacher and Carlson 1998; Wedel 2001).

Interestingly, 25CD1 has estimated age ranges for three samples (UCI-261132, UCI-261128, and UCI-261129) that coincide with the results from 25DX1, 25CD3, and 25DK1 as appearing earlier than what is currently understood for the St. Helena phase chronology (Steinacher and Carlson 1998; Wedel 2001), as well as a sample (UCI-261131) that fits within the currently accepted time span for the St. Helena phase (Steinacher and Carlson 1998; Wedel

2001). This suggests that two St. Helana phase occupations are represented at the site. The results from UCI-261130 illustrate a bimodal distribution due to a radiocarbon plateau and could “swing” either way to belonging to either occupation.

Previously Dated Sites Sampling

The second group of results is from archaeological sites that had been previously dated. The assemblages have unidentifiable wood charcoal samples in their radiocarbon data sets. These analyses aim to compare the new AMS dates from bone collagen samples against the unidentifiable wood charcoal samples to ascertain the presence of “Old Wood” in their chronology. These sites belong to five archaeological cultures: Central Plains tradition Nebraska phase: 25RH70; Central Plains tradition Itskari phase: 25HW9, 25HW6, and 25SM9; Central Plains Oneota: 25PT111; Great Oasis: 25SM9; and Lower Loup phase: 25CU25.

Except for 25HW9, the Central Plains tradition sites considered in this section were selected for analysis because they contained bones in their assemblages and had comparative radiocarbon data. 25HW9 was selected as it only had one AMS date representing the site's occupation history. The Lower Loup phase and Central Plains Oneota sites were selected for their assemblages' previous charcoal dates and dateable bones. Therefore, we took this opportunity to contribute AMS radiocarbon samples to these datasets as the results from Roper's (2014) analysis seriously questioned the reliability of unidentifiable wood charcoal radiocarbon sample data.

The total number of samples analyzed for this analysis is twenty-four out of fifty-seven samples submitted. 25SM9 (n=5), 25RH70 (n= 3), 25PT111 (n=5), 25HW9 (n=3), 25HW6

(n=4), and 25CU25 (n=4). As with the OxCal models for the previously undated archaeological sites, these archaeological site models were also produced using **sequence** models.

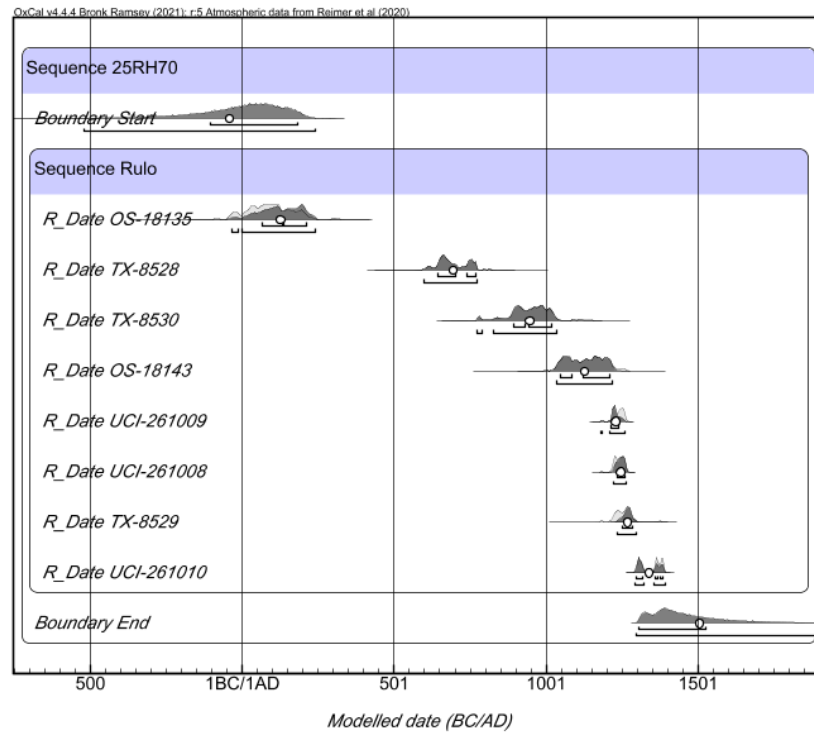


Figure 16. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Rulo 25RH70. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

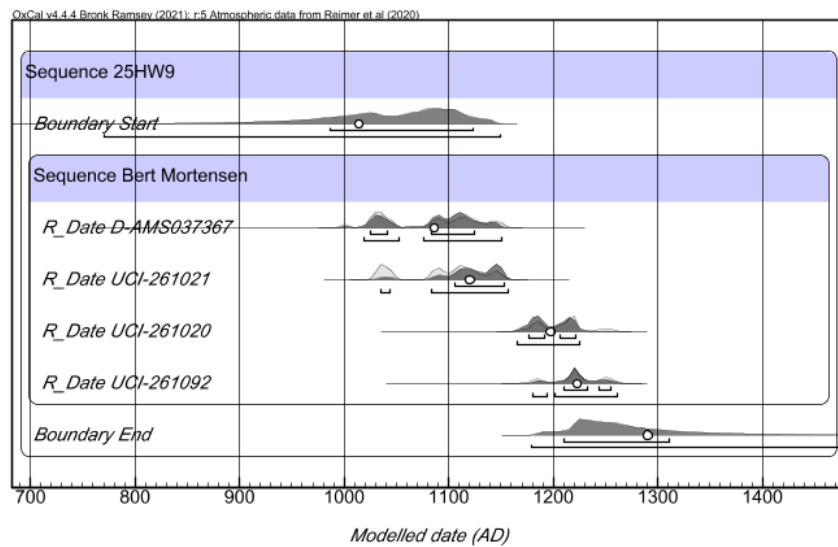


Figure 17. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Bert Mortensen 25HW9. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

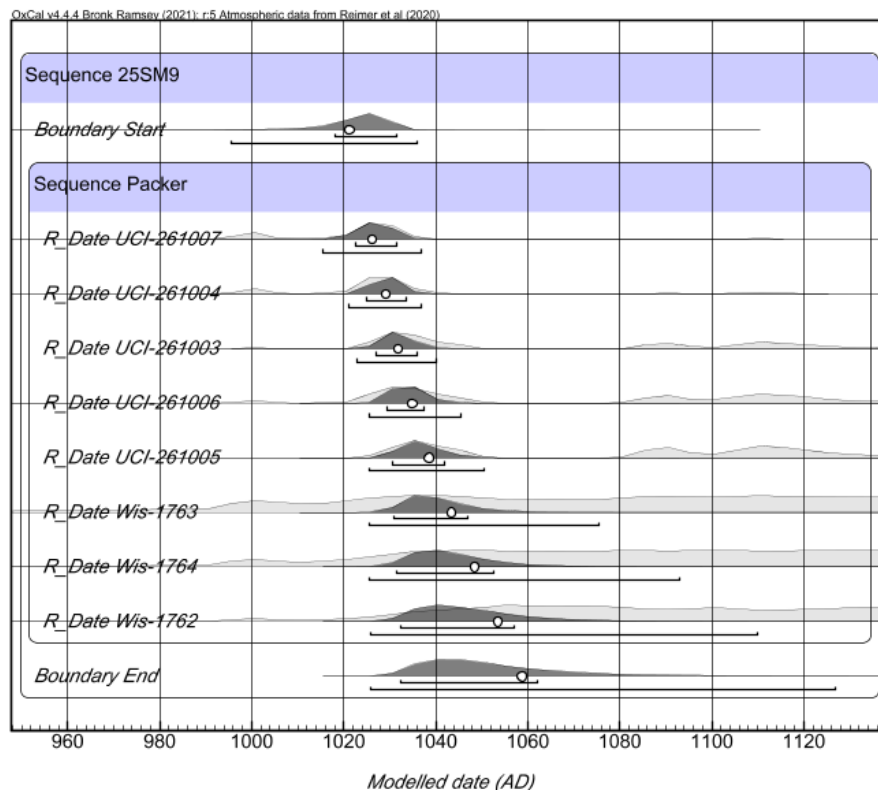


Figure 18. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Packer 25SM9. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

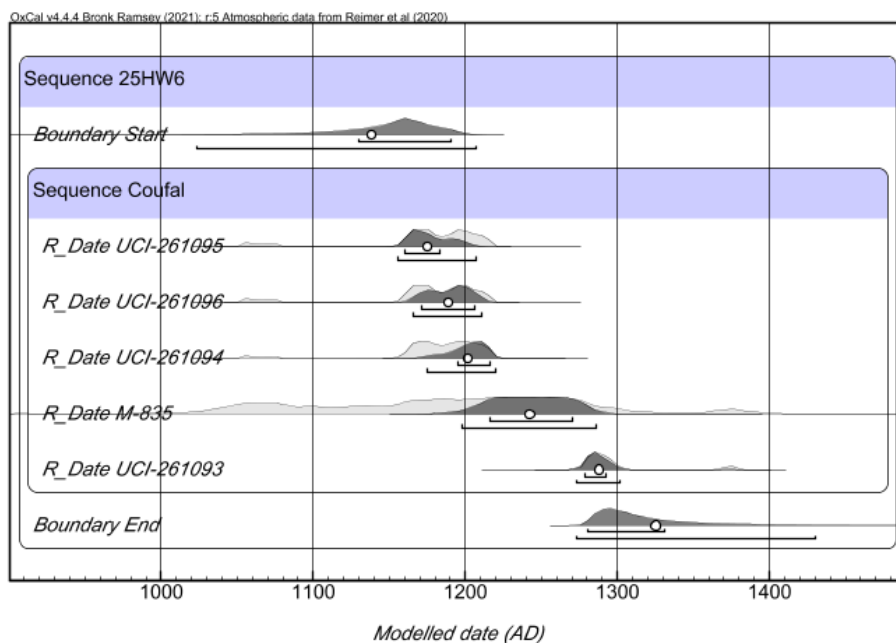


Figure 19. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Coufal 25HW6. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

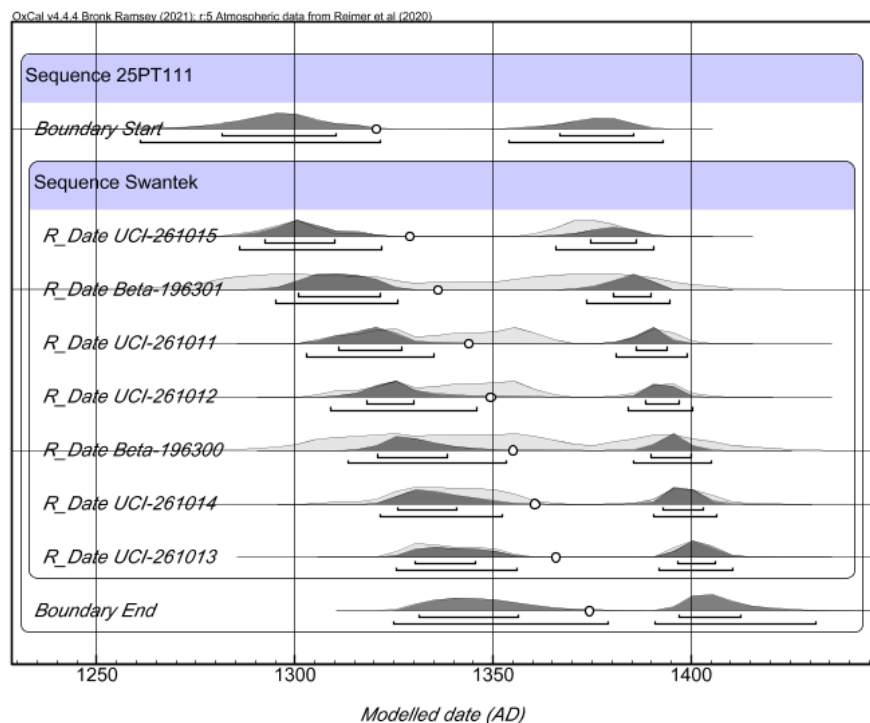


Figure 20. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Swantek 25PT111. Wide bars below probability distributions indicate 95.4% probability range, short bars indicate 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

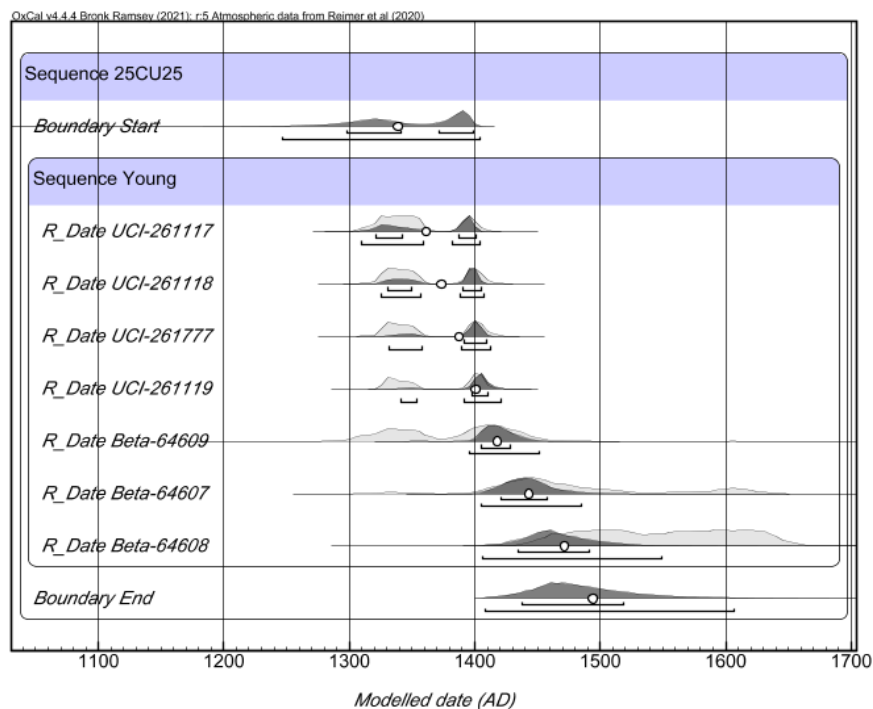


Figure 21. Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Young 25CU25. Wide bars below probability distributions indicate a 95.4% probability range, short bars indicate a 68.3% probability range, and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

Table 4. Posterior Probabilities from the Bayesian Models for the Estimated Start and End Date Ranges for Selected Previously Dated Sites.

Culture	Site	68% Probability		95% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
CPT Nebraska	Rulo 25RH70	-104-184	1308-1526	-522-240	1296-1922	102.5	102.5
CPT Itskari	Bert Mortensen 25HW9	987-1124	1210-1311	770-1149	1179-1505	95.7	92.3
Great Oasis	Packer 25SM9	1018-1031	1032-1062	995-1036	1026-1127	251.5	243.6
CPT Itskari	Coufal 25HW6	1130-1191	1280-1331	1023-1207	1273-1430	128.5	127.9
CPO	Swantek 25PT111	1281-1385	1331-1412	1261-1393	1325-1431	114	113.2
Lower Loup	Young 25CU25	1298-1399	1435-1491	1246-1404	1408-1607	123.7	123.3

Previously Dated Sites Results

The estimated probability distributions for 25SM9 (**Figure 18**) and 25HW6 (**Figure 19**) are very tight single-occupation events. The single wood charcoal date from 25HW09 (M-835) and the three wood charcoal dates from 25SM9 (WIS-1762, WIS-1763, WIS-1764) do not appear to be affected by “Old Wood.” 25PT111(**Figure 20**) also shows a single occupation event, but the posterior probability distributions are bimodal as the estimated age ranges fall on a radiocarbon curve plateau. However, the start and end estimated age ranges fall within the previous Central Plains Oneota estimated age ranges (Shield Chief Gover et al. 2021). 25HW9 (**Figure 17**) is confirmed to contain two occupation events of Central Plains tradition populations based on the presence of separated clusters of age determinations which aligns to previous research on the site occupation (Page 2009). 25RH70 (**Figure 16**), the only Nebraska Phase CPT site represented in these analyses, identifies AMS OS-18135, sampled from *Zea mays*, as a clear outlier and charcoal samples Tx-8530 and Tx-8528 as being affected by “Old Wood.” These samples should be removed from future analyses as they do not represent the target event for dating site occupation.

The results for 25CU25 (**Figure 21**) provide an exciting case study for incorporating non-normalized dates into Bayesian statistical analysis. Sample selection and submission to UC Irvine occurred before I identified the problem with non-normalized sample data. The previous radiocarbon dates (Beta-64607, Beta-64608, Beta-64609), which were the basis for 25CU25's chronology, are non-normalized dates on unidentifiable wood charcoal samples. It was purely by accident that we selected 25CU25 to be redated with AMS dates from bone samples against non-normalized charcoal dates. The non-normalized dates are removed from analyses under current Bayesian statistical practices (Taylor 1987; Toom 1992). Therefore, 25CU25 is older than initially believed and is temporally closer to the Initial Coalescent Variant than it is to Lower Loup. In a personal communication with Rob Bozell (2022), the former Nebraska State archaeologist, about these results, he stated that the pottery from 25CU25 was "Lower Loup-ish" which aligns with Initial Coalescent Variant ceramic design and morphology (Johnson 1998; Krause 2001; Shield Chief Gover et al. 2021). I feel comfortable reclassifying 25CU25 as an ICV occupation, redefining 25CU25 as the only known ICV hunting camp assemblage. This will be further explored in Chapter VI.

Discussion

The results from the 25CU25 analysis coincide with Roper's (2014) results that non-normalized dates in analyses often appear younger than AMS dates from bone and seed samples. However, Roper attributed these dates' incongruence to problems in sampling unidentifiable wood charcoal (2014), whereas "Old Wood" dates make occupations appear older, as demonstrated by the results from 25RH70 and Roper's (2014) analyses of Kansas CPt assemblages. Roper's (2014) Chronometric Hygiene Protocol must be updated to reflect

contemporary practices concerning data hygiene for constructing radiocarbon-age estimates of archaeological culture chronologies. The updated Chronometric Hygiene Protocol must be applied to the current radiocarbon dataset to reevaluate the temporal relationship between archaeological cultures and the landscape.

Chapter V: COMPARING CHRONOLOGICAL MODELS

Introduction

Roper's (2014) Chronometric Hygiene Protocol was critical in developing more accurate and precise radiocarbon chronologies. Still, a critical failure in this protocol was not identifying non-normalized radiocarbon samples as problematic (Taylor 1987). Therefore, the Protocol needs to be updated to reflect the need to remove non-normalized radiocarbon samples and samples that do not align with current archaeological ethical standards.

Precise and accurate chronology is critical in archaeology for interpreting past relationships between populations and cultures. Accurate chronology is especially critical for incorporating Indigenous oral traditions into archaeological research to understand the actual histories of Indigenous people on the continent. Gover's (2019b) results suggesting the Central Plains tradition represents ancestral Pawnee and Arikara populations are predicated on cultural and temporal continuity between the Central Plains tradition, Initial Coalescent Variant, Extended Coalescent Variant, and Lower Loup phase. As demonstrated by Roper (2014) and the results presented in Chapter 3, the presence of Old Wood and non-normalized radiocarbon samples in Bayesian-produced radiocarbon chronologies critically skew the start and end boundaries of posterior probabilities for estimated time spans. Including samples affected by "Old Wood" will make chronologies appear earlier, whereas non-normalized samples will make chronologies end later.

How are the relationships between archaeological cultures within the Central Plains and their relationship to contemporary Indigenous populations affected when these data are removed from analyses of Central Plains cultural chronologies? Additionally, how will interpretations of

the relationship between Central Plains farmers and Mississippian cultures be affected by a new Chronometric Hygiene Protocol?

Research Questions:

1. How is the radiocarbon library for the Central Plains region from the Late Woodland to the Plains Village Pattern affected by a new Chronometric Hygiene Protocol?
2. What does a “clean” dataset inform us about temporal and geographic patterns of the development/appearance of maize farming and social transformation? Will Bayesian analysis of subregional datasets prove critical in examining the spread of maize farming and horticultural practices across the Central Plains compared to significant cultural developments in the broader Central Plains region, such as the advance of the Plains Village Pattern and the conclusion of Late Plains Woodland lifeways?
3. How do Pawnee and Arikara oral traditions contribute to interpreting the archaeological record under a new Central Plains chronology? Will a new chronology for Central Plains tradition phases reflect ancestral Pawnee and Arikara migration routes as documented in their oral traditions?
4. How do our interpretations change to understand the relationship between Central Plains farming populations and the Mississippian World?

An Updated Chronometric Hygiene Protocol

I am proposing an updated Chronometric Hygiene Protocol for Great Plains Archaeology to incorporate recently realized information concerning the quality of radiocarbon sample efficacy. Much of the protocol remains the same as Roper (2014), but the proposed protocol

Table 5. Proposed Chronometric Hygiene Protocol for Great Plains Archaeology.

Great Plains Chronometric Hygiene Protocol		
Samples Usable for Bayesian Statistical Modelling		
Class	C14 Sampled Material	Confidence
1A	Corn (Kernels, Cobs, Cupules), Seeds, Nuts, Grass, or Bone	Very High
1B	Food Residue Scraped from Pottery Vessels	Medium
2A	Bark, Outer Rings of Timber, Short-Growth Twigs	High
2B	Structural Timbers of Unknown Sampling Strategy	Low
2C	Unidentifiable Lumps of Charcoal	Very Low
Samples Disqualified for Bayesian Statistical Modelling		
3A	Samples run by the Gakashuin Laboratory	Reject
3B	Samples run on Juniper	Reject
3C	Samples run on Mussel Shell	Reject
3D	Samples run on Indigenous Ancestor Remains*	Reject
3E	Samples with Non-Normalized Age Distributions	Reject
3F	Samples with Standard Deviations Greater than 100	Reject

includes important updated rules for building Bayesian Statistical Models of radiocarbon data.

The most simplistic addition is giving a “class” designation for radiocarbon samples identified as needing to be immediately removed from a radiocarbon data set. I created these additional class designations purely for data management purposes. I use Microsoft Excel (Microsoft Corporation 2018) to store, catalog, and import radiocarbon data, and having these class designations helps me organize my data. Classes 3A, 3B, 3C, and 3F are automatically disqualified from analysis, as Roper (2014) proposed.

Explanation of the Criteria for Sample Classification

Sample class 1A is what Roper (2014:31) describes as the “gold standard” for dating, as these samples belong to short-lived materials and have a very high confidence level for representing the targeted dated event. However, special attention needs to be paid to the known

taxa of bone to undergo analysis. Species that prey on freshwater mussels can have their age-determinations affected by the freshwater reservoir effect (Philippsen 2013). Therefore, targeting herbivores such as bison for AMS analysis is highly recommended. Additionally, the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ ratios of collagen extracted from bone for AMS age-determinations must be inside the interval of 2.9 to 3.6 or else may show deviant isotopic values due to contamination which may induce aberrant age determinations (DeNiro 1985; Schwarcz and Nahal 2021). Sample class 1B also has tight associations with the targeted dated event because of the assumed relationship between ceramic style and the associated archaeological assemblage but is assigned a lower confidence level than 1A because not all dates yield consistent dates (Johnson 2007:76; Roper 2014:31). The inconsistency of food residue dates has been attributed to fish processing in a pot, thus being affected by the freshwater reservoir effect, or the pre-treatment protocol of ceramic material (Philippsen 2013; Roper 2014:31). However, since my dataset only contains 34 sample class 1B dates (Appendices B. Radiocarbon Data Used in Analyses), I have not removed them from the analysis as OxCal (Bronk Ramsey 2009a, 2009b) flags non-conforming data.

Radiocarbon data from wood samples are broken down into three subclasses represented by 2A, 2B, and 2C. Sample class 2A radiocarbon data is given slightly lower confidence than sample class 1A age determinations because of the presumed slight age offset from the target dated event (Roper 2014:31). Sample class 2B radiocarbon data were given a low confidence level by Roper (2014:31). It is unknown if these samples were composed of outer rings or from a species of juniper, which are a long-lived tree species that are highly susceptible to being affected by “old wood” – which is why sample class 3B constitutes an automatic rejection (Roper 2014:31). Sample class 2C radiocarbon data is given a very low confidence level because there is nothing known about the plant species that the charcoal was produced from and therefore

suffers from confidence issues present in sample classes 2A and 2B but to a more significant degree (Roper 2014:31).

Radiocarbon data in the third category: 3A, 3B, 3C, 3D, 3E, and 3F, constitute automatic rejections from use in chronological analyses. Sample class 3A samples run by the Gakushin laboratory were highly inconsistent with other radiocarbon data produced by other radiocarbon laboratories in the mid-1990s (Blakeslee 1994). Blakeslee's analyses illustrated that Gakushin laboratory dates numbered GaK-5999 and below had significantly different age determinations than samples run by six other radiocarbon laboratories (Blakeslee 1994:205). The cause of inconsistencies between the Gakushin laboratory data and the other radiocarbon laboratories is unknown. Still, due to Blakeslee's (1994) analyses, removing Gakushin Laboratory dates from constructing radiocarbon chronologies has become best practice, and archaeologists working in the Central Plains no longer use the laboratory. However, as Gakushin laboratory dates numbered GaK-6000 and above are believed to be accurate (Blakeslee 1994:205), they should be usable in analyses. Still, there are only ten GaK dates above the GaK-6000 threshold in the investigated Central Plain's dataset, but they are non-normalized samples, so they are unusable for analyses.

Sample class 3B dates have been discussed above. Sample class 3C dates, samples run on freshwater mussel shells, are automatically rejected because they are known to produce unreliable dates due to the freshwater reservoir effect (Blakeslee 1994:307; Philippsen 2013; Roper 2014:30). However, there are only four sample class 3C dates in the investigated radiocarbon dataset. They are either highly anomalous or non-normalized and would be rejected anyway.

The rejection of sample class 3E data, samples with standard deviations greater than 100, is purely speculative. Roper (2014) uses >100, whereas Blakeslee (1997) uses >150. Smaller standard deviations will produce tighter ‘start’ and ‘end’ **boundaries** in OxCal-produced chronologies (Bronk Ramsey 2009a). Roper (2014:30) states that their setting of >100 is a conservative estimate but one that I abide by in my analyses. As standard deviations in radiocarbon data become tighter, our chronologies will become more precise, and we can reduce the breadth of the standard deviation in future analyses.

My additions include classes 3D: Samples run on Indigenous Ancestor Remains and 3E: Samples with Non-Normalized Age Distributions. The addition of excluding samples classified as 3E has already been discussed, but the exclusion of radiocarbon samples from Indigenous Ancestor Remains needs an explanation.

The Southeastern Archaeological Conference and Midwest Archaeological Conference have adopted policies concerning the display and publication of Indigenous Ancestor Remains and Funerary Objects in their quarterly academic journals and annual conferences (Bloch 2022; Doershuk 2022). The adopted policies prohibit the display and publication of Indigenous Ancestor Remains unless the affiliated descendant community approves the publication of these images. The Plains Anthropological Society Board of Directors has created a Sensitive Image Committee to develop similar policies adopted by MAC and SEAC. In keeping with the “spirit” of these adopted and soon-to-be-adopted policies, the proposed Chronometric Hygiene Protocol requires the removal of radiocarbon data sampled from Indigenous Ancestor Remains unless an official representative of the affiliated descendant community such as a Tribal Historic Preservation Officer, NAGPRA Officer, Cultural Resource Division Staff, or member of Tribal Government gives written permission to include such data in Bayesian statistical analyses.

Additionally, the freshwater reservoir effect will also affect age determinations from ancestral remains of an individual who consumes freshwater mussels (Philippsen 2013).

Bayesian Statistical Modelling Methods

I developed four models for each of four different radiocarbon datasets to investigate the effects of radiocarbon sample selection on OxCal-produced Bayesian Statistical Radiocarbon Modelling. In total, I produced sixteen models for this analysis. The four radiocarbon datasets are labeled Late Woodland, Early Plains Village, Late Plains Village, and Central Plains tradition.

I organized my four models in each dataset so that radiocarbon dates belonging to a specific archaeological taxonomic unit are grouped as a single **sequence** within a **phase model** (Bronk Ramsey 2009a). So that each taxonomic unit is treated independently from one another in a model, **sequences** are constructed to be “overlapping” (Bronk Ramsey 2009a). Each **sequence** in a model is constrained by ‘Start’ and ‘End’ **Boundaries**. These **Boundaries** are included for calculating the start and end of a **sequence** based on the calibration of individual radiocarbon dates belonging to a **sequence** (Bronk Ramsey 2009a). As with the models produced in Chapter 3, these models were produced using OxCal version 4.4 (Bronk Ramsey 2009a) using the IntCal20 calibration curve (Reimer et al. 2020) to obtain posterior density functions for the ‘start’ and ‘end’ dates for archaeological taxa. For evaluating the performance of a Bayesian statistical model, the Amodel and Aoverall indices must be greater than 60 as they are equivalent to a 0.05 confidence level of a chi-square test (Bronk Ramsey 2009a).

The Late Woodland **phase** models have four **sequences**: Pomona LW, Nebraska LW, Kansas LW, and Great Oasis LW. I wanted to investigate the Pomona variant of the Plains Late

Woodland culture because of its uncertain relationship to Late Woodland and Central Plains tradition. The Pomona variant is poorly understood (Adair 2012). It has been suggested that it could represent the persistence of Late Woodland lifeways after that way of life had disappeared in other areas (Roper 2006b; Steinacher and Carlson 1998; Wedel 2001). Great Oasis was included in the Late Woodland dataset, even though Great Oasis represents farmers (Alex and Tiffany 2000; Bamforth 2021b; Bozell and Rogers 1989) because the results of **Table 3** and **Table 4** indicated a closer chronological relationship to Late Woodlands assemblages. I wanted to investigate its temporal relationship to the Nebraska Late Woodland period. I separated Late Woodland sites by state boundaries to identify if there is a difference in age ranges resulting from Central Plains tradition populations arriving in Kansas and displacing or integrating Woodland populations before migrating into Nebraska (Gover 2019a; Roper 2006b; Steinacher and Carlson 1998; Wedel 2001).

The Early Plains Village **phase** models have three **sequences**: Central Plains Oneota, Central Plains tradition, and Initial Coalescent Variant. I grouped these three archaeological cultures within the same model to investigate the relationship between the appearance of two horticultural populations, CPO from the East and CPT from the South, with the later maize-based agriculturalist represented by the Initial Coalescent Variant.

The Late Plains Village **phase** models also have three **sequences**: Lower Loup phase, Extended Coalescent Variant, and Red Bird Extended Coalescent Variant. The Red Bird site was separated from the rest of the Extended Coalescent Variant dataset so I can readily identify its temporal relationship to the Lower Loup phase and Extended Coalescent Variant chronology.

The Central Plains tradition **phase** models have eight **sequences**: Upper Republican, Smoky Hill, Itskari, Nebraska, Solomon River, St. Helena, Steed-Kisker, and Glenwood. These

sequences represent the seven phases of the Central Plains tradition, with the Glenwood, Iowa locality of Nebraska phase sites given its own **sequence**. It is increasingly clear that CPT phases are little more than geographic divisions of the region's more extensive pattern of continuous variation. Using them as separate sequences thus makes it possible to examine temporal patterns in the spread of the CPT way of life across the central Plains. The Central Plains tradition dataset was more intensely investigated to identify the migration pattern of ancestral Pawnee and Arikara populations (Gover 2019a).

Each dataset was analyzed through four different modeling parameters: Model A, Model B, Model C, and Model D. Each chronological model utilizes different radiocarbon sample class populations.

- Model A: 1A, 1B, 2A, 2B, 2C, 3E. – How most chronologies have been produced.
- Model B: 1A, 1B, 2A, 2B, 2C. – How they should have been run since 1987.
- Model C: 1A, 1B, 2A, 2B. – What Roper 2014 proposed.
- Model D: 1A, 1B, 2A, 2B, 2C (outlier model). – Best practice approach since 2009.

A “Model D” and a “Model B” for a given dataset incorporate the same sample class data, but a “Model D” represents an outlier model. A General Outlier Model and Charcoal Outlier Model were used for the “Model D” chronological models. A Charcoal Outlier Model was used to account for the unknown inherent age offset in unidentifiable wood charcoal samples (Bronk Ramsey 2009b), represented as sample class 2C. An exponential distribution of the charcoal dates, with an exponential constant of τ of 1 taken over the range -10 to 0 , is assumed under this outlier modeling (Bronk Ramsey 2009b). This is the default setting for OxCal v 4.4 Charcoal Outlier modeling (Bronk Ramsey 2009b). Under this model, radiocarbon data belonging to sample class 2C were given a prior probability of 100 % of being statistical outliers. Using the

General Outlier Model, radiocarbon data belonging to sample classes 1A, 1B, 2A, and 2B were given a prior probability of 5% statistical outliers. A prior probability of 5 % of being statistical outliers was employed following Krus et al. (2022).

I chose to compare datasets by four different modeling criteria to illustrate how chronologies based on radiocarbon-produced estimated age ranges are affected by sample strategies. A “Model A” should have **sequence ‘end’ boundaries** that end later (closer to us in time) than “Model B” **sequence ‘end’ boundaries** because sample class 3E dates will cause site occupations to appear to have ended later. Whereas a “Model B” should have sequence ‘start’ **boundaries** that begin earlier (further from us in time) than “Model C” and “Model D” **sequence ‘start’ boundaries** because sample class 2C dates are assumed to be affected by “Old Wood” and will cause site occupation to appear to have begun earlier. A “Model C” and a “Model D” should have similar posterior probability estimates, but “Model D” posterior probability estimates should be less precise than those in a “Model C” because I am introducing prior probability percentages for dates being statistical outliers. In “Model C,” all radiocarbon dates are assumed to have a 0 % probability of being a statistical outlier. In contrast, the same data in “Model C” are assigned a 5 % probability of being a statistical outlier.

However, as the sample data between the four models become more selected, the number of sites and radiocarbon dates used to calculate posterior probability estimates will decrease. Essentially, as the accuracy of the radiocarbon samples increases because the models include increasingly high-quality dates, the precision of the estimated age ranges for ‘start’ and ‘end’ **boundaries** decreases because strict selection criteria reduce the number of eligible dates.

Results

The plots, ‘start’ and ‘end’ boundary tables, and radiocarbon sample class and site data of the Bayesian model are presented below on pages 98 to 107. Late Woodland model data are shown in **Figure 22, Figure 23, Figure 24, Figure 25, Table 6, and Table 7**. Early Plains Village data are shown in **Figure 26, Figure 27, Figure 28, Figure 29, Table 8, and Table 9**. Late Plains Village data are shown in **Figure 30, Figure 31, Figure 32, Figure 33, Table 10, and Table 11**. Central Plains tradition phase data are shown in **Figure 34, Figure 35, Figure 36, Figure 37, Table 12, and Table 13**. Wide bars below probability distributions indicate a 95.4% probability range (2-sigma standard error), short bars indicate a 68.3% probability range (1-sigma standard error), and the white circle represents the μ , or mean, after the application of Bayesian statistical analysis (Bronk Ramsey 2009a). General trends can be determined throughout all the models:

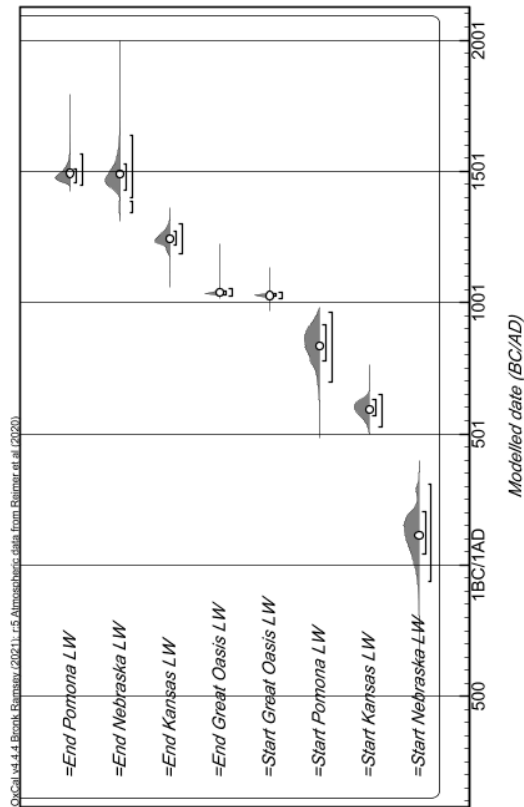


Figure 22. Late Woodland Model A: Start and End Boundaries of Late Woodland assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.

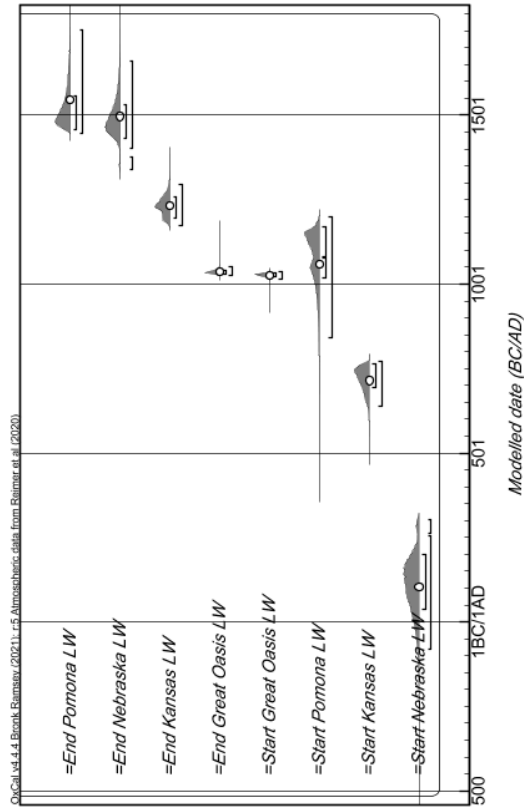


Figure 24. Late Woodland Model B: Start and End Boundaries of Late Woodland assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C.

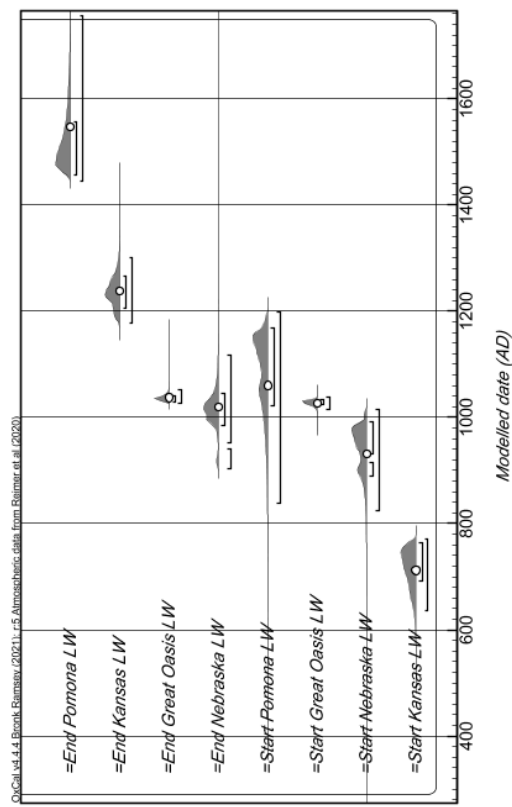


Figure 23. Late Woodland Model C: Start and End Boundaries of Late Woodland assemblages. Sample classes included: 1A, 1B, 2A, 2B.

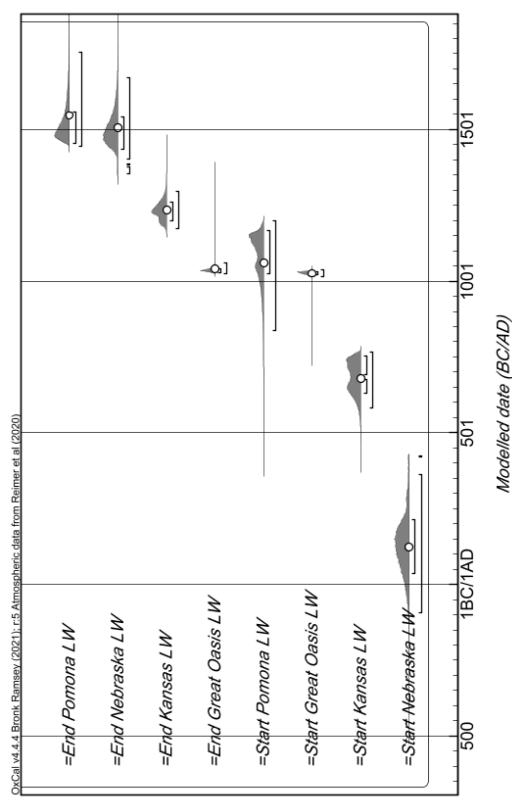


Figure 25. Late Woodland Model D: Start and End Boundaries of Late Woodland assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model)

Table 6. OxCal Produced 'start' and 'end' boundaries for each Woodland sequence by model.

Posterior Probability Distributions of 'start' and 'end' boundaries of Woodland Model sequences							
Model	Phase	68.3% Probability		95.4% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
Model A: Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.						113	113.4
	Great Oasis	1023 - 1033	1030 - 1042	1016 - 1038	1026 - 1056		
	Pomona	780 - 914	1456 - 1507	697 - 962	1446 - 1567		
	Kansas	569 - 630	1220 - 1270	529 - 649	1185 - 1299		
	Nebraska	42 - 205	1431 - 1527	(-)64 - 309	1342 - 1636		
Model B: Sample classes included: 1A, 1B, 2A, 2B, 2C.						112.7	113.3
	Great Oasis	1023 - 1033	1030 - 1042	1016 - 1037	1026 - 1052		
	Pomona	1020 - 1169	1456 - 1558	842 - 1198	1446 - 1754		
	Kansas	695 - 765	1196 - 1259	640 - 772	1176 - 1295		
	Nebraska	36 - 201	1431 - 1531	(-)80 - 305	1341 - 1659		
Model C: Sample classes included: 1A, 1B, 2A, 2B.						130.9	131.2
	Pomona	1022 - 1169	1456 - 1557	839 - 1199	1446 - 1755		
	Great Oasis	1023 - 1033	1029 - 1040	1015 - 1037	1026 - 1051		
	Kansas	691 - 763	1205 - 1265	635 - 771	1177 - 1301		
	Nebraska	890 - 991	985 - 1045	824 - 1015	903 - 1116		
Model D: Sample classes included: 1A, 1B, 2A, 2B, 2C (Outlier Model).						83.6	81.5
	Pomona	1024 - 1169	1456 - 1559	837 - 1198	1446 - 1757		
	Great Oasis	1023 - 1033	1030 - 1043	1015 - 1038	1025 - 1060		
	Kansas	630 - 753	1200 - 1261	581 - 767	1175 - 1298		
	Nebraska	35 - 215	1437 - 1542	(-)94 - 426	1356 - 1670		

Table 7. Radiocarbon Sample Class Data for each Woodland sequence and Bayesian model.

Model	Phase	# of	Number of Dates Per Sample Class						Total #
		Dated Sites	1A	1B	2A	2B	2C	3E	
A	Great Oasis	2	6	0	0	0	3	0	9
	Pomona	15	4	2	0	0	0	21	27
	Kansas	25	18	6	0	0	4	31	59
	Nebraska	9	6	0	0	0	20	3	29
B & D	Great Oasis	2	6	0	0	0	3		9
	Pomona	3	4	2	0	0	0		6
	Kansas	14	18	6	0	0	4		28
	Nebraska	9	6	0	0	0	20		26
C	Pomona	3	4	2	0	0			6
	Great Oasis	2	6	0	0	0			6
	Kansas	10	18	6	0	0			24
	Nebraska	3	6	0	0	0			6

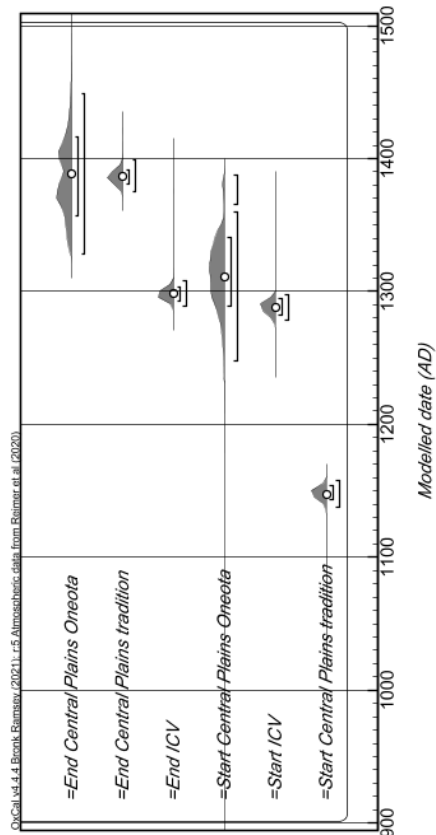


Figure 26. Early Plains Village Model A: Start and End Boundaries of Early Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.

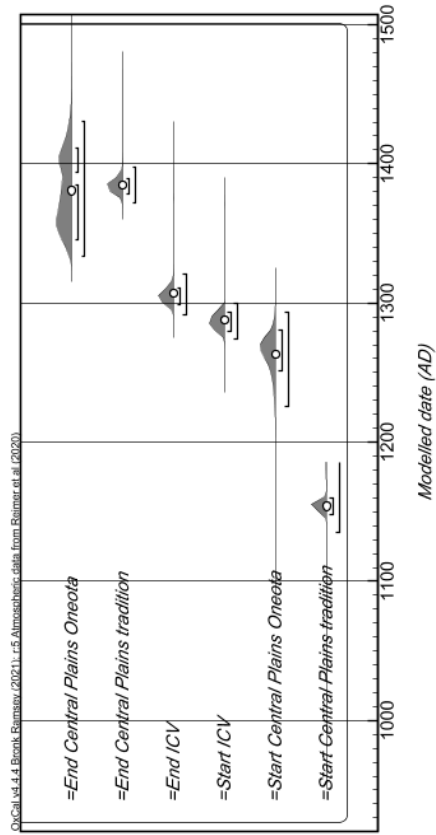


Figure 28. Early Plains Village Model B: Start and End Boundaries of Early Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C.

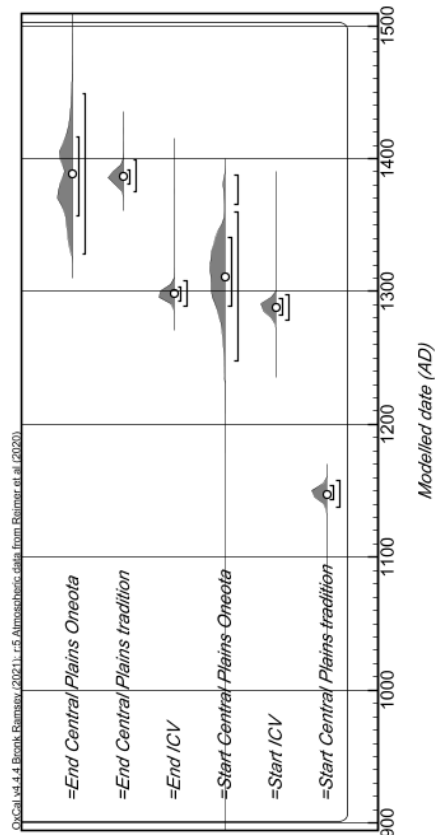


Figure 27. Early Plains Village Model C: Start and End Boundaries of Early Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B.

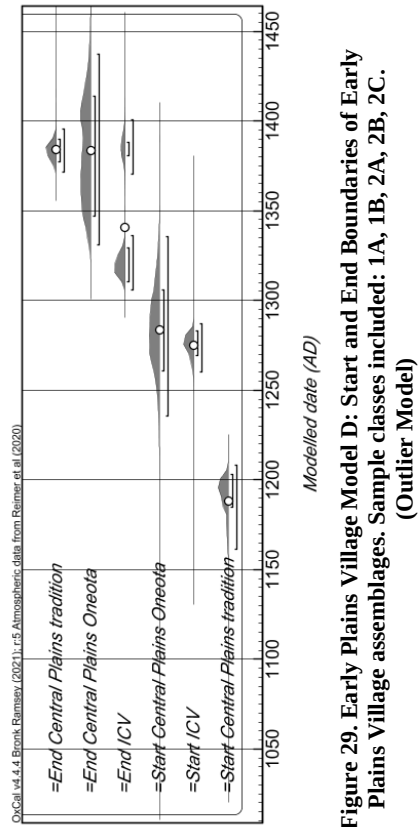


Figure 29. Early Plains Village Model D: Start and End Boundaries of Early Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model)

Table 8. OxCal Produced 'start' and 'end' boundaries for each Early Village Period sequence by model.

Posterior Probability Distributions of 'start' and 'end' boundaries of Early Village Model sequences							
Model	Tradition	68.3% Probability		95.4% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
Model A: Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.						69.6	103.9
	Initial Coalescent Variant	1280 - 1293	1299 - 1311	1274 - 1299	1293 - 1321		
	Central Plains Oneota	1253 - 1279	1347 - 1412	1226 - 1292	1335 - 1430		
	Central Plains tradition	1148 - 1158	1378 - 1390	1054 - 1165	1372 - 1399		
Model B: Sample classes included: 1A, 1B, 2A, 2B, 2C.						85.1	97.3
	Initial Coalescent Variant	1280 - 1293	1274 - 1299	1298 - 1310	1291 - 1320		
	Central Plains Oneota	1251 - 1280	1226 - 1293	1345 - 1411	1333 - 1430		
	Central Plains tradition	1148 - 1159	1135 - ...	1378 - 1389	1372 - 1398		
Model C: Sample classes included: 1A, 1B, 2A, 2B.						86.2	86.9
	Central Plains Oneota	1289 - 1340	1248 - 1387	1357 - 1416	1328 - 1449		
	Initial Coalescent Variant	1282 - 1294	1278 - 1297	1293 - 1303	1289 - 1308		
	Central Plains tradition	1143 - 1153	1137 - 1158	1380 - 1391	1375 - 1399		
Model D: Sample classes included: 1A, 1B, 2A, 2B, 2C (Outlier Model).						73.4	130.1
	Central Plains Oneota	1260 - 1306	1347 - 1414	1235 - 1335	1331 - 1437		
	Initial Coalescent Variant	1269 - 1283	1310 - 1388	1260 - 1287	1306 - 1400		
	Central Plains tradition	1184 - 1203	1377 - 1390	1161 - 1208	1371 - 1395		

Table 9. Radiocarbon Sample Class Data for each Early Plains Village sequence and Bayesian model.

Model	Tradition	# of	Number of Dates Per Sample Class						Total # of Dates
		Dated Sites	1A	1B	2A	2B	2C	3E	
A	CPO	6	5	1	0	0	11	5	22
	ICV	7	42	2	0	0	13	3	60
	CPT	133	138	23	4	32	146	83	426
B & D	CPO	5	5	1	0	0	11		17
	ICV	7	42	2	0	0	13		57
	CPT	112	138	23	4	32	146		343
C	CPO	2	5	1	0	0			6
	ICV	6	42	2	0	0			44
	CPT	63	138	23	4	32			197

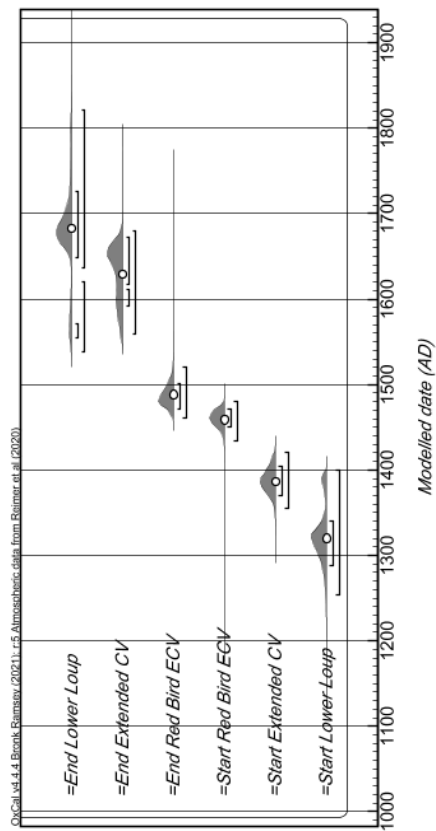


Figure 30. Late Plains Village Model A: Start and End Boundaries of Late Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.

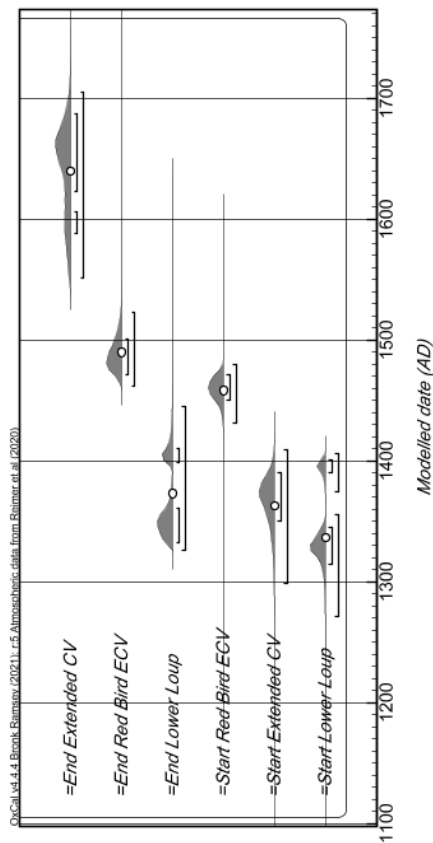


Figure 31. Late Plains Village Model C: Start and End Boundaries of Late Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B.

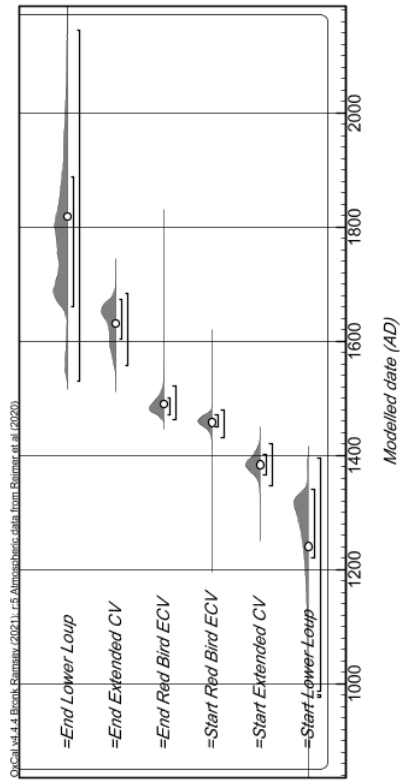


Figure 32. Late Plains Village Model B: Start and End Boundaries of Late Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C.

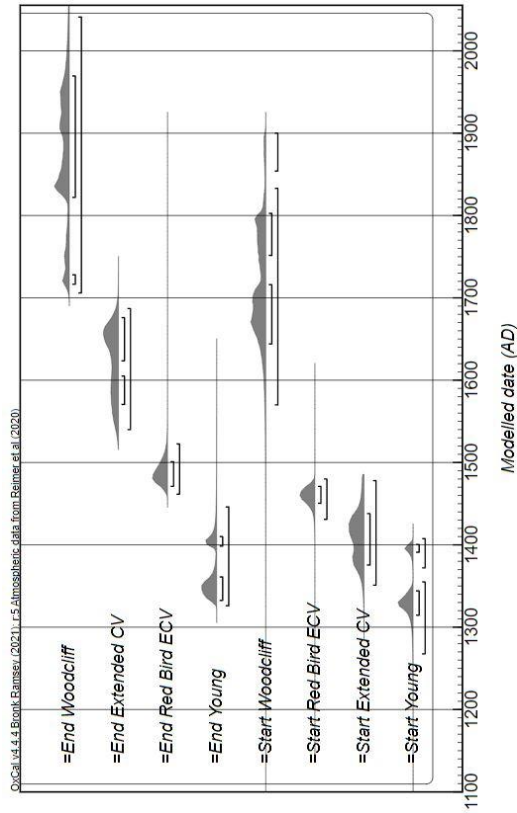


Figure 33. Late Plains Village Model D: Start and End Boundaries of Late Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model).

Table 10. OxCal Produced 'start' and 'end' boundaries for each Late Village Period sequence by model.

Posterior Probability Distributions of 'start' and 'end' boundaries of Early Village Model sequences								
Model	Tradition	68.3% Probability		95.4% Probability		Indices		
		Start	End	Start	End	Amodel	Aoverall	
Model A: Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.						112.2	105.5	
	Red Bird ECV	1451 - 1471	1470 - 1500	1434 - 1480	1461 - 1520			
	Extended Coalescent Variant	1370 - 1404	1591 - 1672	1354 - 1420	1559 - 1680			
	Lower Loup	1288 - 1340	1555 - 1725	1253 - 1399	1538 -1821			
Model B: Sample classes included: 1A, 1B, 2A, 2B, 2C.						103.3	99.6	
	Red Bird ECV	1450 - 1471	1471 - 1500	1431 - 1480	1462 - 1522			
	Extended Coalescent Variant	1366 - 1401	1604 - 1673	1348 - 1421	1558 - 1685			
	Lower Loup	1221 - 1340	1660 - 1887	977 -1396	1531 -2146			
Model C: Sample classes included: 1A, 1B, 2A, 2B.						98.5	95.1	
	Red Bird ECV	1450 - 1471	1471 - 1500	1431 - 1480	1461 - 1523			
	Extended Coalescent Variant	1350 - 1390	1588 - 1687	1298 - 1409	1551 - 1705			
	Lower Loup	1314 - 1400	1332 - 1410	1271 -1406	1326 -1444			
Model D: Sample classes included: 1A, 1B, 2A, 2B, 2C (Outlier Model).						107	93.7	
	Lower Loup	Woodcliff	1644 - 1802	1716 - 1969	1570 - 1900	1706 - 2041		
	Extended CV	Dakota Sites	1375 - 1438	1570 - 1676	1351-1478	1540 - 1687		
		Red Bird	1450 - 1471	1471 - 1501	1431 - 1480	1461 - 1522		
	Initial CV	Young	1314 - 1400	1332 - 1410	1267 - 1407	1326 - 1446		

Table 11. Radiocarbon Sample Class Data for each Late Plains Village sequence and Bayesian model.

Model	Tradition	# of	Number of Dates Per Sample Class						Total # of Dates
		Dated Sites	1A	1B	2A	2B	2C	3E	
A	Red Bird ECV	1	7	0	0	0	0	0	7
	Extended Coalescent Variant	11	19	0	0	4	16	6	45
	Lower Loup	7	4	0	0	0	2	14	20
B	Red Bird ECV	1	7	0	0	0	0		7
	Extended Coalescent Variant	10	19	0	0	4	16		39
	Lower Loup	2	4	0	0	0	2		6
C	Red Bird ECV	1	7	0	0	0			7
	Extended Coalescent Variant	8	19	0	0	4			23
	Lower Loup	1	4	0	0	0			4
D	Lower Loup Woodcliff	1	5	0	0	0	2		7
	ECV Dakota Sites	10	19	0	0	4	16		39
	ECV Red Bird	1	7	0	0	0	0		7
	ICV Young	1	4	0	0	0	0		4

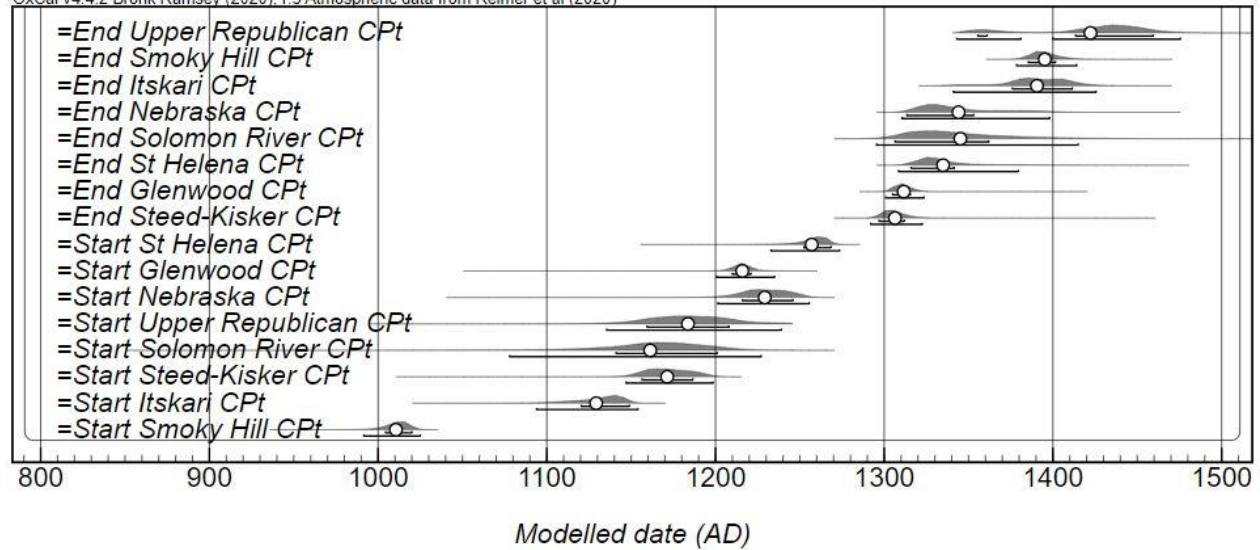


Figure 34. Central Plains tradition Phases Model A: Start and End Boundaries of Central Plains tradition Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.

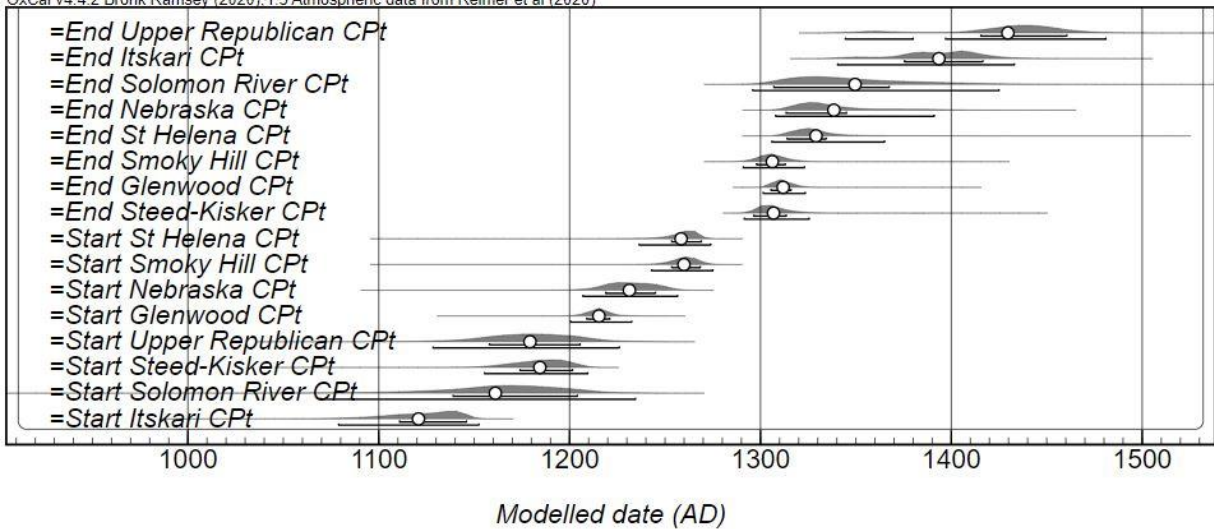


Figure 35. Central Plains tradition Phases Model B: Start and End Boundaries of Central Plains tradition Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C.

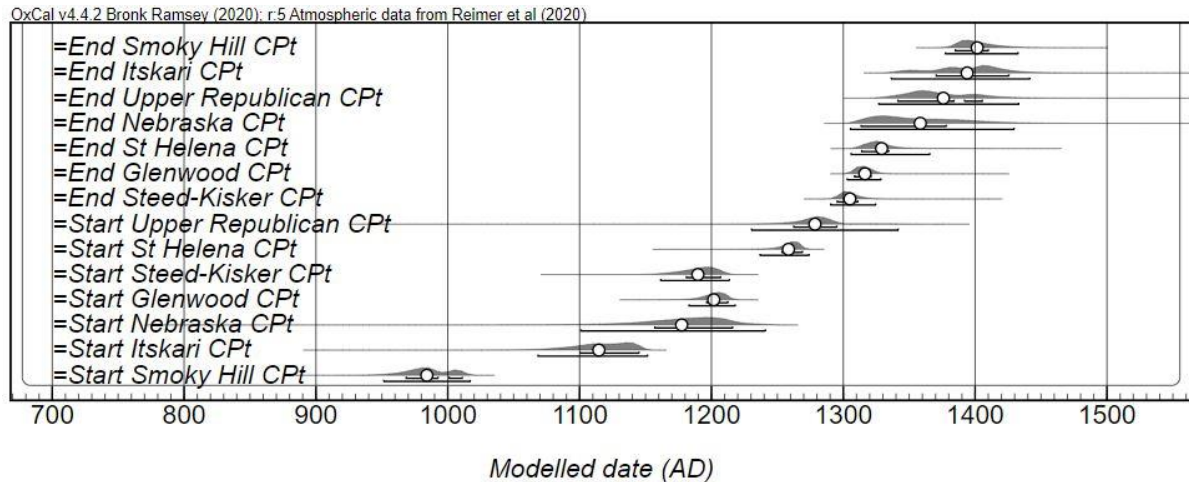


Figure 36. Central Plains tradition Phases Model C: Start and End Boundaries of Central Plains tradition Phases. Sample classes included: 1A, 1B, 2A, 2B.

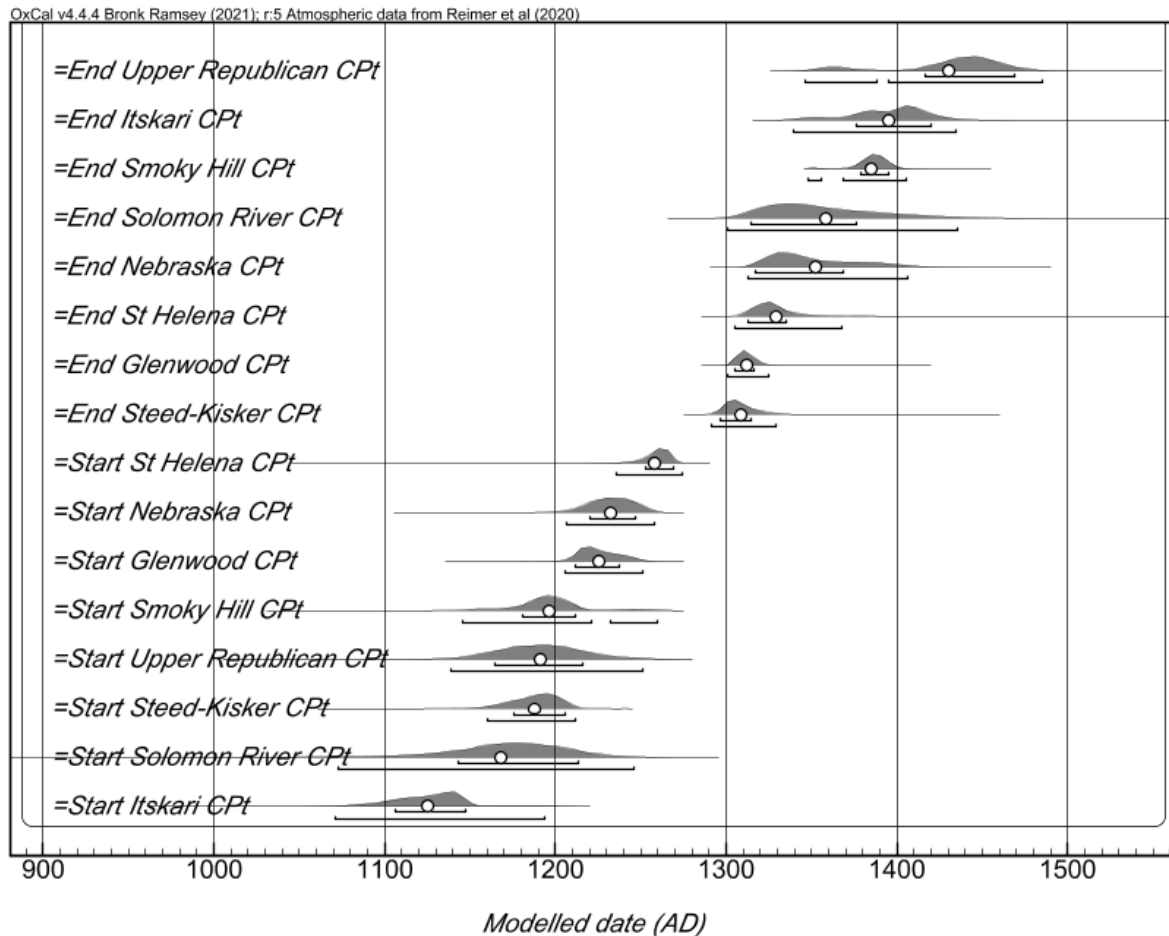


Figure 37. Central Plains tradition Phases Model D: Start and End Boundaries of Central Plains tradition Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model)

Table 12. OxCal Produced 'start' and 'end' boundaries for each Central Plains tradition phase sequence by model.

Posterior Probability Distributions of 'start' and 'end' boundaries of the Cpt Phases Model sequences							
Model	Phase	68.3% Probability		95.4% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
Model A: Sample classes included: 1A, 1B, 2A, 2B, 2C, 3E.						107.2	145.8
	St. Helena	1252 - 1268	1316 - 1341	1233 - 1273	1308 -1379		
	Glenwood	1210 - 1221	1305 - 1315	1200 - 1235	1301 -1323		
	Nebraska	1216 - 1246	1313 - 1353	1201 - 1255	1310 - 1398		
	Upper Republican	1159 - 1208	1355 - 1459	1135 - 1239	1343 - 1475		
	Solomon River	1141 - 1201	1306 - 1362	1078 - 1227	1295 - 1415		
	Steed-Kisker	1156 - 1186	1297 - 1312	1147 - 1198	1292 - 1322		
	Itskari	1120 - 1149	1376 - 1411	1094 -1154	1341 - 1425		
	Smoky Hill	1004 - 1020	1385 - 1401	991 - 1025	1378 - 1414		
Model B: Sample classes included: 1A, 1B, 2A, 2B, 2C.						134	139.2
	St. Helena	1253 - 1269	1314 - 1334	1236 - 1274	1306 - 1365		
	Smoky Hill	1253 - 1268	1298 - 1313	1243 - 1275	1291 - 1323		
	Nebraska	1219 - 1245	1313 - 1345	1207 - 1256	1308 - 1391		
	Glenwood	1209 - 1221	1305 - 1316	1200 - 1232	1301 - 1323		
	Upper Republican	1158 - 1205	1415 - 1460	1128 - 1226	1344 - 1481		
	Steed-Kisker	1174 - 1201	1296 - 1313	1155 -1209	1291 - 1325		
	Solomon River	1139 - 1204	1307 - 1367	1068 -1234	1296 -1425		
	Itskari	1111 - 1146	1375 - 1416	1079 - 1152	1340 - 1433		
Model C: Sample classes included: 1A, 1B, 2A, 2B.						88.2	89.9
	Solomon River	n/a	n/a	n/a	n/a		
	Upper Republican	1262 - 1295	1341 - 1405	1230 - 1341	1327 - 1433		
	St. Helena	1253 - 1269	1314 - 1334	1237 - 1274	1306 - 1365		
	Steed-Kisker	1181 - 1207	1295 - 1311	1161 - 1213	1290 - 1324		
	Glenwood	1196 - 1212	1308 - 1321	1183 - 1218	1303 - 1328		
	Nebraska	1157 - 1216	1313 - 1378	1101 - 1241	1305 - 1429		
	Itskari	1100 - 1145	1370 - 1425	1068 -1151	1336 - 1441		
	Smoky Hill	968 - 1011	1385 - 1410	951 - 1017	1377 - 1432		
Model D: Sample classes included: 1A, 1B, 2A, 2B, 2C (Outlier Model).						90	120.7
	St. Helena	1253 - 1269	1313 - 1335	1235 - 1274	1305 - 1367		
	Nebraska	1220 - 1247	1317 - 1368	1207 - 1258	1312 - 1406		
	Glenwood	1211 - 1237	1305 - 1316	1206 - 1251	1301 - 1324		
	Smoky Hill	1180 - 1212	1378 - 1395	1146 - 1260	1348 - 1405		
	Upper Republican	1164 - 1216	1416 - 1469	1138 - 1251	1346 - 1485		
	Steed-Kisker	1176 - 1205	1297 - 1315	1160 - 1212	1291 - 1329		
	Solomon River	1143 - 1213	1314 - 1376	1072 - 1246	1301 - 1435		
	Itskari	1106 - 1147	1376 - 1420	1071 - 1193	1339 - 1435		

Table 13. Radiocarbon Sample Class Data for each Central Plains tradition phase sequence and Bayesian model.

Model	Phase	# of	Number of Dates Per Sample Class						Total # of Dates
		Dated Sites	1A	1B	2A	2B	2C	3E	
A	St. Helena	6	18	0	0	0	0	5	23
	Nebraska	20	11	0	3	0	35	11	60
	Glenwood	22	28	1	1	29	18	12	89
	Smoky Hill	31	37	11	0	1	28	11	88
	Upper Republican	16	3	5	0	2	32	1	43
	Steed-Kisker	18	19	6	0	0	10	30	65
	Solomon River	9	0	0	0	0	13	1	14
	Itskari	11	22	0	0	0	10	11	43
B & D	St. Helena	4	18	0	0	0	0		18
	Nebraska	14	11	0	3	0	35		49
	Glenwood	18	28	1	1	29	18		77
	Smoky Hill	29	37	11	0	1	28		77
	Upper Republican	16	3	5	0	2	32		42
	Steed-Kisker	13	19	6	0	0	10		35
	Solomon River	8	0	0	0	0	13		13
	Itskari	10	22	0	0	0	10		32
C	St. Helena	4	18	0	0	0			18
	Nebraska	4	11	0	3	0			14
	Glenwood	16	28	1	1	29			59
	Smoky Hill	19	37	11	0	1			49
	Upper Republican	4	3	5	0	2			10
	Steed-Kisker	10	19	6	0	0			25
	Solomon River	0	0	0	0	0			0
	Itskari	6	22	0	0	0			22

as the number of radiocarbon dates used to construct models is reduced, the **boundaries** for the ‘start’ and ‘end’ events of a model **phase** are enlarged. **Phases** with higher concentrations of 1A, 1B, 2A, and 2B radiocarbon sample class data are less affected by the removal of sample class 2C data. It is critical to compare how the parameters of each model reduce the amount of radiocarbon data being used to construct the ‘start’ and ‘end’ **boundaries** of each **phase** and the number of archaeological sites represented.

Late Woodland Models

Immediately identifiable in the results of the Late Woodland dataset are the distributions of the Nebraska Woodland **phase** in each model. The Plains Late Woodland is understood to have existed from C.E. 500 to C.E. 1000 (Adair 1996, 2012; Johnson 2001; Johnson and Johnson 1998). Models A, B, and D have the Nebraska Late Woodlands **phase** beginning between the 1st and 3rd centuries C.E. and ending between the 14th and 17th centuries C.E. Model C does not conform to the C.E. 500 to C.E. 1000-time frame either. Still, only six radiocarbon dates from three sites represent the chronology. I believe the unconformity of the results of these analyses with the understood temporal existence of the Late Plains Woodland is the result of a classification error of radiocarbon data in the Canadian Archaeological Radiocarbon Database (CARD) (Martindale et al. 2015). Essentially, the Late Woodland dataset for the Central Plains region on CARD has erroneous entries. For now, I do not believe the results of these analyses represent Late Plains Woodland occupations in Nebraska. A complete evaluation of the source data is required.

The Great Oasis **boundaries** remain largely the same due to the limited data used to construct the **sequences**. The six 1A class data Dr. Bamforth and I collected for this research represent the culture's chronology. Even with removing the three 2C class dates, the age determinations barely change. However, the results of these analyses indicate that the Great Oasis assemblages in Cedar County, Nebraska, represent the first known appearance of maize farming in Nebraska during the eleventh century. However, as only two sites' radiocarbon data are being used for this analysis, other Great Oasis assemblages must be dated to improve the accuracy and precision of this assessment.

The Pomona age-determination **sequences** change substantially after removing the twenty-one 3E class data. However, the ‘start’ and ‘end’ **boundaries** in models B, C, and D are represented by the exact six dates from three archaeological sites and therefore the results are the same between each of these three analyses. It is suggested that the presence of the Pomona Variant is between C.E. 950 to C.E. 1350 (Adair 2012; Johnson and Johnson 1998). The Pomona Variant is a poorly understood archaeological culture (Adair 2012), and the reduction of sites from fifteen to three and radiocarbon data from twenty-seven dates to six demonstrates the need to redate Pomona Variant assemblages to collect more accurate data.

The Kansas Late Plains Woodland display similar trends to the other models with large amounts of sample class 3E dates in their dataset. Models B, C, and D have similar age ranges, but Model A has an earlier ‘start’ **boundary** than the other three models. The relative similarity in the age-ranges is due to the work of Adair (2012), who collected AMS data from seeds in Late Plains Woodland assemblages in Kansas. These Kansas-specific Late Plains Woodland **sequences** are also not as affected by the presence of sample class 2C dates as other **sequence** age-determinations. The results of these analyses align with Adair’s (2012:217-221) conclusion that the Plains Late Woodland temporal span is not as “tight” or “clean” as the accepted C.E. 500 to C.E. 1000 chronology suggests, that the adoption of horticulture and agriculture was a gradual change in subsistence practices rather than a sudden and immediate adoption across the Central Plains.

Early Plains Village

Of all the models produced for these analyses, the Early Plains Village sequences dataset contains the most significant amount of radiocarbon data. The Initial Coalescent Variant

boundaries barely change between model parameters. That is because the dataset for 25BD1, from the Anoka phase of ICV (Shield Chief Gover et al. 2021), overrepresents the sample. Another model is required that investigates each of the three phases of ICV ‘start’ and ‘end’ **boundaries** to identify the beginning and end of the archaeological culture on the landscape. In Chapter VI: A NEW CENTRAL PLAINS CHRONOLOGY, an OxCal-produced Bayesian model is presented to identify the relationship between Initial Coalescent Variant phases with the other investigated archaeological taxonomic cultures.

The Central Plains Oneota dataset suffers the same issue as other **sequences** when sample class 2C dates are removed from the analysis (**Figure 27. Early Plains Village Model C: Start and End Boundaries of Early Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B.** In Model C, only two sites and six radiocarbon dates represent the Central Plains Oneota occupation in the Central Plains. Sample class 2C radiocarbon dates represent 50% (n=11) of the dataset (n=22). Regardless, based on the analyses, Central Plains Oneota appeared in the mid- to late 13th century C.E.

The Central Plains tradition model **sequences** are analogous to the Initial Coalescent Variant **sequences** in that by combining all the radiocarbon data belonging to the seven phases of the CPt the earliest and latest radiocarbon data are removed from the models. The “true” beginning and end of the Central Plains tradition are not identified by combining all the data into one sequence in a model. As such, we must rely on the results of the specific Central Plains tradition phases model to identify the appearance and disappearance of the CPt from the landscape.

Late Plains Village

The Red Bird **sequence** does not change between models because the same seven AMS samples collected for this analysis are the only dates that represent the site's chronology. However, the Extended Coalescent Variant **sequence** appears firmly in the mid to late 14th century C.E., which is earlier than the understood C.E. 1400 start time for ECV (Johnson 1998, 2007). This is most likely due to the presence of SMU-2728 (747 $\pm$ 62, Sample Class 1A) from 39PO7, SMU-2789 (583 $\pm$ 58, Sample Class 1A) from 39CO1, and SMU-2731 (530 $\pm$ 64, Sample Class 1A) from 39PO7, driving the earlier start time for the Extended Coalescent Variant. However, each model's 'end' boundary has ECV ending between the late 16th and late 17th century C.E., which aligns with the C.E. 1650 end date (Johnson 1998, 2007). The Extended Coalescent Variant comprises several phases, like the Central Plains tradition and the Initial Coalescent Variant. It would benefit from an analysis that focused on the temporal relationship between phases.

The Lower Loup **sequences** need an explanation as the parameters of Model D are different from Models A, B, and C. Upon the completion of Models A, B, and C, former Nebraska State Archaeologist, Rob Bozell provided Dr. Douglas Bamforth and me with five new AMS radiocarbon dates from 25SD31 (Woodcliff), a Lower Loup phase site. The only two sample class 2C dates also only belong to 25SD31. So, Model B consists of four AMS dates from 25CU25 (Young) and two wood charcoal dates from 25SD31 (Woodcliff). Model C consists of the four AMS dates from 25CU25 (Young). The incorporation of the new AMS dates from 25SD31 (Woodcliff) allowed me to create separate model **sequences** for 25CU25 and 25SD31 to compare why the 'start' and 'end' **boundaries** for the Lower Loup **sequence** in Model B were so strange. The late 'end' **boundary** for Lower Loup in Model B is the result of

the 25SD31 dataset, whereas the early ‘start’ **boundary** is the result of the 25CU25 dataset. By separating the two sites into separate **sequences** in Model D, we can identify 25CU25 as more temporally analogous to Initial Coalescent Variant rather than the Lower Loup phase represented by 25SD31.

Central Plains tradition Phases

The Central Plains tradition dataset is the most useful in identifying the trends between model parameters and how important radiocarbon data hygiene is. Many of the datasets for the CPt phases have more radiocarbon dates than the cultural chronologies presented in previous models. These models also demonstrate the importance of the scale of Bayesian statistical analyses. The ‘start’ and ‘end’ **boundary** for the Central Plains tradition **sequence** in the Early Plains Village model has the appearance of the CPt in the mid to late 12th-century C.E. In contrast, several phase **sequences** repeatedly demonstrate ‘start’ **boundaries** before the mid-12th century C.E. Models B and C also illustrate the importance of charcoal outlier models in OxCal: without the use of a charcoal outlier model the Solomon River Phase does not have samples class 1A, 1B, 2A, and 2B radiocarbon data to contribute to a model **sequence**.

However, the results of these analyses indicate that the Itskari phase of the CPt is one of the earliest, if not the earliest, CPt phase to appear in the Central Plains. That is not in line with previous chronological results, which have the Itskari phase appearing after CPt phases having been already established in Kansas (Gover 2019a; Steinacher and Carlson 1998; Wedel 2001). Additionally, these analyses indicate that the St. Helena phase began in the mid-13th century, one-hundred years earlier than previously suggested (Steinacher and Carlson 1998), thus making St. Helena occupations contemporaneous with Initial Coalescent Variant populations along

Ponca Creek (Shield Chief Gover et al. 2021). Most importantly, the models' results indicate that Central Plains tradition phases began one hundred to two hundred years later than previously believed (Steinacher and Carlson 1998; Wedel 2001) and corroborate more recent chronological analyses (Roper 2014; Shield Chief Gover et al. 2021; Tiffany and Lensink 2014). However, the Itskari phase remains closely aligned with Steinacher and Carlson's (1998) estimate as having existed from C.E. 1100 to C.E. 1350. Regardless, the appearance of the Itskari phase as one of the earliest, if not the earliest, expression of the Central Plains tradition in the Central Plains requires us to reexamine our interpretations of the appearance of CPT lifeways on the landscape. I consider this issue in the next chapter.

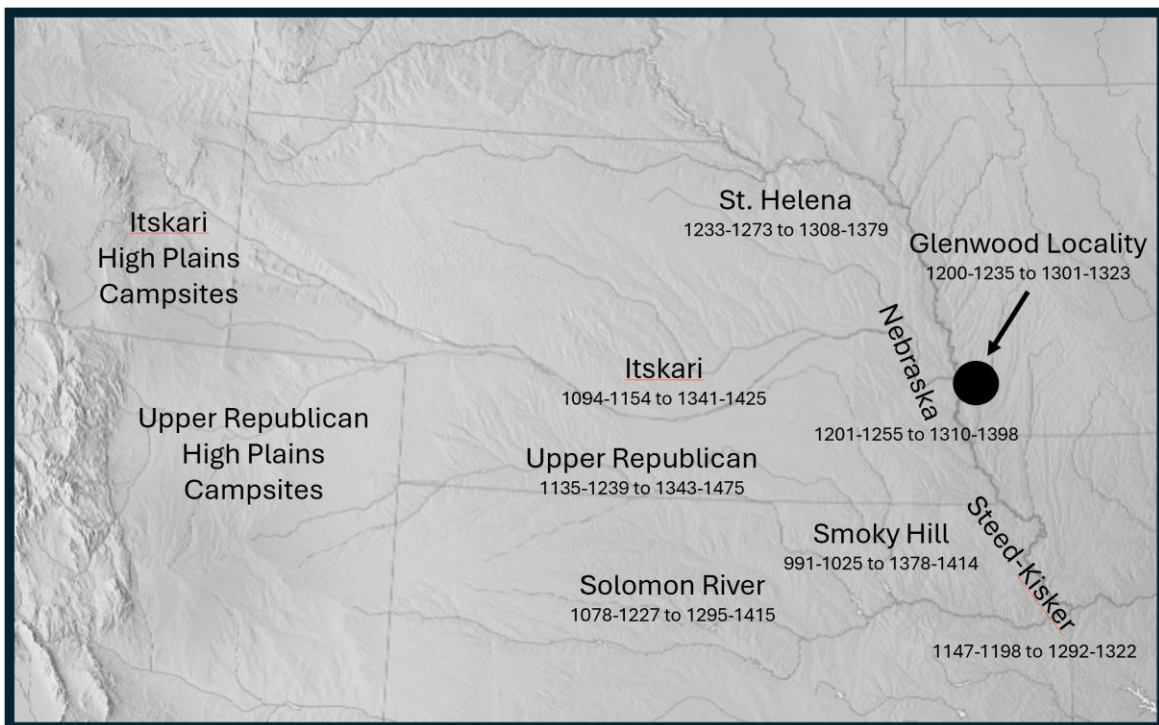


Figure 38. Map of Central Plains tradition phases with Model A estimated age ranges. Base map courtesy of shadedrelief.com.

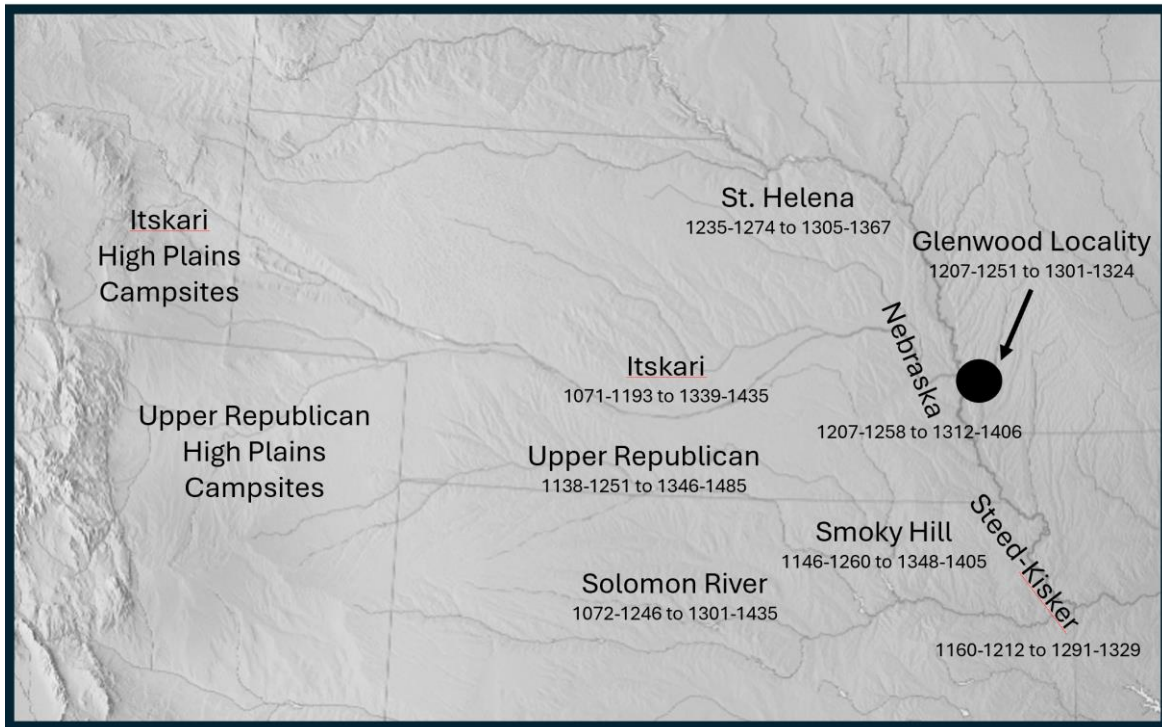


Figure 39. Map of Central Plains tradition phases with Model D estimated age ranges. Base map courtesy of shadedrelief.com.

Discussion

The results of the sixteen models demonstrate two critical aspects of Bayesian statistical analysis that must be considered when creating and interpreting OxCal-produced radiocarbon chronologies. The first consideration for developing my OxCal models is the geographic and taxonomic scale of the analysis. To illustrate this point, I will compare the Central Plains tradition **sequence** from the Early Plains Village dataset (**Figure 29. Early Plains Village Model D: Start and End Boundaries of Early Plains Village assemblages. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model)**) with the **sequences** from the Central Plains tradition dataset (**Figure 37. Central Plains tradition Phases Model D: Start and End Boundaries of Central Plains tradition Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model)**). The ‘start’ and ‘end’ dates for the Central Plains tradition under Model D are 1054 - 1165 to 1372 - 1399 at a 95% confidence interval. In contrast, the earliest **sequence**

(*Itskari CPt*) and latest **sequence** (*Nebraska CPt*) in the Central Plains tradition Phases dataset suggest a ‘start’ **boundary** of 1071 - 1193 and an ‘end’ **boundary** of 1312 - 1404 at a 95% confidence interval. The time span for the Central Plains tradition chronology is narrower when all the radiocarbon dates belonging to the Central Plains tradition are run together in the same **sequence**. This is because the earliest and latest dates in the population are being down-weighted against the mass of dates between them (Bronk Ramsey 2009a).

Therefore, the results from the Central Plains tradition Phases model more accurately represent the ‘start’ and ‘end’ boundaries for the appearance and disappearance of the Central Plains tradition on the central plains landscape. However, I believe the results from the Central Plains tradition **sequence** within the Early Plains Village dataset represent the time span for when the Central Plains tradition was more fully established in the Central Plains. To test this hypothesis would require running a Summed Probability Distribution of the radiocarbon data (Crema et al. 2017; Gover 2019a; Rick 1987; Shennan and Edinborough 2007; Timpson et al. 2014; Williams 2012; Zahid et al. 2016), which is beyond the scope of this dissertation. The finer-scale model results are preferred to identify the “true” value of an archaeological culture's ‘start’ and ‘end’ **boundaries**.

The second consideration in creating and interpreting OxCal models is the population size of samples and archaeological sites selected for analysis. The posterior probability estimates for the ‘start’ and ‘end’ boundaries for the *Smoky Hill CPt sequence* between the four models (**Figure 28, Figure 29, Figure 30, Figure 31**) are wildly different. The severe incongruency between these estimates is that the Smoky Hill dataset contains n=28 of 2C samples representing the earliest occupations of the phase, with the majority of 1A sample class dates (n=37) representing the latest occupations of the phase. Earlier 1A sample class dates are flagged as

outliers in Model C (**Figure 31.**) and get removed from analysis for the model to pass. This is why the *Smoky Hill Cpt sequence* starts after C.E. 1250 with sample class 2C dates (Model B **Figure 30**) but starts before C.E. 1000 in Model C, which has the sample class 2C dates removed.

In contrast to the results of the *Smoky Hill sequence* is the *Great Oasis LW sequence* in the Late Woodlands Models (**Figure 22, Figure 23, Figure 24, Figure 25**). The posterior probability estimates for the ‘start’ and ‘end’ boundaries for the *Great Oasis LW sequence* barely change. That is because we only have nine radiocarbon dates for this archaeological taxon. Six of those samples are class 1A, and three are class 2C. These samples also only come from two sites: 25SM9 and 25CD10, with 25SM9 having eight out of the nine samples. Essentially, the *Great Oasis LW sequence* represents the occupation of 25SM9, which may not represent the chronology of the Great Oasis culture in the Central Plains.

Conclusion

The results from the four models for the Central Plains tradition Phase dataset illustrate why outlier models (Bronk Ramsey 2009b) need to be applied in OxCal-produced radiocarbon chronologies. If we remove all sample class 2C radiocarbon data from our analyses, as Roper (2014) proposed, we not only lose a significant amount of usable data but skew analyses based on the availability and temporal distribution of sample class 1A, 1B, 2A, and 2B samples. Additionally, we must be conscious of the number of sites and samples analyzed to produce the posterior probability estimates for the **sequence** ‘start’ and ‘end’ boundaries. As a rule, the more sites and samples used to construct a **sequence**, the more accurate the age ranges will represent the true target ‘start’ and ‘end’ events.

Importantly, we must significantly redate and increase the quantity of high-confidence radiocarbon data in Central Plains archaeological datasets. We removed class 3E samples from the Lower Loup Phase dataset by removing five archaeological sites from the analysis. Additionally, the entire usable Solomon River Phase dataset is comprised of thirteen sample class 2C radiocarbon data. The Central Plains radiocarbon dataset requires a significant overhaul of archaeological investigation and more comprehensive redating under modern sample selection protocols and strategies. Fundamentally, these analyses demonstrate the critical need for archaeologists working in the Central Plains to cease excavating new archaeological sites and shift our focus to reexamining existing collections readily available in repositories.

Chapter VI: A NEW CENTRAL PLAINS CHRONOLOGY

Introduction

As outlier models in OxCal-produced Bayesian statistical analyses of radiocarbon data to construct chronologies are the preferred modeling strategy for capturing the “true” value of an archaeological culture's ‘start,’ and ‘end’ **boundaries** (Bronk Ramsey 2009b; Krus et al. 2022; Schmid et al. 2019, 2018), age-range determinations produced from Model D for each of the four analyzed datasets (**Figure 25, Figure 29, Figure 33, Figure 37**) are considered to be the most accurate age estimates. We must bear in mind the problems of sample size and site selection: these are the first approximations that need to be refined by expanding the available data. Despite this, the results of the age range estimate for the investigated archaeological cultures in this research require an overhaul of our understanding of transitions in Central Plains lifeways.

Additional Bayesian Models

In Chapter 4, I identified the need to create an additional OxCal-produced Bayesian model to investigate the chronology of the phases belonging to the Initial Coalescent Variant. Additionally, more Great Oasis radiocarbon data were identified for analysis. To analyze the temporal and spatial relationships more critically between archaeological cultures on the Central Plains, I produced two additional Bayesian models to incorporate the Great Oasis data and comprehensively analyze the Initial Coalescent Variant dataset. Since the Bayesian models in Chapter 4 were concerned with investigating the severity of sample selection problems to constructing chronologies and this chapter investigates the relationship between archaeological cultures, each dataset was analyzed through a charcoal-outlier model.

I developed the *Initial Coalescent Variant Phases* **Phase** model and the *Great Oasis* **Phase** model. In the *Initial Coalescent Variant Phases* model, each of the three phases belonging to the ICV was grouped as a single **sequence**. For the *Great Oasis* model, all the dates were grouped as a single **sequence** to produce a single-sequence model. Both models were run through OxCal version 4.4 (Bronk Ramsey 2009a), which operates the Markov Chain Monte Carlo sampling techniques (Bronk Ramsey 2009a) with the IntCal20 calibration curve (Reimer et al. 2020). Both models were constructed using the General Outlier Model and Charcoal Outlier Model (Bronk Ramsey 2009b). An exponential distribution of the charcoal dates, with an exponential constant of τ of 1 taken over the range -10 to 0 , is assumed under this outlier modeling (Bronk Ramsey 2009b). In the *Initial Coalescent Variant Phases* model, each **sequence** in a model is constrained by ‘Start’ and ‘End’ **Boundaries** to calculate the start and end of each **sequence** (Bronk Ramsey 2009a).

Results

The ‘start’ and ‘end’ **boundaries** for Great Oasis change minimally between **Table 10** and **Table 16**. The analyses in Chapter 4 indicate a ‘start’ **boundary** between C.E. 1023 to 1033 and an ‘end’ **boundary** between C.E. 1030 to 1043 at a 68.3% probability. In contrast, the newly presented analysis has a ‘start’ boundary between C.E. 1007 to 1025 and an ‘end’ **boundary** between C.E. 1038 to 1059 at a 68.3% probability. The occupation span is increased in the most recent analysis but based on the radiocarbon data from the three Great Oasis sites analyzed, the archaeological culture may have existed for at most five decades in Nebraska. However, we need dates from more sites to confirm this.

As I suspected in Chapter 4, the Ponca Creek radiocarbon dataset heavily influenced the Initial Coalescent Variant sequence's 'start' and 'end' boundaries. By analyzing

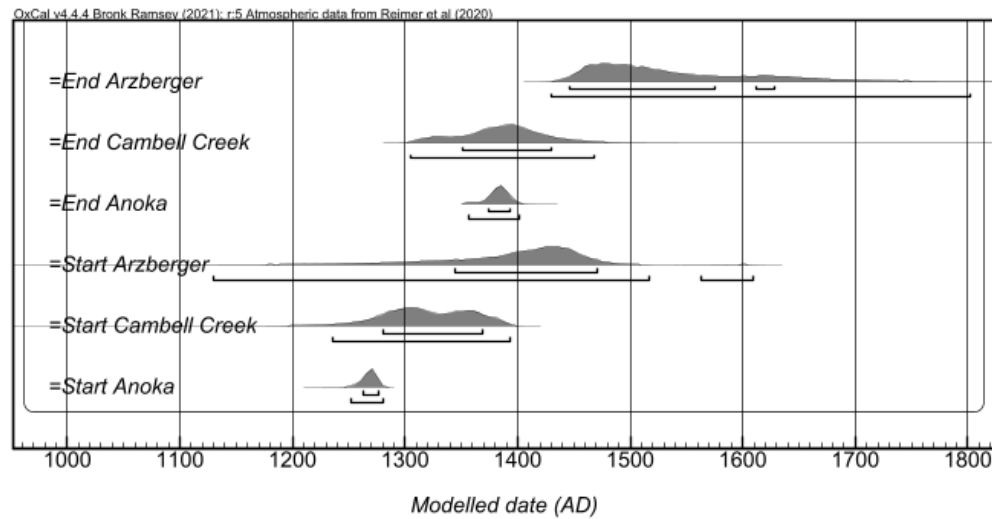


Figure 40. Initial Coalescent Variant Phases Model D: Start and End Boundaries of Initial Coalescent Variant Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model). Wide bars below probability distributions indicate a 95.4% probability range, and short bars indicate a 68.3% probability range after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

Table 14. OxCal Produced 'start' and 'end' boundaries for each Initial Coalescent Variant Phase.

Posterior Probability Distributions of 'start' and 'end' boundaries of ICV Model sequences							
Model	Tradition	68.3% Probability		95.4% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
Model D: Sample classes included: 1A, 1B, 2A, 2B, 2C (Outlier Model).						121.5	118.1
	Arzberger	1345 - 1470	1447 - 1628	1130 - 1609	1430 - 1801		
	Cambell Creek	1281 - 1369	1351 - 1430	1236 - 1393	1305 - 1468		
	Anoka	1263 - 1276	1375 - 1393	1251 - 1280	1356 - 1401		

Table 15. Radiocarbon Sample Class Data for each Initial Coalescent Variant Phase sequence.

Model	Phase	# of	Number of Dates Per Sample Class					Total # of Dates
		Dated Sites	1A	1B	2A	2B	2C	
D	Arzberger	1	2	1	0	0	1	4
	Anoka	4	36	1	0	0	4	41
	Cambell Creek	2	3	0	0	0	3	6

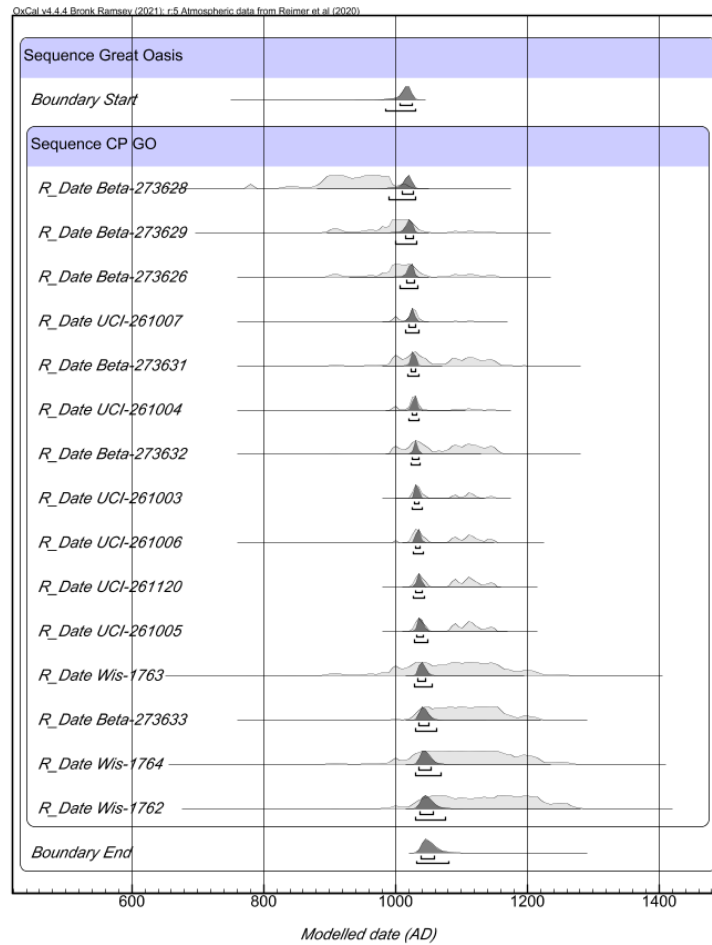


Figure 41. Great Oasis Radiocarbon Data Sequence. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model). Wide bars below probability distributions indicate a 95.4% probability range, and short bars indicate a 68.3% probability range after the application of Bayesian statistical analysis (Bronk Ramsey 2009a).

Table 16. OxCal Produced 'start' and 'end' boundary for Great Oasis sequence model.

Posterior Probability Distributions of 'start' and 'end' boundaries of Great Oasis Model sequences							
Model	Tradition	68.3% Probability		95.4% Probability		Indices	
		Start	End	Start	End	Amodel	Aoverall
Model D: Sample classes included: 1A, 1B, 2A, 2B, 2C (Outlier Model).						270.4	267.7
	Great Oasis	1007 - 1025	1038 - 1059	984 - 1031	1031 - 1081		

Table 17. Radiocarbon Sample Class Data for each Central Plains tradition phase sequence and Bayesian model.

Model	Phase	# of	Number of Dates Per Sample Class					Total # of Dates
		Dated Sites	1A	1B	2A	2B	2C	
D	Great Oasis	3	6	0	0	0	9	15

each ICV Phase as its **sequence**, we can more thoroughly investigate the chronology of the Initial Coalescent Variant. However, the Cambell Creek and Arzberger Phases lack radiocarbon data to produce narrow age estimates for their respective sequence's 'start' and 'end' boundaries. Based on the available data, we can identify that the Anoka phase appeared first, followed by Cambell Creek Phase, and then the Arzberger Phase. More radiocarbon data from high-confidence samples are required to investigate better the age estimates for the Arzberger and Cambell Creek Phases of ICV. Krause (2001:197-198) suggests the timing of the Initial Coalescent Variant is from C.E. 1300 to 1500 but separates Cambell Creek from that chronology as having existed from C.E. 900 to 1300. The results of this analysis closely parallel Krause (2001), except that the Anoka Phase begins in the 13th rather than the 14th century. Recent research by Shield Chief et al. (2021) redated Anoka Phase sites along Ponca Creek in Nebraska.

Although the age-estimates for the Cambell Creek and Arzberger Phases are not as narrow as the age-estimates for the Anoka Phase, for this research is investigating the appearance of maize-based agriculture and the Plains Village Pattern on the Central Plains, those two phases are not as important. The geographic ranges for the Cambell Creek and Arzberger Phases lie along the Missouri River in central to northern South Dakota, whereas the Anoka Phase exists in Northeastern Nebraska (Bamforth 2021b; Johnson 2001, 1998, 2007; Shield Chief Gover et al. 2021). Fundamentally, precision and accuracy in the Anoka Phase age ranges are more critical to this investigation. In contrast, the remaining two ICV phases lie outside this research's investigated geographic area.

New Interpretations

To investigate the temporal relationships among cultural taxa, **Table 18** displays the ‘start’ and ‘end’ boundaries of charcoal outlier models of investigated cultural taxa from **Table 6, Table 8, Table 10, Table 12, Table 14, and Table 16**. **Figure 42** presents the 68.3% confidence age estimates for the same data as a timeline. The *Nebraska LW sequence* was omitted from the timeline due to the highly questionable results from the analysis. The ‘start’ **boundary** for the *Kansas LW sequence* is not displayed for visual display purposes of the timeline. **Figure 35** includes the dates when Cahokia and Spiro began to depopulate. **Table 19** shows the comparisons between the results of this research with previous estimations for selected archaeological taxa.

Late Plains Woodland

Unfortunately, the results from the *Nebraska LW sequence* of the Late Woodland dataset do not help determine the chronological relationship between Late Woodland hunting and gathering populations and emerging horticulturalists in Nebraska. It is traditionally accepted that the Late Plains Woodland period existed from A.D. 500 to A.D. 1000 (Adair 1996, 2012; Johnson 2001; Johnson and Johnson 1998). The ‘start’ and ‘end’ **boundaries** for the *Nebraska LW sequence* wildly deviate from the period. I attribute the inaccuracy of those results to the misidentification of site taxonomy for radiocarbon samples in the Canadian Archaeology Radiocarbon Database (Morlan 2022). CARD is where I acquired 104 out of the 116 radiocarbon samples used in my Late Woodland models. Six of the remaining twelve dates not collected through CARD were used for the *Great Oasis LW sequence*.

Table 18. 'Start' and 'End' Boundaries for Investigated Archaeological Cultures' sequences.

Posterior Probability Distributions of 'start' and 'end' boundaries of Model sequences							
Model	Culture	Phase	68% Probability		95% Probability		Indices
			Start	End	Start	End	Amodel/Aoverall
Late Plains Village							
	Lower Loup Phase	Woodcliff	1644 - 1802	1716 - 1969	1570 - 1900	1706 - 2041	
	Extended Coalescent Variant	Dakota Sites	1375 - 1438	1570 - 1676	1351-1478	1540 - 1687	
		Red Bird	1450 - 1471	1471 - 1501	1431 - 1480	1461 - 1522	
	Initial Coalescent Variant	Young	1314 - 1400	1332 - 1410	1267 - 1407	1326 - 1446	
Early Plains Village							
	Central Plains Oneota	CPO	1260 - 1306	1347 - 1414	1235 - 1335	1331 - 1437	73.4 130.1
	Initial Coalescent Variant	ICV	1269 - 1283	1310 - 1388	1260 - 1287	1306 - 1400	
	Central Plains tradition	CPT	1184 - 1203	1377 - 1390	1161 - 1208	1371 - 1395	
Plains Late Woodland							
	Pomona		1024 - 1169	1456 - 1559	837 - 1198	1446 - 1757	107.1 104.1
	Great Oasis		1023 - 1033	1030 - 1043	1015 - 1038	1025 - 1060	
	Kansas		630 - 753	1200 - 1261	581 - 767	1175 - 1298	
	Nebraska		35 - 215	1437 - 1542	(-)94 - 426	1356 - 1670	
Initial Coalescent Variant Phases							
	Arzberger		1345 - 1470	1447 - 1628	1130 - 1609	1430 - 1801	121.5 118.1
	Cambell Creek		1281 - 1369	1351 - 1430	1236 - 1393	1305 - 1468	
	Anoka		1263 - 1276	1375 - 1393	1251 - 1280	1356 - 1401	
Central Plains tradition Phases							
	St. Helena		1253 - 1269	1313 - 1335	1235 - 1274	1305 - 1367	90 120.7
	Nebraska		1220 - 1247	1317 - 1368	1207 - 1258	1312 - 1406	
	Glenwood		1211 - 1237	1305 - 1316	1206 - 1251	1301 - 1324	
	Smoky Hill		1180 - 1212	1378 - 1395	1146 - 1260	1348 - 1405	
	Upper Republican		1164 - 1216	1416 - 1469	1138 - 1251	1346 - 1485	
	Steed-Kisker		1176 - 1205	1297 - 1315	1160 - 1212	1291 - 1329	
	Solomon River		1143 - 1213	1314 - 1376	1072 - 1246	1301 - 1435	
	Itskari		1106 - 1147	1376 - 1420	1071 - 1193	1339 - 1435	

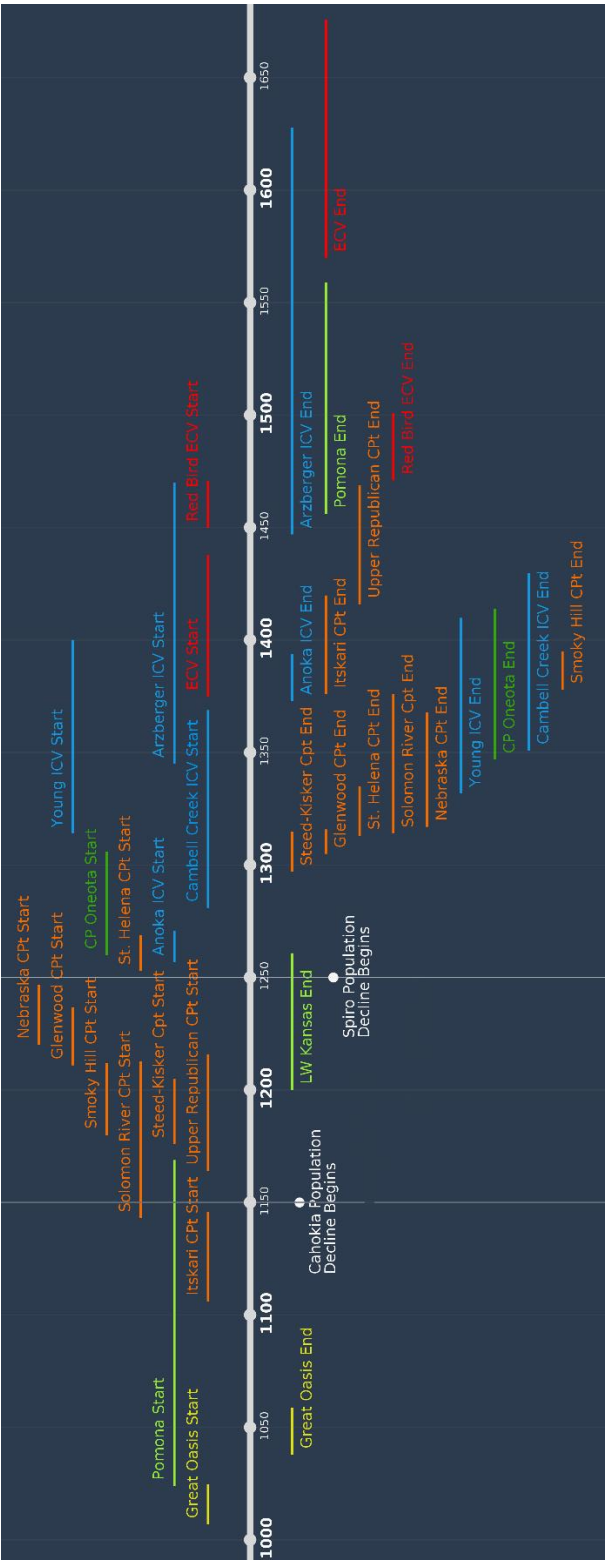


Figure 42. 'Start' and 'End' boundaries of investigated archaeological taxa at 1-sigma standard error from Table 18. It was produced using Timeline Editor by TIME GRAPHICS (Selected Technologies LLC 2022).

The *Kansas LW sequence* results align with the conclusions outlined by Adair (2012). Yes, the 'end' **boundary** extends beyond the C.E. 1000 end date for hunting and gathering lifeways on the Central Plains (Adair 1996, 2012; Johnson 2001; Johnson and Johnson 1998). But the extended temporal span for the Late Woodland in Kansas coincides with the development of horticultural lifeways (Adair 2012:221), which are now appearing on the Kansas landscape approximately two-hundred years later than initially believed (Roper 2006b; Steinacher and Carlson 1998; Wedel 2001, 1986). The data suggest that hunting and gathering lifeways in Kansas disappeared within one hundred years of horticultural practices, represented by the Kansas-located Central Plains tradition phases being established. Whether that same pattern exists in Nebraska requires examining the radiocarbon data and the dating of more assemblages.

Table 19. Selected Archaeological Taxa 'Start' and 'End' Boundaries & previous age estimates for the selected taxa time-spans.

Archaeological Taxa	This Research						Shield Chief et al. 2021			Gover 2019			Steinacher & Carlson		Johnson	
	68% Probability			95% Probability			68% Probability			95% Probability			1998		1998	
	Start	End		Start	End		Start	End		Start	End		Start	End	Start	End
Initial Coalescent Variant	1269 - 1283	1310 - 1388	1260 - 1287	1306 - 1400											1300	1450
Arzberger	1345 - 1470	1447 - 1628	1130 - 1609	1430 - 1801						1190 - 1610	1430 - 1730					
Cambell Creek	1281 - 1369	1351 - 1430	1236 - 1393	1305 - 1468			1273 - 1283	1309 - 1321	1268 - 1288	1305 - 1330	1160 - 1270	1445 - 1555				
Anoka	1263 - 1276	1375 - 1393	1251 - 1280	1356 - 1401						1035 - 1250	1320 - 1480					
Central Plains Oneota	1260 - 1306	1347 - 1414	1235 - 1335	1331 - 1437			1223 - 1270	1425 - 1490	1176 - 1280	1340 - 1548						
Central Plains tradition	1184 - 1203	1377 - 1390	1161 - 1208	1371 - 1395			1200 - 1215	1375 - 1391	1191 - 1220	1367 - 1403						
St. Helena	1253 - 1269	1313 - 1335	1235 - 1274	1305 - 1367						Added to Nebraska Data			900	1450		
Nebraska	1220 - 1247	1317 - 1368	1207 - 1258	1312 - 1406						1170 - 1220	1295 - 1380		1350	1450	Added to Neb.	
Glenwood	1211 - 1237	1305 - 1316	1206 - 1251	1301 - 1324						Added to Nebraska Data			1000	1250	Added to Neb.	
Smoky Hill	1180 - 1212	1378 - 1395	1146 - 1260	1348 - 1405						1115 - 1155	1370 - 1410		1000	1350	1000	1350
Upper Republican	1164 - 1216	1416 - 1469	1138 - 1251	1346 - 1485						970 - 1120	1395 - 1490		1000	1350	1120	1250
Steed-Kisker	1176 - 1205	1297 - 1315	1160 - 1212	1291 - 1329						905 - 1085	1435 - 1500		1000	1250	950	1300
Solomon River	1143 - 1213	1314 - 1376	1072 - 1246	1301 - 1435						1050 - 1220	1290 - 1415		850	1350	Added to UR	
Itskari	1106 - 1147	1376 - 1420	1071 - 1193	1339 - 1435						1210 - 1285	1270 - 1350		1100	1350	Added to UR	

The Pomona Variant is interesting because it represents a mix of hunting and gathering lifeways with aspects of neighboring horticulturalists' material culture (Adair 2012; Johnson and Johnson 1998; Shield Chief Gover et al. 2021; Wedel 2001). Johnson and Johnson (1998:205) describe the Pomona Variant as a Late Plains Woodland Complex existing from C.E. 950 to 1350. In contrast, Wedel (2001:181) classifies Pomona as a phase belonging to the Central Plains tradition that existed from C.E. 900 to 1680. Pomona populations were manufacturing pottery similar to the surrounding Central Plains tradition peoples but continued to construct woodland-style houses, utilizing both Woodland and Plains village project point types and showing little to no evidence for horticulture (Bamforth 2021:263).

Pomona Variant sites are found scattered across Eastern Kansas, and the results of this analysis indicate the culture appeared between C.E. 1024 and 1169 and ended between C.E. 1456 and 1559. So, Pomona appeared on the landscape before the appearance of Kansas-located Central Plains tradition phases but several hundred years after the development of the Late Plains Woodland. Based on the new chronology demonstrating Central Plains tradition began in Central Nebraska, it is unlikely that Pomona represents a progenitor of the Central Plains Village tradition as Wedel (2001:181) suggests, but rather the continuation of Hunting and Gathering lifeways adjacent to neighboring horticulturalists that they were in contact with.

Early Plains Village

The Early Plains Village **sequences** and the Great Oasis **sequence** developed for this research significantly impact our interpretations of how maize was introduced to the Central Plains region, the development of towns represented by the Initial Coalescent Variant, and cultural continuity with later archaeological taxa.

Through this research, the three-dated Great Oasis sites: 25SM9 (Packer), 25CD10 (Ferber), and 25CD86/89, represent the earliest archaeological evidence for settled maize farming (Bamforth 2023) in Nebraska. The Great Oasis occupation of Nebraska was short-lived, having been on the landscape for approximately 20 years at 1-sigma standard error (start: C.E. 1023-1033; end: C.E. 1030-1043) and for as long as 45 years at 2-sigma standard error at the maximum limits of their age distributions (**Table 18**). The sites 25CD10 and 25CD86/89 reside in Cedar County, Nebraska, located in Northeastern Nebraska along the Missouri River. These two sites are within the known geographic boundary of Great Oasis and close to the core cultural area of the taxa in Northwestern Iowa (Winham and Calabrese 1998:274). 25SM9, on the other

hand, resides in Sherman County, Nebraska, which is in the central part of the state, in the core area of the Itskari Phase of the Central Plains tradition (Gover 2019a; Metcalf 2018; Steinacher and Carlson 1998; Wedel 2001). A minimum forty-seven-year gap exists at 2-sigma standard error and a maximum overlap of ten years at 1-sigma standard error between the Great Oasis **sequence ‘end’ boundaries** and the Itskari Phase **sequence ‘start’ boundaries (Table 18)**. The relationship between the Great Oasis in Central Nebraska and the development of the Itskari Phase is purely speculative. However, the Central Plains tradition no longer represents Nebraska's earliest expression of maize horticulture. The early start date for the Itskari Phase opens the possibility of direct continuity from Great Oasis to later occupations. However, we will need dates on more sites to test that exciting possibility.

The Central Plains Oneota chronology is the least affected by this analysis. These results suggest a 1235-1335 to 1331-1437 A.D. occupation of Central Plains Oneota populations on the Central Plains at 95% probability. In contrast, a previous analysis by Shield Chief Gover et al. (2021) identifies a C.E. 1223-1270 to 1425-1490 occupation of Central Plains Oneota populations. However, the 2021 analysis did not include the new data discussed in Chapter 3, and the OxCal model did not include charcoal outlier modeling (Shield Chief Gover et al. 2021). The new results suggest Central Plains Oneota populations arrived slightly later and left slightly earlier than presented by Shield Chief Gover, Bamforth, and Carlson. (2021). Although the chronology has slightly changed, the new occupation chronology impacts the relationship between the Central Plains Oneota and Initial Coalescent Variant.

The Initial Coalescent Variant was understood to have existed from C.E. 1300 to C.E. 1500 (Gover 2019a; Johnson 2001, 1998, 2007; Tiffany et al. 2011). Shield Chief Gover et al. (2021:13) identified the appearance of the Initial Coalescent Variant as having developed in the

late 13th century (1268-1288 at 95% probability (2-sigma standard error)) with an OxCal model that excluded sample class 2C dates, whereas the results from this analysis suggest an occupation between C.E. 1260-1287 to C.E. 1306-1400 at 95% probability (2-sigma standard error). However, the ICV dataset is severely impacted by the radiocarbon data from 25BD1 and surrounding Ponca Creek sites in the Anoka Phase (Shield Chief Gover et al. 2021). The Initial Coalescent Variant chronology benefits from the supplementary analysis on page 119. I (Gover 2019a) conducted a similar analysis, but like all previously OxCal-produced radiocarbon chronologies, it did not incorporate an outlier model or the data from Shield Chief Gover et al. (2021). The age range estimates for the three phases for my previous analysis at a 95.4% confidence (2-sigma standard error) are shown in **Table 19**.

According to the *Initial Coalescent Phases* model results, the Initial Coalescent Variant first appears in Northeastern Nebraska near the Missouri River, represented by the Anoka Phase. The Anoka Phase appeared first in the 13th century C.E., followed by the Arzberger Phase in the mid-14th to the mid-15th century. The Anoka Phase represents the first appearance of large-scale agricultural communities in Nebraska (Shield Chief Gover et al. 2021). As the results currently stand, the Anoka Phase could have begun before “pure” Central Plains Oneota sites appeared in the Central Plains. Additionally, the arrival of CPO settlements within C.E. 1235-1335 at 95% probability (2-sigma standard error), as the results indicate, could have occurred after the occupation of the Lynch site began, sometime between C.E. 1271-1284 (Shield Chief Gover et al. 2021:13). However, the Anoka Phase still appears after the appearance of the CPt, but now ends before the disappearance of the CPt from the Central Plains.

The next ICV Phase to appear is the Cambell Creek Phase. The earliest of the two dated Cambell Creek Phase sites is 39HU242. 39HU424 is a fortified town comprised of Central Plains

tradition-style square-shaped houses (Toom and Kvamme 2002). Toom and Kvamme (2002) date 39HU242 to C.E. 1300, and the Campbell Creek Phase has existed from C.E. 1300 to 1500. The results of this analysis closely mirror their age range estimates, but the model suggests that the phase ended before the 16th century C.E.

The results from the Central Plains tradition Phase outlier model (Model D) are astonishing. Roper (2014) correctly identified that the Central Plains tradition appeared roughly 200 years later than what was accepted. Original age estimations for the appearance of the Central Plains tradition were in the 10th century C.E., starting with the Steed-Kisker phase in northeastern Kansas (Gover 2019a; Steinacher and Carlson 1998; Wedel 2001). However, the results of the outlier model definitively illustrate that the Central Plains tradition began in the 12th century C.E. in Central Nebraska with the appearance of the Istkari phase. The next phase to appear from the Central Plains tradition is difficult to determine; there is substantial overlap in the probability distributions for ‘start’ **boundaries** between the four phases in Kansas: Solomon River, Steed-Kisker, Upper Republican, and Smoky Hill. Regardless, the results show that all seven phases and the Glenwood locality appeared within 150 years of one another, which is in sharp contrast to the 300-year period that has traditionally been believed (Steinacher and Carlson 1998; Wedel 2001).

Additionally, as mentioned in Chapter 3, this analysis indicates that the St. Helena phase began approximately 100 years earlier than was previously believed (Steinacher and Carlson 1998:255). The St. Helena phase is still identified as the latest expression of Central Plains tradition lifeways to appear on the Central Plains. However, this phase's ‘start’ and ‘end’ boundaries make it contemporary with the Ponca Creek ICV sites (Shield Chief Gover et al.

2021). Interestingly, the Upper Republican phase is still the last phase to end in this model and has a similar ‘end’ **boundary** to Gover’s (2019a) analysis.

However, whether the appearance of the Central Plains tradition phases was the result of Itskari populations radiating out of central Nebraska into Northern Kansas and Eastern Nebraska is unclear. Previous interpretations of the appearance of Central Plains tradition phases suggested that it resulted from horticulturalists migrating north into the Central Plains along the Missouri River (Gover 2019a; Roper 2006b; Steinacher and Carlson 1998). But the Itskari phase appearing first upends those interpretations. This will be explored later.

Late Plains Village

As explained in Chapter 4, the outlier model for the Late Plains Village dataset contains different **sequences** than Models A, B, and C to incorporate newly analyzed samples provided by the former Nebraska State Archaeologist Rob Bozell. This analysis shows that 25SD1 is a Lower Loup phase site while 25CU25 temporally overlaps with the Initial Coalescent Variant results.

- 25CU25
 - Start: 1314-1400 to End: 1332-1410 at 1-sigma standard error
 - Start: 1267-1407 to End: 1326-1446 at 2-sigma standard error
- ICV
 - Start: 1269-1283 to End: 1310-1388 at 1-sigma standard error
 - Start: 1260-1287 to End: 1306-1400 at 2-sigma standard error
- 25BD1
 - Start: 1271-1284 to End: 1311-1330 at 1-sigma standard error (Shield Chief Gover et al. 2021).
 - Start: 1265-1290 to End: 1305-1341 at 2-sigma standard error (Shield Chief Gover et al. 2021).

Based on the age of 25CU25 and the comments made by Rob Bozell regarding the ceramic assemblage of the site, I think 25CU25 is an Initial Coalescent Variant hunting camp out in Custer County, Nebraska. Using a Geodesic distance calculator (2022), which measures the

distance between two points, the distance between Lynch, Nebraska, the closest ICV town, and the Custer County centroid is 118.08 miles or 190.03 kilometers. Ethnographic and experimental data suggest that North American Indigenous family units and their pack dogs could travel heavily loaded between five and ten miles a day (Eiselt 2022). Based on this data, a fully loaded family unit could make the 118-mile pedestrian journey between 25CU25 and 25BD1 in an eleven to twenty-three-day journey.

The results indicate that 25HT3 is within the estimated **boundary** for the Extended Coalescent Variant. As such, 25HT3 is an Extended Coalescent Variant locality in Nebraska, which is consistent with the pottery and architecture of 25HT3, which is Extended Coalescent Variant in nature (Johnson 2007; Wood 1965). There are **boundary** overlaps between the ‘end’ posterior probability estimates of the Cambell Creek and Arzberger Phases of the Initial Coalescent Variant **sequence** with the ‘start’ posterior probability estimate of the Extended Coalescent Variant **sequence**. But the “true” temporal range for the Extended Coalescent Variant could better be identified by analyzing each ECV phase as a separate **sequence** in an OxCal outlier model rather than this approach of combining all the ECV dates into one **sequence**. The produced temporal range suffers from the same issue noted in the ICV **sequence** and the Central Plains tradition **sequence** in the Plains Village model. There is a temporal overlap between the ECV **sequence** and the ICV **sequences**, as the results currently illustrate. Still, we should see a more significant temporal overlap when the phases of the Extended Coalescent Variant are analyzed as separate **sequences**, as shown with the CPt and ICV datasets. However, cultural continuity from the Central Plains tradition to ICV and then into ECV is still established based on the results of the Late Plains Village, Initial Coalescent Variant Phases, and Central Plains traditions Phases outlier models.

However, we no longer know when the Lower Loup Phase began. We have acceptable radiocarbon data for only one Lower Loup phase site: 25SD31. Of all of the archaeological taxa that require significant redating, the Lower Loup Phase is the most urgent. We no longer have any indication of when “typical” Pawnee lifeways appeared on the Central Plains.

Key Takeaways

The critical outcomes of the outlier models for the investigated archaeological taxa are:

1. CPt began in the 12th century, not the 10th century.
2. The first CPt phase to appear was Itskari in Nebraska, not Steed-Kisker in Kansas.
3. The CPt phase, St. Helena, began 100 years earlier than previously believed.
4. CPt lasted for approximately 350 years, not 500 years.
5. Evidence for ICV populations along Ponca Creek engaging in long-distance bison hunting by provisionally reclassifying 25CU25 as an ICV hunting camp (confirming this will require analysis of the site’s artifact assemblage, mainly the pottery, which has not been done).
6. CPO appeared in the late 13th century, not the mid-13th century, making it contemporary with the appearance of ICV and the town of 25BD1; CPO ended in the latter half of the 14th century, not the mid-15th century.
7. Maize farming appeared in Northeastern and Central Nebraska in the 11th century C.E. via the Great Oasis archaeological culture from Northwestern Iowa, not in the 10th century in North-central and Northeastern Kansas via the Central Plains tradition.
8. Established and continual generalized maize horticulture, via CPt south of the Platte River but via Oneota North of the Platte River, to the appearance of intensive maize agriculture, via ICV, with a possible emphasis on long-distance bison hunting, occurred within two hundred years.

The deployment of a revised Chronometric Hygiene Protocol in tandem with outlier modeling in OxCal has produced a new chronology for the Central Plains. The new chronology proposed in this dissertation fundamentally upends our understanding of the Central Plains

tradition and the development of Late Plains Village Pattern lifeways. But how does this new chronology reflect, if at all, Pawnee and Arikara history as told by their Oral Traditions?

Additionally, does this new chronology require us to reevaluate the relationship between Central Plains farmers and Mississippian cities such as Spiro and Cahokia?

Weaving Radiocarbon with Oral Traditions

The oral traditions summarized in Chapter 2 focus on migration stories involving Pawnee and Arikara ancestral groups arriving on the central Plains from various other places. The chronologies built in this dissertation bear on those traditions in meaningful ways but also highlight the long residence of ancestral groups on the central Plains, suggested by the early appearance of CPt lifeways in the Itskari phase and the possibility of continuity from late Woodland occupations to CPt occupations noted earlier. Blaine (1979) and Echo-Hawk (2018) observe that oral traditions also speak to this continuity, describing pre-earthlodge occupations consistent with the Woodland period. My analysis focuses on migration, but there is little doubt that new people arriving on the Central Plains integrated themselves with those already there. According to the oral traditions presented in Chapter 2, we should expect to see the following events in the Central Plains archaeological record listed below. It is important to note that the oral traditions presented in this paper do not account for the integration of immigrant populations with preexisting local groups; that is an essential topic for future work.

1. Ancestral Arikara populations appear along the Republican River in Northern Kansas and Southern Nebraska.
2. Ancestral Ckiri populations joined the ancestral Arikara along the Republican River.

3. Ancestral Arikara populations move northward into the Dakotas (not investigated in this analysis).
4. Ancestral Ckiri populations moved into Central Nebraska.
5. Ancestral South Band and Wichita populations migrated to northeastern Kansas along the Missouri River.
6. Ancestral South Band populations migrate northward into southeastern Nebraska along the Missouri River.
7. Ancestral South Band populations migrate west following the Platte and Upper Republican Rivers to North-Central Kansas and South-Central Nebraska.
8. Ancestral Ckiri populations move north to the Loup River.
9. The Ckiri Federation is formed along Beaver Creek; by the time of this event, an earthlodge community is already present North of Beaver Creek along the Elkhorn River; after this event, the ancestral Ckiri begin to construct earth lodge villages in Central Nebraska along the Loup River.

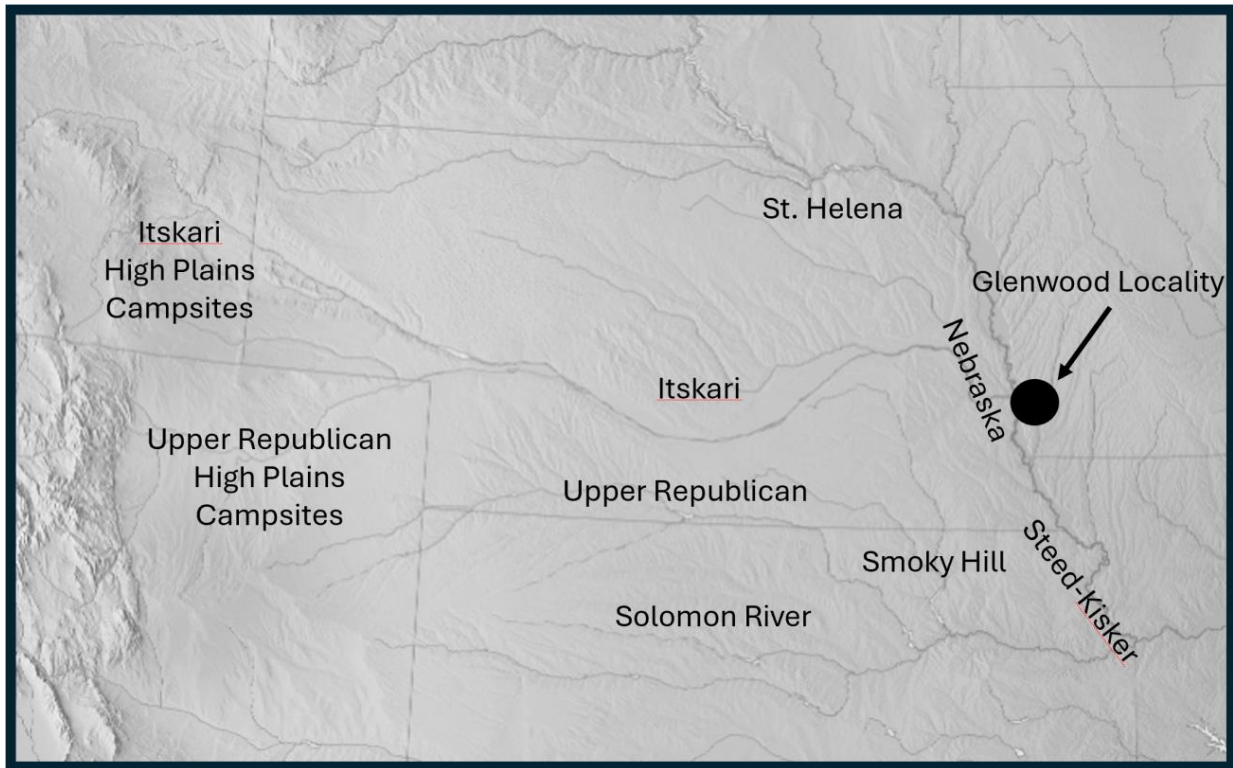


Figure 43. Map of Central Plains tradition phase and Glenwood locality locations (Page 2009; Steinacher and Carlson 1998). Base map courtesy of shadedrelief.com.

The new chronology shows the first appearance of CPT populations as being in the Itskari phase along the Platte River in Central Nebraska. The first CPT population that should appear is the Upper Republican phase, according to the oral traditions. However, the Upper Republican radiocarbon dataset is heavily represented by sample class 2C dates which significantly skews the posterior probability distributions for the ‘start’ and ‘end’ **boundaries** of the Upper Republican **sequence**. Under the new chronology, the Upper Republican phase is “tied” with Solomon River, Smoky Hill, and Steed-Kisker for being the second CPT phase to appear. Still, more radiocarbon data are required before the order of those four phases can be determined. Regardless, the results indicate a local change to the Itskari phase. Early CPT populations at Davis Creek (Metcalf 2018) built upon preexisting maize farming communities led to social and subsistence economy change southward into the Upper Republican River drainage. CPT

populations along the CPT frontier had links to Mississippian societies, as evidenced by Mississippian material culture in Upper Republican and Steed-Kisker assemblages. Ceramic similarities in early site components support the chronological relationship between Itskari and Upper Republican CPT populations. In contrast, later Itskari components share more significant ceramic similarities with St. Helena assemblages (Metcalf 2018).

However, Page's (2009) analysis of Itskari and Upper Republican ceramic typologies identified the presence of Upper Republican pottery within the Itskari phase geographic boundary. Metcalf (2018) separates the occupation at Davis Creek into two occupations: Davis Creek 1 and Davis Creek 2. Davis Creek 1 sites share ceramic similarities with Upper Republican Phase material culture, whereas Davis Creek 2 sites share ceramic similarities with St. Helena Phase material culture (Metcalf 2018). Page (2009) and Metcalf (2018) suggest this demonstrates Upper Republican populations moving north into central Nebraska and living near Itskari phase populations which could support the fourth listed event that ancestral Ckiri populations moved into Central Nebraska. But his conclusions were based on a radiocarbon chronology that this analysis has proven invalid; the data presented in this research refute Page's (2008) argument. My analysis suggests the opposite be true, that Itskari populations influenced the pre-existing population south along the Upper Republican region.

Additionally, events (5) Ancestral South Band and Wichita populations migrated to northeastern Kansas along the Missouri River, (6) Ancestral South Band populations migrate northward into southeastern Nebraska along the Missouri River, and (7) Ancestral South Band populations migrate west following the Platte and Upper Republican Rivers to North-Central Kansas and South-Central Nebraska, cannot be determined based on the results of the Bayesian model. It is unclear if the Steed-Kisker phase appeared before the Solomon River and Smoky

Hill phases, which would support a secondary migration of ancestral Pawnee populations from the southeast along the Missouri River into the Central Plains. But the updated chronology diminishes the separation between the appearance of the Central Plains tradition and the decline of Mississippian population centers.

Identifying the validity of event (8) Ancestral Ckiri populations move north to the Loup River, would require an additional OxCal outlier model that investigates the chronologies for individual Itskari phase sites. The model would have to show that the earliest occupations in the Itskari phase were close to the Platte River and the later sites were close to the Loup River. Currently, three of the four best-dated Itskari phase sites with narrow posterior probability distributions are all from Howard County, Nebraska, and therefore, such an analysis cannot be conducted.

Event (9) The Ckiri Federation is formed along Beaver Creek, also cannot be ascertained of its validity. 25SD31 is the only Lower Loup site for which we have usable radiocarbon data, and it is a post-contact Pawnee town. We need to redate previously sampled assemblages such as 25CX1, 25LC1, 25LP8, 25NC1, and 25NC3 and collect dates from undated Lower Loup phase sites to determine a correlation between the end of the Itskari phase and the appearance of Ckiri earthlodge towns.

Based on the current chronology of the Central Plains tradition phases, it is difficult to unequivocally confirm the accuracy of the Pawnee and Arikara oral traditions regarding migration and population movements. However, it is reasonable to state that the oral traditions generally represent the patterns we witness in the Central Plains archaeological record. The Itskari phase is clearly ancestral to the Ckiri as it is the first to appear in the general area that both the Arikara and Ckiri claimed to have settled in before the arrival of the South Band

Pawnees into Nebraska and Kansas. It is also apparent that there is a second pulse of change from Woodland to CPt ways of life in Northern Kansas, which aligns with South Band oral traditions regarding the region where they first settled and the transition from hunting and gathering subsistence strategies to maize-based horticulture (Steinacher and Carlson 1998:236-237). The regional adoption of Central Plains tradition lifeways by local hunter-gatherers in Kansas is further supported by Steinacher and Carlson, who suggest the appearance of the Solomon River CPt phase was possibly the result of Indigenous Plains Woodland groups encountering early Central Plains tradition populations and adopting CPt lifeways (1998:238).

We need more radiocarbon data to identify the sequence of appearance between the Upper Republican, Steed-Kisker, Solomon River, and Smoky Hill phases. Although it is possible that a secondary migration into the Central Plains happened rapidly enough that OxCal modeling of radiocarbon data will be unable to identify a precise sequence, even with more radiocarbon data. The oral traditions accurately account for ancestral Pawnee and Arikara migration history.

Pawnees, Arikaras, and Wichitas – The Missing Mississippians?

Are ancestral Caddoan populations in the Central Plains “missing links” to Mississippian chiefdom cultures in Oklahoma and along the Missouri River in Missouri and Illinois? Highly doubtful. Figure 35 shows evidence that Spiro began to depopulate in C.E. 1250 (Perttula and Walker 2012; Ray 2018) after most Central Plain's tradition phases had been established in Nebraska and Kansas. Cahokia began to decline at approximately C.E. 1150 (Benson et al. 2009; Butler 2021; Pauketat 2009) after the Itskari Phase of the CPt was established and within one hundred years of five other CPt phases appeared on the Central Plains through interaction with pre-existing Woodland communities and migrating populations along the Missouri River.

Additionally, this research suggests that the Central Plains tradition was a local development in Central Nebraska that radiated outward to surrounding areas in Northern Kansas and then into Eastern Nebraska.

There is evidence of Mississippian material culture in Upper Republican and Nebraska Phase assemblages (Bamforth 2021b; McNerney 1987; Steinacher and Carlson 1998), so interaction occurs between these communities. However, it is unlike the interactions between Ohio River Valley and Mississippian Communities during the 11th century C.E. in which we have evidence for Cahokian missionization of Midwestern hunting and gathering populations through the appearance of mound building and ritualized feasting (Wells 2008). If Central Plains tradition communities did primarily represent Cahokian or Spiroan populations migrating into the Central Plains, we would expect to see more Mississippian lifeways and material culture. The existence of Mississippian material culture found in some Central Plains tradition assemblages most likely represents regional interaction between people and limited migration of Mississippian populations (Bamforth 2021:244-246) rather than evidence for the Mississippian origins of ancestral Pawnee and Arikara.

Final Thoughts, Future Projects

We need more radiocarbon dates. First and foremost, this research illustrates how important it is that archaeologists have a strict sampling strategy for radiocarbon dating archaeological sites. Utilizing a modern chronometric hygiene protocol for the radiocarbon dataset of Central Plains archaeological cultures from C.E. 500 to C.E. 1650, the amount of useable radiocarbon data and the number of sites used to represent cultural chronologies is

significantly reduced. We do not have a precise time frame for when the Lower Loup Phase appeared, which is alarming to me as a Citizen of the Pawnee Nation.

Additionally, the results of this research upend what we previously assumed about the appearance of maize agriculture on the Central Plains. Maize agriculture appears to have originated from communities in Northwestern Iowa through Great Oasis populations. The results are also incongruent with the “neat fit” between Pawnee and Arikara oral traditions of migration and the archaeological record. The relationship between the oral and archaeological traditions is more complex than I initially believed (Gover 2019). Suppose the oral traditions referred to the movement of hunting and gathering populations rather than established maize horticulturalists. In that case, we might not be able to identify a precise “match” that identifies an ancestral archaeological culture moving across the landscape and into the traditional homelands of the Pawnee in Nebraska and Kansas. Regardless, more radiocarbon data and investigation of the archaeological record are required. Additionally, an examination of the Caddoan and Siouan languages for evidence of contact and aDNA analysis of ancestral remains has the potential to illuminate relationships between archaeological cultures and modern Indigenous populations.

What is irrefutable, though, is the deep history the Pawnee have in Nebraska and Kansas. As this research suggests, the Central Plains tradition was a local development of horticultural lifeways in Central Nebraska by resident hunting and gathering communities. Whether these communities were introduced to maize farming by the Great Oasis community that briefly occupied Central Nebraska requires further investigation. Although the results of my Bayesian analyses of radiocarbon data require a re-evaluation of what our Pawnee oral traditions are speaking to, ancestral Pawnee have lived, hunted, and then farmed in the Central Plains for

hundreds of years. Working in Nebraska and Kansas will always make me feel like I am returning home.

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APPENDICES A. OxCal Code

- a. OxCal 4.4 Code for Figure 9.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Ferber 25CD10.

```
Plot(Ferber)
{
  Sequence("25CD10")
  {
    Boundary("Start");
    Sequence("Ferber")
    {
      R_Date("UCI-261120", 975, 15);
      R_Date("UCI-261122", 215, 15);
      R_Date("UCI-261121", 200, 15);
      R_Date("UCI-261123", 200, 15);
    };
    Boundary("End");
  };
};
```

- b. OxCal 4.4 Code for Figure 10.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Peterson 25DX1.

```
Plot(Peterson)
{
  Sequence("25DX1")
  {
    Boundary("Start");
    Sequence("Peterson")
    {
      R_Date("UCI-261107", 660, 15);
      R_Date("UCI-261106", 610, 15);
      R_Date("UCI-261105", 605, 15);
      R_Date("UCI-261104", 155, 15);
    };
  };
};
```

```
Boundary("End");
};
};
```

- c. OxCal 4.4 Code for Figure 11.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Schulte 25CD1.

```
Plot(Schulte)
{
  Sequence("25CD1")
  {
    Boundary("Start Schulte");
    Sequence("Schulte")
    {
      R_Date("UCI-261132", 775, 15);
      R_Date("UCI-261128", 770, 15);
      R_Date("UCI-261129", 725, 15);
      R_Date("UCI-261130", 640, 15);
      R_Date("UCI-261131", 520, 20);
    };
    Boundary("End Schulte");
  };
};
```

- d. OxCal 4.4 Code for Figure 12.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Wiseman 25CD3.

```
Plot(Wiseman)
{
  Sequence("25CD3")
  {
    Boundary("Start");
    Sequence("Wiseman")
    {

```

```

R_Date("UCI-261125", 785, 15);
R_Date("UCI-261126", 770, 20);
R_Date("UCI-261127", 740, 15);
R_Date("UCI-261124", 730, 15);
};
Boundary("End");
};
};

```

- e. OxCal 4.4 Code for Figure 13.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Bobier 25DK1.

```

Plot(Bobier)
{
Sequence("25DK1")
{
Boundary("Start");
Sequence("Bobier")
{
R_Date("UCI-261111", 735, 20);
R_Date("UCI-261110", 700, 20);
R_Date("UCI-261109", 670, 15);
R_Date("UCI-261116", 670, 20);
R_Date("UCI-261108", 595, 15);
};
Boundary("End");
};
};
};

```

- f. OxCal 4.4 Code for Figure 14.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Jensen Brothers 25HW10.

```

Plot(Jensen Bros)
{
Sequence("25HW10")
{

```

```

Boundary("Start");
Sequence("Jensen Bros")
{
R_Date("UCI-261017", 715, 15);
R_Date("UCI-261018", 710, 20);
R_Date("UCI-261016", 695, 15);
R_Date("UCI-261019", 675, 15);
};
Boundary("End");
};
};

```

- g. OxCal 4.4 Code for Figure 15.**
Posterior probabilities for the estimated time spans and individual radiocarbon samples from the Bayesian models used to interpret the occupation history of Red Bird 25HT3.

```

Plot(Red Bird)
{
Sequence("25HT3")
{
Boundary("Start");
Sequence("Red Bird")
{
R_Date("UCI-261102", 415, 15);
R_Date("UCI-261101", 405, 20);
R_Date("UCI-261099", 395, 15);
R_Date("UCI-261103", 390, 15);
R_Date("UCI-261098", 370, 15);
R_Date("UCI-261100", 370, 15);
R_Date("UCI-261097", 360, 15);
};
Boundary("End");
};
};

```


- h. OxCal 4.4 Code for Figure 16.**
Posterior probabilities for the
estimated time spans and
individual radiocarbon samples
from the Bayesian models used to
interpret the occupation history of
Rulo 25RH70.

```
Plot(Rulo)
{
  Sequence("25RH70")
  {
    Boundary("Start");
    Sequence("Rulo")
    {
      R_Date("OS-18135", 1940, 55);
      R_Date("TX-8528", 1350, 50);
      R_Date("TX-8530", 1085, 55);
      R_Date("OS-18143 ", 905, 50);
      R_Date("UCI-261009", 820, 15);
      R_Date("UCI-261008", 810, 15);
      R_Date("TX-8529", 765, 45);
      R_Date("UCI-261010", 640, 15);
    };
    Boundary("End");
  };
};
```

- i. OxCal 4.4 Code for Figure 17.**
Posterior probabilities for the
estimated time spans and
individual radiocarbon samples
from the Bayesian models used to
interpret the occupation history of
Bert Mortensen 25HW9.

```
Plot(Bert Mortensen)
{
  Sequence("25HW9")
  {
    Boundary("Start");
    Sequence("Bert Mortensen")
    {
      R_Date("D-AMS037367", 984, 24);
      R_Date("UCI-261021", 970, 15);
      R_Date("UCI-261020", 845, 15);
      R_Date("UCI-261092", 835, 15);
    };
  };
};
```

```
};
Boundary("End");
};
};
```

- j. OxCal 4.4 Code for Figure 18.**
Posterior probabilities for the
estimated time spans and
individual radiocarbon samples
from the Bayesian models used to
interpret the occupation history of
Packer 25SM9.

```
Plot(Packer)
{
  Sequence("25SM9")
  {
    Boundary("Start");
    Sequence("Packer")
    {
      R_Date("UCI-261007", 1005, 15);
      R_Date("UCI-261004", 1000, 15);
      R_Date("UCI-261003", 985, 15);
      R_Date("UCI-261006", 985, 20);
      R_Date("UCI-261005", 975, 15);
      R_Date("Wis-1763", 970, 70);
      R_Date("Wis-1764", 940, 70);
      R_Date("Wis-1762", 900, 70);
    };
    Boundary("End");
  };
};
```

- k. OxCal 4.4 Code for Figure 19.**
Posterior probabilities for the
estimated time spans and
individual radiocarbon samples
from the Bayesian models used to
interpret the occupation history of
Coufal 25HW6.

```
Plot(Coufal)
{
  Sequence("25HW6")
  {
    Boundary("Start");
  };
};
```

```
Sequence("Coufal")
{
  R_Date("UCI-261095", 885, 15);
  R_Date("UCI-261096", 885, 15);
  R_Date("UCI-261094", 880, 15);
  R_Date("M-835", 820, 100);
  R_Date("UCI-261093", 700, 20);
};
Boundary("End");
};
};
```

**l. OxCal 4.4 Code for Figure 20.
Posterior probabilities for the
estimated time spans and
individual radiocarbon samples
from the Bayesian models used to
interpret the occupation history of
Swantek 25PT111.**

```
Plot(Swantek)
{
  Sequence("25PT111")
  {
    Boundary("Start");
    Sequence("Swantek")
    {
      R_Date("UCI-261015", 660, 15);
      R_Date("Beta-196301", 660, 60);
      R_Date("UCI-261011", 605, 15);
      R_Date("UCI-261012", 600, 15);
      R_Date("Beta-196300", 600, 40);
      R_Date("UCI-261014", 580, 20);
      R_Date("UCI-261013", 570, 15);
    };
    Boundary("End");
  };
};
```

**m. OxCal 4.4 Code for Figure 21.
Posterior probabilities for the
estimated time spans and
individual radiocarbon samples
from the Bayesian models used to
interpret the occupation history of
Young 25CU25.**

```
Plot(Young)
{
  Sequence("25CU25")
  {
    Boundary("Start");
    Sequence("Young")
    {
      R_Date("UCI-261117", 590, 20);
      R_Date("UCI-261118", 575, 20);
      R_Date("UCI-261777", 570, 20);
      R_Date("UCI-261119", 565, 15);
      R_Date("Beta-64609", 540, 60);
      R_Date("Beta-64607", 450, 60);
      R_Date("Beta-64608", 350, 60);
    };
    Boundary("End");
  };
};
```

**n. OxCal 4.4 Code for Figure 22.
Late Woodland Model A: Start
and End Boundaries of Late
Woodland assemblages. Sample
classes included: 1A, 1B, 2A, 2B,
2C, 3E.**

```
Plot(Woodland All Dates)
{
  Phase("Woodland")
  {
    Sequence("Great Oasis LW")
    {
      Boundary("Start Great Oasis LW");
      Phase("Great Oasis LW")
      {
        R_Date("UCI-261007", 1005, 15);
        R_Date("UCI-261004", 1000, 15);
        R_Date("UCI-261003", 985, 15);
      };
    };
  };
};
```

```

R_Date("UCI-261006", 985, 20);
R_Date("UCI-261120", 975, 15);
R_Date("UCI-261005", 975, 15);
R_Date("Wis-1763", 970, 70);
R_Date("Wis-1764", 940, 70);
R_Date("Wis-1762", 900, 70);
};
Boundary("End Great Oasis LW");
};
Sequence("Kansas LW")
{
Boundary("Start Kansas LW");
Phase("Kansas LW")
{
R_Date("UGa-2142", 1535, 85);
R_Date("Tx-6483", 1530, 170);
R_Date("M-867", 1470, 75);
R_Date("Beta-18610", 1460, 100);
R_Date("Tx-5667", 1400, 100);
R_Date("Beta-10121", 1350, 60);
R_Date("Beta-10121 (10120?)", 1350,
60);
R_Date("Beta-10120", 1350, 60);
R_Date("C-928", 1339, 200);
R_Date("D-AMS-7435", 1334, 28);
R_Date("Beta-12906", 1300, 100);
R_Date("SI-134", 1260, 100);
R_Date("D-AMS-7434", 1258, 25);
R_Date("UGa-2143", 1250, 165);
R_Date("UGa-2807", 1240, 75);
R_Date("Beta-12904", 1230, 90);
R_Date("ISGS-A1777", 1225, 20);
R_Date("UGa-4091", 1225, 75);
R_Date("AA-36102", 1220, 50);
R_Date("UGa-2560", 1215, 55);
R_Date("Beta-19434", 1200, 60);
R_Date("AA-36100", 1200, 40);
R_Date("D-AMS-7947", 1183, 23);
R_Date("Beta-33220", 1170, 50);
R_Date("AA-36101", 1165, 40);
R_Date("Beta-18609", 1130, 60);
R_Date("D-AMS-7948", 1116, 23);
R_Date("OS-58082", 1110, 35);
R_Date("ISGS-A1789", 1100, 20);
R_Date("SI-132", 1100, 100);
R_Date("Beta-18611", 1090, 50);

```

```

R_Date("SI-133", 1080, 100);
R_Date("UGa-2501", 1065, 65);
R_Date("ISGS-A576", 1030, 25);
R_Date("Beta-10122", 1030, 60);
R_Date("I-10983", 1010, 80);
R_Date("AA-39099", 985, 40);
R_Date("UGa-2502", 985, 45);
R_Date("ISGS-A1785", 970, 15);
R_Date("ISGS-A1787", 970, 15);
R_Date("UGa-1346", 970, 80);
R_Date("UGa-2500", 970, 80);
R_Date("ISGS-1786", 950, 15);
R_Date("ISGS-A1786", 950, 15);
R_Date("UGa-2504", 950, 135);
R_Date("AA-36112", 940, 35);
R_Date("AA-36111", 935, 45);
R_Date("AA-36113", 925, 60);
R_Date("LUNK-1371", 920, 60);
R_Date("ISGS-A1782", 890, 20);
R_Date("ISGS-A1783", 890, 15);
R_Date("UGa-1345", 890, 60);
R_Date("ISGS-A1761", 820, 20);
R_Date("UGa-3137", 775, 235);
R_Date("UGa-3044", 720, 70);
};
Boundary("End Kansas LW");
};
Sequence("Nebraska LW")
{
Boundary("Start Nebraska LW");
Phase("Nebraska LW")
{
R_Date("UM-470", 1940, 80);
R_Date("UM-549", 1920, 70);
R_Date("SI-126", 1580, 100);
R_Date("SI-68", 1430, 45);
R_Date("UM-466", 1370, 100);
R_Date("SI-197", 1260, 80);
R_Date("UGa-5478", 1250, 110);
R_Date("DIC-3325", 1220, 55);
R_Date("AA-41425", 1194, 41);
R_Date("D-AMS027242", 1169, 23);
R_Date("M-637", 1150, 100);
R_Date("D-AMS027243", 1138, 37);
R_Date("M-841", 1130, 100);
R_Date("AA-41427", 1084, 40);

```

```

R_Date("AA-41426", 1051, 42);
R_Date("AA-36097", 1050, 40);
R_Date("UGa-5482", 1050, 70);
R_Date("AA-36098", 1040, 40);
R_Date("Beta-273626", 1030, 40);
R_Date("M-1129", 1030, 75);
R_Date("UGa-2799", 990, 75);
R_Date("WIS-1795", 970, 70);
R_Date("WIS-2315", 910, 95);
R_Date("UGa-2804", 810, 55);
R_Date("UGa-2801", 755, 65);
R_Date("UGa-2802", 755, 70);
R_Date("UGa-2803", 665, 55);
R_Date("UGa-2800", 430, 50);
};
Boundary("End Nebraska LW");
};
Sequence("Pomona LW")
{
Boundary("Start Pomona LW");
Phase("Pomona LW")
{
R_Date("I-12327", 1230, 180);
R_Date("UGa-4090", 1195, 70);
R_Date("UGa-2666", 1175, 130);
R_Date("Beta-35858", 1150, 110);
R_Date("Beta-38587", 1150, 110);
R_Date("I-12338", 1100, 90);
R_Date("UGa-4705", 1075, 65);
R_Date("UGa-2670", 1045, 130);
R_Date("GX-6488", 1040, 150);
R_Date("I-11166", 990, 80);
R_Date("Beta-19873", 970, 60);
R_Date("UGa-4704", 950, 150);
R_Date("ISGS-A1775", 910, 15);
R_Date("ISGS-A1760", 895, 20);
R_Date("I-11164", 890, 80);
R_Date("I-9654", 890, 80);
R_Date("ISGS-A1784", 850, 20);
R_Date("Beta-63728", 850, 60);
R_Date("GX-6487", 840, 150);
R_Date("ISGS-A1776", 835, 15);
R_Date("I-9655", 705, 135);
R_Date("I-9657", 485, 145);
R_Date("OS-4905 ", 415, 26);
R_Date("OS-49053", 415, 25);

```

```

};
Boundary("End Pomona LW");
};
Order("End")
{
Date("=End Pomona LW");
Date("=End Nebraska LW");
Date("=End Kansas LW");
Date("=End Great Oasis LW");
};
Order("Start")
{
Date("=Start Great Oasis LW");
Date("=Start Pomona LW");
Date("=Start Kansas LW");
Date("=Start Nebraska LW");
};
};
};
};

```

**o. OxCal 4.4 Code for Figure 23.
Late Woodland Model C: Start
and End Boundaries of Late
Woodland assemblages. Sample
classes included: 1A, 1B, 2A, 2B.**

```

Plot(Woodland Clean Dates)
{
Phase("Woodland")
{
Sequence("Great Oasis LW")
{
Boundary("Start Great Oasis LW");
Phase("Great Oasis LW")
{
R_Date("UCI-261007", 1005, 15);
R_Date("UCI-261004", 1000, 15);
R_Date("UCI-261003", 985, 15);
R_Date("UCI-261006", 985, 20);
R_Date("UCI-261120", 975, 15);
R_Date("UCI-261005", 975, 15);
};
Boundary("End Great Oasis LW");
};
Sequence("Kansas LW")
{

```

```

Boundary("Start Kansas LW");
Phase("Kansas LW")
{
  R_Date("D-AMS-7435", 1334, 28);
  R_Date("SI-134", 1260, 100);
  R_Date("D-AMS-7434", 1258, 25);
  R_Date("ISGS-A1777", 1225, 20);
  R_Date("AA-36102", 1220, 50);
  R_Date("AA-36100", 1200, 40);
  R_Date("D-AMS-7947", 1183, 23);
  R_Date("AA-36101", 1165, 40);
  R_Date("D-AMS-7948", 1116, 23);
  R_Date("ISGS-A1789", 1100, 20);
  R_Date("SI-132", 1100, 100);
  R_Date("SI-133", 1080, 100);
  R_Date("ISGS-A576", 1030, 25);
  R_Date("AA-39099", 985, 40);
  R_Date("ISGS-A1785", 970, 15);
  R_Date("ISGS-A1787", 970, 15);
  R_Date("ISGS-1786", 950, 15);
  R_Date("ISGS-A1786", 950, 15);
  R_Date("AA-36112", 940, 35);
  R_Date("AA-36111", 935, 45);
  R_Date("AA-36113", 925, 60);
  R_Date("ISGS-A1782", 890, 20);
  R_Date("ISGS-A1783", 890, 15);
  R_Date("ISGS-A1761", 820, 20);
};
Boundary("End Kansas LW");
};
Sequence("Nebraska LW")
{
  Boundary("Start Nebraska LW");
  Phase("Nebraska LW")
  {
    R_Date("D-AMS027243", 1138, 37);
    R_Date("AA-41427", 1084, 40);
    R_Date("AA-41426", 1051, 42);
    R_Date("AA-36097", 1050, 40);
    R_Date("AA-36098", 1040, 40);
  };
  Boundary("End Nebraska LW");
};
Sequence("Pomona LW")
{
  Boundary("Start Pomona LW");

```

```

Phase("Pomona LW")
{
  R_Date("ISGS-A1775", 910, 15);
  R_Date("ISGS-A1760", 895, 20);
  R_Date("ISGS-A1784", 850, 20);
  R_Date("ISGS-A1776", 835, 15);
  R_Date("OS-4905 ", 415, 26);
  R_Date("OS-49053", 415, 25);
};
Boundary("End Pomona LW");
};
Order("End")
{
  Date("=End Pomona LW");
  Date("=End Kansas LW");
  Date("=End Great Oasis LW");
  Date("=End Nebraska LW");
};
Order("Start")
{
  Date("=Start Pomona LW");
  Date("=Start Great Oasis LW");
  Date("=Start Nebraska LW");
  Date("=Start Kansas LW");
};
};
};

```

**p. OxCal 4.4 Code for Figure 24.
Late Woodland Model B: Start
and End Boundaries of Late
Woodland assemblages. Sample
classes included: 1A, 1B, 2A, 2B,
2C.**

```

Plot(Woodland Normalized Dates)
{
  Phase("Woodland")
  {
    Sequence("Great Oasis LW")
    {
      Boundary("Start Great Oasis LW");
      Phase("Great Oasis LW")
      {
        R_Date("UCI-261007", 1005, 15);
        R_Date("UCI-261004", 1000, 15);

```

```

R_Date("UCI-261003", 985, 15);
R_Date("UCI-261006", 985, 20);
R_Date("UCI-261120", 975, 15);
R_Date("UCI-261005", 975, 15);
R_Date("Wis-1763", 970, 70);
R_Date("Wis-1764", 940, 70);
R_Date("Wis-1762", 900, 70);
};
Boundary("End Great Oasis LW");
};
Sequence("Kansas LW")
{
Boundary("Start Kansas LW");
Phase("Kansas LW")
{
R_Date("D-AMS-7435", 1334, 28);
R_Date("SI-134", 1260, 100);
R_Date("D-AMS-7434", 1258, 25);
R_Date("ISGS-A1777", 1225, 20);
R_Date("AA-36102", 1220, 50);
R_Date("AA-36100", 1200, 40);
R_Date("Beta-19434", 1200, 60);
R_Date("D-AMS-7947", 1183, 23);
R_Date("AA-36101", 1165, 40);
R_Date("D-AMS-7948", 1116, 23);
R_Date("OS-58082", 1110, 35);
R_Date("ISGS-A1789", 1100, 20);
R_Date("SI-132", 1100, 100);
R_Date("SI-133", 1080, 100);
R_Date("ISGS-A576", 1030, 25);
R_Date("AA-39099", 985, 40);
R_Date("ISGS-A1785", 970, 15);
R_Date("ISGS-A1787", 970, 15);
R_Date("ISGS-1786", 950, 15);
R_Date("ISGS-A1786", 950, 15);
R_Date("AA-36112", 940, 35);
R_Date("AA-36111", 935, 45);
R_Date("AA-36113", 925, 60);
R_Date("ISGS-A1782", 890, 20);
R_Date("ISGS-A1783", 890, 15);
R_Date("ISGS-A1761", 820, 20);
};
Boundary("End Kansas LW");
};
Sequence("Nebraska LW")
{

```

```

Boundary("Start Nebraska LW");
Phase("Nebraska LW")
{
R_Date("UM-470", 1940, 80);
R_Date("UM-549", 1920, 70);
R_Date("SI-126", 1580, 100);
R_Date("SI-68", 1430, 45);
R_Date("UM-466", 1370, 100);
R_Date("SI-197", 1260, 80);
R_Date("UGa-5478", 1250, 110);
R_Date("AA-41425", 1194, 41);
R_Date("D-AMS027242", 1169, 23);
R_Date("M-637", 1150, 100);
R_Date("D-AMS027243", 1138, 37);
R_Date("M-841", 1130, 100);
R_Date("AA-41427", 1084, 40);
R_Date("AA-41426", 1051, 42);
R_Date("AA-36097", 1050, 40);
R_Date("UGa-5482", 1050, 70);
R_Date("AA-36098", 1040, 40);
R_Date("Beta-273626", 1030, 40);
R_Date("UGa-2799", 990, 75);
R_Date("WIS-1795", 970, 70);
R_Date("WIS-2315", 910, 95);
R_Date("UGa-2804", 810, 55);
R_Date("UGa-2801", 755, 65);
R_Date("UGa-2802", 755, 70);
R_Date("UGa-2803", 665, 55);
R_Date("UGa-2800", 430, 50);
};
Boundary("End Nebraska LW");
};
Sequence("Pomona LW")
{
Boundary("Start Pomona LW");
Phase("Pomona LW")
{
R_Date("ISGS-A1775", 910, 15);
R_Date("ISGS-A1760", 895, 20);
R_Date("ISGS-A1784", 850, 20);
R_Date("ISGS-A1776", 835, 15);
R_Date("OS-4905 ", 415, 26);
R_Date("OS-49053", 415, 25);
};
Boundary("End Pomona LW");
};

```

```

Order("End")
{
  Date("=End Pomona LW");
  Date("=End Nebraska LW");
  Date("=End Kansas LW");
  Date("=End Great Oasis LW");
};
Order("Start")
{
  Date("=Start Great Oasis LW");
  Date("=Start Pomona LW");
  Date("=Start Kansas LW");
  Date("=Start Nebraska LW");
};
};
};

```

**q. OxCal 4.4 Code for Figure 25.
Late Woodland Model D: Start
and End Boundaries of Late
Woodland assemblages. Sample
classes included: 1A, 1B, 2A, 2B,
2C. (Outlier Model).**

```

Plot(Woodland Outlier Model)
{
  Outlier_Model("Charcoal",Exp(1,-
10,0),U(0,3),"t");
  Outlier_Model("General",T(5),U(0,4),"t");
  Phase("Woodland")
  {
    Sequence("Great Oasis LW")
    {
      Boundary("Start Great Oasis LW");
      Phase("Great Oasis LW")
      {
        R_Date("UCI-261007", 1005, 15)
        {
          Outlier("General", 0.05);
        };
        R_Date("UCI-261004", 1000, 15)
        {
          Outlier("General", 0.05);
        };
        R_Date("UCI-261006", 985, 20)
        {

```

```

          Outlier("General", 0.05);
        };
        R_Date("UCI-261003", 985, 15)
        {
          Outlier("General", 0.05);
        };
        R_Date("UCI-261120", 975, 15)
        {
          Outlier("General", 0.05);
        };
        R_Date("UCI-261005", 975, 15)
        {
          Outlier("General", 0.05);
        };
        R_Date("Wis-1763", 970, 70)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Wis-1764", 940, 70)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Wis-1762", 900, 70)
        {
          Outlier("Charcoal", 1);
        };
        Boundary("End Great Oasis LW");
        Sequence("Kansas LW")
        {
          Boundary("Start Kansas LW");
          Phase("Kansas LW")
          {
            R_Date("M-867", 1470, 75)
            {
              Outlier("Charcoal", 1);
            };
            R_Date("D-AMS-7435", 1334, 28)
            {
              Outlier("General", 0.05);
            };
            R_Date("SI-134", 1260, 100)
            {
              Outlier("General", 0.05);
            };

```

```

R_Date("D-AMS-7434", 1258, 25)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1777", 1225, 20)
{
  Outlier("General", 0.05);
};
R_Date("AA-36102", 1220, 50)
{
  Outlier("General", 0.05);
};
R_Date("Beta-19434", 1200, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-36100", 1200, 40)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS-7947", 1183, 23)
{
  Outlier("General", 0.05);
};
R_Date("AA-36101", 1165, 40)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS-7948", 1116, 23)
{
  Outlier("General", 0.05);
};
R_Date("OS-58082", 1110, 35)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-132", 1100, 100)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1789", 1100, 20)
{
  Outlier("General", 0.05);
};
R_Date("SI-133", 1080, 100)
{

```

```

  Outlier("General", 0.05);
};
R_Date("ISGS-A576", 1030, 25)
{
  Outlier("General", 0.05);
};
R_Date("AA-39099", 985, 40)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1787", 970, 15)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1785", 970, 15)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1786", 950, 15)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-1786", 950, 15)
{
  Outlier("General", 0.05);
};
R_Date("AA-36112", 940, 35)
{
  Outlier("General", 0.05);
};
R_Date("AA-36111", 935, 45)
{
  Outlier("General", 0.05);
};
R_Date("AA-36113", 925, 60)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1783", 890, 15)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A1782", 890, 20)
{
  Outlier("General", 0.05);
};

```



```

R_Date("ISGS-A1761", 820, 20)
{
  Outlier("General", 0.05);
};
};
Boundary("End Kansas LW");
};
Sequence("Nebraska LW")
{
  Boundary("Start Nebraska LW");
  Phase("Nebraska LW")
  {
    R_Date("UM-470", 1940, 80)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UM-549", 1920, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-126", 1580, 100)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-68", 1430, 45)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UM-466", 1370, 100)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-197", 1260, 80)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGa-5478", 1250, 110)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("AA-41425", 1194, 41)
    {
      Outlier("General", 0.05);
    };
    R_Date("D-AMS027242", 1169, 23)
    {

```

```

      Outlier("Charcoal", 1);
    };
    R_Date("M-637", 1150, 100)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("D-AMS027243", 1138, 37)
    {
      Outlier("General", 0.05);
    };
    R_Date("M-841", 1130, 100)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("AA-41427", 1084, 40)
    {
      Outlier("General", 0.05);
    };
    R_Date("AA-41426", 1051, 42)
    {
      Outlier("General", 0.05);
    };
    R_Date("UGa-5482", 1050, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("AA-36097", 1050, 40)
    {
      Outlier("General", 0.05);
    };
    R_Date("AA-36098", 1040, 40)
    {
      Outlier("General", 0.05);
    };
    R_Date("Beta-273626", 1030, 40)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UGa-2799", 990, 75)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("WIS-1795", 970, 70)
    {
      Outlier("Charcoal", 1);
    };

```

```

R_Date("WIS-2315", 910, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-2804", 810, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-2802", 755, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-2801", 755, 65)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-2803", 665, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-2800", 430, 50)
{
  Outlier("Charcoal", 1);
};
};
Boundary("End Nebraska LW");
};
Sequence("Pomona LW")
{
  Boundary("Start Pomona LW");
  Phase("Pomona LW")
  {
    R_Date("ISGS-A1775", 910, 15)
    {
      Outlier("General", 0.05);
    };
    R_Date("ISGS-A1760", 895, 20)
    {
      Outlier("General", 0.05);
    };
    R_Date("ISGS-A1784", 850, 20)
    {
      Outlier("General", 0.05);
    };
    R_Date("ISGS-A1776", 835, 15)
    {

```

```

      Outlier("General", 0.05);
    };
    R_Date("OS-49053", 415, 25)
    {
      Outlier("General", 0.05);
    };
    R_Date("OS-4905 ", 415, 26)
    {
      Outlier("General", 0.05);
    };
    };
    Boundary("End Pomona LW");
  };
  Order("End")
  {
    Date("=End Pomona LW");
    Date("=End Nebraska LW");
    Date("=End Kansas LW");
    Date("=End Great Oasis LW");
  };
  Order("Start")
  {
    Date("=Start Pomona LW");
    Date("=Start Great Oasis LW");
    Date("=Start Kansas LW");
    Date("=Start Nebraska LW");
  };
  };
};
};

```

**r. OxCal 4.4 Code for Figure 26.
Early Plains Village Model A:
Start and End Boundaries of Early
Plains Village assemblages.
Sample classes included: 1A, 1B,
2A, 2B, 2C, 3E.**

```

Plot(Early Plains Village All Dates)
{
  Phase("Central Plains")
  {
    Sequence("Central Plains Oneota")
    {
      Boundary("Start Central Plains Oneota");
      Phase("Central Plains Oneota")
      {

```

```

R_Date("OS-74659", 775, 30);
R_Date("Wis-151", 740, 55);
R_Date("Beta-65893", 720, 70);
R_Date("TX-8193", 720, 50);
R_Date("UCI-261015", 660, 15);
R_Date("Beta-196301", 660, 60);
R_Date("Beta-53612", 660, 80);
R_Date("BGS-2301", 641, 40);
R_Date("Beta-133384", 620, 50);
R_Date("SI-617", 620, 100);
R_Date("UCR-3945", 610, 110);
R_Date("UCI-261011", 605, 15);
R_Date("UCI-261012", 600, 15);
R_Date("Beta-196300", 600, 40);
R_Date("UCI-261014", 580, 20);
R_Date("ISGS-5631", 580, 70);
R_Date("UCI-261013", 570, 15);
R_Date("BGS-2302", 548, 40);
R_Date("Wis-155", 540, 55);
};
Boundary("End Central Plains Oneota");
};
Sequence("ICV")
{
Boundary("Start ICV");
Phase("ICV")
{
R_Date("D-AMS 037282", 735, 25);
R_Date("ISGS-A622", 730, 35);
R_Date("ISGS-A623", 730, 35);
R_Date("D-AMS 037281", 722, 28);
R_Date("ISGS-A620", 720, 35);
R_Date("D-AMS 037279", 717, 23);
R_Date("D-AMS 037276", 714, 26);
R_Date("UCR-2037", 710, 70);
R_Date("D-AMS 037280", 700, 24);
R_Date("ISGS-A624", 700, 35);
R_Date("D-AMS 037264", 692, 22);
R_Date("D-AMS 037289", 691, 24);
R_Date("ISGS-A606", 690, 30);
R_Date("ISGS-A621", 690, 35);
R_Date("D-AMS 037266", 685, 22);
R_Date("D-AMS 037270", 685, 22);
R_Date("D-AMS 037290", 685, 24);
R_Date("ISGS-A618", 675, 45);
R_Date("D-AMS 037265", 667, 23);

```

```

R_Date("UGa-2601", 660, 50);
R_Date("D-AMS 037278", 659, 24);
R_Date("D-AMS 037277", 653, 21);
R_Date("D-AMS 037268", 652, 23);
R_Date("D-AMS 037284", 651, 27);
R_Date("ISGS-A619", 650, 35);
R_Date("ISGS-A625", 650, 25);
R_Date("UCR-2035", 650, 60);
R_Date("D-AMS 037274", 649, 25);
R_Date("ISGS-A605", 645, 35);
R_Date("D-AMS 037286", 644, 22);
R_Date("D-AMS 037283", 639, 28);
R_Date("D-AMS 037272", 636, 22);
R_Date("D-AMS 037288", 630, 23);
R_Date("D-AMS 037287", 625, 22);
R_Date("ISGS-A604", 625, 40);
R_Date("Wis-1074", 610, 55);
R_Date("M-1079 a", 560, 75);
R_Date("M-1079", 560, 150);
R_Date("UGa-3367", 555, 60);
R_Date("UCR-2036", 550, 70);
R_Date("M-1127", 540, 100);
R_Date("M-1126a", 510, 100);
};
Boundary("End ICV");
};
Sequence("Central Plains tradition")
{
Boundary("Start Central Plains
tradition");
Phase("Central Plains tradition")
{
R_Date("SI-211", 1050, 90);
R_Date("UGa-467", 1045, 60);
R_Date("GX-2004", 1030, 130);
R_Date("TX-5913", 1010, 210);
R_Date("Wis-633", 985, 45);
R_Date("Wis-717", 975, 60);
R_Date("UCI-261021", 970, 15);
R_Date("I-509", 963, 100);
R_Date("M-1395-B", 950, 110);
R_Date("M-1395b", 950, 110);
R_Date("I-6296", 945, 100);
R_Date("SI-143", 940, 90);
R_Date("ISGS-A1554", 935, 15);
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 R_Date("I-584", 510, 100);
 R_Date("M-844", 500, 100);
 };
 Boundary("End Central Plains tradition");
 };
 Order("End")
 {
 Date("=End Central Plains Oneota");
 Date("=End Central Plains tradition");
 Date("=End ICV");

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};
Order("Start")
{
  Date("=Start ICV");
  Date("=Start Central Plains Oneota");
  Date("=Start Central Plains tradition");
};
};
};

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**s. OxCal 4.4 Code for Figure 27.
Early Plains Village Model C:
Start and End Boundaries of Early
Plains Village assemblages.
Sample classes included: 1A, 1B,
2A, 2B.**

```

Plot(Early Plains Village Normalized Dates)
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  {
    Sequence("Central Plains Oneota")
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    };
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    {
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      Phase("ICV")
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    };
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    {
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tradition");
      Phase("Central Plains tradition")
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        R_Date("ISGS-A1728", 900, 20);
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  Date("=End Central Plains tradition");
  Date("=End ICV");
};
Order("Start")
{
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  Date("=Start ICV");
  Date("=Start Central Plains tradition");
};
};
};

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**t. OxCal 4.4 Code for Figure 28.
Early Plains Village Model B:
Start and End Boundaries of Early
Plains Village assemblages.
Sample classes included: 1A, 1B,
2A, 2B, 2C.**

Plot(Early Plains Village Normalized Dates)

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};
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Phase("ICV")
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Boundary("End Central Plains tradition");
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Order("End")
{
  Date("=End Central Plains Oneota");
  Date("=End Central Plains tradition");
  Date("=End ICV");
};
Order("Start")
{
  Date("=Start ICV");
  Date("=Start Central Plains Oneota");
  Date("=Start Central Plains tradition");
};
};
};

```

**u. OxCal 4.4 Code for Figure 29.
Early Plains Village Model D:
Start and End Boundaries of Early
Plains Village assemblages.
Sample classes included: 1A, 1B,
2A, 2B, 2C. (Outlier Model).**

```

Plot(Early Plains Village Outlier Model)
{
  Outlier_Model("Charcoal",Exp(1,-
10,0),U(0,3),"t");
  Outlier_Model("General",T(5),U(0,4),"t");
  Phase("Central Plains")
  {
    Sequence("Central Plains Oneota")
    {
      Boundary("Start Central Plains Oneota");
      Phase("Central Plains Oneota")
      {
        R_Date("OS-74659", 775, 30)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-65893", 720, 70)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("TX-8193", 720, 50)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("UCI-261015", 660, 15)
        {
          Outlier("General", 0.05);
        };
        R_Date("Beta-196301", 660, 60)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("BGS-2301", 641, 40)
        {
          Outlier("Charcoal", 1);
        };
        R_Date("Beta-133384", 620, 50)
        {
          Outlier("Charcoal", 1);
        };
      }
    }
  }
}

```

```

};
R_Date("UCR-3945", 610, 110)
{
  Outlier("General", 0.05);
};
R_Date("UCI-261011", 605, 15)
{
  Outlier("General", 0.05);
};
R_Date("UCI-261012", 600, 15)
{
  Outlier("General", 0.05);
};
R_Date("Beta-196300", 600, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261014", 580, 20)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-5631", 580, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261013", 570, 15)
{
  Outlier("General", 0.05);
};
R_Date("BGS-2302", 548, 40)
{
  Outlier("Charcoal", 1);
};
Boundary("End Central Plains Oneota");
};
Sequence("ICV")
{
  Boundary("Start ICV");
  Phase("ICV")
  {
    R_Date("UGa-3368", 870, 75)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("M-1128", 820, 100)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("ETH-11049", 780, 55)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A603", 765, 30)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037282", 735, 25)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A622", 730, 35)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A623", 730, 35)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037281", 722, 28)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A620", 720, 35)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037279", 717, 23)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037276", 714, 26)
{
  Outlier("General", 0.05);
};
R_Date("UCR-2037", 710, 70)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037280", 700, 24)
{
  Outlier("General", 0.05);
};

```



```

};
R_Date("ISGS-A624", 700, 35)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037264", 692, 22)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037289", 691, 24)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A606", 690, 30)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A621", 690, 35)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037266", 685, 22)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037270", 685, 22)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037290", 685, 24)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A618", 675, 45)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037265", 667, 23)
{
  Outlier("General", 0.05);
};
R_Date("UGa-2601", 660, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("D-AMS 037278", 659, 24)

```

```

{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037277", 653, 21)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037268", 652, 23)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037284", 651, 27)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A619", 650, 35)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A625", 650, 25)
{
  Outlier("Charcoal", 1);
};
R_Date("UCR-2035", 650, 60)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037274", 649, 25)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A605", 645, 35)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037286", 644, 22)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037283", 639, 28)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037272", 636, 22)
{
  Outlier("General", 0.05);
};

```

```

};
R_Date("D-AMS 037288", 630, 23)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037287", 625, 22)
{
  Outlier("General", 0.05);
};
R_Date("ISGS-A604", 625, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-1074", 610, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("D-AMS 037267", 592, 22)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037275", 581, 22)
{
  Outlier("General", 0.05);
};
R_Date("D-AMS 037273", 580, 22)
{
  Outlier("General", 0.05);
};
R_Date("M-1079 a", 560, 75)
{
  Outlier("Charcoal", 1);
};
R_Date("UCR-2036", 550, 70)
{
  Outlier("General", 0.05);
};
R_Date("M-1127", 540, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("M-1126a", 510, 100)
{
  Outlier("General", 0.05);
};
};

```

```

Boundary("End ICV");
};
Sequence("Central Plains tradition")
{
  Boundary("Start Central Plains
tradition");
  Phase("Central Plains tradition")
  {
    R_Date("M-1395-B", 950, 110)
    {
      Outlier("General", 0.05);
    };
    R_Date("SI-143", 940, 90)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Wis-2153", 930, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-194", 930, 80)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Wis-324", 930, 60)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("TX-8524", 925, 55)
    {
      Outlier("General", 0.05);
    };
    R_Date("Beta-100933", 920, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-230", 920, 90)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-54043", 920, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Wis-719", 910, 60)
    {

```

```

    Outlier("Charcoal", 1);
};
R_Date("SI-619", 910, 140)
{
    Outlier("Charcoal", 1);
};
R_Date("OS-18143 ", 905, 50)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3449", 900, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1728", 900, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-85337", 890, 33)
{
    Outlier("General", 0.05);
};
R_Date("Beta-121009", 890, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-97603", 890, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261095", 885, 15)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261096", 885, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1729", 885, 20)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261094", 880, 15)
{
    Outlier("General", 0.05);
};

```

```

R_Date("Beta-54047", 880, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54039", 880, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("M-2347", 880, 110)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-697", 875, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("I-641", 875, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3629", 870, 20)
{
    Outlier("General", 0.05);
};
R_Date("Beta-178533", 870, 40)
{
    Outlier("General", 0.05);
};
R_Date("Beta-54046", 870, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-2154", 870, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-699", 865, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-36", 865, 65)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-709", 860, 55)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1461", 860, 15)
{
    Outlier("General", 0.05);
};
R_Date("UGa-465", 860, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-177518", 860, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A5746", 860, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54040", 860, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1726", 860, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-41432", 858, 39)
{
    Outlier("General", 0.05);
};
R_Date("Wis-566", 855, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-701", 850, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-631", 850, 140)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1727", 850, 20)
{
    Outlier("General", 0.05);
};

```

```

R_Date("Beta-121008", 850, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261020", 845, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA36110 ", 845, 45)
{
    Outlier("General", 0.05);
};
R_Date("SI-53", 845, 65)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-41434", 842, 38)
{
    Outlier("General", 0.05);
};
R_Date("Wis-716", 840, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3440", 840, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3444", 840, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3144", 840, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("M-1395-A", 840, 110)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-700", 835, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3447", 835, 15)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("UCI-261092", 835, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1459", 835, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3624", 830, 20)
{
    Outlier("General", 0.05);
};
R_Date("TX-8321", 830, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-2155", 830, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-32", 830, 65)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-564", 825, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("TX-8576", 825, 130)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A569", 825, 25)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-560", 820, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-559", 820, 55)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("M-835", 820, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261009", 820, 15)
{
    Outlier("General", 0.05);
};
R_Date("Beta-178238", 820, 40)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-6654", 820, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-5747", 820, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54050", 820, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-73", 820, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("TX-8527", 815, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3622", 810, 20)
{
    Outlier("General", 0.05);
};
R_Date("Beta-382843 ", 810, 30)
{
    Outlier("General", 0.05);
};
R_Date("AA36108 ", 810, 45)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261008", 810, 15)
{

```

```

    Outlier("General", 0.05);
};
R_Date("UGa-828", 810, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-1796", 810, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3621", 805, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1734", 805, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-41433", 804, 42)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3623", 800, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3625", 800, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3441", 800, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3445", 800, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3446", 800, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-5752", 800, 70)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("Beta-54048", 800, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1455", 800, 15)
{
    Outlier("General", 0.05);
};
R_Date("SI-193", 800, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3443", 795, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-565", 790, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3314", 790, 20)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1735", 790, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1725", 790, 20)
{
    Outlier("General", 0.05);
};
R_Date("Wis-318", 790, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-43407", 789, 39)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3619", 785, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3315", 785, 20)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("AA36107 ", 785, 40)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261125", 785, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3442", 780, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("AA36109 ", 780, 40)
{
    Outlier("General", 0.05);
};
R_Date("M-113", 780, 75)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A570", 780, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54045", 780, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("I-585", 780, 125)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-698", 775, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-900", 775, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-629", 775, 175)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("UCI-261132", 775, 15)
{
    Outlier("General", 0.05);
};
R_Date("Wis-896", 770, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("TX-8577", 770, 145)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-231", 770, 80)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261128", 770, 15)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261126", 770, 20)
{
    Outlier("General", 0.05);
};
R_Date("OS-4450", 770, 25)
{
    Outlier("General", 0.05);
};
R_Date("Wis-319", 770, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85316", 766, 41)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3626", 765, 15)
{
    Outlier("General", 0.05);
};
R_Date("Wis-562", 765, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-2152", 765, 50)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("TX-8529", 765, 45)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3618", 760, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3132 ", 760, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3145", 760, 70)
{
    Outlier("General", 0.05);
};
R_Date("M-869", 760, 75)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3134", 760, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1456", 760, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA-85315", 758, 41)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1558", 755, 15)
{
    Outlier("General", 0.05);
};
R_Date("TX-8322", 750, 80)
{
    Outlier("Charcoal", 1);
};
R_Date("TX-8324", 750, 50)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("SI-634", 750, 120)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-192", 750, 80)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-56", 750, 65)
{
    Outlier("Charcoal", 1);
};
R_Date("I-642", 750, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3620", 745, 20)
{
    Outlier("General", 0.05);
};
R_Date("TX-8320", 745, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-212", 740, 80)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85338", 740, 35)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3137", 740, 240)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54044", 740, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261127", 740, 15)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261111", 735, 20)
{

```



```

    Outlier("General", 0.05);
};
R_Date("AA-85334", 733, 41)
{
    Outlier("General", 0.05);
};
R_Date("Wis-632", 730, 45)
{
    Outlier("Charcoal", 1);
};
R_Date("NSRL-3413", 730, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-173317", 730, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261124", 730, 15)
{
    Outlier("General", 0.05);
};
R_Date("UGa-1950", 729, 75)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1550", 725, 20)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261129", 725, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3181", 720, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3148", 720, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-184493", 720, 70)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("TX-8319", 720, 45)
{
    Outlier("Charcoal", 1);
};
R_Date("TX-8323", 720, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-633", 720, 140)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54042", 720, 50)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1733", 720, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-85336", 719, 35)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261017", 715, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA-85317", 715, 41)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1553", 715, 15)
{
    Outlier("General", 0.05);
};
R_Date("I-583", 715, 125)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85320", 714, 40)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3147", 710, 90)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("UCI-261018", 710, 20)
{
    Outlier("General", 0.05);
};
R_Date("NSRL-3414", 710, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-101876 ", 710, 40)
{
    Outlier("General", 0.05);
};
R_Date("Beta-179560", 710, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-177519", 710, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-33", 710, 15)
{
    Outlier("General", 0.05);
};
R_Date("SI-40", 710, 65)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-878", 705, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1548", 705, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1549", 705, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1457 ", 705, 15)
{
    Outlier("General", 0.05);
};

```

```

R_Date("Wis-894", 700, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261093", 700, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-85318", 700, 40)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3138", 700, 80)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261110", 700, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-96465", 698, 35)
{
    Outlier("General", 0.05);
};
R_Date("AA-85335", 697, 32)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3434", 695, 15)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261016", 695, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA-85339", 692, 35)
{
    Outlier("General", 0.05);
};
R_Date("Beta-55495", 690, 60)
{
    Outlier("General", 0.05);
};
R_Date("Wis-702", 690, 50)
{

```

```

    Outlier("Charcoal", 1);
};
R_Date("Wis-877", 690, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3436", 690, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-2344", 690, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-1798", 690, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85324", 686, 35)
{
    Outlier("General", 0.05);
};
R_Date("A2268", 685, 20)
{
    Outlier("General", 0.05);
};
R_Date("AA-85322", 685, 37)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1458 ", 685, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1731", 685, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1732", 685, 20)
{
    Outlier("General", 0.05);
};
R_Date("UGa-1949", 684, 75)
{
    Outlier("General", 0.05);
};

```

```

R_Date("ISGS-3428", 680, 15)
{
    Outlier("General", 0.05);
};
R_Date("SI-632", 680, 140)
{
    Outlier("Charcoal", 1);
};
R_Date("PRI-11-157-200", 680, 20)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261019", 675, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1462", 675, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1552", 675, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA-85326", 674, 36)
{
    Outlier("General", 0.05);
};
R_Date("SI-210", 670, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-1765", 670, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3141", 670, 190)
{
    Outlier("Charcoal", 1);
};
R_Date("UGa-827", 670, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261109", 670, 15)
{

```

```

    Outlier("General", 0.05);
};
R_Date("UCI-261116", 670, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1781", 670, 15)
{
    Outlier("General", 0.05);
};
R_Date("SI-196", 670, 120)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-1814", 670, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-3435", 665, 15)
{
    Outlier("General", 0.05);
};
R_Date("TX-8580", 665, 45)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A1556", 665, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA-85323", 664, 35)
{
    Outlier("General", 0.05);
};
R_Date("AA-85340", 663, 35)
{
    Outlier("General", 0.05);
};
R_Date("A2267", 660, 20)
{
    Outlier("General", 0.05);
};
R_Date("Beta-184492", 660, 60)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("Wis-2150", 660, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Beta-54051", 660, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261107", 660, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A1730", 660, 20)
{
    Outlier("General", 0.05);
};
R_Date("M-2346", 660, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-219-2", 660, 60)
{
    Outlier("General", 0.05);
};
R_Date("Wis-1797", 660, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-41431", 656, 68)
{
    Outlier("General", 0.05);
};
R_Date("Beta-382844", 650, 30)
{
    Outlier("General", 0.05);
};
R_Date("A2269", 650, 20)
{
    Outlier("General", 0.05);
};
R_Date("WIS-2314", 650, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85341", 647, 33)
{

```

```

    Outlier("General", 0.05);
};
R_Date("AA-85327", 646, 45)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3627", 645, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3133 ", 645, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3357", 645, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3450", 645, 15)
{
    Outlier("General", 0.05);
};
R_Date("TX-8318", 645, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("PRI-11-157-2389", 645, 15)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85328", 643, 34)
{
    Outlier("General", 0.05);
};
R_Date("AA-85332", 643, 42)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261010", 640, 15)
{
    Outlier("General", 0.05);
};
R_Date("TX-8579", 640, 40)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("PRI-11-157-2254", 640, 15)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261130", 640, 15)
{
    Outlier("General", 0.05);
};
R_Date("SI-70", 640, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85331", 638, 45)
{
    Outlier("General", 0.05);
};
R_Date("PRI-11-157-196", 635, 15)
{
    Outlier("General", 0.05);
};
R_Date("AA-85325", 631, 36)
{
    Outlier("General", 0.05);
};
R_Date("TX-8578", 630, 95)
{
    Outlier("Charcoal", 1);
};
R_Date("PRI-11-157-831", 630, 15)
{
    Outlier("General", 0.05);
};
R_Date("PRI-11-157-2905", 630, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-3133", 630, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-5074", 630, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("ISGS-A3451", 625, 15)
{

```

```

    Outlier("General", 0.05);
};
R_Date("AA-85330", 622, 42)
{
    Outlier("General", 0.05);
};
R_Date("Beta-55494", 620, 60)
{
    Outlier("Charcoal", 1);
};
R_Date("TX-8523 ", 620, 45)
{
    Outlier("General", 0.05);
};
R_Date("Beta-54049", 620, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-1800", 620, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("UGa-1951", 614, 75)
{
    Outlier("General", 0.05);
};
R_Date("AA-41430", 611, 42)
{
    Outlier("General", 0.05);
};
R_Date("Beta-267045 ", 610, 40)
{
    Outlier("General", 0.05);
};
R_Date("TX-8525", 610, 45)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261106", 610, 15)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-5540", 610, 70)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("PRI-11-140-221", 610, 15)
{
    Outlier("General", 0.05);
};
R_Date("PRI-11-140-222-2", 610, 20)
{
    Outlier("General", 0.05);
};
R_Date("UCI-261105", 605, 15)
{
    Outlier("General", 0.05);
};
R_Date("PRI-11-140-218", 605, 20)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-2151", 595, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("UCI-261108", 595, 15)
{
    Outlier("General", 0.05);
};
R_Date("PRI-11-140-1556", 595, 20)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-635", 585, 115)
{
    Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-221-2", 585, 20)
{
    Outlier("General", 0.05);
};
R_Date("PRI-11-140-222-1", 585, 20)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A3628", 580, 20)
{
    Outlier("General", 0.05);
};
R_Date("A1927", 580, 15)
{

```

```

    Outlier("General", 0.05);
};
R_Date("ISGS-6656", 580, 70)
{
    Outlier("Charcoal", 1);
};
R_Date("A1929", 565, 15)
{
    Outlier("General", 0.05);
};
R_Date("M-1365", 565, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("A1928", 560, 15)
{
    Outlier("General", 0.05);
};
R_Date("Beta-54041", 560, 50)
{
    Outlier("Charcoal", 1);
};
R_Date("NSRL-3434 ", 550, 60)
{
    Outlier("General", 0.05);
};
R_Date("SI-622", 550, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("SI-628", 550, 65)
{
    Outlier("Charcoal", 1);
};
R_Date("Wis-2311", 540, 55)
{
    Outlier("Charcoal", 1);
};
R_Date("AA-85319", 539, 67)
{
    Outlier("General", 0.05);
};
R_Date("Wis-1801", 530, 70)
{
    Outlier("Charcoal", 1);
};

```

```

R_Date("I-584", 510, 100)
{
    Outlier("Charcoal", 1);
};
R_Date("M-844", 500, 100)
{
    Outlier("Charcoal", 1);
};
};
Boundary("End Central Plains tradition");
};
Order("End")
{
    Date("=End Central Plains tradition");
    Date("=End Central Plains Oneota");
    Date("=End ICV");
};
Order("Start")
{
    Date("=Start Central Plains Oneota");
    Date("=Start ICV");
    Date("=Start Central Plains tradition");
};
};
};

```

**v. OxCal 4.4 Code for Figure 30.
Late Plains Village Model A: Start
and End Boundaries of Late Plains
Village assemblages. Sample
classes included: 1A, 1B, 2A, 2B,
2C, 3E.**

```

Plot()
{
    Phase("Central Plains")
    {
        Sequence("Red Bird ECV")
        {
            Boundary("Start Red Bird ECV");
            Phase("Red Bird ECV")
            {
                R_Date("UCI-261102", 415, 15);
                R_Date("UCI-261101", 405, 20);
                R_Date("UCI-261099", 395, 15);
                R_Date("UCI-261103", 390, 15);
            }
        }
    }
}

```

```

R_Date("UCI-261098", 370, 15);
R_Date("UCI-261100", 370, 15);
R_Date("UCI-261097", 360, 15);
};
Boundary("End Red Bird ECV");
};
Sequence("Extended CV")
{
Boundary("Start Extended CV");
Phase("Extended CV")
{
R_Date("SMU-2728", 747, 62);
R_Date("SMU-2789", 583, 58);
R_Date("SMU-2731", 530, 64);
R_Date("I-17912", 510, 90);
R_Date("SMU-2800", 509, 47);
R_Date("USGS-168", 495, 45);
R_Date("SI-25", 475, 100);
R_Date("ETH-10112", 470, 55);
R_Date("RL-304", 450, 90);
R_Date("RL-305", 450, 90);
R_Date("SI-169", 450, 120);
R_Date("SMU-797", 440, 40);
R_Date("SMU-2627", 430, 60);
R_Date("ETH-10415", 420, 55);
R_Date("ETH-10121", 415, 55);
R_Date("SMU-2726", 400, 63);
R_Date("ETH-10117", 395, 55);
R_Date("SMU-2689", 395, 57);
R_Date("I-720", 385, 95);
R_Date("RL-306", 380, 90);
R_Date("ETH-10416", 365, 55);
R_Date("SI-59", 360, 50);
R_Date("ETH-10116", 350, 55);
R_Date("ETH-11039", 345, 60);
R_Date("SMU-2628", 330, 60);
R_Date("SMU-1103", 330, 30);
R_Date("SMU-2725", 326, 66);
R_Date("SMU-2677", 322, 64);
R_Date("SMU-2687", 321, 57);
R_Date("SMU-2629", 320, 100);
R_Date("SMU-2685", 320, 63);
R_Date("RL-307", 310, 90);
R_Date("SI-106", 310, 55);
R_Date("ETH-10119", 295, 55);
R_Date("ETH-10412", 280, 55);

```

```

R_Date("SMU-2678", 279, 46);
R_Date("ETH-10118", 275, 55);
R_Date("I-721", 275, 85);
R_Date("SI-95", 270, 50);
R_Date("I-17913", 270, 80);
R_Date("SMU-1101", 270, 40);
R_Date("ETH-10417", 265, 55);
R_Date("ETH-10414", 250, 50);
R_Date("ETH-10120", 235, 55);
R_Date("SMU-2732", 232, 56);
};
Boundary("End Extended CV");
};
Sequence("Lower Loup")
{
Boundary("Start Lower Loup");
Phase("Lower Loup")
{
R_Date("UCI-261117", 590, 20);
R_Date("UCI-261118", 575, 20);
R_Date("UCI-261777", 570, 20);
R_Date("Beta-12739", 570, 120);
R_Date("UCI-261119", 565, 15);
R_Date("Beta-12736", 550, 80);
R_Date("Beta-64609", 540, 60);
R_Date("SI-636", 515, 115);
R_Date("Wis-2347", 500, 50);
R_Date("Beta-64607", 450, 60);
R_Date("Wis-2348", 425, 55);
R_Date("Beta-64608", 350, 60);
R_Date("Wis-2340", 330, 60);
R_Date("M-1368", 320, 100);
R_Date("Beta-12737", 280, 60);
R_Date("M-1369", 270, 100);
R_Date("Wis-2341", 250, 70);
R_Date("Wis-2349", 230, 45);
R_Date("Beta-189688", 220, 50);
R_Date("Beta-189689", 210, 40);
};
Boundary("End Lower Loup");
};
Order("End")
{
Date("=End Lower Loup");
Date("=End Extended CV");
Date("=End Red Bird ECV");

```



```

};
Order("Start")
{
  Date("=Start Red Bird ECV");
  Date("=Start Extended CV");
  Date("=Start Lower Loup");
};
};
};

```

**w. OxCal 4.4 Code for Figure 31.
Late Plains Village Model C: Start
and End Boundaries of Late Plains
Village assemblages. Sample
classes included: 1A, 1B, 2A, 2B.**

```

Plot()
{
  Phase("Central Plains")
  {
    Sequence("Red Bird ECV")
    {
      Boundary("Start Red Bird ECV");
      Phase("Red Bird ECV")
      {
        R_Date("UCI-261102", 415, 15);
        R_Date("UCI-261101", 405, 20);
        R_Date("UCI-261099", 395, 15);
        R_Date("UCI-261103", 390, 15);
        R_Date("UCI-261098", 370, 15);
        R_Date("UCI-261100", 370, 15);
        R_Date("UCI-261097", 360, 15);
      };
      Boundary("End Red Bird ECV");
    };
    Sequence("Extended CV")
    {
      Boundary("Start Extended CV");
      Phase("Extended CV")
      {
        R_Date("SMU-2728", 747, 62);
        R_Date("SMU-2789", 583, 58);
        R_Date("SMU-2731", 530, 64);
        R_Date("ETH-10112", 470, 55);
        R_Date("RL-304", 450, 90);
        R_Date("RL-305", 450, 90);

```

```

      R_Date("ETH-10415", 420, 55);
      R_Date("ETH-10121", 415, 55);
      R_Date("SMU-2726", 400, 63);
      R_Date("ETH-10117", 395, 55);
      R_Date("RL-306", 380, 90);
      R_Date("ETH-10416", 365, 55);
      R_Date("ETH-10116", 350, 55);
      R_Date("ETH-11039", 345, 60);
      R_Date("RL-307", 310, 90);
      R_Date("ETH-10119", 295, 55);
      R_Date("ETH-10412", 280, 55);
      R_Date("SMU-2678", 279, 46);
      R_Date("ETH-10118", 275, 55);
      R_Date("ETH-10417", 265, 55);
      R_Date("ETH-10414", 250, 50);
      R_Date("ETH-10120", 235, 55);
      R_Date("SMU-2732", 232, 56);
    };
    Boundary("End Extended CV");
  };
  Sequence("Lower Loup")
  {
    Boundary("Start Lower Loup");
    Phase("Lower Loup")
    {
      R_Date("UCI-261117", 590, 20);
      R_Date("UCI-261118", 575, 20);
      R_Date("UCI-261777", 570, 20);
      R_Date("UCI-261119", 565, 15);
    };
    Boundary("End Lower Loup");
  };
  Order("End")
  {
    Date("=End Extended CV");
    Date("=End Red Bird ECV");
    Date("=End Lower Loup");
  };
  Order("Start")
  {
    Date("=Start Red Bird ECV");
    Date("=Start Extended CV");
    Date("=Start Lower Loup");
  };
};
};

```

**x. OxCal 4.4 Code for Figure 32.
Late Plains Village Model B: Start
and End Boundaries of Late Plains
Village assemblages. Sample
classes included: 1A, 1B, 2A, 2B,
2C.**

```
Plot()
{
  Phase("Central Plains")
  {
    Sequence("Red Bird ECV")
    {
      Boundary("Start Red Bird ECV");
      Phase("Red Bird ECV")
      {
        R_Date("UCI-261102", 415, 15);
        R_Date("UCI-261101", 405, 20);
        R_Date("UCI-261099", 395, 15);
        R_Date("UCI-261103", 390, 15);
        R_Date("UCI-261098", 370, 15);
        R_Date("UCI-261100", 370, 15);
        R_Date("UCI-261097", 360, 15);
      };
      Boundary("End Red Bird ECV");
    };
    Sequence("Extended CV")
    {
      Boundary("Start Extended CV");
      Phase("Extended CV")
      {
        R_Date("SMU-2728", 747, 62);
        R_Date("SMU-2789", 583, 58);
        R_Date("SMU-2731", 530, 64);
        R_Date("SMU-2800", 509, 47);
        R_Date("SI-25", 475, 100);
        R_Date("ETH-10112", 470, 55);
        R_Date("RL-304", 450, 90);
        R_Date("RL-305", 450, 90);
        R_Date("SI-169", 450, 120);
        R_Date("SMU-797", 440, 40);
        R_Date("SMU-2627", 430, 60);
        R_Date("ETH-10415", 420, 55);
        R_Date("ETH-10121", 415, 55);
        R_Date("SMU-2726", 400, 63);
```

```
        R_Date("ETH-10117", 395, 55);
        R_Date("SMU-2689", 395, 57);
        R_Date("I-720", 385, 95);
        R_Date("RL-306", 380, 90);
        R_Date("ETH-10416", 365, 55);
        R_Date("SI-59", 360, 50);
        R_Date("ETH-10116", 350, 55);
        R_Date("ETH-11039", 345, 60);
        R_Date("SMU-2628", 330, 60);
        R_Date("SMU-2725", 326, 66);
        R_Date("SMU-2677", 322, 64);
        R_Date("SMU-2687", 321, 57);
        R_Date("SMU-2629", 320, 100);
        R_Date("SMU-2685", 320, 63);
        R_Date("RL-307", 310, 90);
        R_Date("SI-106", 310, 55);
        R_Date("ETH-10119", 295, 55);
        R_Date("ETH-10412", 280, 55);
        R_Date("SMU-2678", 279, 46);
        R_Date("ETH-10118", 275, 55);
        R_Date("I-721", 275, 85);
        R_Date("SI-95", 270, 50);
        R_Date("ETH-10417", 265, 55);
        R_Date("ETH-10414", 250, 50);
        R_Date("ETH-10120", 235, 55);
        R_Date("SMU-2732", 232, 56);
      };
      Boundary("End Extended CV");
    };
    Sequence("Lower Loup")
    {
      Boundary("Start Lower Loup");
      Phase("Lower Loup")
      {
        R_Date("UCI-261117", 590, 20);
        R_Date("UCI-261118", 575, 20);
        R_Date("UCI-261777", 570, 20);
        R_Date("UCI-261119", 565, 15);
        R_Date("Beta-189688", 220, 50);
        R_Date("Beta-189689", 210, 40);
      };
      Boundary("End Lower Loup");
    };
    Order("End")
    {
      Date("=End Lower Loup");
```

```

Date("=End Extended CV");
Date("=End Red Bird ECV");
};
Order("Start")
{
Date("=Start Red Bird ECV");
Date("=Start Extended CV");
Date("=Start Lower Loup");
};
};
};
};

```

**y. OxCal 4.4 Code for Figure 33.
Late Plains Village Model D: Start
and End Boundaries of Late Plains
Village assemblages. Sample
classes included: 1A, 1B, 2A, 2B,
2C. (Outlier Model).**

```

Plot(Late Plains Village)
{
Outlier_Model("Charcoal",Exp(1,-
10,0),U(0,3),"t");
Outlier_Model("General",T(5),U(0,4),"t");
Phase("Central Plains")
{
Sequence("Red Bird ECV")
{
Boundary("Start Red Bird ECV");
Phase("Red Bird ECV")
{
R_Date("UCI-261102", 415, 15)
{
Outlier("General", 0.05);
};
R_Date("UCI-261101", 405, 20)
{
Outlier("General", 0.05);
};
R_Date("UCI-261099", 395, 15)
{
Outlier("General", 0.05);
};
R_Date("UCI-261103", 390, 15)
{
Outlier("General", 0.05);
};
};
};
};
};

```

```

};
R_Date("UCI-261098", 370, 15)
{
Outlier("General", 0.05);
};
R_Date("UCI-261100", 370, 15)
{
Outlier("General", 0.05);
};
R_Date("UCI-261097", 360, 15)
{
Outlier("General", 0.05);
};
};
Boundary("End Red Bird ECV");
};
Sequence("Extended CV")
{
Boundary("Start Extended CV");
Phase("Extended CV")
{
R_Date("SMU-2728", 747, 62)
{
Outlier("General", 0.05);
};
R_Date("SMU-2789", 583, 58)
{
Outlier("General", 0.05);
};
R_Date("SMU-2731", 530, 64)
{
Outlier("General", 0.05);
};
R_Date("SMU-2800", 509, 47)
{
Outlier("Charcoal", 1);
};
R_Date("SI-25", 475, 100)
{
Outlier("Charcoal", 1);
};
R_Date("ETH-10112", 470, 55)
{
Outlier("General", 0.05);
};
R_Date("RL-304", 450, 90)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("RL-305", 450, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-169", 450, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("SMU-2627", 430, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ETH-10415", 420, 55)
{
  Outlier("General", 0.05);
};
R_Date("ETH-10121", 415, 55)
{
  Outlier("General", 0.05);
};
R_Date("SMU-2726", 400, 63)
{
  Outlier("General", 0.05);
};
R_Date("ETH-10117", 395, 55)
{
  Outlier("General", 0.05);
};
R_Date("SMU-2689", 395, 57)
{
  Outlier("Charcoal", 1);
};
R_Date("I-720", 385, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("RL-306", 380, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("ETH-10416", 365, 55)
{
  Outlier("General", 0.05);
};

```

```

};
R_Date("SI-59", 360, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("ETH-10116", 350, 55)
{
  Outlier("General", 0.05);
};
R_Date("ETH-11039", 345, 60)
{
  Outlier("General", 0.05);
};
R_Date("SMU-2628", 330, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("SMU-2725", 326, 66)
{
  Outlier("Charcoal", 1);
};
R_Date("SMU-2677", 322, 64)
{
  Outlier("Charcoal", 1);
};
R_Date("SMU-2687", 321, 57)
{
  Outlier("Charcoal", 1);
};
R_Date("SMU-2629", 320, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("SMU-2685", 320, 63)
{
  Outlier("Charcoal", 1);
};
R_Date("RL-307", 310, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-106", 310, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("ETH-10119", 295, 55)

```

```

{
  Outlier("General", 0.05);
};
R_Date("ETH-10412", 280, 55)
{
  Outlier("General", 0.05);
};
R_Date("SMU-2678", 279, 46)
{
  Outlier("General", 0.05);
};
R_Date("ETH-10118", 275, 55)
{
  Outlier("General", 0.05);
};
R_Date("I-721", 275, 85)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-95", 270, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("ETH-10417", 265, 55)
{
  Outlier("General", 0.05);
};
R_Date("ETH-10414", 250, 50)
{
  Outlier("General", 0.05);
};
R_Date("ETH-10120", 235, 55)
{
  Outlier("General", 0.05);
};
R_Date("SMU-2732", 232, 56)
{
  Outlier("General", 0.05);
};
};
Boundary("End Extended CV");
};
Sequence("Young")
{
  Boundary("Start Young");
  Phase("Young")

```

```

{
  R_Date("UCI-261117", 590, 20)
  {
    Outlier("General", 0.05);
  };
  R_Date("UCI-261118", 575, 20)
  {
    Outlier("General", 0.05);
  };
  R_Date("UCI-261777", 570, 20)
  {
    Outlier("General", 0.05);
  };
  R_Date("UCI-261119", 565, 15)
  {
    Outlier("General", 0.05);
  };
};
Boundary("End Young");
};
Sequence("Woodcliff")
{
  Boundary("Start Woodcliff");
  Phase("Woodcliff")
  {
    R_Date("Beta-189688", 220, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-189689", 210, 40)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("D-AMS-047809", 179, 19)
    {
      Outlier("General", 0.05);
    };
    R_Date("D-AMS-047812", 118, 17)
    {
      Outlier("General", 0.05);
    };
    R_Date("D-AMS-047808", 95, 19)
    {
      Outlier("General", 0.05);
    };
    R_Date("D-AMS-047811", 82, 21)

```

```

{
  Outlier("General", 0.05);
};
R_Date("D-AMS-047810", 53, 19)
{
  Outlier("General", 0.05);
};
};
Boundary("End Woodcliff");
};
Order("End")
{
  Date("=End Woodcliff");
  Date("=End Extended CV");
  Date("=End Red Bird ECV");
  Date("=End Young");
};
Order("Start")
{
  Date("=Start Woodcliff");
  Date("=Start Red Bird ECV");
  Date("=Start Extended CV");
  Date("=Start Young");
};
};
};

```

**z. OxCal 4.4 Code for Figure 34.
Central Plains tradition Phases
Model A: Start and End
Boundaries of Central Plains
tradition Phases. Sample classes
included: 1A, 1B, 2A, 2B, 2C, 3E.**

```

Plot(Central Plains tradition All Dates)
{
  Phase("Central Plains")
  {
    Sequence("Glenwood CPT")
    {
      Boundary("Start Glenwood CPT");
      Phase("Glenwood CPT")
      {
        R_Date("Wis-697", 875, 60);
        R_Date("ISGS-A3629", 870, 20);
        R_Date("Wis-699", 865, 55);

```

```

        R_Date("Wis-709", 860, 55);
        R_Date("Wis-713", 860, 60);
        R_Date("Wis-566", 855, 55);
        R_Date("Wis-701", 850, 55);
        R_Date("Wis-716", 840, 60);
        R_Date("ISGS-3440", 840, 15);
        R_Date("ISGS-3444", 840, 15);
        R_Date("ISGS-3144", 840, 70);
        R_Date("ISGS-3447", 835, 15);
        R_Date("Wis-700", 835, 55);
        R_Date("ISGS-A3624", 830, 20);
        R_Date("Wis-564", 825, 60);
        R_Date("Wis-560", 820, 50);
        R_Date("Wis-559", 820, 55);
        R_Date("ISGS-A3622", 810, 20);
        R_Date("Beta-382843 ", 810, 30);
        R_Date("ISGS-A3621", 805, 20);
        R_Date("ISGS-3441", 800, 15);
        R_Date("ISGS-3445", 800, 15);
        R_Date("ISGS-3446", 800, 15);
        R_Date("ISGS-A3623", 800, 20);
        R_Date("ISGS-A3625", 800, 20);
        R_Date("ISGS-3443", 795, 15);
        R_Date("Wis-565", 790, 55);
        R_Date("ISGS-A3314", 790, 20);
        R_Date("ISGS-A3315", 785, 20);
        R_Date("ISGS-A3619", 785, 20);
        R_Date("ISGS-3442", 780, 15);
        R_Date("Wis-698", 775, 55);
        R_Date("Wis-900", 775, 55);
        R_Date("Wis-896", 770, 60);
        R_Date("Wis-562", 765, 55);
        R_Date("ISGS-A3626", 765, 15);
        R_Date("ISGS-A3618", 760, 20);
        R_Date("ISGS-3145", 760, 70);
        R_Date("ISGS-A3132 ", 760, 20);
        R_Date("SI-693", 750, 90);
        R_Date("I-693", 750, 90);
        R_Date("ISGS-A3620", 745, 20);
        R_Date("SI-212", 740, 80);
        R_Date("GX-2005", 735, 90);
        R_Date("Wis-632", 730, 45);
        R_Date("ISGS-3148", 720, 70);
        R_Date("ISGS-A3181", 720, 15);
        R_Date("I-6295", 712, 90);
        R_Date("ISGS-3147", 710, 90);

```

```

R_Date("Wis-878", 705, 50);
R_Date("I-6297", 705, 100);
R_Date("Wis-894", 700, 55);
R_Date("ISGS-3434", 695, 15);
R_Date("ISGS-3436", 690, 15);
R_Date("Wis-702", 690, 50);
R_Date("Wis-877", 690, 55);
R_Date("Beta-55495", 690, 60);
R_Date("GX-2008", 690, 100);
R_Date("ISGS-3428", 680, 15);
R_Date("SI-210", 670, 70);
R_Date("ISGS-3435", 665, 15);
R_Date("Beta-382844", 650, 30);
R_Date("ISGS-A3627", 645, 20);
R_Date("ISGS-A3133 ", 645, 15);
R_Date("ISGS-A3357", 645, 15);
R_Date("ISGS-A3450", 645, 15);
R_Date("ISGS-A3451", 625, 15);
R_Date("Beta-55494", 620, 60);
R_Date("Beta-267045 ", 610, 40);
};
Boundary("End Glenwood CPT");
};
Sequence("Itskari CPT")
{
Boundary("Start Itskari CPT");
Phase("Itskari CPT")
{
R_Date("D-AMS037367", 984, 24);
R_Date("UCI-261021", 970, 15);
R_Date("Beta-100933", 920, 50);
R_Date("Beta-70725", 900, 80);
R_Date("UCI-261095", 885, 15);
R_Date("UCI-261096", 885, 15);
R_Date("UCI-261094", 880, 15);
R_Date("TX-8367", 861, 47);
R_Date("UCI-261020", 845, 15);
R_Date("UCI-261092", 835, 15);
R_Date("UGa-1952", 830, 75);
R_Date("M-835", 820, 100);
R_Date("UGa-1953", 795, 60);
R_Date("Wis-2146", 770, 50);
R_Date("TX-8368", 744, 55);
R_Date("NSRL-3413", 730, 60);
R_Date("UGa-1950", 729, 75);
R_Date("Beta-184493", 720, 70);

```

```

R_Date("UCI-261017", 715, 15);
R_Date("UCI-261018", 710, 20);
R_Date("NSRL-3414", 710, 60);
R_Date("UCI-261093", 700, 20);
R_Date("UCI-261016", 695, 15);
R_Date("Wis-2149", 695, 50);
R_Date("A2268", 685, 20);
R_Date("UGa-1949", 684, 75);
R_Date("Wis-2148", 680, 50);
R_Date("UCI-261019", 675, 15);
R_Date("Wis-2147", 675, 50);
R_Date("Wis-1765", 670, 70);
R_Date("A2267", 660, 20);
R_Date("Beta-184492", 660, 60);
R_Date("A2269", 650, 20);
R_Date("WIS-2314", 650, 60);
R_Date("TX-8369", 637, 39);
R_Date("UGa-1951", 614, 75);
R_Date("AA-41430", 611, 42);
R_Date("Beta-70724", 590, 70);
R_Date("A1927", 580, 15);
R_Date("A1929", 565, 15);
R_Date("A1928", 560, 15);
};
Boundary("End Itskari CPT");
};
Sequence("Nebraska CPT")
{
Boundary("Start Nebraska CPT");
Phase("Nebraska CPT")
{
R_Date("SI-619", 910, 140);
R_Date("OS-18143 ", 905, 50);
R_Date("SI-631", 850, 140);
R_Date("AA36110 ", 845, 45);
R_Date("TX-8321", 830, 40);
R_Date("TX-8576", 825, 130);
R_Date("UCI-261009", 820, 15);
R_Date("TX-8527", 815, 40);
R_Date("UCI-261008", 810, 15);
R_Date("AA36108 ", 810, 45);
R_Date("NWU-66", 810, 80);
R_Date("AA36107 ", 785, 40);
R_Date("AA36109 ", 780, 40);
R_Date("SI-629", 775, 175);
R_Date("TX-8577", 770, 145);

```

```

R_Date("TX-8529", 765, 45);
R_Date("Wis-2152", 765, 50);
R_Date("TX-8322", 750, 80);
R_Date("TX-8324", 750, 50);
R_Date("SI-634", 750, 120);
R_Date("TX-8320", 745, 55);
R_Date("SI-624", 735, 115);
R_Date("NWU-67", 730, 95);
R_Date("TX-8319", 720, 45);
R_Date("TX-8323", 720, 40);
R_Date("SI-633", 720, 140);
R_Date("Beta-101876 ", 710, 40);
R_Date("M-1367", 705, 100);
R_Date("Wis-2344", 690, 60);
R_Date("SI-632", 680, 140);
R_Date("TX-8580", 665, 45);
R_Date("Wis-2150", 660, 50);
R_Date("TX-8318", 645, 40);
R_Date("UCI-261010", 640, 15);
R_Date("TX-8579", 640, 40);
R_Date("TX-8578", 630, 95);
R_Date("TX-8523 ", 620, 45);
R_Date("SI-621", 615, 115);
R_Date("TX-8525", 610, 45);
R_Date("SI-625", 610, 140);
R_Date("Wis-2151", 595, 50);
R_Date("SI-635", 585, 115);
R_Date("M-1366", 585, 100);
R_Date("NSRL-3434 ", 550, 60);
R_Date("SI-628", 550, 65);
R_Date("SI-622", 550, 100);
R_Date("Wis-2311", 540, 55);
R_Date("SI-620", 540, 110);
R_Date("SI-627", 515, 115);
};
Boundary("End Nebraska Cpt");
};
Sequence("Smoky Hill Cpt")
{
Boundary("Start Smoky Hill Cpt");
Phase("Smoky Hill Cpt")
{
R_Date("ISGS-A1547", 1070, 15);
R_Date("SI-143", 1020, 90);
R_Date("TX-5913", 1010, 210);
R_Date("ISGS-A1551", 990, 15);

```

```

R_Date("I-509", 963, 100);
R_Date("ISGS-A1554", 935, 15);
R_Date("AA-85333", 926, 33);
R_Date("SI-230", 920, 90);
R_Date("AA-85337", 890, 33);
R_Date("Beta-178533", 870, 40);
R_Date("ISGS-A1461", 860, 15);
R_Date("ISGS-A5746", 860, 70);
R_Date("UGa-465", 860, 60);
R_Date("Beta-177518", 860, 60);
R_Date("UGa-826", 835, 65);
R_Date("ISGS-A569", 825, 25);
R_Date("ISGS-6654", 820, 70);
R_Date("Beta-178238", 820, 40);
R_Date("ISGS-5747", 820, 70);
R_Date("UGa-828", 810, 60);
R_Date("ISGS-5752", 800, 70);
R_Date("M-113", 780, 75);
R_Date("ISGS-A570", 780, 60);
R_Date("SI-231", 770, 80);
R_Date("AA-85316", 766, 41);
R_Date("M-869", 760, 75);
R_Date("ISGS-3134", 760, 70);
R_Date("AA-85315", 758, 41);
R_Date("ISGS-A1558", 755, 15);
R_Date("AA-85338", 740, 35);
R_Date("ISGS-3137", 740, 240);
R_Date("AA-85334", 733, 41);
R_Date("Beta-173317", 730, 60);
R_Date("Beta-16479", 730, 70);
R_Date("ISGS-A1550", 725, 20);
R_Date("AA-85336", 719, 35);
R_Date("ISGS-A1553", 715, 15);
R_Date("AA-85317", 715, 41);
R_Date("AA-85320", 714, 40);
R_Date("Beta-177519", 710, 60);
R_Date("Beta-179560", 710, 60);
R_Date("ISGS-A1548", 705, 15);
R_Date("ISGS-A1549", 705, 15);
R_Date("AA-85318", 700, 40);
R_Date("ISGS-3138", 700, 80);
R_Date("UGa-824", 700, 75);
R_Date("AA-96465", 698, 35);
R_Date("AA-85335", 697, 32);
R_Date("AA-85339", 692, 35);
R_Date("AA-85324", 686, 35);

```



```

R_Date("AA-85322", 685, 37);
R_Date("PRI-11-157-200", 680, 20);
R_Date("Beta-16480", 680, 70);
R_Date("ISGS-A1462", 675, 15);
R_Date("ISGS-A1552", 675, 15);
R_Date("AA-85326", 674, 36);
R_Date("ISGS-3141", 670, 190);
R_Date("UGa-827", 670, 60);
R_Date("UGa-3867", 670, 60);
R_Date("ISGS-A1556", 665, 15);
R_Date("AA-85323", 664, 35);
R_Date("AA-85340", 663, 35);
R_Date("AA-85341", 647, 33);
R_Date("AA-85327", 646, 45);
R_Date("PRI-11-157-2389", 645, 15);
R_Date("AA-85328", 643, 34);
R_Date("AA-85332", 643, 42);
R_Date("PRI-11-157-2254", 640, 15);
R_Date("AA-85331", 638, 45);
R_Date("PRI-11-157-196", 635, 15);
R_Date("AA-85325", 631, 36);
R_Date("ISGS-3133", 630, 70);
R_Date("PRI-11-157-831", 630, 15);
R_Date("PRI-11-157-2905", 630, 15);
R_Date("Beta-45873", 630, 60);
R_Date("AA-85330", 622, 42);
R_Date("UGa-825", 595, 60);
R_Date("ISGS-6656", 580, 70);
R_Date("Beta-46652", 580, 50);
R_Date("AA-85319", 539, 67);
};
Boundary("End Smoky Hill CPt");
};
Sequence("Solomon River CPt")
{
Boundary("Start Solomon River CPt");
Phase("Solomon River CPt")
{
R_Date("Beta-54043", 920, 70);
R_Date("Beta-54047", 880, 50);
R_Date("Beta-54039", 880, 50);
R_Date("Beta-54046", 870, 60);
R_Date("Beta-54040", 860, 50);
R_Date("Beta-3334", 850, 50);
R_Date("Beta-54050", 820, 50);
R_Date("Beta-54048", 800, 50);

```

```

R_Date("Beta-54045", 780, 50);
R_Date("Beta-54044", 740, 50);
R_Date("Beta-54042", 720, 50);
R_Date("Beta-54051", 660, 50);
R_Date("Beta-54049", 620, 50);
R_Date("Beta-54041", 560, 50);
};
Boundary("End Solomon River CPt");
};
Sequence("St Helena CPt")
{
Boundary("Start St Helena CPt");
Phase("St Helena CPt")
{
R_Date("M-1074", 830, 75);
R_Date("UCI-261125", 785, 15);
R_Date("UCI-261132", 775, 15);
R_Date("UCI-261128", 770, 15);
R_Date("UCI-261126", 770, 20);
R_Date("UCI-261127", 740, 15);
R_Date("UCI-261111", 735, 20);
R_Date("UCI-261124", 730, 15);
R_Date("UCI-261129", 725, 15);
R_Date("UCI-261110", 700, 20);
R_Date("UCI-261109", 670, 15);
R_Date("UCI-261116", 670, 20);
R_Date("UCI-261107", 660, 15);
R_Date("UCI-261130", 640, 15);
R_Date("UCI-261106", 610, 15);
R_Date("UCI-261105", 605, 15);
R_Date("UCI-261108", 595, 15);
R_Date("Beta-16406", 570, 60);
R_Date("M-1073", 515, 75);
};
Boundary("End St Helena CPt");
};
Sequence("Steed-Kisker CPt")
{
Boundary("Start Steed-Kisker CPt");
Phase("Steed-Kisker CPt")
{
R_Date("M-1395-B", 950, 110);
R_Date("M-1395b", 950, 110);
R_Date("M-1395", 920, 140);
R_Date("Beta-39366", 910, 50);
R_Date("Beta-34371", 910, 50);

```

R_Date("Beta-36366", 910, 50);
 R_Date("ISGS-A1460", 905, 15);
 R_Date("ISGS-A1728", 900, 20);
 R_Date("Beta-97603", 890, 40);
 R_Date("Beta-121009", 890, 50);
 R_Date("ISGS-A1729", 885, 20);
 R_Date("M-2347", 880, 110);
 R_Date("UGa-1445", 865, 70);
 R_Date("ISGS-A1726", 860, 20);
 R_Date("Wis-326", 860, 55);
 R_Date("AA-41432", 858, 39);
 R_Date("ISGS-A1727", 850, 20);
 R_Date("Beta-121008", 850, 50);
 R_Date("M-9026?", 850, 110);
 R_Date("M-9026-9027?", 850, 110);
 R_Date("M-9027?", 850, 110);
 R_Date("M-9036", 850, 110);
 R_Date("M-9037", 850, 110);
 R_Date("UGa-1454", 845, 80);
 R_Date("AA-41434", 842, 38);
 R_Date("M-1395-A", 840, 110);
 R_Date("M-1395a", 840, 110);
 R_Date("M-1995a", 840, 110);
 R_Date("ISGS-A1459", 835, 15);
 R_Date("UGa-1447", 835, 75);
 R_Date("Beta-10693", 830, 90);
 R_Date("ISGS-A1734", 805, 20);
 R_Date("AA-41433", 804, 42);
 R_Date("ISGS-A1455", 800, 15);
 R_Date("ISGS-A1725", 790, 20);
 R_Date("ISGS-A1735", 790, 20);
 R_Date("AA-43407", 789, 39);
 R_Date("OS-4450", 770, 25);
 R_Date("ISGS-A1456", 760, 15);
 R_Date("M-1398", 740, 100);
 R_Date("ISGS-A1733", 720, 20);
 R_Date("M-1399", 720, 100);
 R_Date("ISGS-A1457 ", 705, 15);
 R_Date("UGa-1148", 695, 100);
 R_Date("ISGS-A1458 ", 685, 15);
 R_Date("ISGS-A1731", 685, 20);
 R_Date("ISGS-A1732", 685, 20);
 R_Date("ISGS-A1781", 670, 15);
 R_Date("Beta-10692", 670, 70);
 R_Date("ISGS-A1730", 660, 20);
 R_Date("M-2346", 660, 100);

R_Date("AA-41431", 656, 68);
 R_Date("UGa-466", 645, 60);
 R_Date("UGa-392", 635, 60);
 R_Date("ISGS-5074", 630, 70);
 R_Date("ISGS-5540", 610, 70);
 };
 Boundary("End Steed-Kisker CPT");
 };
 Sequence("Upper Republican CPT")
 {
 Boundary("Start Upper Republican CPT");
 Phase("Upper Republican CPT")
 {
 R_Date("SI-194", 930, 80);
 R_Date("Wis-324", 930, 60);
 R_Date("I-641", 875, 100);
 R_Date("Wis-2154", 870, 40);
 R_Date("SI-36", 865, 65);
 R_Date("SI-53", 845, 65);
 R_Date("SI-32", 830, 65);
 R_Date("Wis-2155", 830, 50);
 R_Date("SI-73", 820, 50);
 R_Date("Wis-1796", 810, 70);
 R_Date("SI-193", 800, 100);
 R_Date("Wis-318", 790, 55);
 R_Date("I-585", 780, 125);
 R_Date("Wis-319", 770, 55);
 R_Date("SI-192", 750, 80);
 R_Date("SI-56", 750, 65);
 R_Date("I-642", 750, 100);
 R_Date("I-583", 715, 125);
 R_Date("SI-40", 710, 65);
 R_Date("PRI-11-140-33", 710, 15);
 R_Date("Wis-1798", 690, 70);
 R_Date("SI-196", 670, 120);
 R_Date("Wis-1814", 670, 70);
 R_Date("PRI-11-140-219-2", 660, 60);
 R_Date("Wis-1797", 660, 70);
 R_Date("SI-70", 640, 50);
 R_Date("Wis-1800", 620, 70);
 R_Date("PRI-11-140-221", 610, 15);
 R_Date("PRI-11-140-222-2", 610, 20);
 R_Date("PRI-11-140-218", 605, 20);
 R_Date("PRI-11-140-1556", 595, 20);
 R_Date("PRI-11-140-221-2", 585, 20);
 R_Date("PRI-11-140-222-1", 585, 20);

```

R_Date("M-1365", 565, 100);
R_Date("Wis-1801", 530, 70);
R_Date("I-584", 510, 100);
R_Date("M-844", 500, 100);
R_Date("SI-72", 440, 40);
R_Date("Wis-1799", 430, 70);
};
Boundary("End Upper Republican CPt");
};
Order("End")
{
Date("=End Upper Republican CPt");
Date("=End Smoky Hill CPt");
Date("=End Itskari CPt");
Date("=End Nebraska CPt");
Date("=End Solomon River CPt");
Date("=End St Helena CPt");
Date("=End Glenwood CPt");
Date("=End Steed-Kisker CPt");
};
Order("Start")
{
Date("=Start St Helena CPt");
Date("=Start Glenwood CPt");
Date("=Start Nebraska CPt");
Date("=Start Upper Republican CPt");
Date("=Start Solomon River CPt");
Date("=Start Steed-Kisker CPt");
Date("=Start Itskari CPt");
Date("=Start Smoky Hill CPt");
};
};
};

```

**aa. OxCal 4.4 Code for Figure 35.
Central Plains tradition Phases
Model B: Start and End
Boundaries of Central Plains
tradition Phases. Sample classes
included: 1A, 1B, 2A, 2B, 2C.**

```

Plot(Central Plains tradition Normalized
Dates)
{
Phase("Central Plains")
{

```

```

Sequence("Glenwood CPt")
{
Boundary("Start Glenwood CPt");
Phase("Glenwood CPt")
{
R_Date("Wis-697", 875, 60);
R_Date("ISGS-A3629", 870, 20);
R_Date("Wis-699", 865, 55);
R_Date("Wis-709", 860, 55);
R_Date("Wis-566", 855, 55);
R_Date("Wis-701", 850, 55);
R_Date("Wis-716", 840, 60);
R_Date("ISGS-3440", 840, 15);
R_Date("ISGS-3444", 840, 15);
R_Date("ISGS-3144", 840, 70);
R_Date("Wis-700", 835, 55);
R_Date("ISGS-3447", 835, 15);
R_Date("ISGS-A3624", 830, 20);
R_Date("Wis-564", 825, 60);
R_Date("Wis-560", 820, 50);
R_Date("Wis-559", 820, 55);
R_Date("ISGS-A3622", 810, 20);
R_Date("Beta-382843 ", 810, 30);
R_Date("ISGS-A3621", 805, 20);
R_Date("ISGS-A3623", 800, 20);
R_Date("ISGS-A3625", 800, 20);
R_Date("ISGS-3441", 800, 15);
R_Date("ISGS-3445", 800, 15);
R_Date("ISGS-3446", 800, 15);
R_Date("ISGS-3443", 795, 15);
R_Date("Wis-565", 790, 55);
R_Date("ISGS-A3314", 790, 20);
R_Date("ISGS-A3619", 785, 20);
R_Date("ISGS-A3315", 785, 20);
R_Date("ISGS-3442", 780, 15);
R_Date("Wis-698", 775, 55);
R_Date("Wis-900", 775, 55);
R_Date("Wis-896", 770, 60);
R_Date("ISGS-A3626", 765, 15);
R_Date("Wis-562", 765, 55);
R_Date("ISGS-A3618", 760, 20);
R_Date("ISGS-3145", 760, 70);
R_Date("ISGS-A3132 ", 760, 20);
R_Date("ISGS-A3620", 745, 20);
R_Date("SI-212", 740, 80);
R_Date("Wis-632", 730, 45);

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R_Date("ISGS-A3181", 720, 15);
R_Date("ISGS-3148", 720, 70);
R_Date("ISGS-3147", 710, 90);
R_Date("Wis-878", 705, 50);
R_Date("Wis-894", 700, 55);
R_Date("ISGS-3434", 695, 15);
R_Date("Beta-55495", 690, 60);
R_Date("Wis-702", 690, 50);
R_Date("Wis-877", 690, 55);
R_Date("ISGS-3436", 690, 15);
R_Date("ISGS-3428", 680, 15);
R_Date("SI-210", 670, 70);
R_Date("ISGS-3435", 665, 15);
R_Date("Beta-382844", 650, 30);
R_Date("ISGS-A3627", 645, 20);
R_Date("ISGS-A3133 ", 645, 15);
R_Date("ISGS-A3357", 645, 15);
R_Date("ISGS-A3450", 645, 15);
R_Date("ISGS-A3451", 625, 15);
R_Date("Beta-55494", 620, 60);
R_Date("Beta-267045 ", 610, 40);
};
Boundary("End Glenwood CPT");
};
Sequence("Itskari CPT")
{
  Boundary("Start Itskari CPT");
  Phase("Itskari CPT")
  {
    R_Date("D-AMS037367", 984, 24);
    R_Date("UCI-261021", 970, 15);
    R_Date("Beta-100933", 920, 50);
    R_Date("UCI-261095", 885, 15);
    R_Date("UCI-261096", 885, 15);
    R_Date("UCI-261094", 880, 15);
    R_Date("UCI-261020", 845, 15);
    R_Date("UCI-261092", 835, 15);
    R_Date("M-835", 820, 100);
    R_Date("NSRL-3413", 730, 60);
    R_Date("UGa-1950", 729, 75);
    R_Date("Beta-184493", 720, 70);
    R_Date("UCI-261017", 715, 15);
    R_Date("UCI-261018", 710, 20);
    R_Date("NSRL-3414", 710, 60);
    R_Date("UCI-261093", 700, 20);
    R_Date("UCI-261016", 695, 15);

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```

R_Date("A2268", 685, 20);
R_Date("UGa-1949", 684, 75);
R_Date("UCI-261019", 675, 15);
R_Date("Wis-1765", 670, 70);
R_Date("A2267", 660, 20);
R_Date("Beta-184492", 660, 60);
R_Date("A2269", 650, 20);
R_Date("WIS-2314", 650, 60);
R_Date("UGa-1951", 614, 75);
R_Date("AA-41430", 611, 42);
R_Date("A1927", 580, 15);
R_Date("A1929", 565, 15);
R_Date("A1928", 560, 15);
};
Boundary("End Itskari CPT");
};
Sequence("Nebraska CPT")
{
  Boundary("Start Nebraska CPT");
  Phase("Nebraska CPT")
  {
    R_Date("SI-619", 910, 140);
    R_Date("SI-631", 850, 140);
    R_Date("AA36110 ", 845, 45);
    R_Date("TX-8321", 830, 40);
    R_Date("TX-8576", 825, 130);
    R_Date("UCI-261009", 820, 15);
    R_Date("TX-8527", 815, 40);
    R_Date("UCI-261008", 810, 15);
    R_Date("AA36108 ", 810, 45);
    R_Date("AA36107 ", 785, 40);
    R_Date("AA36109 ", 780, 40);
    R_Date("SI-629", 775, 175);
    R_Date("TX-8577", 770, 145);
    R_Date("TX-8529", 765, 45);
    R_Date("Wis-2152", 765, 50);
    R_Date("TX-8322", 750, 80);
    R_Date("TX-8324", 750, 50);
    R_Date("SI-634", 750, 120);
    R_Date("TX-8320", 745, 55);
    R_Date("TX-8319", 720, 45);
    R_Date("TX-8323", 720, 40);
    R_Date("SI-633", 720, 140);
    R_Date("Beta-101876 ", 710, 40);
    R_Date("Wis-2344", 690, 60);
    R_Date("SI-632", 680, 140);

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R_Date("TX-8580", 665, 45);
R_Date("Wis-2150", 660, 50);
R_Date("TX-8318", 645, 40);
R_Date("UCI-261010", 640, 15);
R_Date("TX-8579", 640, 40);
R_Date("TX-8578", 630, 95);
R_Date("TX-8523 ", 620, 45);
R_Date("TX-8525", 610, 45);
R_Date("Wis-2151", 595, 50);
R_Date("SI-635", 585, 115);
R_Date("NSRL-3434 ", 550, 60);
R_Date("SI-628", 550, 65);
R_Date("SI-622", 550, 100);
R_Date("Wis-2311", 540, 55);
};
Boundary("End Nebraska Cpt");
};
Sequence("Smoky Hill Cpt")
{
Boundary("Start Smoky Hill Cpt");
Phase("Smoky Hill Cpt")
{
R_Date("Beta-178533", 870, 55);
R_Date("ISGS-A1461", 860, 55);
R_Date("ISGS-A5746", 860, 55);
R_Date("UGa-465", 860, 55);
R_Date("Beta-177518", 860, 55);
R_Date("ISGS-A569", 825, 55);
R_Date("Beta-178238", 820, 55);
R_Date("ISGS-6654", 820, 55);
R_Date("ISGS-5747", 820, 55);
R_Date("UGa-828", 810, 55);
R_Date("ISGS-5752", 800, 55);
R_Date("M-113", 780, 55);
R_Date("ISGS-A570", 780, 55);
R_Date("SI-231", 770, 55);
R_Date("AA-85316", 766, 55);
R_Date("M-869", 760, 55);
R_Date("ISGS-3134", 760, 55);
R_Date("AA-85315", 758, 55);
R_Date("ISGS-A1558", 755, 55);
R_Date("AA-85338", 740, 55);
R_Date("ISGS-3137", 740, 55);
R_Date("AA-85334", 733, 55);
R_Date("Beta-173317", 730, 55);
R_Date("ISGS-A1550", 725, 55);

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R_Date("AA-85336", 719, 55);
R_Date("AA-85317", 715, 55);
R_Date("ISGS-A1553", 715, 55);
R_Date("AA-85320", 714, 55);
R_Date("Beta-177519", 710, 55);
R_Date("Beta-179560", 710, 55);
R_Date("ISGS-A1548", 705, 55);
R_Date("ISGS-A1549", 705, 55);
R_Date("AA-85318", 700, 55);
R_Date("ISGS-3138", 700, 55);
R_Date("AA-96465", 698, 55);
R_Date("AA-85335", 697, 55);
R_Date("AA-85339", 692, 55);
R_Date("AA-85324", 686, 55);
R_Date("AA-85322", 685, 55);
R_Date("PRI-11-157-200", 680, 55);
R_Date("ISGS-A1462", 675, 55);
R_Date("ISGS-A1552", 675, 55);
R_Date("AA-85326", 674, 55);
R_Date("ISGS-3141", 670, 55);
R_Date("UGa-827", 670, 55);
R_Date("ISGS-A1556", 665, 55);
R_Date("AA-85323", 664, 55);
R_Date("AA-85340", 663, 55);
R_Date("AA-85341", 647, 55);
R_Date("AA-85327", 646, 55);
R_Date("PRI-11-157-2389", 645, 55);
R_Date("AA-85328", 643, 55);
R_Date("AA-85332", 643, 55);
R_Date("PRI-11-157-2254", 640, 55);
R_Date("AA-85331", 638, 55);
R_Date("PRI-11-157-196", 635, 55);
R_Date("AA-85325", 631, 55);
R_Date("PRI-11-157-831", 630, 55);
R_Date("PRI-11-157-2905", 630, 55);
R_Date("ISGS-3133", 630, 55);
R_Date("AA-85330", 622, 55);
R_Date("ISGS-6656", 580, 55);
R_Date("Beta-46652", 580, 55);
};
Boundary("End Smoky Hill Cpt");
};
Sequence("Solomon River Cpt")
{
Boundary("Start Solomon River Cpt");
Phase("Solomon River Cpt")

```

```

{
  R_Date("Beta-54043", 920, 70);
  R_Date("Beta-54047", 880, 50);
  R_Date("Beta-54039", 880, 50);
  R_Date("Beta-54046", 870, 60);
  R_Date("Beta-54040", 860, 50);
  R_Date("Beta-54050", 820, 50);
  R_Date("Beta-54048", 800, 50);
  R_Date("Beta-54045", 780, 50);
  R_Date("Beta-54044", 740, 50);
  R_Date("Beta-54042", 720, 50);
  R_Date("Beta-54051", 660, 50);
  R_Date("Beta-54049", 620, 50);
  R_Date("Beta-54041", 560, 50);
};
Boundary("End Solomon River CPT");
};
Sequence("St Helena CPt")
{
  Boundary("Start St Helena CPt");
  Phase("St Helena CPt")
  {
    R_Date("UCI-261125", 785, 15);
    R_Date("UCI-261132", 775, 15);
    R_Date("UCI-261128", 770, 15);
    R_Date("UCI-261126", 770, 20);
    R_Date("UCI-261127", 740, 15);
    R_Date("UCI-261111", 735, 20);
    R_Date("UCI-261124", 730, 15);
    R_Date("UCI-261129", 725, 15);
    R_Date("UCI-261110", 700, 20);
    R_Date("UCI-261109", 670, 15);
    R_Date("UCI-261116", 670, 20);
    R_Date("UCI-261107", 660, 15);
    R_Date("UCI-261130", 640, 15);
    R_Date("UCI-261106", 610, 15);
    R_Date("UCI-261105", 605, 15);
    R_Date("UCI-261108", 595, 15);
  };
  Boundary("End St Helena CPt");
};
Sequence("Steed-Kisker CPT")
{
  Boundary("Start Steed-Kisker CPT");
  Phase("Steed-Kisker CPT")
  {

```

```

    R_Date("M-1395-B", 950, 110);
    R_Date("ISGS-A1728", 900, 20);
    R_Date("Beta-97603", 890, 40);
    R_Date("Beta-121009", 890, 50);
    R_Date("ISGS-A1729", 885, 20);
    R_Date("M-2347", 880, 110);
    R_Date("ISGS-A1726", 860, 20);
    R_Date("AA-41432", 858, 39);
    R_Date("ISGS-A1727", 850, 20);
    R_Date("Beta-121008", 850, 50);
    R_Date("AA-41434", 842, 38);
    R_Date("M-1395-A", 840, 110);
    R_Date("ISGS-A1459", 835, 15);
    R_Date("ISGS-A1734", 805, 20);
    R_Date("AA-41433", 804, 42);
    R_Date("ISGS-A1455", 800, 15);
    R_Date("ISGS-A1735", 790, 20);
    R_Date("ISGS-A1725", 790, 20);
    R_Date("AA-43407", 789, 39);
    R_Date("OS-4450", 770, 25);
    R_Date("ISGS-A1456", 760, 15);
    R_Date("ISGS-A1733", 720, 20);
    R_Date("ISGS-A1457 ", 705, 15);
    R_Date("ISGS-A1458 ", 685, 15);
    R_Date("ISGS-A1731", 685, 20);
    R_Date("ISGS-A1732", 685, 20);
    R_Date("ISGS-A1781", 670, 15);
    R_Date("ISGS-A1730", 660, 20);
    R_Date("M-2346", 660, 100);
    R_Date("AA-41431", 656, 68);
    R_Date("ISGS-5074", 630, 70);
    R_Date("ISGS-5540", 610, 70);
  };
  Boundary("End Steed-Kisker CPT");
};
Sequence("Upper Republican CPT")
{
  Boundary("Start Upper Republican CPT");
  Phase("Upper Republican CPT")
  {
    R_Date("SI-194", 930, 80);
    R_Date("Wis-324", 930, 60);
    R_Date("I-641", 875, 100);
    R_Date("Wis-2154", 870, 40);
    R_Date("SI-36", 865, 65);
    R_Date("SI-53", 845, 65);

```

```

R_Date("SI-32", 830, 65);
R_Date("Wis-2155", 830, 50);
R_Date("SI-73", 820, 50);
R_Date("Wis-1796", 810, 70);
R_Date("SI-193", 800, 100);
R_Date("Wis-318", 790, 55);
R_Date("I-585", 780, 125);
R_Date("Wis-319", 770, 55);
R_Date("SI-192", 750, 80);
R_Date("SI-56", 750, 65);
R_Date("I-642", 750, 100);
R_Date("I-583", 715, 125);
R_Date("PRI-11-140-33", 710, 15);
R_Date("SI-40", 710, 65);
R_Date("Wis-1798", 690, 70);
R_Date("SI-196", 670, 120);
R_Date("Wis-1814", 670, 70);
R_Date("PRI-11-140-219-2", 660, 60);
R_Date("Wis-1797", 660, 70);
R_Date("SI-70", 640, 50);
R_Date("Wis-1800", 620, 70);
R_Date("PRI-11-140-221", 610, 15);
R_Date("PRI-11-140-222-2", 610, 20);
R_Date("PRI-11-140-218", 605, 20);
R_Date("PRI-11-140-1556", 595, 20);
R_Date("PRI-11-140-221-2", 585, 20);
R_Date("PRI-11-140-222-1", 585, 20);
R_Date("M-1365", 565, 100);
R_Date("Wis-1801", 530, 70);
R_Date("I-584", 510, 100);
R_Date("M-844", 500, 100);
R_Date("SI-72", 440, 40);
R_Date("Wis-1799", 430, 70);
};
Boundary("End Upper Republican CPt");
};
Order("End")
{
Date("=End Upper Republican CPt");
Date("=End Itskari CPt");
Date("=End Solomon River CPt");
Date("=End Nebraska CPt");
Date("=End St Helena CPt");
Date("=End Smoky Hill CPt");
Date("=End Glenwood CPt");
Date("=End Steed-Kisker CPt");

```

```

};
Order("Start")
{
Date("=Start St Helena CPt");
Date("=Start Smoky Hill CPt");
Date("=Start Nebraska CPt");
Date("=Start Glenwood CPt");
Date("=Start Upper Republican CPt");
Date("=Start Steed-Kisker CPt");
Date("=Start Solomon River CPt");
Date("=Start Itskari CPt");
};
};
};

```

**ab. OxCal 4.4 Code for Figure 36.
Central Plains tradition Phases
Model C: Start and End
Boundaries of Central Plains
tradition Phases. Sample classes
included: 1A, 1B, 2A, 2B.**

```

Plot(Central Plains tradition Normalized
Dates)
{
Phase("Central Plains")
{
Sequence("Glenwood CPt")
{
Boundary("Start Glenwood CPt");
Phase("Glenwood CPt")
{
R_Date("Wis-719", 910, 60);
R_Date("ISGS-3449", 900, 15);
R_Date("Wis-697", 875, 60);
R_Date("ISGS-A3629", 870, 20);
R_Date("Wis-699", 865, 55);
R_Date("Wis-709", 860, 55);
R_Date("Wis-566", 855, 55);
R_Date("Wis-701", 850, 55);
R_Date("Wis-716", 840, 60);
R_Date("Wis-700", 835, 55);
R_Date("ISGS-A3624", 830, 20);
R_Date("Wis-564", 825, 60);
R_Date("Wis-560", 820, 50);
R_Date("Wis-559", 820, 55);

```

```

R_Date("ISGS-A3622", 810, 20);
R_Date("Beta-382843 ", 810, 30);
R_Date("ISGS-A3621", 805, 20);
R_Date("ISGS-A3623", 800, 20);
R_Date("ISGS-A3625", 800, 20);
R_Date("Wis-565", 790, 55);
R_Date("ISGS-A3619", 785, 20);
R_Date("Wis-698", 775, 55);
R_Date("Wis-900", 775, 55);
R_Date("Wis-896", 770, 60);
R_Date("ISGS-A3626", 765, 15);
R_Date("Wis-562", 765, 55);
R_Date("ISGS-A3618", 760, 20);
R_Date("ISGS-3145", 760, 70);
R_Date("ISGS-A3132 ", 760, 20);
R_Date("ISGS-A3620", 745, 20);
R_Date("Wis-632", 730, 45);
R_Date("ISGS-A3181", 720, 15);
R_Date("ISGS-3148", 720, 70);
R_Date("ISGS-3147", 710, 90);
R_Date("Wis-878", 705, 50);
R_Date("Wis-894", 700, 55);
R_Date("ISGS-3434", 695, 15);
R_Date("Beta-55495", 690, 60);
R_Date("Wis-702", 690, 50);
R_Date("Wis-877", 690, 55);
R_Date("ISGS-3428", 680, 15);
R_Date("ISGS-3435", 665, 15);
R_Date("Beta-382844", 650, 30);
R_Date("ISGS-A3627", 645, 20);
R_Date("ISGS-A3133 ", 645, 15);
R_Date("ISGS-A3357", 645, 15);
R_Date("ISGS-A3450", 645, 15);
R_Date("ISGS-A3451", 625, 15);
R_Date("Beta-55494", 620, 60);
R_Date("Beta-267045 ", 610, 40);
};
Boundary("End Glenwood CPt");
};
Sequence("Itskari CPt")
{
Boundary("Start Itskari CPt");
Phase("Itskari CPt")
{
R_Date("D-AMS037367", 984, 24);
R_Date("UCI-261021", 970, 15);

```

```

R_Date("UCI-261095", 885, 15);
R_Date("UCI-261096", 885, 15);
R_Date("UCI-261094", 880, 15);
R_Date("UCI-261020", 845, 15);
R_Date("UCI-261092", 835, 15);
R_Date("UGa-1950", 729, 75);
R_Date("UCI-261017", 715, 15);
R_Date("UCI-261018", 710, 20);
R_Date("UCI-261093", 700, 20);
R_Date("UCI-261016", 695, 15);
R_Date("A2268", 685, 20);
R_Date("UGa-1949", 684, 75);
R_Date("UCI-261019", 675, 15);
R_Date("A2267", 660, 20);
R_Date("A2269", 650, 20);
R_Date("UGa-1951", 614, 75);
R_Date("AA-41430", 611, 42);
R_Date("A1927", 580, 15);
R_Date("A1929", 565, 15);
R_Date("A1928", 560, 15);
};
Boundary("End Itskari CPt");
};
Sequence("Nebraska CPt")
{
Boundary("Start Nebraska CPt");
Phase("Nebraska CPt")
{
R_Date("TX-8524", 925, 55);
R_Date("OS-18143 ", 905, 50);
R_Date("AA36110 ", 845, 45);
R_Date("UCI-261009", 820, 15);
R_Date("UCI-261008", 810, 15);
R_Date("AA36108 ", 810, 45);
R_Date("AA36107 ", 785, 40);
R_Date("AA36109 ", 780, 40);
R_Date("Beta-101876 ", 710, 40);
R_Date("UCI-261010", 640, 15);
R_Date("TX-8523 ", 620, 45);
R_Date("TX-8525", 610, 45);
R_Date("NSRL-3434 ", 550, 60);
};
Boundary("End Nebraska CPt");
};
Sequence("Smoky Hill CPt")
{

```



```

Boundary("Start Smoky Hill CPt");
Phase("Smoky Hill CPt")
{
  R_Date("ISGS-A1724", 1110, 25);
  R_Date("ISGS-A1547", 1070, 15);
  R_Date("ISGS-A1551", 990, 15);
  R_Date("ISGS-A1554", 935, 15);
  R_Date("AA-85333", 926, 33);
  R_Date("AA-85337", 890, 33);
  R_Date("Beta-178533", 870, 40);
  R_Date("ISGS-A1461", 860, 15);
  R_Date("Beta-178238", 820, 40);
  R_Date("AA-85316", 766, 41);
  R_Date("AA-85315", 758, 41);
  R_Date("ISGS-A1558", 755, 15);
  R_Date("AA-85338", 740, 35);
  R_Date("AA-85334", 733, 41);
  R_Date("ISGS-A1550", 725, 20);
  R_Date("AA-85336", 719, 35);
  R_Date("AA-85317", 715, 41);
  R_Date("ISGS-A1553", 715, 15);
  R_Date("AA-85320", 714, 40);
  R_Date("ISGS-A1548", 705, 15);
  R_Date("ISGS-A1549", 705, 15);
  R_Date("AA-85318", 700, 40);
  R_Date("AA-96465", 698, 35);
  R_Date("AA-85335", 697, 32);
  R_Date("AA-85339", 692, 35);
  R_Date("AA-85324", 686, 35);
  R_Date("AA-85322", 685, 37);
  R_Date("PRI-11-157-200", 680, 20);
  R_Date("ISGS-A1462", 675, 15);
  R_Date("ISGS-A1552", 675, 15);
  R_Date("AA-85326", 674, 36);
  R_Date("ISGS-A1556", 665, 15);
  R_Date("AA-85323", 664, 35);
  R_Date("AA-85340", 663, 35);
  R_Date("AA-85341", 647, 33);
  R_Date("AA-85327", 646, 45);
  R_Date("PRI-11-157-2389", 645, 15);
  R_Date("AA-85328", 643, 34);
  R_Date("AA-85332", 643, 42);
  R_Date("PRI-11-157-2254", 640, 15);
  R_Date("AA-85331", 638, 45);
  R_Date("PRI-11-157-196", 635, 15);
  R_Date("AA-85325", 631, 36);

```

```

  R_Date("PRI-11-157-831", 630, 15);
  R_Date("PRI-11-157-2905", 630, 15);
  R_Date("AA-85330", 622, 42);
  R_Date("AA-85319", 539, 67);
  R_Date("AA-85329", 534, 35);
};
Boundary("End Smoky Hill CPt");
};
Sequence("St Helena CPt")
{
  Boundary("Start St Helena CPt");
  Phase("St Helena CPt")
  {
    R_Date("UCI-261125", 785, 15);
    R_Date("UCI-261132", 775, 15);
    R_Date("UCI-261128", 770, 15);
    R_Date("UCI-261126", 770, 20);
    R_Date("UCI-261127", 740, 15);
    R_Date("UCI-261111", 735, 20);
    R_Date("UCI-261124", 730, 15);
    R_Date("UCI-261129", 725, 15);
    R_Date("UCI-261110", 700, 20);
    R_Date("UCI-261109", 670, 15);
    R_Date("UCI-261116", 670, 20);
    R_Date("UCI-261107", 660, 15);
    R_Date("UCI-261130", 640, 15);
    R_Date("UCI-261106", 610, 15);
    R_Date("UCI-261105", 605, 15);
    R_Date("UCI-261108", 595, 15);
  };
  Boundary("End St Helena CPt");
};
Sequence("Steed-Kisker CPt")
{
  Boundary("Start Steed-Kisker CPt");
  Phase("Steed-Kisker CPt")
  {
    R_Date("ISGS-A1728", 900, 20);
    R_Date("ISGS-A1729", 885, 20);
    R_Date("ISGS-A1726", 860, 20);
    R_Date("AA-41432", 858, 39);
    R_Date("ISGS-A1727", 850, 20);
    R_Date("AA-41434", 842, 38);
    R_Date("ISGS-A1459", 835, 15);
    R_Date("ISGS-A1734", 805, 20);
    R_Date("AA-41433", 804, 42);
  };
}

```

```

R_Date("ISGS-A1455", 800, 15);
R_Date("ISGS-A1735", 790, 20);
R_Date("ISGS-A1725", 790, 20);
R_Date("AA-43407", 789, 39);
R_Date("OS-4450", 770, 25);
R_Date("ISGS-A1456", 760, 15);
R_Date("ISGS-A1733", 720, 20);
R_Date("ISGS-A1457 ", 705, 15);
R_Date("ISGS-A1458 ", 685, 15);
R_Date("ISGS-A1731", 685, 20);
R_Date("ISGS-A1732", 685, 20);
R_Date("ISGS-A1781", 670, 15);
R_Date("ISGS-A1730", 660, 20);
R_Date("AA-41431", 656, 68);
};
Boundary("End Steed-Kisker CPt");
};
Sequence("Upper Republican CPt")
{
Boundary("Start Upper Republican CPt");
Phase("Upper Republican CPt")
{
R_Date("PRI-11-140-33", 710, 15);
R_Date("PRI-11-140-219-2", 660, 60);
R_Date("PRI-11-140-221", 610, 15);
R_Date("PRI-11-140-222-2", 610, 20);
R_Date("PRI-11-140-218", 605, 20);
R_Date("PRI-11-140-1556", 595, 20);
R_Date("PRI-11-140-221-2", 585, 20);
R_Date("PRI-11-140-222-1", 585, 20);
};
Boundary("End Upper Republican CPt");
};
Order("End")
{
Date("=End Smoky Hill CPt");
Date("=End Itskari CPt");
Date("=End Upper Republican CPt");
Date("=End Nebraska CPt");
Date("=End St Helena CPt");
Date("=End Glenwood CPt");
Date("=End Steed-Kisker CPt");
};
Order("Start")
{
Date("=Start Upper Republican CPt");

```

```

Date("=Start St Helena CPt");
Date("=Start Steed-Kisker CPt");
Date("=Start Glenwood CPt");
Date("=Start Nebraska CPt");
Date("=Start Itskari CPt");
Date("=Start Smoky Hill CPt");
};
};
};

```

ac. OxCal 4.4 Code for Figure 37. Central Plains tradition Phases Model D: Start and End Boundaries of Central Plains tradition Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model).

```

Plot(Central Plains tradition phases Outlier
Model)
{
Outlier_Model("Charcoal",Exp(1,-
10,0),U(0,3),"t");
Outlier_Model("General",T(5),U(0,4),"t");
Phase("Central Plains")
{
Sequence("Glenwood CPt")
{
Boundary("Start Glenwood CPt");
Phase("Glenwood CPt")
{
R_Date("Wis-697", 875, 60)
{
Outlier("Charcoal", 1);
};
R_Date("ISGS-A3629", 870, 20)
{
Outlier("General ", 0.05);
};
R_Date("Wis-699", 865, 55)
{
Outlier("Charcoal", 1);
};
R_Date("Wis-709", 860, 55)
{
Outlier("Charcoal", 1);
};
R_Date("Wis-566", 855, 55)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("Wis-701", 850, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-716", 840, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3440", 840, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3444", 840, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3144", 840, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-700", 835, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3447", 835, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A3624", 830, 20)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-564", 825, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-560", 820, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-559", 820, 55)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("ISGS-A3622", 810, 20)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-382843 ", 810, 30)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3621", 805, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3623", 800, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3625", 800, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3441", 800, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3445", 800, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3446", 800, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3443", 795, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-565", 790, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A3314", 790, 20)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A3619", 785, 20)

```

```

{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3315", 785, 20)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3442", 780, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-698", 775, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-900", 775, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-896", 770, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A3626", 765, 15)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-562", 765, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A3618", 760, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3145", 760, 70)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3132 ", 760, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3620", 745, 20)
{
  Outlier("General ", 0.05);
};

```

```

};
R_Date("SI-212", 740, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-632", 730, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A3181", 720, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3148", 720, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3147", 710, 90)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-878", 705, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-894", 700, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3434", 695, 15)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-55495", 690, 60)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-702", 690, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-877", 690, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3436", 690, 15)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3428", 680, 15)
{
  Outlier("General ", 0.05);
};
R_Date("SI-210", 670, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3435", 665, 15)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-382844", 650, 30)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3627", 645, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3133 ", 645, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3357", 645, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3450", 645, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A3451", 625, 15)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-55494", 620, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-267045 ", 610, 40)
{
  Outlier("General ", 0.05);
};

```

```

};
};
Boundary("End Glenwood CPt");
};
Sequence("Itskari CPt")
{
  Boundary("Start Itskari CPt");
  Phase("Itskari CPt")
  {
    R_Date("D-AMS037367", 984, 24)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261021", 970, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("Beta-100933", 920, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("UCI-261095", 885, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261096", 885, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261094", 880, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261020", 845, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261092", 835, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("M-835", 820, 100)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("NSRL-3413", 730, 60)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("UGa-1950", 729, 75)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-184493", 720, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261017", 715, 15)
{
  Outlier("General ", 0.05);
};
R_Date("UCI-261018", 710, 20)
{
  Outlier("General ", 0.05);
};
R_Date("NSRL-3414", 710, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261093", 700, 20)
{
  Outlier("General ", 0.05);
};
R_Date("UCI-261016", 695, 15)
{
  Outlier("General ", 0.05);
};
R_Date("A2268", 685, 20)
{
  Outlier("General ", 0.05);
};
R_Date("UGa-1949", 684, 75)
{
  Outlier("General ", 0.05);
};
R_Date("UCI-261019", 675, 15)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-1765", 670, 70)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("A2267", 660, 20)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-184492", 660, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("A2269", 650, 20)
{
  Outlier("General ", 0.05);
};
R_Date("WIS-2314", 650, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-1951", 614, 75)
{
  Outlier("General ", 0.05);
};
R_Date("AA-41430", 611, 42)
{
  Outlier("General ", 0.05);
};
R_Date("A1927", 580, 15)
{
  Outlier("General ", 0.05);
};
R_Date("A1929", 565, 15)
{
  Outlier("General ", 0.05);
};
R_Date("A1928", 560, 15)
{
  Outlier("General ", 0.05);
};
};
Boundary("End Itskari CPT");
};
Sequence("Nebraska CPT")
{
  Boundary("Start Nebraska CPT");
  Phase("Nebraska CPT")
  {
    R_Date("SI-631", 850, 140)
  }
};

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("AA36110 ", 845, 45)
{
  Outlier("General ", 0.05);
};
R_Date("TX-8321", 830, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8576", 825, 130)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261009", 820, 15)
{
  Outlier("General ", 0.05);
};
R_Date("TX-8527", 815, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261008", 810, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA36108 ", 810, 45)
{
  Outlier("General ", 0.05);
};
R_Date("AA36107 ", 785, 40)
{
  Outlier("General ", 0.05);
};
R_Date("AA36109 ", 780, 40)
{
  Outlier("General ", 0.05);
};
R_Date("SI-629", 775, 175)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8577", 770, 145)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("TX-8529", 765, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-2152", 765, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8322", 750, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8324", 750, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-634", 750, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8320", 745, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8319", 720, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8323", 720, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-633", 720, 140)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-101876 ", 710, 40)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-2344", 690, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-632", 680, 140)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("TX-8580", 665, 45)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-2150", 660, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8318", 645, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("UCI-261010", 640, 15)
{
  Outlier("General ", 0.05);
};
R_Date("TX-8579", 640, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8578", 630, 95)
{
  Outlier("Charcoal", 1);
};
R_Date("TX-8523 ", 620, 45)
{
  Outlier("General ", 0.05);
};
R_Date("TX-8525", 610, 45)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-2151", 595, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-635", 585, 115)
{
  Outlier("Charcoal", 1);
};
R_Date("NSRL-3434 ", 550, 60)
{
  Outlier("General ", 0.05);
};

```

```

};
R_Date("SI-628", 550, 65)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-622", 550, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-2311", 540, 55)
{
  Outlier("Charcoal", 1);
};
};
Boundary("End Nebraska CPt");
};
Sequence("Smoky Hill CPt")
{
  Boundary("Start Smoky Hill CPt");
  Phase("Smoky Hill CPt")
  {
    R_Date("ISGS-A1554", 935, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("AA-85333", 926, 33)
    {
      Outlier("General ", 0.05);
    };
    R_Date("SI-230", 920, 90)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("AA-85337", 890, 33)
    {
      Outlier("General ", 0.05);
    };
    R_Date("Beta-178533", 870, 40)
    {
      Outlier("General ", 0.05);
    };
    R_Date("ISGS-A1461", 860, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("ISGS-A5746", 860, 70)

```



```

{
  Outlier("Charcoal", 1);
};
R_Date("UGa-465", 860, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-177518", 860, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A569", 825, 25)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-178238", 820, 40)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-6654", 820, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-5747", 820, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-828", 810, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-5752", 800, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("M-113", 780, 75)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A570", 780, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-231", 770, 80)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("AA-85316", 766, 41)
{
  Outlier("General ", 0.05);
};
R_Date("M-869", 760, 75)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-3134", 760, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-85315", 758, 41)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1558", 755, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85338", 740, 35)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3137", 740, 240)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-85334", 733, 41)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-173317", 730, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A1550", 725, 20)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85336", 719, 35)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85317", 715, 41)

```

```

{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1553", 715, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85320", 714, 40)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-177519", 710, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-179560", 710, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A1548", 705, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1549", 705, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85318", 700, 40)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3138", 700, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-96465", 698, 35)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85335", 697, 32)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85339", 692, 35)
{
  Outlier("General ", 0.05);
};

```

```

};
R_Date("AA-85324", 686, 35)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85322", 685, 37)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-157-200", 680, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1462", 675, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1552", 675, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85326", 674, 36)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3141", 670, 190)
{
  Outlier("Charcoal", 1);
};
R_Date("UGa-827", 670, 60)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A1556", 665, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85323", 664, 35)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85340", 663, 35)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85341", 647, 33)

```

```

{
  Outlier("General ", 0.05);
};
R_Date("AA-85327", 646, 45)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-157-2389", 645, 15)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-85328", 643, 34)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85332", 643, 42)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-157-2254", 640, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85331", 638, 45)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-157-196", 635, 15)
{
  Outlier("General ", 0.05);
};
R_Date("AA-85325", 631, 36)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-157-831", 630, 15)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-157-2905", 630, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-3133", 630, 70)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("AA-85330", 622, 42)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-6656", 580, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-46652", 580, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-85319", 539, 67)
{
  Outlier("General ", 0.05);
};
};
Boundary("End Smoky Hill CPt");
};
Sequence("Solomon River CPt")
{
  Boundary("Start Solomon River CPt");
  Phase("Solomon River CPt")
  {
    R_Date("Beta-54043", 920, 70)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-54047", 880, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-54039", 880, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-54046", 870, 60)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-54040", 860, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-54050", 820, 50)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54048", 800, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54045", 780, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54044", 740, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54042", 720, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54051", 660, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54049", 620, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Beta-54041", 560, 50)
{
  Outlier("Charcoal", 1);
};
};
Boundary("End Solomon River CPt");
};
Sequence("St Helena CPt")
{
  Boundary("Start St Helena CPt");
  Phase("St Helena CPt")
  {
    R_Date("UCI-261125", 785, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261132", 775, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261128", 770, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261126", 770, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261127", 740, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261111", 735, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261124", 730, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261129", 725, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261110", 700, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261109", 670, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261116", 670, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261107", 660, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261130", 640, 15)
    {
      Outlier("General ", 0.05);
    };
    R_Date("UCI-261106", 610, 15)
    {
      Outlier("General ", 0.05);
    };
  }
};

```

```

{
  Outlier("General ", 0.05);
};
R_Date("UCI-261105", 605, 15)
{
  Outlier("General ", 0.05);
};
R_Date("UCI-261108", 595, 15)
{
  Outlier("General ", 0.05);
};
};
Boundary("End St Helena CPT");
};
Sequence("Steed-Kisker CPT")
{
  Boundary("Start Steed-Kisker CPT");
  Phase("Steed-Kisker CPT")
  {
    R_Date("ISGS-A1728", 900, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("Beta-97603", 890, 40)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Beta-121009", 890, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("ISGS-A1729", 885, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("M-2347", 880, 110)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("ISGS-A1726", 860, 20)
    {
      Outlier("General ", 0.05);
    };
    R_Date("AA-41432", 858, 39)
    {
      Outlier("General ", 0.05);
    };
  }
};

```

```

};
R_Date("ISGS-A1727", 850, 20)
{
  Outlier("General ", 0.05);
};
R_Date("Beta-121008", 850, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-41434", 842, 38)
{
  Outlier("General ", 0.05);
};
R_Date("M-1395-A", 840, 110)
{
  Outlier("Charcoal", 1);
};
R_Date("ISGS-A1459", 835, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1734", 805, 20)
{
  Outlier("General ", 0.05);
};
R_Date("AA-41433", 804, 42)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1455", 800, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1735", 790, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1725", 790, 20)
{
  Outlier("General ", 0.05);
};
R_Date("AA-43407", 789, 39)
{
  Outlier("General ", 0.05);
};
R_Date("OS-4450", 770, 25)

```

```

{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1456", 760, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1733", 720, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1457 ", 705, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1458 ", 685, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1731", 685, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1732", 685, 20)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1781", 670, 15)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-A1730", 660, 20)
{
  Outlier("General ", 0.05);
};
R_Date("M-2346", 660, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("AA-41431", 656, 68)
{
  Outlier("General ", 0.05);
};
R_Date("ISGS-5074", 630, 70)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("ISGS-5540", 610, 70)
{
  Outlier("Charcoal", 1);
};
};
Boundary("End Steed-Kisker CPT");
};
Sequence("Upper Republican CPT")
{
  Boundary("Start Upper Republican CPT");
  Phase("Upper Republican CPT")
  {
    R_Date("SI-194", 930, 80)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Wis-324", 930, 60)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("I-641", 875, 100)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Wis-2154", 870, 40)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-36", 865, 65)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-53", 845, 65)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-32", 830, 65)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("Wis-2155", 830, 50)
    {
      Outlier("Charcoal", 1);
    };
    R_Date("SI-73", 820, 50)

```

```

{
  Outlier("Charcoal", 1);
};
R_Date("Wis-1796", 810, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-193", 800, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-318", 790, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("I-585", 780, 125)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-319", 770, 55)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-192", 750, 80)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-56", 750, 65)
{
  Outlier("Charcoal", 1);
};
R_Date("I-642", 750, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("I-583", 715, 125)
{
  Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-33", 710, 15)
{
  Outlier("General ", 0.05);
};
R_Date("SI-40", 710, 65)
{
  Outlier("Charcoal", 1);
};

```

```

};
R_Date("Wis-1798", 690, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-196", 670, 120)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-1814", 670, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-219-2", 660, 60)
{
  Outlier("General ", 0.05);
};
R_Date("Wis-1797", 660, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-70", 640, 50)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-1800", 620, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-221", 610, 15)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-140-222-2", 610, 20)
{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-140-218", 605, 20)
{
  Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-1556", 595, 20)
{
  Outlier("Charcoal", 1);
};
R_Date("PRI-11-140-221-2", 585, 20)

```

```

{
  Outlier("General ", 0.05);
};
R_Date("PRI-11-140-222-1", 585, 20)
{
  Outlier("General ", 0.05);
};
R_Date("M-1365", 565, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-1801", 530, 70)
{
  Outlier("Charcoal", 1);
};
R_Date("I-584", 510, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("M-844", 500, 100)
{
  Outlier("Charcoal", 1);
};
R_Date("SI-72", 440, 40)
{
  Outlier("Charcoal", 1);
};
R_Date("Wis-1799", 430, 70)
{
  Outlier("Charcoal", 1);
};
Boundary("End Upper Republican CPt");
};
Order("End")
{
  Date("=End Upper Republican CPt");
  Date("=End Itskari CPt");
  Date("=End Smoky Hill CPt");
  Date("=End Solomon River CPt");
  Date("=End Nebraska CPt");
  Date("=End St Helena CPt");
  Date("=End Glenwood CPt");
  Date("=End Steed-Kisker CPt");
};
Order("Start")

```

```

{
  Date("=Start St Helena CPt");
  Date("=Start Nebraska CPt");
  Date("=Start Glenwood CPt");
  Date("=Start Smoky Hill CPt");
  Date("=Start Upper Republican CPt");
  Date("=Start Steed-Kisker CPt");
  Date("=Start Solomon River CPt");
  Date("=Start Itskari CPt");
};
};
};

```

ad. OxCal 4.4 Code for Figure 40. Initial Coalescent Variant Phases Model D: Start and End Boundaries of Initial Coalescent Variant Phases. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model)

```

Plot(ICV Outlier Model)
{
  Outlier_Model("Charcoal",Exp(1,-
10,0),U(0,3),"t");
  Outlier_Model("General",T(5),U(0,4),"t");
  Phase("Central Plains")
{
  Sequence("Arzberger")
{
  Boundary("Start Arzberger");
  Phase("Arzberger")
{
  R_Date("M-1126a",510,100)
{
  Outlier("General",0.05);
};
R_Date("M-1126",500,75)
{
  Outlier("Charcoal",1);
};
R_Date("ETH-10114",440,55)
{
  Outlier("General",0.05);
};
R_Date("ETH-11042",340,60)
{

```



```

    Outlier("General",0.05);
};
};
Boundary("End Arzberger");
};
Sequence("Anoka")
{
    Boundary("Start Anoka");
    Phase("Anoka")
    {
        R_Date("M-1128", 820, 100)
        {
            Outlier("Charcoal", 1);
        };
        R_Date("ETH-11049", 780, 55)
        {
            Outlier("General", 0.05);
        };
        R_Date("ISGS-A603", 765, 30)
        {
            Outlier("General", 0.05);
        };
        R_Date("D-AMS 037282", 735, 25)
        {
            Outlier("General", 0.05);
        };
        R_Date("ISGS-A622", 730, 35)
        {
            Outlier("General", 0.05);
        };
        R_Date("ISGS-A623", 730, 35)
        {
            Outlier("General", 0.05);
        };
        R_Date("D-AMS 037281", 722, 28)
        {
            Outlier("General", 0.05);
        };
        R_Date("ISGS-A620", 720, 35)
        {
            Outlier("General", 0.05);
        };
        R_Date("D-AMS 037279", 717, 23)
        {
            Outlier("General", 0.05);
        };
};

```

```

R_Date("D-AMS 037276", 714, 26)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037280", 700, 24)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A624", 700, 35)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037264", 692, 22)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037289", 691, 24)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A606", 690, 30)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A621", 690, 35)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037266", 685, 22)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037270", 685, 22)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037290", 685, 24)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A618", 675, 45)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037265", 667, 23)
{
};

```

```

    Outlier("General", 0.05);
};
R_Date("D-AMS 037278", 659, 24)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037277", 653, 21)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037268", 652, 23)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037284", 651, 27)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A619", 650, 35)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A625", 650, 25)
{
    Outlier("Charcoal", 1);
};
R_Date("D-AMS 037274", 649, 25)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A605", 645, 35)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037286", 644, 22)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037283", 639, 28)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037272", 636, 22)
{
    Outlier("General", 0.05);
};

```

```

R_Date("D-AMS 037288", 630, 23)
{
    Outlier("General", 0.05);
};
R_Date("D-AMS 037287", 625, 22)
{
    Outlier("General", 0.05);
};
R_Date("ISGS-A604", 625, 40)
{
    Outlier("Charcoal", 1);
};
R_Date("D-AMS 037267", 592, 22)
{
    Outlier("General", 0.05);
};
R_Date("M-1127", 540, 100)
{
    Outlier("Charcoal", 1);
};
Boundary("End Anoka");
};
Sequence("Cambell Creek")
{
    Boundary("Start Cambell Creek");
    Phase("Cambell Creek")
    {
        R_Date("UCR-2037", 710, 70)
        {
            Outlier("General", 0.05);
};
        R_Date("UGa-2601", 660, 50)
        {
            Outlier("Charcoal", 1);
};
        R_Date("UCR-2035", 650, 60)
        {
            Outlier("General", 0.05);
};
        R_Date("Wis-1074", 610, 55)
        {
            Outlier("Charcoal", 1);
};
        R_Date("M-1079 a", 560, 75)
        {

```

```

    Outlier("Charcoal",1);
};
R_Date("UCR-2036",550,70)
{
    Outlier("General",0.05);
};
};
Boundary("End Cambell Creek");
};
Order("End")
{
    Date("=End Arzberger");
    Date("=End Cambell Creek");
    Date("=End Anoka");
};
Order("Start")
{
    Date("=Start Arzberger");
    Date("=Start Cambell Creek");
    Date("=Start Anoka");
};
};
};

```

ae. OxCal 4.4 Code for Figure 41. Great Oasis Radiocarbon Data Sequence. Sample classes included: 1A, 1B, 2A, 2B, 2C. (Outlier Model).

```

Plot(Great Oasis Outlier Model)
{
    Outlier_Model("Charcoal",Exp(1,-
10,0),U(0,3),"t");
    Outlier_Model("General",T(5),U(0,4),"t");
    Sequence("Great Oasis")
    {
        Boundary("Start");
        Sequence("CP GO")
        {
            R_Date("Beta-273628",1110,40)
            {
                Outlier("Charcoal",1);
            };
            R_Date("Beta-273629",1040,40)
            {
                Outlier("Charcoal",1);
            };
        };
    };
}

```

```

};
R_Date("Beta-273626",1030,40)
{
    Outlier("Charcoal",1);
};
R_Date("UCI-261007",1005,15)
{
    Outlier("General",0.05);
};
R_Date("Beta-273631",1000,40)
{
    Outlier("Charcoal",1);
};
R_Date("UCI-261004",1000,15)
{
    Outlier("General",0.05);
};
R_Date("Beta-273632",990,40)
{
    Outlier("Charcoal",1);
};
R_Date("UCI-261003",985,15)
{
    Outlier("General",0.05);
};
R_Date("UCI-261006",985,20)
{
    Outlier("General",0.05);
};
R_Date("UCI-261120",975,15)
{
    Outlier("General",0.05);
};
R_Date("UCI-261005",975,15)
{
    Outlier("General",0.05);
};
R_Date("Wis-1763",970,70)
{
    Outlier("Charcoal",1);
};
R_Date("Beta-273633",940,40)
{
    Outlier("Charcoal",1);
};
R_Date("Wis-1764",940,70)

```

```
{
  Outlier("Charcoal",1);
};
R_Date("Wis-1762",900,70)
{
  Outlier("Charcoal",1);
};
};
Boundary("End");
};
};
```

Appendices B. Radiocarbon Data Used in Analyses

Name	Site	LabNumber	RCYBP	SD	Cultural Tradition	Locality/Phase	Class	Sample	Dating Type	Date other than RCYBP	YBP	SD
White Rock	14JW1	OS-74659	775	30	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
White Rock	14JW1	Beta-65893	720	70	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
White Rock	14JW1	TX-8193	720	50	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
White Rock	14JW1	TX-7984	510	41	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
White Rock	14JW1	Beta-73924	390	60	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
Warne	14JW24	Beta-53612			Central Plains Oneota	Oneota	3E	Charcoal	Radiometric	Measured Age	660	80
Warne	14JW8	ISGS-5631	580	70	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
Swantek	25PT111	UCI-261015	660	15	Central Plains Oneota	Oneota	1A	Bison ?	AMS			
Swantek	25PT111	Beta-196301	660	60	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
Swantek	25PT111	UCI-261011	605	15	Central Plains Oneota	Oneota	1A	Bison ?	AMS			
Swantek	25PT111	UCI-261012	600	15	Central Plains Oneota	Oneota	1A	Bison Scapula	AMS			
Swantek	25PT111	Beta-196300	600	40	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
Swantek	25PT111	UCI-261014	580	20	Central Plains Oneota	Oneota	1A	Bison ?	AMS			
Swantek	25PT111	UCI-261013	570	15	Central Plains Oneota	Oneota	1A	Bison Scapula	AMS			
Leary	25RH1	BGS-2301	641	40	Central Plains Oneota	Oneota	2C	Charcoal	Radiometric			
Leary	25RH1	UCR-3945	610	110	Central Plains Oneota	Oneota	3F	Ceramic Residue	Radiometric			

Leary	25RH1	BGS-2302	548	40	Central Plains Oneota	Oneota	2C	Charcoal	Radiometric	Measured Age	620	100
Leary	25RH1	SI-617			Central Plains Oneota	Oneota	3E	Charcoal	Radiometric	Measured Age	1170	60
Leary	25RH1	SI-618			Central Plains Oneota	Oneota	3E	Charcoal	Radiometric	Measured Age	740	55
Leary	25RH1	Wis-151			Central Plains Oneota	Oneota	3E	Charcoal	Radiometric	Measured Age	540	55
Leary	25RH1	Wis-155			Central Plains Oneota	Oneota	3E	Charcoal	Radiometric	Measured Age		
Ashland	25SD147	Beta-133384	620	50	Central Plains Oneota	Oneota	2C	Charcoal	AMS			
	13ML119	GX-2004			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	1030	130
	13ML119	GX-2003			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	1065	105
	13ML121	GX-2008			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	690	100
	13ML121	GX-2007			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	1080	95
Gamble	13ML124	GX-2006			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	1520	100
Gamble	13ML124	GX-2005			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	735	90
Kuhl 1	13ML126	ISGS-3439	3845	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS			
Kuhl 1	13ML126	ISGS-3448	1370	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS			
Kuhl 1	13ML126	Wis-633	985	45	Central Plains Tradition	Glenwood	2B	Charcoal (Quercus rubra)	AMS			
Kuhl 1	13ML126	ISGS-3449	900	15	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS			
Kuhl 1	13ML126	Wis-716	840	60	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS			
Kuhl 1	13ML126	ISGS-3440	840	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS			
Kuhl 1	13ML126	ISGS-3444	840	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS			

Kuhl 1	13ML126	ISGS-3447	835	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	ISGS-3441	800	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	ISGS-3445	800	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	ISGS-3446	800	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	ISGS-3443	795	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	ISGS-3442	780	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	Wis-632	730	45	Central Plains Tradition	Glenwood	2B	Charcoal (Populus deltoides)	AMS
Kuhl 1	13ML126	ISGS-3434	695	15	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS
Kuhl 1	13ML126	ISGS-3436	690	15	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
Kuhl 1	13ML126	ISGS-3428	680	15	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS
Kuhl 1	13ML126	ISGS-3435	665	15	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS
Johnson Farm 1	13ML128	Wis-566	855	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS
Johnson Farm 1	13ML128	Wis-560	820	50	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS
Johnson Farm 1	13ML128	Wis-565	790	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS
Johnson Farm 2	13ML129	Wis-564	825	60	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus americana)	AMS
Johnson Farm 2	13ML129	Wis-559	820	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS
Johnson Farm 2	13ML129	ISGS-A3314	790	20	Central Plains Tradition	Glenwood	2C	Charcoal	AMS

Johnson Farm 2	13ML129	ISGS-A3315	785	20	Central Plains Tradition	Glenwood	2C	Charcoal	AMS	
Johnson Farm 2	13ML129	Wis-562	765	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS	
Johnson Farm 3	13ML130	ISGS-A3629	870	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3624	830	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3622	810	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3621	805	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3623	800	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3625	800	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3619	785	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3626	765	15	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3618	760	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3620	745	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3627	645	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	ISGS-A3628	580	20	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS	
Johnson Farm 3	13ML130	I-6296			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age 945 100
Johnson Farm 3	13ML130	I-6297			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age 705 100
Johnson Farm 3	13ML130	I-6295			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age 712 90
Institution 1	13ML132	Wis-709	860	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS	

Institution 1	13ML132	Wis-710	360	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)			
Institution 1	13ML132	Wis-708	310	60	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS		
Institution 2	13ML135	Wis-717	975	60	Central Plains Tradition	Glenwood	2B	Charcoal (Quercus alba)	AMS		
Institution 2	13ML135	Wis-719	910	60	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS		
Institution 2	13ML135	Wis-713			Central Plains Tradition	Glenwood	3E	Charcoal (Ulmus rubra or Celtis occidentalis)		Measured Age	860 60
Kuhl 2	13ML136	Wis-697	875	60	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra)	AMS		
Kuhl 2	13ML136	Wis-699	865	55	Central Plains Tradition	Glenwood	2B	Charcoal (Quercus alba)	AMS		
Kuhl 2	13ML136	Wis-698	775	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus americana)	AMS		
Kuhl 2	13ML136	Wis-702	690	50	Central Plains Tradition	Glenwood	2B	Charcoal (Quercus alba)	AMS		
Kuhl 3	13ML138	Wis-729	1010	55	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS		
Kuhl 4	13ML139	Wis-701	850	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS		
Kuhl 4	13ML139	Wis-700	835	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS		
Kuhl 4	13ML139	Wis-691	440	45	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus rubra or Celtis occidentalis)	AMS		
McGee	13ML145	Wis-900	775	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus americana)	AMS		
McGee	13ML145	Wis-896	770	60	Central Plains Tradition	Glenwood	2B	Charcoal (Fraxinus americana)	AMS		

McGee	13ML145	Wis-894	700	55	Central Plains Tradition	Glenwood	2B	Charcoal (Populus deltoides)	AMS
State School	13ML155	Wis-878	705	50	Central Plains Tradition	Glenwood	2B	Charcoal (Juglans nigra)	AMS
State School	13ML155	Wis-877	690	55	Central Plains Tradition	Glenwood	2B	Charcoal (Ostrya sp.)	AMS
	13ML175	ISGS-3144	840	70	Central Plains Tradition	Glenwood	2C	Charcoal	AMS
	13ML175	ISGS-3145	760	70	Central Plains Tradition	Glenwood	1A	Charcoal (charred grass)	AMS
	13ML175	ISGS-3148	720	70	Central Plains Tradition	Glenwood	2B	Charcoal	AMS
	13ML175	ISGS-3147	710	90	Central Plains Tradition	Glenwood	2B	Charcoal (charred grass and wood)	AMS
Wall Ridge	13ML176	Wis-2076	1200	70	Central Plains Tradition	Glenwood	2A	Charcoal (Ulmus rubra)	AMS
Wall Ridge	13ML176	Beta-382843	810	30	Central Plains Tradition	Glenwood	1A	Nut Shell Frags (Juglandaceae ulls, carbonized)	AMS
Wall Ridge	13ML176	ISGS-A3132	760	20	Central Plains Tradition	Glenwood	1A	Nut Shell Frags (Juglandaceae ulls, carbonized)	AMS
Wall Ridge	13ML176	ISGS-A3181	720	15	Central Plains Tradition	Glenwood	1B	Pottery Residue	AMS
Wall Ridge	13ML176	Beta-382844	650	30	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds) same as ISGS-A3133	AMS
Wall Ridge	13ML176	ISGS-A3133	645	15	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds) same as Beta-382844	AMS
Wall Ridge	13ML176	ISGS-A3357	645	15	Central Plains Tradition	Glenwood	1A	Phaseolus vulgaris (Seeds) carbonized	AMS
Wall Ridge	13ML176	ISGS-A3450	645	15	Central Plains Tradition	Glenwood	1A	Helianthus annuus (Seeds) carbonized	AMS
Wall Ridge	13ML176	ISGS-A3451	625	15	Central Plains Tradition	Glenwood	1A	Zea mays (cob), carbonized	AMS

Wall Ridge	13ML176	Wis-2295	430	70	Central Plains Tradition	Glenwood	2C	Charcoal	AMS		
Little Pony	13ML216	I-693			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	750 90
Little Pony	13ML216	SI-693			Central Plains Tradition	Glenwood	3E	Charcoal	Radiometric	Measured Age	750 90
Stonebrook	13ML219	SI-211	1050	90	Central Plains Tradition	Glenwood	2C	Charcoal	AMS		
Stonebrook	13ML219	SI-210	670	70	Central Plains Tradition	Glenwood	2C	Charcoal	AMS		
Steinheimer	13ML222	SI-212	740	80	Central Plains Tradition	Glenwood	2C	Charcoal	AMS		
Bare	13ML360	Beta-55494	620	60	Central Plains Tradition	Glenwood	2B	Charcoal (Ulmus americana)	AMS		
Millipede	13ML361	Beta-55495	690	60	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS		
Davis Oriole	13ML429	Beta-267045	610	40	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS		
Davis Oriole	13ML429	Beta-267046	510	40	Central Plains Tradition	Glenwood	1A	Zea mays (Seeds)	AMS		
Beaver Creek	25BO23	AA-41430	611	42	Central Plains Tradition	Itskari	1A	Phaseolus vulgaris (Seeds) charred	AMS		
Beaver Creek	25BO23	Beta-70725			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	900 80
Beaver Creek	25BO23	Beta-70724			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	590 70
Beaver Creek	25BO23	TX-8368			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	744 55
Beaver Creek	25BO23	TX-8367			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	861 47
Beaver Creek	25BO23	TX-8369			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	637 39
Palmer Johnson	25BU37	Wis-2146			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	770 50
Palmer Johnson	25BU37	Wis-2149			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	695 50
Palmer Johnson	25BU37	Wis-2148			Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	680 50

Palmer Johnson	25BU37	Wis-2147	Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	675	50
McIntosh	25BW15	WIS-2314	Central Plains Tradition	Itskari	2C	Charcoal	Radiometric			
McIntosh	25BW15	WIS-2312	Central Plains Tradition	Itskari	2C	Charcoal	Radiometric			
Jensen Brothers	25HW10	UCI-261017	Central Plains Tradition	Itskari	1A	Bison TOE	AMS			
Jensen Brothers	25HW10	UCI-261018	Central Plains Tradition	Itskari	1A	Bison TARSIL	AMS			
Jensen Brothers	25HW10	UCI-261016	Central Plains Tradition	Itskari	1A	Bison TOE	AMS			
Jensen Brothers	25HW10	UCI-261019	Central Plains Tradition	Itskari	1A	Bison Scapula	AMS			
Schmidt	25HW301	UGa-1950	Central Plains Tradition	Itskari	1A	Zea mays (Seeds)	Radiometric			
Schmidt	25HW301	UGa-1949	Central Plains Tradition	Itskari	1A	Zea mays (Seeds)	Radiometric			
Schmidt	25HW301	UGa-1951	Central Plains Tradition	Itskari	1A	Zea mays (Seeds)	Radiometric			
Schmidt	25HW301	A1927	Central Plains Tradition	Itskari	1A	corn kernel	AMS			
Schmidt	25HW301	A1929	Central Plains Tradition	Itskari	1A	corn cob pieces	AMS			
Schmidt	25HW301	A1928	Central Plains Tradition	Itskari	1A	corn kernel	AMS			
Schmidt	25HW301	UGa-1952	Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	830	75
Schmidt	25HW301	UGa-1953	Central Plains Tradition	Itskari	3E	Charcoal	Radiometric	Measured Age	795	60
Coufal	25HW6	UCI-261095	Central Plains Tradition	Itskari	1A	Bison LONG BONE	AMS			
Coufal	25HW6	UCI-261096	Central Plains Tradition	Itskari	1A	Bison Misc?	AMS			
Coufal	25HW6	UCI-261094	Central Plains Tradition	Itskari	1A	Bison TOE	AMS			
Coufal	25HW6	M-835	Central Plains Tradition	Itskari	2C	Charcoal	Radiometric			

Coufal	25HW6	UCL-261093	700	20	Central Plains Tradition	Itskari	1A	Bison RIB	AMS
Bert Mortensen	25HW9	D-AMS037367	984	24	Central Plains Tradition	Itskari	1A	Bone (collagen)	AMS
Bert Mortensen	25HW9	UCL-261021	970	15	Central Plains Tradition	Itskari	1A	Bison Os Coxa	AMS
Bert Mortensen	25HW9	UCL-261020	845	15	Central Plains Tradition	Itskari	1A	Bison TOE	AMS
Bert Mortensen	25HW9	UCL-261092	835	15	Central Plains Tradition	Itskari	1A	Bison TOE	AMS
Tahaksu	25MK15	Beta-100933	920	50	Central Plains Tradition	Itskari	2C	Charcoal	UKN
Tahaksu	25MK15	NSRL-3413	730	60	Central Plains Tradition	Itskari	2C	Charcoal	AMS
Tahaksu	25MK15	NSRL-3414	710	60	Central Plains Tradition	Itskari	2C	Charcoal	AMS
Tahaksu	25MK15	Beta-100934	106	90	Central Plains Tradition	Itskari	UKN	UKN	UKN
	25NC29	A2268	685	20	Central Plains Tradition	Itskari	1A	corn cupules	AMS
	25NC29	A2267	660	20	Central Plains Tradition	Itskari	1A	corn cupules	AMS
	25NC29	A2269	650	20	Central Plains Tradition	Itskari	1A	corn cupules	AMS
Felis Concolor	25SM20	Beta-184493	720	70	Central Plains Tradition	Itskari	2C	Charcoal	UKN
Felis Concolor	25SM20	Beta-184492	660	60	Central Plains Tradition	Itskari	2C	Charcoal	UKN
Bill Packer	25SM9	Wis-1765	670	70	Central Plains Tradition	Itskari	2C	Charcoal	Radiometric
DB Site	14LV1071	Beta-101876	710	40	Central Plains Tradition	Nebraska	1A	Zea mays (Seeds)	AMS
DB Site	14LV1071	NSRL-3434	550	60	Central Plains Tradition	Nebraska	1A	Zea mays (Seeds)	AMS
Houston	25BT1	SI-631	850	140	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric
Houston	25BT1	SI-632	680	140	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric

Ashland	25CC1	SI-623	1040	100	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric		
T. Davis	25CC17	M-1367			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	705 100
Little Pawnee Creek	25CC228	Wis-2150	660	50	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric		
Little Pawnee Creek	25CC228	Wis-2151	595	50	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric		
Zessen	25CC44	M-1366			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	585 100
Dodson	25CC71	NWU-67			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	730 95
Dodson	25CC71	NWU-66			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	810 80
Cass	25CC96	SI-621			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	615 115
Cass	25CC96	SI-620			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	540 110
Minnie Parker	25DO2	SI-629	775	175	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric		
Minnie Parker	25DO2	SI-628	550	65	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric		
Minnie Parker	25DO2	SI-630	290	120	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric		
Majors	25NH2	SI-619	910	140	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric		
	25RH60	Wis-2309	1275	60	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric		
	25RH69	TX-8524	925	55	Central Plains Tradition	Nebraska	2A	Charcoal Outer-mid rings	Radiometric		
	25RH69	TX-8527	815	40	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric		
	25RH69	TX-8523	620	45	Central Plains Tradition	Nebraska	2A	Charcoal Outer rings wall post	Radiometric		
	25RH69	TX-8525	610	45	Central Plains Tradition	Nebraska	2A	Charcoal Inner rings wall post	Radiometric		
	25RH69	TX-8526			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	323 46

Rulo Southeast	25RH70	OS-18135	1940	55	Central Plains Tradition	Nebraska	1A	Zea mays (Seeds)	AMS	
Rulo Southeast	25RH70	TX-8528	1350	50	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	
Rulo Southeast	25RH70	TX-8530	1085	55	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	
Rulo Southeast	25RH70	OS-18143	905	50	Central Plains Tradition	Nebraska	1A	Zea mays (Seeds)	AMS	
Rulo Southeast	25RH70	UCI-261009	820	15	Central Plains Tradition	Nebraska	1A	Elk Axial	AMS	
Rulo Southeast	25RH70	UCI-261008	810	15	Central Plains Tradition	Nebraska	1A	Bison Hummerus	AMS	
Rulo Southeast	25RH70	TX-8529	765	45	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	
Rulo Southeast	25RH70	UCI-261010	640	15	Central Plains Tradition	Nebraska	1A	Elk Toe	AMS	
Farnsworth	25SY1	SI-625			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age 610 140
Farnsworth	25SY1	SI-624			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age 735 115
Cornish Meadows	25SY2	SI-622	550	100	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	
Patterson	25SY31	Wis-2153	930	50	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	
Patterson	25SY31	AA36110	845	45	Central Plains Tradition	Nebraska	1A	Phaseolus vulgaris Charred (seeds)	AMS	
Patterson	25SY31	TX-8321	830	40	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	
Patterson	25SY31	AA36108	810	45	Central Plains Tradition	Nebraska	1A	Phaseolus vulgaris Charred (seeds)	AMS	
Patterson	25SY31	AA36107	785	40	Central Plains Tradition	Nebraska	1A	Zea mays (Seeds)	AMS	
Patterson	25SY31	AA36109	780	40	Central Plains Tradition	Nebraska	1A	Phaseolus vulgaris Charred (seeds)	AMS	
Patterson	25SY31	Wis-2152	765	50	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric	

Patterson	25SY31	TX-8322	750	80	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	TX-8324	750	50	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	TX-8320	745	55	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	TX-8319	720	45	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	TX-8323	720	40	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	TX-8318	645	40	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	Wis-2311	540	55	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Patterson	25SY31	Wis-2310	325	40	Central Plains Tradition	Nebraska	2C	Charcoal	
Patterson	25SY31	TX-8317	309	37	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Plattford	25SY45	TX-8576	825	130	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric
Plattford	25SY45	TX-8577	770	145	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric
Plattford	25SY45	TX-8580	665	45	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Plattford	25SY45	TX-8579	640	40	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Plattford	25SY45	TX-8578	630	95	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Ross	25TS2	SI-634	750	120	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric
Ross	25TS2	SI-633	720	140	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric
Ross	25TS2	SI-635	585	115	Central Plains Tradition	Nebraska	3F	Charcoal	Radiometric
Whitetail	25TS3	Wis-2344	690	60	Central Plains Tradition	Nebraska	2C	Charcoal	Radiometric
Frank Parker	25WN1	SI-627			Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric
									Measured Age
									515
									115

Frank Parker	25WN1	SI-626	Central Plains Tradition	Nebraska	3E	Charcoal	Radiometric	Measured Age	540	110
	14MP407	ISGS-A569	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS			
Nutter	14CD480	AA-85328	Central Plains Tradition	Smoky Hill	1A	CHARRED GRASS	AMS			
Mugler	14CY1	AA-85326	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Mugler	14CY1	AA-85327	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Mugler	14CY1	AA-85325	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moll Creek	14CY102	ISGS-A1548	Central Plains Tradition	Smoky Hill	1B	Charcoal RES	AMS			
Moll Creek	14CY102	ISGS-A1549	Central Plains Tradition	Smoky Hill	1B	Charcoal RES	AMS			
Moll Creek	14CY102	AA-85339	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moll Creek	14CY102	AA-85340	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moore	14CY17	AA-85320	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moore	14CY17	ISGS-A1462	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moore	14CY17	AA-85319	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moore	14CY17	AA-85321	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Moore	14CY17	Beta-46652	Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age	580	50
Perreault	14CY2	ISGS-A1550	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS			
Woods	14CY30	M-113	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS			
Kemp	14CY4	AA-85324	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			
Kemp	14CY4	AA-85322	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS			

Kemp	14CY4	AA-85323	664	35	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Rush Creek	14GE127	AA-85332	643	42	Central Plains Tradition	Smoky Hill	1A	Cucurbita pepo (Seeds) charred	AMS	
Rush Creek	14GE127	AA-85331	638	45	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds) charred	AMS	
Rush Creek	14GE127	AA-85330	622	42	Central Plains Tradition	Smoky Hill	1A	Cucurbita pepo (Seeds) charred	AMS	
Rush Creek	14GE127	AA-85329	534	35	Central Plains Tradition	Smoky Hill	1A	Phaseolus vulgaris (Seeds) charred	AMS	
Miller	14GE21	SI-230	920	90	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric	
Miller	14GE21	SI-231	770	80	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric	
Miller	14GE21	SI-232	410	100	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric	
Witt Lodge	14GE600	AA-85337	890	33	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Witt Lodge	14GE600	ISGS-A1461	860	15	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Witt Lodge	14GE600	AA-85338	740	35	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Witt Lodge	14GE600	AA-85336	719	35	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Witt Lodge	14GE600	UGa-824			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 700 75
Witt Lodge	14GE600	UGa-826			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 835 65
Witt Lodge	14GE600	UGa-825			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 595 60
Root	14LC301	ISGS-A1551	990	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS	
Root	14LC301	ISGS-A1554	935	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS	
Root	14LC301	I-509			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 963 100
Frank Wetmore	14MD502	SI-143			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 940 90

14MP407	ISGS-A5746	860	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS
14MP407	ISGS-A570	780	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS
Markley 14OT308	Beta-173317	730	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS
Markley 14OT308	ISGS-A1553	715	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS
Minneapolis 14OT5	ISGS-A1547	1070	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS
Minneapolis 14OT5	AA-85316	766	41	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS
Minneapolis 14OT5	AA-85315	758	41	Central Plains Tradition	Smoky Hill	1A	Charred Grass	AMS
Minneapolis 14OT5	AA-85317	715	41	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS
Minneapolis 14OT5	AA-85318	700	40	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS
Minneapolis 14OT5	ISGS-A1552	675	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS
Minneapolis 14OT5	Beta-16479			Central Plains Tradition	Smoky Hill	3E	Charcoal	Measured Age 730 70
Minneapolis 14OT5	Beta-16480			Central Plains Tradition	Smoky Hill	3E	Charcoal	Measured Age 680 70
Budenbender 14PO4	M-869	760	75	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS
14RY10	ISGS-A1556	665	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS
14RY10	AA-85341	647	33	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds) cob	AMS
14RY128	ISGS-3137	740	240	Central Plains Tradition	Smoky Hill	3F	Charcoal	Radiometric
ForThree 14RY3183	ISGS-3135	14610	100	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric
ForThree 14RY3183	ISGS-3134	760	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric
ForThree 14RY3183	ISGS-3138	700	80	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric

ForThree	14RY3183	ISGS-3141	670	190	Central Plains Tradition	Smoky Hill	3F	Charcoal	Radiometric	
ForThree	14RY3183	ISGS-3133	630	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric	
Elk Hill	14RY328	ISGS-6654	820	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric	
Elk Hill	14RY328	ISGS-6656	580	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	Radiometric	
Griffing/Longergran Trailer	14RY401	UGa-465	860	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS	
Griffing/Longergran Trailer	14RY401	UGa-828	810	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS	
Griffing/Longergran Trailer	14RY401	AA-85334	733	41	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds) cob	AMS	
Griffing/Longergran Trailer	14RY401	AA-85335	697	32	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds) cob	AMS	
Griffing/Longergran Trailer	14RY401	UGa-827	670	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS	
Holidome	14RY442	UGa-3866			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 250 440
Holidome	14RY442	UGa-3867			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 670 60
Fancy Creek	14RY8	TX-5913			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 1010 210
Fancy Creek	14RY8	TX-5914			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age 1090 80
Whiteford	14SA1	Beta-178533	870	40	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Winslow	14SA403	Beta-177518	860	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS	
Winslow	14SA403	ISGS-A1558	755	15	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS	
Kohr	14SA414	AA-85333	926	33	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
Kohr	14SA414	Beta-178238	820	40	Central Plains Tradition	Smoky Hill	1A	Zea mays (Seeds)	AMS	
	14SA415	Beta-177519	710	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS	

Forsberg	14SA420	ISGS-6038	1150	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS			
Forsberg	14SA420	ISGS-5747	820	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS			
Forsberg	14SA420	ISGS-5752	800	70	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS			
Albert Bell	14SD305	Beta-179560	710	60	Central Plains Tradition	Smoky Hill	2C	Charcoal	AMS			
Albert Bell	14SD305	PRI-11-157-200	680	20	Central Plains Tradition	Smoky Hill	1A	Zea mays kernel (Seeds) charred	AMS			
Albert Bell	14SD305	PRI-11-157-196	635	15	Central Plains Tradition	Smoky Hill	1A	Helianthus endosperm (Seeds) charred	AMS			
Albert Bell	14SD305	PRI-11-157-831	630	15	Central Plains Tradition	Smoky Hill	1A	Zea mays kernel (Seeds) charred	AMS			
Claussen	14WB322	ISGS-A1724	1110	25	Central Plains Tradition	Smoky Hill	1B	Ceramic Residue	AMS			
Claussen	14WB322	AA-96465	698	35	Central Plains Tradition	Smoky Hill	1A	Hackberry seed (Seeds)	AMS			
Wollenberg	14WH319	PRI-11-157-2389	645	15	Central Plains Tradition	Smoky Hill	2B	Ulmus rubra (Charcoal)	AMS			
Wollenberg	14WH319	PRI-11-157-2254	640	15	Central Plains Tradition	Smoky Hill	1A	Viburnum prunifolium twig (Charcoal)	AMS			
Wollenberg	14WH319	PRI-11-157-2905	630	15	Central Plains Tradition	Smoky Hill	1A	Poaceae stem (Charcoal)	AMS			
Wollenberg	14WH319	Beta-45873			Central Plains Tradition	Smoky Hill	3E	Charcoal	Radiometric	Measured Age	630	60
	14ML11	Beta-54042	720	50	Central Plains Tradition	Solomon River	2C	Charcoal	AMS			
	14ML15	Beta-54043	920	70	Central Plains Tradition	Solomon River	2C	Charcoal	AMS			
	14ML15	Beta-54047	880	50	Central Plains Tradition	Solomon River	2C	Charcoal	AMS			
	14ML15	Beta-54046	870	60	Central Plains Tradition	Solomon River	2C	Charcoal	AMS			
	14ML15	Beta-54045	780	50	Central Plains Tradition	Solomon River	2C	Charcoal	AMS			

14ML15	Beta-54044	740	50	Central Plains Tradition	Solomon River	2C	Charcoal	AMS		
Brock Site	14ML16	Beta-54048	800	50	Central Plains Tradition	2C	Charcoal	AMS		
	14ML306	Beta-54049	620	50	Central Plains Tradition	2C	Charcoal	AMS		
	14ML310	Beta-54050	820	50	Central Plains Tradition	2C	Charcoal	AMS		
Pottman	14ML376	Beta-54051	660	50	Central Plains Tradition	2C	Charcoal	AMS		
	14ML417	Beta-3334			Central Plains Tradition	3E	Charcoal	Radiometric	Measured Age	850 50
	14ML5	Beta-54039	880	50	Central Plains Tradition	2C	Charcoal	AMS		
	14ML5	Beta-54040	860	50	Central Plains Tradition	2C	Charcoal	AMS		
Lund	14ML8	Beta-54041	560	50	Central Plains Tradition	2C	Charcoal	AMS		
Schulte	25CD1	UCI-261132	775	15	Central Plains Tradition	1A	Bison Lower Limb	AMS		
Schulte	25CD1	UCI-261128	770	15	Central Plains Tradition	1A	Bison Rib	AMS		
Schulte	25CD1	UCI-261129	725	15	Central Plains Tradition	1A	Bison Scapula	AMS		
Schulte	25CD1	UCI-261130	640	15	Central Plains Tradition	1A	Bison Scapula	AMS		
Schulte	25CD1	UCI-261131	520	20	Central Plains Tradition	1A	Bison Scapula	AMS		
Wiseman	25CD3	UCI-261125	785	15	Central Plains Tradition	1A	Bison MANDIBLE	AMS		
Wiseman	25CD3	UCI-261126	770	20	Central Plains Tradition	1A	Bison	AMS		
Wiseman	25CD3	UCI-261127	740	15	Central Plains Tradition	1A	Bison Scapula	AMS		
Wiseman	25CD3	UCI-261124	730	15	Central Plains Tradition	1A	Bison Scapula	AMS		
Bobier	25DK1	UCI-261111	735	20	Central Plains Tradition	1A	Bison	AMS		

Bobier	25DK1	UCI-261110	700	20	Central Plains Tradition	St. Helena	1A	Bison TOE	AMS		
Bobier	25DK1	UCI-261116	670	20	Central Plains Tradition	St. Helena	1A	Bison MANDIBLE	AMS		
Bobier	25DK1	UCI-261109	670	15	Central Plains Tradition	St. Helena	1A	Bison	AMS		
Bobier	25DK1	UCI-261108	595	15	Central Plains Tradition	St. Helena	1A	Bison Scapula	AMS		
Nelson	25DK7	M-1074			Central Plains Tradition	St. Helena	3E	Charcoal	Radiometric	Measured Age	830 75
Nelson	25DK7	M-1073			Central Plains Tradition	St. Helena	3E	Charcoal	Radiometric	Measured Age	515 75
Peterson	25DX1	UCI-261107	660	15	Central Plains Tradition	St. Helena	1A	Bison Os Coxa	AMS		
Peterson	25DX1	UCI-261106	610	15	Central Plains Tradition	St. Helena	1A	Bison TOE	AMS		
Peterson	25DX1	UCI-261105	605	15	Central Plains Tradition	St. Helena	1A	Bison Toe Bone	AMS		
Peterson	25DX1	UCI-261104	155	15	Central Plains Tradition	St. Helena	1A	Bison TOE	AMS		
Annie's Site	25DX30	Beta-16406			Central Plains Tradition	St. Helena	3E	Charcoal	Radiometric	Measured Age	570 60
Annie's Site	25DX30	Beta-16408			Central Plains Tradition	St. Helena	3E	Charcoal	Radiometric	Measured Age	500 60
Annie's Site	25DX30	Beta-16407			Central Plains Tradition	St. Helena	3E	Charcoal	Radiometric	Measured Age	380 60
Nuzum	14DP10	Wis-326			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	860 55
Squaw Creek	14DP13	ISGS-A1457	705	15	Central Plains Tradition	Steed-Kisker	1A	Zea mays (Seeds)	AMS		
Squaw Creek	14DP13	ISGS-A1458	685	15	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS		
Squaw Creek	14DP13	M-1069	390	75	Central Plains Tradition	Steed-Kisker	2C	Charcoal	AMS		
Zacharias	14LV380	Beta-39366			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	910 50
Calovich	14WY7	UGa-1454			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	845 80

Cobb	23AN56	Beta-10693	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	830	90
Cobb	23AN56	Beta-10692	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	670	70
Cloverdale	23BN2	ISGS-A1460	Central Plains Tradition	Steed-Kisker	1B	Ceramic Residue	AMS			
Cloverdale	23BN2	ISGS-A1726	Central Plains Tradition	Steed-Kisker	1B	Ceramic Residue	AMS			
Cloverdale	23BN2	ISGS-A1727	Central Plains Tradition	Steed-Kisker	1B	Ceramic Residue	AMS			
Richardson Hulse	23CL109	AA-41434	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS			
Richardson Hulse	23CL109	ISGS-A1459	Central Plains Tradition	Steed-Kisker	1A	Zea mays (Seeds)	AMS			
Richardson Hulse	23CL109	ISGS-A1456	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS			
Richardson Hulse	23CL109	UGa-1148	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	695	100
Richardson Hulse	23CL109	UGa-1446	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	1260	90
Richardson Hulse	23CL109	UGa-1447	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	835	75
Richardson Hulse	23CL109	UGa-1445	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	865	70
Friend and Foe	23CL113	M-9026?	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	850	110
Friend and Foe	23CL113	M-9026-9027?	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	850	110
Friend and Foe	23CL113	M-9027?	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	850	110
Friend and Foe	23CL113	M-9036	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	850	110
Friend and Foe	23CL113	M-9037	Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age	850	110
	23CL115	AA-41433	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS			

23CL115	ISGS-A1455	800	15	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS
23CL115	ISGS-A1781	670	15	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS
Butcher 23CL118	M-2179	1170	150	Central Plains Tradition	Steed-Kisker	3F	Charcoal	Radiometric
Katz 23CL163	Beta-97603	890	40	Central Plains Tradition	Steed-Kisker	2C	Charcoal	AMS
Crabtree 23CL164	Beta-121009	890	50	Central Plains Tradition	Steed-Kisker	2C	Charcoal	AMS
Crabtree 23CL164	Beta-121008	850	50	Central Plains Tradition	Steed-Kisker	2C	Charcoal	AMS
Steed-Kisker 23PL13	M-1395-B	950	110	Central Plains Tradition	Steed-Kisker	3F	Charred Zea mays cob and kernels	Radiometric?
Steed-Kisker 23PL13	ISGS-A1728	900	20	Central Plains Tradition	Steed-Kisker	1B	Ceramic Residue	AMS
Steed-Kisker 23PL13	ISGS-A1729	885	20	Central Plains Tradition	Steed-Kisker	1B	Ceramic Residue	AMS
Steed-Kisker 23PL13	M-1395-A	840	110	Central Plains Tradition	Steed-Kisker	3F	Charcoal	Radiometric?
Steed-Kisker 23PL13	M-1395			Central Plains Tradition	Steed-Kisker	3E	UKN	Measured Age 920 140
Steed-Kisker 23PL13	M-1397			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 1090 110
Steed-Kisker 23PL13	M-1395b			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 950 110
Steed-Kisker 23PL13	M-1395a			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 840 110
Steed-Kisker 23PL13	M-1995a			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 840 110
Steed-Kisker 23PL13	M-1398			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 740 100
Steed-Kisker 23PL13	M-1399			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 720 100
Steed-Kisker 23PL13	M-1396			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Measured Age 50 100

Coons	23PL16	AA-41432	858	39	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS	
Coons	23PL16	ISGS-A1730	660	20	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS	
Coons	23PL16	AA-41431	656	68	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS	
Coons	23PL16	UGa-375			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 1180 110
Coons	23PL16	UGa-467			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 1045 60
Coons	23PL16	UGa-466			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 645 60
Coons	23PL16	UGa-392			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 635 60
Young	23PL4	M-2347	880	110	Central Plains Tradition	Steed-Kisker	3F	Charcoal	Radiometric	
Young	23PL4	ISGS-A1725	790	20	Central Plains Tradition	Steed-Kisker	1B	Ceramic Residue	AMS	
Young	23PL4	ISGS-A1731	685	20	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS	
Young	23PL4	ISGS-A1732	685	20	Central Plains Tradition	Steed-Kisker	1A	Phaseolus vulgaris (Seeds) charred	AMS	
Young	23PL4	M-2346	660	100	Central Plains Tradition	Steed-Kisker	2C	Charcoal	Radiometric	
Warren Gresham	23PL48	M-1182			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 1075 150
White	23PL80	ISGS-A1734	805	20	Central Plains Tradition	Steed-Kisker	1A	Zea mays (Seeds) charred	AMS	
White	23PL80	ISGS-A1735	790	20	Central Plains Tradition	Steed-Kisker	1A	Zea mays (Seeds) charred	AMS	
White	23PL80	ISGS-A1733	720	20	Central Plains Tradition	Steed-Kisker	1A	Zea mays (Seeds) charred	AMS	

Scott	14LV1082	OS-4450	770	25	Central Plains Tradition	Steed-Kisker	1A	Carya sp. / Nutshell (Seeds) charred	AMS	
Scott	14LV1082	ISGS-5074	630	70	Central Plains Tradition	Steed-Kisker	2C	Charcoal	Radiometric	
Scott	14LV1082	ISGS-5540	610	70	Central Plains Tradition	Steed-Kisker	2C	Charcoal	AMS	
Zacharias	14LV380	AA-43407	789	39	Central Plains Tradition	Steed-Kisker	1A	Prunus sp. (Seeds)	AMS	
Zacharias	14LV380	Beta-36365			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 70
Zacharias	14LV380	Beta-34371			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 50
Zacharias	14LV380	Beta-36366			Central Plains Tradition	Steed-Kisker	3E	Charcoal	Radiometric	Measured Age 50
Holdredge 3	25FR6	ISGS-A1790	1015	20	Central Plains Tradition	Upper Republican	1B	Ceramic Residue	AMS	
Holdredge 3	25FR6	ISGS-A1791	910	15	Central Plains Tradition	Upper Republican	1B	Ceramic Residue	AMS	
Compton	25FT13	I-584	510	100	Central Plains Tradition	Upper Republican	2C	Charcoal	AMS	
Aiken	25FT16	SI-194	930	80	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	
Aiken	25FT16	I-583	715	125	Central Plains Tradition	Upper Republican	3F	Charcoal	AMS	
Medicine Creek	25FT17	SI-34	1485	65	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	
Medicine Creek	25FT17	SI-36	865	65	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	
Medicine Creek	25FT17	SI-32	830	65	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	
Medicine Creek	25FT17	SI-73	820	50	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	
Medicine Creek	25FT17	I-585	780	125	Central Plains Tradition	Upper Republican	3F	Charcoal	AMS	
Medicine Creek	25FT17	SI-40	710	65	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	
Upper Republican	25FT32	M-1365	565	100	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric	

Mowry Bluff	25FT35	Wis-324	930	60	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Mowry Bluff	25FT35	Wis-318	790	55	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Mowry Bluff	25FT35	Wis-319	770	55	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
N/A	25FT354	PRI-11-140-33	710	15	Central Plains Tradition	Upper Republican	1A	BONE	AMS
Medicine Creek	25FT36	SI-193	800	100	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Medicine Creek	25FT36	SI-192	750	80	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Medicine Creek	25FT39	SI-56	750	65	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Medicine Creek	25FT39	SI-196	670	120	Central Plains Tradition	Upper Republican	3F	Charcoal	Radiometric
N/A	25FT54	SI-70	640	50	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
N/A	25FT54	PRI-11-140-1556	595	20	Central Plains Tradition	Upper Republican	2B	Charcoal (Fraxinus pennsylvanica)	AMS
N/A	25FT56	PRI-11-140-219-2	660	60	Central Plains Tradition	Upper Republican	1B	Pottery Residue	AMS
N/A	25FT56	PRI-11-140-222-2	610	20	Central Plains Tradition	Upper Republican	1B	Pottery Residue	AMS
N/A	25FT56	PRI-11-140-221	610	15	Central Plains Tradition	Upper Republican	1B	Pottery Residue	AMS
N/A	25FT56	PRI-11-140-218	605	20	Central Plains Tradition	Upper Republican	2B	Charcoal (Acer negundo)	AMS
N/A	25FT56	PRI-11-140-221-2	585	20	Central Plains Tradition	Upper Republican	1A	Zea mays (Seeds) kernel, charred	AMS
N/A	25FT56	PRI-11-140-222-1	585	20	Central Plains Tradition	Upper Republican	1A	Zea mays (Seeds) kernel, charred	AMS
Medicine Creek	25FT70	SI-53	845	65	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Medicine Creek	25FT70	M-844	500	100	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric
Upper Republican	25FT80	SI-72	440	40	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric

Upper Republican	25FT80	UM-467	Central Plains Tradition	Upper Republican	3E	Charcoal	Radiometric	Measured Age	1380	180
Hulme	25HL28	Wis-2154	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Hulme	25HL28	Wis-2155	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
N/A	25HN36	I-641	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
N/A	25HN36	I-642	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1796	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1798	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1814	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1797	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1800	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1801	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Shipman	25WT7	Wis-1799	Central Plains Tradition	Upper Republican	2C	Charcoal	Radiometric			
Redbird	25HT3	UCI-261102	Extended Coalescent	Redbird	1A	Bison Scapula	AMS			
Redbird	25HT3	UCI-261101	Extended Coalescent	Redbird	1A	Bison Scapula	AMS			
Redbird	25HT3	UCI-261099	Extended Coalescent	Redbird	1A	Bison Scapula	AMS			
Redbird	25HT3	UCI-261103	Extended Coalescent	Redbird	1A	Bison Calcaneus	AMS			
Redbird	25HT3	UCI-261098	Extended Coalescent	Redbird	1A	Bison Scapula	AMS			
Redbird	25HT3	UCI-261100	Extended Coalescent	Redbird	1A	Bison ?	AMS			
Redbird	25HT3	UCI-261097	Extended Coalescent	Redbird	1A	Bison Scapula	AMS			

Elbee	32ME408	SMU-797	Extended Coalescent Variant	3E	Charcoal	Radiometric	Measured Age	440	40
Elbee	32ME408	SMU-1101	Extended Coalescent Variant	3E	Charcoal	Radiometric	Measured Age	270	40
Elbee	32ME408	SMU-1103	Extended Coalescent Variant	3E	Charcoal	Radiometric	Measured Age	330	30
Demery	39CO1	SMU-2789	Extended Coalescent Variant	1A	Zea mays (Seeds)	AMS			
Demery	39CO1	SMU-2800	Extended Coalescent Variant	2C	Charcoal (Unid Charred Wood)	AMS			
Demery	39CO1	USGS-168	Extended Coalescent Variant	UKN	UKN	Radiometric	Measured Age	495	45
Lower Grand	39CO14	ETH-10112	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS			
Lower Grand	39CO14	SMU-2689	Extended Coalescent Variant	2C	Charcoal	AMS			
Lower Grand	39CO14	SMU-2725	Extended Coalescent Variant	2C	Charcoal	AMS			
Lower Grand	39CO14	ETH-10412	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS			
Lower Grand	39CO14	I-17912	Extended Coalescent Variant	3E	Charcoal	Radiometric	Measured Age	510	90
Lower Grand	39CO14	I-17913	Extended Coalescent Variant	3E	Charcoal	Radiometric	Measured Age	270	80
Potts	39CO19	ETH-10121	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS			

Potts	39CO19	ETH-10120	235	55	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Molstad	39DW234	SI-25	475	100	Extended Coalescent Variant	2C	Wood	AMS
Molstad	39DW234	I-720	385	95	Extended Coalescent Variant	2C	Wood	AMS
Molstad	39DW234	SI-59	360	50	Extended Coalescent Variant	2C	Wood	AMS
Molstad	39DW234	I-721	275	85	Extended Coalescent Variant	2C	Wood	AMS
Little Pumpkin	39HU97	SMU-2627	430	60	Extended Coalescent Variant	2C	Charcoal	AMS
Little Pumpkin	39HU97	SMU-2628	330	60	Extended Coalescent Variant	2C	Charcoal	AMS
Little Pumpkin	39HU97	SMU-2629	320	100	Extended Coalescent Variant	2C	Charcoal	AMS
Meander	39LM201	ETH-10117	395	55	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Meander	39LM201	ETH-10116	350	55	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Meander	39LM201	ETH-10118	275	55	Extended Coalescent Variant	1A	Seeds (fruit pit, unidentified)	AMS
Hosterman	39PO7	SMU-2728	747	62	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Hosterman	39PO7	SMU-2731	530	64	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS

Hosterman	39PO7	ETH-10119	295	55	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Hosterman	39PO7	SMU-2732	232	56	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Sully	39SL4	SMU-2726	400	63	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Sully	39SL4	ETH-10416	365	55	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Sully	39SL4	ETH-10417	265	55	Extended Coalescent Variant	1A	cucurbit? seeds	AMS
La Roche	39ST9	SI-169	450	120	Extended Coalescent Variant	3F	Wood	AMS
La Roche	39ST9	ETH-10415	420	55	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
La Roche	39ST9	ETH-11039	345	60	Extended Coalescent Variant	1A	Seeds (fruit pit, unidentified)	AMS
La Roche	39ST9	SI-106	310	55	Extended Coalescent Variant	2C	Charcoal	AMS
La Roche	39ST9	SI-95	270	50	Extended Coalescent Variant	2C	Charcoal	AMS
La Roche	39ST9	ETH-10414	250	50	Extended Coalescent Variant	1A	Seeds (fruit pit, unidentified)	AMS
Waltham Bay	39WW203	RL-304	450	90	Extended Coalescent Variant	2B	Charcoal (Silix / Populus spp.)	AMS
Waltham Bay	39WW203	RL-305	450	90	Extended Coalescent Variant	2B	Charcoal (Silix / Populus spp.)	AMS

Waltham Bay	39WWW203	RL-306	380	90	Extended Coalescent Variant	2B	Charcoal (Silix / Populus spp.)	AMS
Waltham Bay	39WWW203	SMU-2677	322	64	Extended Coalescent Variant	2C	Charcoal	AMS
Waltham Bay	39WWW203	SMU-2687	321	57	Extended Coalescent Variant	2C	Charcoal	AMS
Waltham Bay	39WWW203	SMU-2685	320	63	Extended Coalescent Variant	2C	Charcoal	AMS
Waltham Bay	39WWW203	RL-307	310	90	Extended Coalescent Variant	2B	Charcoal (Silix / Populus spp.)	AMS
Waltham Bay	39WWW203	SMU-2678	279	46	Extended Coalescent Variant	1A	Zea mays (Seeds) charred	AMS
Lynch	25BD1	M-1128	820	100	Initial Coalescent Variant	2C	Charcoal	Radiometric
Lynch	25BD1	D-AMS 037269	805	23	Initial Coalescent Variant	1A	Bone (collagen)	AMS
Lynch	25BD1	ETH-11049	780	55	Initial Coalescent Variant	1B	Pottery Carbonized Residue	AMS
Lynch	25BD1	ISGS-A603	765	30	Initial Coalescent Variant	1A	Zea mays (Seeds) kernel	AMS
Lynch	25BD1	D-AMS 037282	735	25	Initial Coalescent Variant	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037281	722	28	Initial Coalescent Variant	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037279	717	23	Initial Coalescent Variant	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037276	714	26	Initial Coalescent Variant	1A	Bone (collagen)	AMS

Lynch	25BD1	D-AMS 037280	700	24	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037264	692	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037289	691	24	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037290	685	24	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037266	685	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037270	685	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037265	667	23	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037278	659	24	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037277	653	21	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037268	652	23	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037284	651	27	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037274	649	25	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	ISGS-A605	645	35	Initial Coalescent Variant	Anoka	2C	Charcoal	AMS
Lynch	25BD1	D-AMS 037286	644	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037283	639	28	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS

Lynch	25BD1	D-AMS 037272	636	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037288	630	23	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037287	625	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	ISGS-A604	625	40	Initial Coalescent Variant	Anoka	2C	Charcoal	AMS
Lynch	25BD1	D-AMS 037267	592	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037275	581	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	D-AMS 037273	580	22	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	M-1127	540	100	Initial Coalescent Variant	Anoka	2C	Charcoal	Radiometric
Lynch	25BD1	D-AMS 037285	520	27	Initial Coalescent Variant	Anoka	1A	Bone (collagen)	AMS
Lynch	25BD1	M-842			Initial Coalescent Variant	Anoka	3E		Measured Age
Mohr	25BD139	ISGS-A623	730	35	Initial Coalescent Variant	Anoka	1A	Zea mays (Seeds) kernel	AMS
Mohr	25BD139	ISGS-A624	700	35	Initial Coalescent Variant	Anoka	1A	Prunus americana seed fragment	AMS
Mohr	25BD139	ISGS-A625	650	25	Initial Coalescent Variant	Anoka	1A	Vitis sp. Pip	AMS
Hostert	25BD16	ISGS-A622	730	35	Initial Coalescent Variant	Anoka	1A	Zea mays (Seeds) kernel	AMS
Hostert	25BD16	ISGS-A620	720	35	Initial Coalescent Variant	Anoka	1A	Zea mays (Seeds) kernel	AMS

Hostert	25BD16	ISGS-A621	690	35	Initial Coalescent Variant	Anoka	1A	Zea mays (Seeds) kernel	AMS	
Anoka	25BD2	ISGS-A606	690	30	Initial Coalescent Variant	Anoka	1A	Phaseolus vulgaris cotyledon fragment	AMS	
Anoka	25BD2	ISGS-A618	675	45	Initial Coalescent Variant	Anoka	1A	Prunus americana seed fragment	AMS	
Anoka	25BD2	ISGS-A619	650	35	Initial Coalescent Variant	Anoka	1A	Zea mays (Seeds) kernel	AMS	
Arzberger	39HU6	M-1126 a	510	100	Initial Coalescent Variant	Arzberger	1A	Bone; os	AMS	
Arzberger	39HU6	M-1126a	510	100	Initial Coalescent Variant	Arzberger	1A	Bone	AMS	
Arzberger	39HU6	M-1126	500	75	Initial Coalescent Variant	Arzberger	2C	Charcoal	AMS	
Arzberger	39HU6	ETH-10114	440	55	Initial Coalescent Variant	Arzberger	1B	Charcoal (Ceramic Residue)	AMS	
Arzberger	39HU6	ETH-11042	340	60	Initial Coalescent Variant	Arzberger	1A	Seeds (wild sunflower)	AMS	
Crow Creek	39BF11	Wis-1074	610	55	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Crow Creek	39BF11	M-1079 a	560	75	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Crow Creek	39BF11	M-1079			Initial Coalescent Variant	Cambell Creek	3E	Charcoal	Radiometric	Measured Age 560 150
Whistling Elk	39HU242	UGa-3366	1060	55	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Whistling Elk	39HU242	UGa-3369	1020	55	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Whistling Elk	39HU242	UGa-2599	975	80	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	

Whistling Elk	39HU242	UGa-2600	900	65	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Whistling Elk	39HU242	UGa-3368	870	75	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Whistling Elk	39HU242	UCR-2037	710	70	Initial Coalescent Variant	Cambell Creek	1A	Zea mays (Seeds) charred	AMS?	
Whistling Elk	39HU242	UGa-2601	660	50	Initial Coalescent Variant	Cambell Creek	2C	Charcoal	Radiometric	
Whistling Elk	39HU242	UCR-2035	650	60	Initial Coalescent Variant	Cambell Creek	1A	Zea mays (Seeds) charred	AMS?	
Whistling Elk	39HU242	UCR-2036	550	70	Initial Coalescent Variant	Cambell Creek	1A	Zea mays (Seeds) charred	AMS?	
Whistling Elk	39HU242	UGa-3367			Initial Coalescent Variant	Cambell Creek	3E	Charcoal	Radiometric	Measured Age 555 60
Two Deer	14BU55	AA-36112	940	35	Late Woodland	Bemis Creek	1A	Iva annua (Charcoal)	AMS	
Two Deer	14BU55	AA-36111	935	45	Late Woodland	Bemis Creek	1A	Helianthus annuus (Seeds)	AMS	
Two Deer	14BU55	AA-36113	925	60	Late Woodland	Bemis Creek	1A	Zea mays (Seeds) charred	AMS	
Two Deer	14BU55	UGa-2501			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 1065 65
Two Deer	14BU55	UGa-2502			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 985 45
Two Deer	14BU55	UGa-1346			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 970 80
Two Deer	14BU55	UGa-2500			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 970 80
Two Deer	14BU55	UGa-2504			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 950 135
Two Deer	14BU55	UGa-1345			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 890 60
Two Deer	14BU55	UGa-2503			Late Woodland	Bemis Creek	3E	Charcoal	Radiometric	Measured Age 325 140
	14BU31	UGa-2807			Late Woodland	Butler?	3E	Charcoal	Radiometric	Measured Age 1240 75
	14BU31	UGa-2560			Late Woodland	Butler?	3E	Charcoal	Radiometric	Measured Age 1215 55

	14BU32	UGa-3044	Late Woodland	Butler?	3E	Charcoal	Radiometric	Measured Age	720	70
Anderson	14DO32	Beta-18611	Late Woodland	Deer Creek	3E	Charcoal	Radiometric	Measured Age	1090	50
Richland	14SH101	Beta-18610	Late Woodland	Deer Creek	3E	Charcoal	Radiometric	Measured Age	1460	100
Richland	14SH101	Tx-5667	Late Woodland	Deer Creek	3E	Charcoal	Radiometric	Measured Age	1400	100
Richland	14SH101	Beta-18609	Late Woodland	Deer Creek	3E	Charcoal	Radiometric	Measured Age	1130	60
	14AT2	Beta-10121	Late Woodland	Grasshopper Falls	3E	UKN	UKN	Measured Age	1350	60
	14AT2	Beta-10121 (10120?)	Late Woodland	Grasshopper Falls	3E	Charcoal	Radiometric	Measured Age	1350	60
	14AT2	Beta-10120	Late Woodland	Grasshopper Falls	3E	Charcoal	Radiometric	Measured Age	1350	60
	14AT2	Beta-10122	Late Woodland	Grasshopper Falls	3E	Charcoal	Radiometric	Measured Age	1030	60
Hamon	14JF350	D-AMS-7435	1334	28	1B	Ceramic Residue	AMS			
Hamon	14JF350	D-AMS-7434	1258	25	1B	Ceramic Residue	AMS			
Hamon	14JF350	D-AMS-7947	1183	23	1B	Ceramic Residue	AMS			
Hamon	14JF350	D-AMS-7948	1116	23	1B	Ceramic Residue	AMS			
Senn's Hill	14JF414	Beta-19434	Late Woodland	Grasshopper Falls	3E	Charcoal	Radiometric	Measured Age	1200	60
Avoca	14JN332	AA-36102	1220	50	1A	Zea mays (Seeds) charred	AMS			
Avoca	14JN332	AA-36100	1200	40	1A	Iva annua (Seeds)	AMS			
Avoca	14JN332	AA-36101	1165	40	1A	Zea mays (Seeds) charred	AMS			
Avoca	14JN332	AA-39099	985	40	1A	Iva annua (Seeds)	AMS			
Avoca	14JN332	Beta-33220	Late Woodland	Grasshopper Falls	3E	Charcoal	Radiometric	Measured Age	1170	50
Avoca	14JN332	LUNK-1371	Late Woodland	Grasshopper Falls	3E	UKN	Radiometric	Measured Age	920	60

Booth	14JN349	Tx-6483		Late Woodland	Grasshopper Falls	3E	Charcoal	Radiometric	Measured Age	1530	170
Ferber	25CD10	UCI-261120	975	15	Great Oasis	1A	Bison	AMS			
Bill Packer	25SM9	Wis-1763	970	70	Great Oasis	2C	Charcoal	Radiometric			
Bill Packer	25SM9	Wis-1764	940	70	Great Oasis	2C	Charcoal	Radiometric			
Bill Packer	25SM9	Wis-1762	900	70	Great Oasis	2C	Charcoal	Radiometric			
Bill Packer	25SM9	UCI-261007	1005	15	Great Oasis	1A	Bison Femur	AMS			
Bill Packer	25SM9	UCI-261004	1000	15	Great Oasis	1A	Bison Pelvis	AMS			
Bill Packer	25SM9	UCI-261003	985	15	Great Oasis	1A	Bison Femur	AMS			
Bill Packer	25SM9	UCI-261006	985	20	Great Oasis	1A	Bison Vertebrae	AMS			
Bill Packer	25SM9	UCI-261005	975	15	Great Oasis	1A	Bison Vertebrae	AMS			
Cow-Killer	14OS347	Beta-12906		Late Woodland	Greenwood	3E	Charcoal	Radiometric	Measured Age	1300	100
Cow-Killer	14OS347	Beta-12904		Late Woodland	Greenwood	3E	Charcoal	Radiometric	Measured Age	1230	90
Stiles	14WB504	UGa-4091		Late Woodland	Greenwood	3E	Charcoal	Radiometric	Measured Age	1225	75
Stiles	14WB504	UGa-4088		Late Woodland	Greenwood	3E	Charcoal	Radiometric	Measured Age	1795	145
Forrest Site	14PA303	ISGS-A576	1030	25	Keith	1A	Bison Bone	AMS			
Meckfessel	14PA363	I-10983		Late Woodland	Keith	3E	Charcoal	Radiometric	Measured Age	1010	80
Woodruff Ossuary	14PH4	C-928		Late Woodland	Keith	3E	Charcoal	Radiometric	Measured Age	1339	200
Keith Site	25FT18	SI-126	1580	100	Keith	2C	Charcoal	Radiometric			
Keith Site	25FT18	M-841	1130	100	Keith	2C	Charcoal	Radiometric			
Medicine Creek	25FT70	SI-197	1260	80	Keith	2C	Charcoal	Radiometric			
	25HN12	UGa-5478	1250	110	Keith	2C	Charcoal	Radiometric			
	25HN12	UGa-5482	1050	70	Keith	2C	Charcoal	Radiometric			
	25HN12	DIC-3325		Late Woodland	Keith	3E	Charcoal	Radiometric	Measured Age	1220	55
	25MO86	WIS-1795	970	70	Keith	2C	Charcoal	Radiometric			
Doyle (Red Willow)	25RW28	UM-470	1940	80	Keith	2C	Charcoal	Radiometric			
Doyle (Red Willow)	25RW28	UM-549	1920	70	Keith	2C	Charcoal	Radiometric			

Doyle (Red Willow)	25RW28	SI-68	1430	45	Late Woodland	Keith	2C	Charcoal	Radiometric	
Doyle (Red Willow)	25RW28	UM-466	1370	100	Late Woodland	Keith	2C	Charcoal	Radiometric	
	25CD86/89	Beta-273626	1030	40	Late Woodland	Loseke Creek	2C	Charcoal	AMS	
Andrews	25DO12	AA-36097	1050	40	Late Woodland	Loseke Creek	1A	Zea mays (Seeds)	AMS	
Andrews	25DO12	AA-36098	1040	40	Late Woodland	Loseke Creek	1A	Zea mays (Seeds)	AMS	
Andrews	25DO12	WIS-2315	910	95	Late Woodland	Loseke Creek	2C	Charcoal	Radiometric	
Kelso	25HO23	M-637	1150	100	Late Woodland	South Platte	2C	Charcoal	Radiometric	
Kelso	25HO23	D-AMS027242	1169	23	Late Woodland	South Platte	2C	Charcoal	AMS	
Kelso	25HO23	D-AMS027243	1138	37	Late Woodland	South Platte	1A	animal bone collagen	AMS	
Walker Gilmore	25CC28	AA-41425	1194	41	Late Woodland	Stems Creek Component	1A	C. pepo, charred (Seeds)	AMS	
Walker Gilmore	25CC28	AA-41427	1084	40	Late Woodland	Stems Creek Component	1A	C. pepo, charred (Seeds)	AMS	
Walker Gilmore	25CC28	AA-41426	1051	42	Late Woodland	Stems Creek Component	1A	C. pepo, charred (Seeds)	AMS	
Walker Gilmore	25CC28	UGa-2799	990	75	Late Woodland	Stems Creek Component	2C	Charcoal	Radiometric	
Walker Gilmore	25CC28	UGa-2804	810	55	Late Woodland	Stems Creek Component	2C	Charcoal	Radiometric	
Walker Gilmore	25CC28	UGa-2801	755	65	Late Woodland	Stems Creek Component	2C	Charcoal	Radiometric	
Walker Gilmore	25CC28	UGa-2802	755	70	Late Woodland	Stems Creek Component	2C	Charcoal	Radiometric	
Walker Gilmore	25CC28	UGa-2803	665	55	Late Woodland	Stems Creek Component	2C	Charcoal	Radiometric	
Walker Gilmore	25CC28	UGa-2800	430	50	Late Woodland	Stems Creek Component	2C	Charcoal	Radiometric	
Walker Gilmore	25CC28	M-1129			Late Woodland	Stems Creek Component	3E	Charcoal	Radiometric	Measured Age 1030 75
Walker Gilmore	25CC28	M-1130			Late Woodland	Stems Creek Component	3E	Charcoal	Radiometric	Measured Age 6090 250
	14BO20	ISGS-A1789	1100	20	Late Woodland		1A	Walnut Shell (Seeds)	AMS	

Anderson	14CF508	I-9655		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	705	135
	14DO154	GX-6488		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1040	150
	14DO154	GX-6487		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	840	150
Hatcher	14DO19	UGa-4705		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1075	65
Hatcher	14DO19	Beta-19873		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	970	60
Anderson	14DO32	UGa-4704		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	950	150
	14JO46	Beta-35858		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1150	110
	14JO46	Beta-38587		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1150	110
	14JO46	Beta-38586		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	2350	60
Caenen	14LV1083	OS-4905	415	26	Pomona	1A	Nutshell (Seeds) charred	AMS			
Caenen	14LV1083	OS-49053	415	25	Pomona	1A	Carya sp. (Seeds) charred	AMS			
Garrison	14MM506	UGa-2666		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1175	130
Garrison	14MM506	UGa-2670		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1045	130
Williams Sherwood Jr	14MM509	UGa-4090		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	1195	70
	14MY2336	Beta-63728		LW / EPV	Pomona	3E	Charcoal	Radiometric	Measured Age	850	60
Wiley	14OS312	ISGS-A1775	910	15	Pomona	1B	Ceramic Residue	AMS			
Wiley	14OS312	ISGS-A1776	835	15	Pomona	1B	Ceramic Residue	AMS			
Harsch	14OS314	ISGS-A1760	895	20	Pomona	1A	Zea mays (Seeds)	AMS			
Harsch	14OS314	ISGS-A1784	850	20	Pomona	1A	Zea mays (Seeds)	AMS			
Woodcliff	25SD31	D-AMS-047809	179	19	Lower Loup	1A	Bison Bone (collagen)	AMS			
Woodcliff	25SD31	D-AMS-047812	118	17	Lower Loup	1A	Bison Bone (collagen)	AMS			
Woodcliff	25SD31	D-AMS-047808	95	19	Lower Loup	1A	Bison Bone (collagen)	AMS			
Woodcliff	25SD31	D-AMS-047811	82	21	Lower Loup	1A	Bison Bone (collagen)	AMS			

Woodcliff	25SD31	D-AMS-047810	53	19	Pawnee	Lower-Loup	1A	Bison Bone (collagen)	AMS	
Young	25CU25	UCI-261117	590	20	Pawnee	Lower-Loup	1A	Bison HUMMERUS	AMS	
Young	25CU25	UCI-261118	575	20	Pawnee	Lower-Loup	1A	Bison TOE?	AMS	
Young	25CU25	UCI-261777	570	20	Pawnee	Lower-Loup	1A	Bison	AMS	
Young	25CU25	UCI-261119	565	15	Pawnee	Lower-Loup	1A	Bison TOE	AMS	
Young	25CU25	Beta-64609			Pawnee	Lower-Loup	3E	Animal Bone (Rob)	Radiometric	Measured Age 540 60
Young	25CU25	Beta-64607			Pawnee	Lower-Loup	3E	Animal Bone(Rob)	Radiometric	Measured Age 450 60
Young	25CU25	Beta-64608			Pawnee	Lower-Loup	3E	Animal Bone (Rob)	Radiometric	Measured Age 350 60
Schuyler, Gray	25CX1	Wis-2341			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 250 70
Schuyler, Gray	25CX1	Wis-2340			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 330 60
Schrader	25LC1	SI-636			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 515 115
Royel Goodenow	25LP8	Beta-12739			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 570 120
Royel Goodenow	25LP8	Beta-12736			Pawnee	Lower-Loup	3E	Wood Spruce	Radiometric	Measured Age 550 80
Royel Goodenow	25LP8	Beta-12737			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 280 60
Burkett	25NC1	M-1368			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 320 100
Burkett	25NC1	Wis-2348			Pawnee	Lower-Loup	3E	Seeds Zea mays (Seeds) Cob	Radiometric	Measured Age 425 55
Burkett	25NC1	Wis-2347			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 500 50
Burkett	25NC1	Wis-2349			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 230 45
Wright	25NC3	M-1369			Pawnee	Lower-Loup	3E	Charcoal	Radiometric	Measured Age 270 100
Woodcliff	25SD31	Beta-189688	220	50	Pawnee	Lower-Loup	2C	Charcoal	UKN	
Woodcliff	25SD31	Beta-189689	210	40	Pawnee	Lower-Loup	2C	Charcoal	UKN	
Ferber	25CD10	UCI-261122	215	15	UKN	UKN	1A		AMS	
Ferber	25CD10	UCI-261121	200	15	UKN	UKN	1A		AMS	
Ferber	25CD10	UCI-261123	200	15	UKN	UKN	1A		AMS	