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THE ANZICK ARTIFACTS: A HIGH-TECHNOLOGY FORAGER TOOL ASSEMBLAGE

Samuel Stockton White V

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THE ANZICK ARTIFACTS: A HIGH-TECHNOLOGY FORAGER TOOL ASSEMBLAGE

By
Samuel Stockton White V

M.A. Anthropology, University of Montana, Missoula, Mt, 2019

Dissertation
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This academic journey has been one of the most rewarding experiences in my life, taking me to amazing places such as the Yellowstone Backcountry and Chilean Patagonia. It all began for me as a boy following a passion for “arrowhead-hunting” on the shores of tributaries to the Chesapeake Bay. Fishing and kicking-around on these shores at a young age, led me to the realization that our experience in this world is only a small part of the human continuum of occupations through the millennia, a point which has captivated me for decades. This life-long passion combined with an ability to attend the University of Montana, led to nearly ten years of academic pursuit towards this Doctorate. While this journey has been very personal for me, I have certainly not been alone and could not have reached this goal without the help and support of many through the years.

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DEDICATION

I Dedicate this dissertation to

my Beloved Wife, Lilly,

You Are Golden to Me ♥

I also Dedicate this dissertation to

My Parents

Samuel Stockton White IV and Pauline Wendler White

“I finally got those sheepskins, Mom” ♥
Abstract

The Anzick Site (24PA506) is a multi-component archaeological site located in the Shields River Valley of south-central Montana approximately 125 km north of Yellowstone National Park. The site was accidentally discovered in 1968, leading to the unfortunate destruction of its archaeological context. Included in the recovered elements of the site are the fragmentary human remains of two individuals, as well as approximately 116 lithic and osseous tools diagnostic of Clovis Culture technology. These tools were thickly covered with red ochre, as was one set of remains, presumably indicative of a burial from which osseous tool samples were dated to approximately 11,000 radiocarbon years before present (rcybp) with the remains dating to approximately 10,900 rcybp. The other set of remains, discovered ten meters distant and uphill from the ochre-covered remains dates to approximately 8,600 rcybp and are thought to be from a separate interment. The purpose of this dissertation is to assess certain facts associated with the Anzick Site, remains and artifacts. More specifically, does the site represent an assemblage deposited during a single event or possibly a collection of materials from several separate depositional events? Additionally, the artifacts may serve to elucidate a pattern of landscape and material use by this particular group of people, living at the end of the Pleistocene Epoch. Past research has shown that the Clovis Culture was highly proficient in terms of subsistence strategy and likely employed a “high technology forager” (HTF) land use system, incorporating attributes of both “forager” and “collector” hunter-gatherer systems. In keeping
with the HTF system, the Clovis hunter-gatherers were very mobile, and likely focused primarily on technology as it applied to prey acquisition and the availability of raw materials required for tool manufacture. Although the context of the site was destroyed, the existing data pertaining to the recovered elements do allow for further analyses.
# Table of Contents

Acknowledgements .............................................................................................................. ii

Abstract................................................................................................................................. v

List of Tables ......................................................................................................................... viii

List of Figures ....................................................................................................................... viii

Chapter 1: Introduction ........................................................................................................ 1

Chapter 2: Environmental, Ecological and Cultural Background ........................................... 8

2.1 Ecology, Geology, Physiography, and Hydrology ........................................................... 8

2.2 The Cultural Elements: Pre-Clovis to Late Prehistoric ................................................ 15

   Plains Indian Period (~13,500-8,000 rcybp) ................................................................. 15

   Plains Archaic Period (8,000-1,500 rcybp) ................................................................. 29

   Late Prehistoric Period (1,500-300 rcybp) ............................................................... 38

Chapter 3: Anzick Site Background .................................................................................... 48

3.1 The Post-Discovery History of the Anzick Site Attributes ........................................... 55

Chapter 4: The Reburial ....................................................................................................... 60

   Native American Perspectives .................................................................................. 60

   Understanding the Multi-Cultural Issues of the Anzick Site ....................................... 71

   Legal topics pertaining to The Anzick Site attributes ............................................... 74

   The Laws as they pertained to the Anzick Site attributes ......................................... 78

Chapter 5: Dating The Anzick Site Clovis and Early Archaic Components .............................. 97

5.1 Hypothesis 1 .................................................................................................................. 97

5.2 History of Radiocarbon Dating of The Anzick Site attributes .................................... 100

Chapter 6: The Anzick artifacts represent typical Clovis Technology .................................... 112

6.1 Hypothesis 2 ................................................................................................................ 113

6.2 Broad-Based Analysis of Clovis Sites utilizing PAST and Splits Tree4 ......................... 113

6.3 Analysis of Clovis Sites utilizing SPSS ..................................................................... 124

Chapter 7: Protein Analysis of Selected Anzick Artifacts .................................................... 145

7.1 Hypotheses 3a, 3b ......................................................................................................... 145

7.2 The PRI CIEP Analysis ............................................................................................. 149

7.3 The PRI CIEP Analysis Results ................................................................................ 150

Chapter 8: Margin Scrapers ............................................................................................... 155

8.1 Hypothesis 4 .............................................................................................................. 163

Chapter 9: Anzick Group as High Technology Foragers? .................................................... 174
List of Tables
Table 1. Notable Clovis Sites in North America ................................................................. 22
Table 2. A Summary of Documented Prehistoric Sites in the Shields Valley .................. 44
Table 3. Owner Summary of Anzick Artifacts .................................................................. 53
Table 4. (Stafford 1994) A-1 and A-2 radiocarbon dates ............................................... 101
Table 5. From Stafford et al. 1991: Separate Amino Acid Dates for A1 and A2 remains .... 102
Table 6. (Waters and Stafford 2007) A-1 radiocarbon dates ........................................... 106
Table 7. Sites (Taxa) For Clovis Site Comparisons ......................................................... 115
Table 8 Character State Table from muniz 2014 ............................................................. 117
Table 9 Character State Table designed for this study .................................................... 117
Table 10. Clovis Sites for SPSS site comparisons ........................................................... 124
Table 11. Non-Clovis Sites included for SPSS comparison ............................................. 137
Table 12. Anzick A 1 and A2 Remains Re-interment Summary ....................................... 204

List of Figures
Figure 1. Red Arrow points to location of The Anzick Site in Montana ........................... 1
Figure 2. Early Summer at The Anzick Site ...................................................................... 2
Figure 3. A selection of Anzick Artifacts ......................................................................... 5
Figure 4. Approximation of Cordilleran and Laurentide Ice Sheets at ~11,000 rcybp ....... 12
Figure 5. Map of Notable Clovis Sites in North America ................................................. 21
Figure 6. Map of Documented Prehistoric Sites in Shields Valley (Per Table 2) .......... 45
Figure 7. Tribal Territories in Montana according to The Fort Laramie Treaty of 1851 and the Flathead and Blackfeet Treaties of 1855 ......................................................... 47
Figure 8. The Anzick Site in relation to the town of Wilsall, Montana ............................ 48
Figure 9. Calvin Sarver describes the day of Anzick Site discovery to the author ............. 51
Figure 10. Double Beveled Bone rod (Top) with close-up of one end bevel cross-hatching (Verso) .... 54
Figure 11. Example of sampling on Anzick artifact Rod2 (BETA-168967) Morrow and Fiedel 2006) ... 104
Figure 12. Becerra-Valdivia et al. OxCal radiocarbon dates (calibrated) ........................................ 109
Figure 13. OxCal chart of radiocarbon dates (calibrated) ................................................................. 110
Figure 14. PAST Generated Image of Clovis Site Phylogram ............................................................ 120
Figure 15. PAST Generated Image of Clovis Sites Modal Parsimony Tree ...................................... 121
Figure 16. PAST Generated Image of Clovis Sites Strict Consensus Tree ........................................ 122
Figure 17. SplitsTree4 Neighbor-Net Graph .................................................................................... 123
Figure 18. Large Anzick Biface featuring flake-blade removal scars ............................................... 126
Figure 19. Examples of Bone Rods from the Anzick Site ................................................................. 127
Figure 20. Callahan's illustration of Lithic Reduction "Stages" (Callahan 1979) ................................. 135
Figure 21. Image of all Clovis lithic tools from all sites (n=304) and All non-Clovis tools from all non-Clovis sites (n=339) ................................................................. 138
Figure 22. Comparison of Clovis and non-Clovis projectile point (total n=228) ......................... 139
Figure 23. Comparison of Clovis Bifaces and Fluted Points (Length, Width) ................................. 140
Figure 24. Comparison of Clovis Bifaces and Fluted Points (Length and Thickness) ................... 141
Figure 25. 3D rendering of all Clovis Lithic Samples ........................................................................ 141
Figure 26. Artifacts from the Anzick Assemblage ........................................................................... 144
Figure 27. Anzick Artifacts submitted for CIEP analysis at PRI .................................................... 146
Figure 28. Caitlin Clark, MS, analyst for PRI; extracting ancient proteins from Anzick Artifact #99 ... 149
Figure 29. Anzick Artifacts which tested positive for Animal Proteins ........................................ 151
Figure 30. Anzick in relation to Wally's Beach and Mahaffy (~11,000rcybp) ................................. 152
Figure 31. Artistic Rendition of Camelops Hesternus (Image from La Brea Tar Pits Museum) ....... 153
Figure 32. Lahren and Bonnischen Portrayal of Anzick Points hafted to Bone Shafts (Lahren and Bonnischen, 1974) ................................................................. 155
Figure 33. Images of Anzick Artifacts # 78 and #2 with wide and narrow Concave Margin Scrapers ... 157
Figure 34. Illustration of dual-Bevel Anzick Bone Rod as Preform for 2 Bone Points .................. 158
Figure 35. Relative Comparison of Anzick Double-Beveled Rod and Sheridan Cave Bone Points (to scale) ..................................................................................... 159
Figure 36. Sketch of Ovoid Bone Rod from Anzick Assemblage .................................................... 159
Figure 37. Image of Elk Cannon Bone and Cross section (utilized compact bone circled in blue) .... 160
Figure 38. Anzick bone rods exhibiting consistency in manufacturing ............................................ 161
Figure 39. Cast of Anzickck artifact #78 and authentic Anzick Artifact #2 with Authentic Ovoid Bone Rod ................................................................. 162
Figure 40. My modern work area for bone rod replication ................................................................. 164
Figure 41. Mallet, Sandstone Block and Pieces Esquillee in bone reduction process .................... 165
Figure 42. Splitting of Elk Metacarpal with Piece Esquilles ............................................................ 166
Figure 43. Wide and Narrow margin scrapers used to rough-shape the bone blank .................... 167
Figure 44. Stone block used for shaping rough bone rod ................................................................. 168
Figure 45. Image illustrating reduction sequence from raw bone to finished point ....................... 169
Figure 46. Image of reduction sequence from Semenov 1976 ....................................................... 170
Figure 47. Concave margin scrapers, Replication (top) and Anzick assemblage original (bottom) .... 171
Figure 48. A collage of images from this replication study ............................................................... 173
Figure 49. Graph displaying Use-Wear found throughout the Anzick Lithic Artifact Assemblage .... 183
Figure 50. Graph displaying retouch found throughout the Anzick Lithic Artifact Assemblage ....... 184
Figure 51. Anzick Concave Margin Scraper with Use-Wear Evidence on Working Edge
Figure 52. Unifacial Scraper with Use-Wear on Working Edge
Figure 53. Image of several Anzick Lithic Artifacts exhibiting smoothed Flake-Scar Ridges and Use-
Wear/ Retouch on Working Edges
Figure 54. Image of Largest Anzick Biface exhibiting smoothed/worn flake scar ridges and bifacial retouch on working edges
Figure 55. Anzick Bone Rod Exhibiting Long-Term reuse hafting scar patterns
Figure 56. Anzick A1 Remains
Figure 57. Anzick A2 Remains
Figure 58. The Author Documenting A1 remains before final re-interment
Figure 59. The excavation for the re-interment of A1 and A2 remains
Figure 60. The Author Screening the Re-interment excavation soils
Figure 61. Shortly before the re-interment ceremony commenced
Figure 62. The Rain starting, just before the ceremony
Figure 63. A time of connection
Figure 64. A time of reflection
Figure 65. Men called to share in contributing soil to the burial
Figure 66. Women called to share in contributing soil to the burial
Figure 67. Bud Anzick and the author permanently seal the tomb box containing the ancient remains
Figure 68. Eske Willerslev and Shane Doyle finish filling in the grave with Anzick Family members standing in observance
Figure 69. Mike Waters, the author, and Mel Anzick after the ceremony
Figure 70. A time of respect, reflection and renewal
Figure 71. Below the cliff, a time of peace and connection
Figure 72. At rest once again
Figure 73. A dramatic sense of timelessness
Figure 74. Selected Group Anzick Lithic Artifacts 1
Figure 75. Selected Group Anzick Lithic Artifacts 2
Figure 76. Selected Group of Anzick Osseous Rods
Figure 77. Anzick Artifact #10 Top
Figure 78. Anzick Artifact #10 Verso
Figure 79. Anzick Artifact #4 Top
Figure 80. Anzick Artifact #4 Verso
Figure 81. Anzick Artifact #25 Top
Figure 82. Anzick Artifact #25 Verso
Figure 83. Anzick Artifact #36 Top
Figure 84. Anzick Artifact #36 Verso
Figure 85. Anzick Artifact #34 Top
Figure 86. Anzick Artifact #34 Verso
Figure 87. Anzick Artifact #18 Top
Figure 88. Anzick Artifact #18 Verso
Figure 89. Anzick Artifact #99 Top
Figure 90. Anzick Artifact #99 Verso
Figure 91. Anzick Artifact #23 Top
Figure 92. Anzick artifact #23 Verso................................................................. 242
Figure 93. Anzick Artifact #21 Top.................................................................. 243
Figure 94. Anzick Artifact #21 Verso................................................................. 244
Figure 95. Anzick Artifact #12 Top.................................................................. 245
Figure 96. Anzick Artifact #12 Verso................................................................. 246
Figure 97. Anzick Artifact #2 Top..................................................................... 247
Figure 98. Anzick Artifact #2 Verso................................................................. 248
Figure 99. Anzick Artifact #70 Top.................................................................... 249
Figure 100. Anzick Artifact #70 Verso............................................................... 250
Figure 101. Anzick Artifact #82 Top................................................................. 251
Figure 102. Anzick Artifact #82 Verso............................................................... 252
Figure 103. Anzick Artifact #89 Top................................................................. 253
Figure 104. Anzick Artifact #89 Verso............................................................... 254
Figure 105. Anzick Artifact #72 Top................................................................. 255
Figure 106. Anzick Artifact #72 Verso............................................................... 256
Figure 107. Anzick Artifact #88 Top................................................................. 257
Figure 108. Anzick Artifact #88 Verso............................................................... 258
Figure 109. Anzick Artifact #77 Top................................................................. 259
Figure 110. Anzick Artifact #77 Verso............................................................... 260
Figure 111. Anzick Artifact #71 Top................................................................. 261
Figure 112. Anzick Artifact #71 Verso............................................................... 262
Figure 113. Anzick Artifact #84 Top................................................................. 263
Figure 114. Anzick Artifact #84 Verso............................................................... 264
Figure 115. Anzick Artifact #78 Top................................................................. 265
Figure 116. Anzick Artifact #78 Verso............................................................... 266
Chapter 1: Introduction

This dissertation is focused on the cultural attributes of the Anzick Clovis Site (24PA506), located in south central Montana. Although these attributes have been studied sporadically, the evaluations of the artifacts and skeletal materials have been inconsistent and topic specific (Jones and Bonnichsen 1994; Jones 1996; Lahren 2006; Lahren and Bonnichsen 1971; Lahren and Bonnichsen 1974; Owsley and Hunt 2001; Rasmussen et al. 2014; Taylor 1969). Additionally, research concerning the Anzick Site has provided valuable insight regarding tangible aspects of the site while not offering a substantial understanding of its cultural significance (Canby 1979; Fiedel 2015; Gramly 1993; Morrow and Fiedel 2006; Pitblado 2017; Wilke et al. 1991).

Figure 1. Red arrow points to location of the Anzick Site in Montana
We cannot be certain whether the people of the Anzick Clovis group were collectors, foragers or possibly HTF, the hybrid of both. The Anzick Clovis people were hunter-gatherers, yet it is currently uncertain as to how they compared to other Clovis groups from throughout North America and whether they in fact exemplified the HTF system. When considering how the Anzick Site may contribute to our understanding of the life ways of these ancient peoples, we must take a closer look at what was discovered at the site. It is through this close analysis that we may derive concepts regarding such topics as land use, mobility patterns and subsistence strategy so adeptly employed by these people as to allow their existence in a relatively inhospitable and challenging environment.
Since the first days of its discovery in 1968, the Anzick Site and its attributes have presented as many enduring questions as there are facts. To address these issues, I compare and contrast the artifact attributes to artifacts discovered at other known Clovis sites. In these comparisons, I strive to interpret valuable yet overlooked data which may only be recognized by thorough knowledge of and access to the Anzick Site attributes. I have previously recognized (White 2015) and continue to research overlooked aspects of these attributes such as the “concave margin scrapers” which theoretically provide insight into the technology of production and possibly the function of the bone rods found amongst the Anzick artifacts.

Additionally, the comparison with other Clovis artifacts may contribute further information to our understanding of the Anzick Site and the Clovis culture. Anzick bifaces may represent a segmented reduction process as explained in several narratives (Bamforth, 2002; Goodyear 1979; Kelly 1988; Nelson, 1990); or, they may be, as Bamforth suggests (see Bamforth 2002: p.58), partially reduced bifaces, used first as cores and later as blanks for finished knives or projectile points. While I agree that bifaces were integral to the Clovis toolkit, I believe that the bifaces found in the Anzick Site represent tools, as well as cores from which expedient blades were removed with the existing scar patterns on the bifaces adding to positive proof of this theory. While the Anzick Site was contextually destroyed (Taylor 1969), the use of the existing documented data, along with the additional research will assist in providing insight into the people of the Anzick Clovis group as well as the greater Clovis Culture.

In Chapter 2, utilizing published data pertaining to geological, climatic profiles, as well as data pertaining to flora and fauna, I provide pertinent background information regarding the Anzick Site locale. As the focus of this dissertation is the Anzick Site, and most specifically, the Clovis Age Burial found at the site, this background provides insight in local and global terms to
elucidate the past and present environment which affects the Anzick Site both geologically and biologically. Although the local environment has itself changed greatly through the millennia, it is imperative to understand, at least generally, how these local changes were influenced by global events, inevitably caused by extraterrestrial fluctuations. In this chapter, I also provide a brief description of Native American cultures which inhabited the landscape from pre-Clovis to Late Prehistoric times. I focus on the culture history of Clovis in relation to important issues, such as origins land-use and subsistence strategy.

In Chapter 3, I provide a summary of the Anzick Site background, from its discovery in 1968 to the reburial of the human remains in 2014. Through the decades, the site has been the focus of much debate regarding the Clovis Culture, concepts regarding the peopling of the Americas, as well as thoughts and practice pertaining to the proper handling of human remains in the process of establishing a greater understanding of our collective human past.

In Chapter 4, I describe the laws which apply to the treatment of human remains and associated grave goods as they existed and have evolved subsequent to the day of the Anzick Site discovery, through the reburial in 2014. The laws while very specific and detailed, have changed through the years for various reasons. These changes have occurred through time to address the vulnerable nature of Native American cultural properties and remains which may be discovered on federal, state or private lands.

In Chapter 5, I attempt to clarify the long-misunderstood facts regarding the two sets of remains discovered at the site, as well as their possible association with an assemblage of lithic tools, all of which was discovered at the Anzick Site in 1968. Through the decades, the facts have been skewed to the point that many differing stories contributed to the blurring of the truth
regarding just what was found at the site, which further contributed to great difficulty in the extraction of the true significance of the site. Here, I provide a time-line of the dating of the site attributes as well as a synopsis of the results and how they contribute to the understanding of the site.

In Chapter 6, I provide a comparison of the artifacts found at the Anzick Site, to those found at other known Clovis Culture sites, to provide a definitive basis by which we may clarify that these artifacts are certainly diagnostic of and representative of the Clovis Culture. This chapter is important to the understanding of the meaning of the Anzick Site as it simply verifies that the artifacts discovered at the site are Clovis, even in light of the destruction of the site context on the day of site discovery.

![Figure 3. A selection of Anzick Artifacts](image)
In Chapter 7, I review the results of an analysis of a selection of the Anzick artifacts, which was undertaken for the purpose of identifying any proteins which may exist on the artifact surfaces. More specifically, this study addresses the question of whether the Anzick artifacts had been produced as utilitarian tools (for daily regular use); or if they in fact had been produced for the express purpose of use as burial goods for the interment of the Anzick Clovis Child. Ultimately, I posit that, if discovered on the artifacts, proteins would provide insight into the intended use of the assemblage.

In Chapter 8, I consider the use of concave margin-scrapers, in the manufacture of ovoid rods included in the artifacts discovered at the Anzick Site. Through an initial analysis of the Anzick bifaces, I have determined that at least four of them exhibit concave margin scrapers which have been purposefully produced on their bifacial and unifacial edges. The concave margin scrapers that I have identified in the Anzick assemblage represent two sizes which I posit, were used to independently shape the narrow and wide portions of the ovoid bone rods (White 2015). To investigate the validity of this hypothesis, I replicated the process of manufacture of similar osseous rods utilizing modern elk metacarpal bones and chert on which I manufactured the margin scrapers to facilitate in completing the task. I attempted this process according to academic literature such as that written by Semenov (1976), who presents a reputable and substantial narrative of the consecutive stages in a manufacturing process pertaining to osseous rods.

Finally, in Chapter 9, I consider whether the Anzick Site artifacts may reflect the High Technology Forager (HTF) subsistence strategy. To explore this question, I provide an overview of the literature regarding HTF strategy and examine the assemblage while considering the integral technological attributes as they pertain to this study. Specifically, I considered the
artifacts to determine the presence or absence of evidence of curation, recycling, maintenance, and exotic material use throughout the assemblage. Additionally, I focused on the question of whether the assemblage is in fact consistent with the characteristics described by Goodyear pertaining to the flexibility and plasticity of the technology utilized by hunter-gatherers employing a High Technology Forager subsistence strategy.
Chapter 2: Environmental, Ecological and Cultural Background

In this chapter I provide overviews of regional geology, climate, flora and fauna known to have existed contemporaneous to the Anzick Site occupation. It is important to include contemporary climate and environmental information as well as evidence pertaining to the ancient climate and environment of the subject area to support an understanding of human habitation and land use through the millennia. I strive to contribute extensive and sufficient information regarding the environmental setting of the Anzick Site, yet further investigation may be required. I have provided pertinent references throughout the text to assist further investigations toward a more comprehensive assessment of specific topics. In addition to this geologic, climatic and environmental review of the subject area, I also include a brief history of the Clovis Culture and other peoples who have called this area home for thousands of years. Suitable for habitation for dozens of species through the millennia, it is no surprise that the lush, intermontane Shields Valley played a part in the peopling of the Americas. As I discuss in this chapter, the valley is known to have been inhabited by groups of hunter-gatherers at least sporadically since the end of the Pleistocene Epoch.

2.1 Ecology, Geology, Physiography, and Hydrology

Located in south-central Montana (Figure 1), the intermontane Shields River valley provides the setting for the Anzick Site. The valley is bounded by the Yellowstone River to the south, the Crazy Mountains to the east, the Bridger Range to the west and the Castle Mountains to the north. To a great extent, this valley was shaped by forces associated with ice sheets and glaciers which originated during the last glacial maximum (Clark, et al. 2009; Haynes 1970; Locke
The Shields River flows in a southerly direction, beginning at a source in the northern extremes of the Crazy Mountains, ending at a confluence with the Yellowstone River for a total length of approximately 60 kilometers (km). Originating at a maximum altitude of ~2000 meters (m) and dropping to ~1400 m at its confluence with the Yellowstone River, the Shields River loses ~600 m in altitude as it meanders along the valley floor. The total drainage area encompassed by the Shields River Valley is ~ 2100 km² with historically continuous annual flow ranging seasonally from a possible high flow rate of 140 cubic meters per second (cms), and diminishing to a possible low flow rate of ~4 cms (USGS National Water Information System 2019). The average precipitation for the valley is between 30 and 50 cm annually with temperatures ranging from -23° to 86° Celsius. The contemporary ecoregion comprising the Anzick Site locale and proximate surroundings is included in the greater region known as the Northern Great Plains (Woods, et al. 2002). According to Woods et al., the majority of the Shields River Valley is a broad and hilly, mostly treeless, intermontane valley consisting mainly of sagebrush steppe to riparian river and creek-bottom settings. Included in these landscapes are localized habitats such as marshy stream bank areas producing stands of cottonwood trees, willows, sedges and rushes. The sagebrush steppe supports silver sage, big sagebrush and a variety of shrubs and bunch grasses (Woods, et al. 2002). In addition to this floral spectrum, the valley is home to a plethora of fauna ranging from ungulates such as elk, deer and moose to a variety of other large and medium-sized mammals such as bear, wolves and coyotes, as well as small terrestrial vertebrates. The local streams are teeming with a variety of fishes such as trout, mountain whitefish and sculpin to name a few. Additionally, there are numerous species of birds that are native to the area which include raptors, and migratory species such as geese, ducks and
cranes as well as many other species native to the area (Montana FWP: Species of Montana 2019).

In terms of the geology of the Shields Valley, Woods et al. provide a geological description of the general area in their 2002 level four ecoregion map in the area specified as 43t. Shields-Smith Valley. In this general description the surficial and bedrock consist of: Quaternary alluvium, Late-Cretaceous water-laid volcanics of the Livingston Formation and undifferentiated Tertiary sedimentary rocks; also, Mesozoic and Paleozoic sedimentary rocks as well as Precambrian Belt rocks. In addition, soil order (Great Group) consists of Mollisols (Haploborolls, Argiborolls, Calciborolls, Cryoborolls), and Inceptisols (Ustochrepts). The common soil series in the valley consist of: Castner; Savage; Sweetgrass; Regent; Chama; Coben; Work; Big Timber; Martinsdale; Owen Creek; Fairfield; Reeder; Ashlo; Musselshell; Cetrack; Prospect; Crago; Bridger and Anaconda soils (USDA Natural Resources Conservation Service Official Soils Description 2019; Woods, et al. 2002).

Pertaining more specifically to the Anzick Site, John P. Albanese, Ann M. Johnson and Ruthann Knudson co-authored a paper, Geology of the Anzick Site, in which specifics of the existing subsurface stratigraphy were described (Albanese, et al. 2015). According to Albanese, et al., the location where the Anzick remains and artifacts were discovered consists of a north-facing sandstone cliff which in turn is adjacent to and lies under a dominant, higher bluff neighboring the confluence of the Shields River and Flathead Creek, in the center of the valley. The sandstone escarpment is of the Livingston Formation bedrock dating to the Cretaceous and Tertiary ages (Albanese, et al. 2015; Ross et al. 1955).

The ground elevation at the base of the sandstone scarp is approximately 1520 m as estimated from U.S. Geological Topographic sheet “Wilsall Quadrangle” (scale 1:24,000). The north face of the scarp slopes 38°-45° to the top of the hill. The scarp is bordered on
The forces that formed the Shields River Valley were due in large part to the influences of long periods of glaciation and interglacial periods beginning approximately 2.5 million years ago during what is known as the Quaternary Glaciation Period. During this period, the glaciation of North America occurred in a series of glacial expansions followed by periods of recession; likely caused by fluctuations in insolation (incoming solar radiation), a result of the variability in the eccentricity, or departure from a near perfect circle to more of an ellipse in the earth’s orbit (Meltzer 2009, 26; Park and Allaby 2017). According to Meltzer 2009, this variation “changes the tilt or obliquity, of the earth relative to its plane of travel; and it triggers the precession of the equinox, shifting the time of the year when the earth is closest to (perihelion) or most distant from (aphelion) the sun. In the same text, Meltzer adds:

All these changes occur in predictable cycles. Eccentricity varies over a 100,000-year period; the earth’s tilt swings in 41,000-year cycles between 21.8° and 24.4° (during the most recent glacial episode it was 22.95°; it is 23.45° at present) the full precession circuit takes approximately 23,000 years (at the moment, perihelion occurs during Northern Hemisphere winters; 10,000 years ago, it was opposite)(Meltzer 2009).

There were two main glacial ice sheets that formed directly to the northwest and northeast of the Shields Valley; these were the Cordilleran Ice Sheet and the Laurentide Ice sheet, respectively. The Laurentide ice sheet was by far the larger of the two, covering most of eastern and central North America from latitudes ~N 75° to ~N 40°, from the Atlantic coast to near the
Rocky Mountain front from longitudes ~ W 64° to W 120°, encompassing a total of 13.4 million km² and measuring 4 km thick in places. The Cordilleran Ice Sheet covered the Aleutian Peninsula and east to the rocky mountain front near the mouth of the Mackenzie River with a northeastern extreme at ~N 66°, W 135°; continuing south along the Rocky Mountain front to its southeastern-most location in Montana at ~N 47°, W 113°; from this southeastern extreme, the Cordilleran Ice sheet spread to the Pacific coast with its southwestern extreme at ~N 46°, W 124°. The Cordilleran Ice sheet reached a maximum area of 2.5 million km², attaining a thickness of over 2 km in places. During the LGM, it is thought that both the Cordilleran and Laurentide ice sheets coalesced at some point followed by the beginning of their recession at ~14,000 rcpybp along this coalescence margin (Gauntney 2018; Meltzer 2009). During this recession, the Laurentide Ice sheet receded to the east and the Cordilleran to the west, leaving an ice-free void conceivably opening what is known today as the Ice-Free Corridor (IFC) from Montana to inland Alaska, possibly providing human passage between Montana and central Alaska after

![Figure 4. Approximation of Cordilleran and Laurentide Ice Sheets at ~11,000 rcpybp](image)

Toward the end of the previously described Quaternary Glaciation Period, these influences of the Late Wisconsinan Glaciation period contributed greatly to the existing landscape and geologic formations found in the Shields Valley. A glacial segment of the Quaternary Glaciation Period, the Late Wisconsinan dates to between ~35,000 and ~10,000 rcybp and is the time period most likely to have been experienced by the earliest human occupants of North America such as the group who created and contributed to the cultural attributes found at the Anzick Site (Adovasio and Pedler 2016; Meltzer 2009; Park and Allaby 2017; West 1996). The Anzick Site, located in the Shields River Valley, is approximately 180 km south of the southern extremes of both the Cordilleran and Laurentide ice sheets which reached their maximum southerly extent at ~14,000 rcybp. Additionally, the Anzick Site is south and nearly centered below the south end of the IFC at ~N 45°, W 110° (Figure 4).

According to past research (Clark, et al. 2009; Gauntney 2018; Haynes 2013; Licciardi and Pierce 2018; Locke 1990; Meltzer 2009), an interstadial warming period known as the Boling Allerod Warming Period was the result of increased insolation, and began at ~12,600 rcybp which is thought to have resulted in the eventual collapse of the Laurentide Ice Sheet. This collapse led to a massive addition of cold fresh water to the Atlantic Ocean; which in turn interrupted and drastically changed the flow of ocean currents, leading to what is known as the Younger Dryas Cooling Period at ~11,000rcybp (Bonnichsen and Lepper 2013). The Younger Dryas essentially marks the end of the Pleistocene Epoch and the beginning of the Holocene Epoch arguably at some point between ~11,000 rcybp and ~10,000rcybp. This time period was tumultuous in terms of environmental factors such as temperature fluctuations, leading to
changes in the variety of flora and fauna species at the Pleistocene/Holocene temporal boundary (Bonnichsen and Lepper 2013; Buchanan, et al. 2018; Clark, et al. 2009; Faith 2011; Faith and Surovell 2009; Fiedel 2004, 2009; Gauntney 2018; Haynes 2013; Meltzer 2009; West 1996). During this transitional period between the Pleistocene and Holocene Epochs, these environmental fluctuations likely affected the habitats of nearly every level of the food chain, from grasslands to the mega-fauna of the period. “Such changes triggered the wholesale rearrangement of biotic communities, which included mass extinctions (the mega-faunal extinction was complete by about 10,800 rcybp)” (Meltzer 2009). Where mega-faunal creatures such as the Mammoth, once found abundant, preferred food sources on the Mammoth Steppe biome of North America (Guthrie 2001, 2006), the characteristics of these biomes changed to the extent that many of these species of mega-fauna became extinct. In areas such as the Shields River Valley, which during the Pleistocene, typified the Mammoth Steppe, large numbers of these mega-fauna species existed and were likely hunted by the Anzick Clovis group. These species included: giant beaver; sloth; mammoth; mastodon; horse; camel; musk ox; elk; goat; dire wolf; short-faced bear, lion and the american cheetah to name a few. As noted by Meltzer and others, these mega-faunal species likely succumbed to the environment associated with the Younger Dryas at ~10,800 rcybp (Bonnichsen and Lepper 2013; Broughton and Weitzel 2018; Buchanan, et al. 2018; Clark, et al. 2009; Fiedel 2004, 2009; Faith 2011; Faith and Surovell 2009; Gauntney 2018; Haynes 2013; Meltzer 2009; Waters et al. 2015; West 1996).
2.2 The Cultural Elements: Pre-Clovis to Late Prehistoric

Paleoindian Period (~13,500-8,000 rcybp)

Known as the Paleoindian Period, the earliest human occupation of North America is divided into two segments; the Early Period, which includes Pre-Clovis, Clovis, Folsom and Goshen complexes and the Late Period, including the Agate Basin, Hell Gap, Cody and Foothill/Mountain complexes (Adovaiso et al. 1990; Adovaiso and Hemmings 2011; Dillehay et al. 2008; Frison 1991; Kornfeld et al. 2010; MacDonald 2012; Stanford et al. 2012, 2014; Wormington 1954).

Early Paleoindian Complexes

Pre-Clovis

Although the popular belief during the mid to late 20th century was pointing to the Clovis Culture as first occupying North America, evidence shows that locations in both North and South America were inhabited by humans who have been collectively termed by some as Pre-Clovis.

The Clovis period is widely accepted as occurring between 11,100 and 10,700 rcybp. For the purpose of this overview, Pre-Clovis will cover the known temporal human occupation periods prior to Clovis in North and South America (Stanford et al. 2012, 2014). Although the research continues, we know that the lands of North and South America were inhabited at least 14,000 rcybp. In South America, a widely accepted pre-Clovis site, located in central Chile and known as Monte Verde, is a site of human habitation demonstrating hearths, structures constructed of wood and footprints in clay, all of which date to approximately 12,500 rcybp (Dillehay et al. 2008). Although rare, sites such as Monte Verde attest to the pre-Clovis occupation in the southern hemisphere and suggest a possible coastal migration route to the Americas from Asia.
There are also several sites in North America attesting to a pre-clovis human habitation, such as Meadowcroft Rockshelter located in southwestern Pennsylvania, and the Cactus Hill site in Virginia (Adovasio et al. 1990; McAvoy & McAvoy 1997), as well as the Dutton-Selby site located in northeastern Colorado (Stanford 1979). Further south in Florida, the Page-Ladson site (Adovasio & Hemmings 2011) dates to approximately 12,300 rcybp, establishing evidence of a pre-Clovis habitation along the Eastern Seaboard and the Gulf of Mexico. Other North American sites representing a pre-Clovis occupation include Paisley Caves, in Oregon (Hockett & Jenkins 2013) and the Debra L. Friedkin site in Texas, one of the most extensively verified pre-clovis sites known to exist (Jennings & Waters 2014). These spatially distinct North and South American sites produced evidence of a human occupation dating to at least 14,000 rcybp, further pointing to a peopling of the Americas prior to the Clovis culture.

The only known Pre-Clovis site in Montana is the Lindsay Mammoth Site, located near Glendive, along a Dawson County Road. The site was found by Joe Walker in 1966 as he operated a combine while farming his land in July of that year. Based on initial investigative information provided by Dr. George Arthur and Dr. William McMannus of Montana State College, Dr. Roy E. Huffman, then vice president of the MSC Endowment and Research Foundation provided funding for further site studies. Found at the site were the remains of a Columbian Mammoth, imbedded within silt, below a buried A-horizon dating to late Pleistocene/Early Holocene transition period (Davis and Wilson 1985). The Mammoth remains date to ~12,300 rcybp, a period predating the accepted temporal range of Clovis (11,100-10,700 rcybp), (Rasmussen, et al. 2014; Waters and Stafford 2007). According to Waters and Stafford (2013, 551), “…The pivotal importance of this site is that it provides solid evidence for older-than Clovis occupation of the Americas, even though no stone tools were found…”. In spite of
no formal stone artifacts being found at the site, there were several stone blocks located below an assortment of mammoth bones. Due to the placement and possible stacking of bones and blocks within the stratigraphy of the site, these bones appeared to have been purposefully broken on the blocks, likely for marrow procurement by humans of the period. In addition to the discovery of the stone blocks and the un-natural stacking of the bones, Krasinski (2010) located notches and other patterns on the bones, indicative of possible human interaction with the remains at the site (Davis and Wilson 1985; Krasinski 2010; Waters and Stafford 2013).

_Clovis Complex_

Named for the location of discovery of the first “Clovis points”, which is Blackwater Draw near Clovis, New Mexico, the Clovis Culture is one of the oldest, wide-spread inhabiting cultures of the Americas. Known for its distinctive “fluted” projectile points, the Clovis toolkit represents a remarkable level of lithic knapping ability and an extremely efficient use of high-quality lithic materials (Kilby and Huckell 2013). This culture is thought to have existed between 11,100 and 10,700 rcybp (Rasmussen, et al. 2014; Waters and Stafford 2007). These people were hunter-gatherers and among the first true North American explorers, facing dramatic and challenging times in the everyday course of life and survival at the end of the Pleistocene Epoch. In Montana, the Anzick Site is the oldest known archaeological site, presenting with artifacts diagnostic of the Clovis technology, additionally, it is the only excavated Clovis Site in the state. There have been discoveries of fluted points, diagnostic of Clovis in Gardiner, Montana such as that found during the excavation of the Gardiner Post Offices by Otho Mack in 1959; as well as a Clovis point recovered by a University of Montana archaeological team member on the banks of the Yellowstone, north of Gardner in 2007 (Lahren 2006; MacDonald 2018). In 2013, another
Clovis projectile point was found during University of Montana archaeological survey on the shoreline of the South Arm of Yellowstone Lake (MacDonald 2018). These discoveries are rare indeed but do elucidate the fact that the locations were once visited as a part of a wider use of the landscape by ancient Clovis hunter-gatherers. Little is known about the origin of the Clovis Culture, however DNA and archaeological data do support a 3-wave migration from North East Asia (Raghavan and Skoglund 2014; Rasmussen, et al. 2014; Skoglund and Reich 2016). The ancestors of the Clovis Culture might have journeyed inland from the Pacific Coast, possibly by following river corridors such as the Columbia River toward the Great Plains and other North American regions. Another scenario is that these people traveled through the ice-free corridor which formed between the Laurentide and Cordilleran ice sheets and was passable approximately 11,500 rcybp (Dewar 2001; Fagan 2005; Haynes 2002; Meltzer 2009; Stanford, Bradley and Collins 2012; West 1996). There are many known sites throughout North America which were once occupied by people of the Clovis Culture. These sites are recognized as being associated with Clovis often due to the discovery of the diagnostic, fluted “Clovis point” as well as large bifacial cores. The technology associated with the Clovis Culture reflects a consistent and unique pattern of highly refined lithic reduction. As noted by Waters and Stafford, “These technological traits are consistent over a defined geographic area (continental United States and Mexico), and they occur during a short time period” (Waters and Stafford 2013). As there are known locations of Clovis Culture habitation such as Wally’s Beach in Alberta (Waters et al. 2015), Canada, dating to approximately 11,300 rcybp, which is geographically in line with the areas in central Alaska, there is a potential ancestral connection with the Clovis Culture remains found in Montana at the Anzick Site (Haynes 2002; MacDonald 2012, 2018); and with this in mind, the Anzick Site might serve to verify a viable course of migration directly to the south (Fagan 2005;
Haynes 2002; MacDonald 2012, 2018; Meltzer 2009; West 1996). This route may have brought the ancestors of the Anzick Clovis group through the area that is thought to have been the IFC as mentioned previously. In keeping with such a proposed north/south migration from central Alaska between 11,500 and 11,000 rcybp, components of the Anzick site date to approximately 11,040 rcybp (Morrow and Fiedel 2006; Owsley and Hunt 2001; Waters and Stafford 2007). According to Potter et al. (2017), “…data indicate that the IFC opening and viability predates Clovis, and we agree with Ives et al. (2013) and Freeman (2016) that we cannot reject the hypothesis of migration(s) of Clovis progenitors through the IFC” (Freeman 2016; Ives et al. 2013; Potter et al. 2017). Although potentially viable, there are also arguments against this route as being able to sustain populations migrating through a corridor to locations south of the Laurentide and Cordilleran Ice sheets. These arguments are based on the likely high frequency of nitrogen-poor early post glacial soils, limiting the growth of a post-glacial biomass capable of sustaining human migration through the area. Also, varve samples from Charlie lake and Spring lakes in the area of the postulated IFC, strongly suggest the existence of Glacial Lake Peace, which possibly flooded the area nearing the terminus of the accepted age of Clovis (Fladmark 1979; Pederson et al., 2016; Potter et al. 2017). The oldest known fluted points found in Alaska are from the Serpentine Hot Springs Site which post-dates Clovis at approximately 10,000 rcybp. These fluted points are distinct from Clovis and exhibit a sharp “v” concave base such that the fluting would likely have been created with the assistance of a punch. Although we do not yet know all of the facts, this site and other post-Clovis sites may support the viability of the “ice-free corridor” having been traveled by Clovis descendants in a South to North migration (Fladmark 1979; Goebel et al. 2013; Kunz and Reanier 1995). Another theoretical approach to the ancestry of the Clovis Culture is the possible, yet unsubstantiated prospect of a North
Atlantic migration by the Solutrean Culture approximately 17,000 rcybp. This migration is thought by a few notable archaeologists to explain the early occupation by Clovis peoples of locations in Florida, some of which date to approximately 11,300 rcybp (Stanford, Bradley and Collins 2012). The DNA evidence recovered from the Anzick, Clovis- age remains, does have the potential to disprove this European connection to Clovis, however, it should be noted that the sampling of current populations is limited to the extent that we may not be seeing the full scope of variability specific to the founding populations (Rasmussen et al. 2014). Yet another interesting contribution to the Clovis origination enigma, is the discovery of a Clovis tool assemblage associated with the remains of a gomphothere, suggesting a hunting event and location of habitation at El Fin Del Mundo, Sonora, Mexico which dates to approximately 11,550 rcybp (Sanchez, et al. 2014).

Archaeological evidence from Sonora, Mexico, indicates that the earliest widespread and recognizable group of hunter-gatherers (“Clovis”) were in place ~13,390 years ago in south western North America. This is the earliest well-documented population on the continent and suggest that the unique artifact style originated in the southwest or south-central part of the continent, well south of the Arctic gateways into the continent. These hunters targeted gomphotheres, an elephant common in south and central North America, but unknown in association with humans or at this late age in North America (Sanchez, et al. 2014).
Figure 5. Map of Notable Clovis Sites in North America
<table>
<thead>
<tr>
<th>Site Name</th>
<th>Location</th>
<th>Site Type</th>
<th>Cultural Association</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Burial</td>
<td>Remains, Clovis Lithics, Bone Rods</td>
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<td>Kill</td>
<td>Clovis Lithics</td>
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<td>Assemblage</td>
<td>Clovis Lithics</td>
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Table 1. Notable Clovis Sites in North America
**Folsom Complex**

The Folsom cultural complex is thought to have existed between 10,200 and 11,000 rcybp, occupying vast areas of North America from Texas to Manitoba, Canada, and Wisconsin to Idaho (MacDonald 2012). With a heightened focus on *Bison Antiquus* as a primary food source, the Folsom hunter-gatherers utilized an exceptionally intricate lithic technology which included the manufacture of what has come to be known as the Folsom point. This point was lanceolate in form and much thinner than the earlier Clovis projectile points, yet exhibited similar fluting patterns as Clovis. The Folsom flutes differ from Clovis as they often extend nearly the entire length of the point as opposed to one-third of the point length considered to be typical of Clovis (Bradley 2010; Meltzer 2009; Waters et al. 2011). In addition to being very thin and fluted, these lanceolate points were expertly and articulately created with concave bases and fine parallel bifacial pressure flaking along their lateral margins. Similar to previous Paleoindian cultures such as Clovis, the Folsom hunter-gatherers utilized high-quality lithic materials which originated from procurement locations often hundreds of kilometers distant from place of use. The purposeful procurement of these high-quality materials through direct or embedded strategies or possibly trade networks represents a substantial hallmark of many Paleoindian cultures (Bradley 2010; Collins et al. 2013; Frison 2004; Jones & Beck et al. 2003; Lahren 2006). In addition to the use of refined projectile points, these bison hunters often utilized local topography, such as arroyos, which assisted in the taking of many animals in one event. It is believed that these structured hunts were often communal in nature, bringing together several groups at specific times of the year. One such occurrence was at the Cattle Guard kill site in Colorado where approximately 50 Bison were killed amid sand dunes near an adjacent camp where there was ample evidence of a relatively long-term occupation (Jodry 1999). Another notable Folsom site is the Lindenmeier Site, found in northern Colorado where it is believed that...
groups of Folsom hunter-gatherers may have converged on at least a semi-regular basis to rendezvous socially, while at the same time, participating in a collaborative bison hunt. Among other interesting aspects of this site were several areas of occupation, simultaneously inhabited by groups displaying stylistically distinctive Folsom points, manufactured on materials which had been transported to the location from over 150 km distant in several directions (Meltzer 2009; Wilmsen and Roberts 1978). The MacHaffie Site, located near Helena, Montana, is a bison kill site where artifacts diagnostic of the Folsom culture were discovered and included a preform and bases as well as a channel flake removed during the lithic reduction process. This site is a relatively late Folsom Site, dating to between −10,390 and −10,090 rcybp, based on radiocarbon dates taken from two samples of bison bone recovered at the site. (Cummings 2012; Davis et al. 2002; Forbis 1955; MacDonald 2012). The Indian Creek Site, another Folsom bison kill site, is located ~40 km southeast of Helena, Montana and dates to ~10,800. The artifacts found at the Indian Creek Site are similar to those found at MacHaffie, including Folsom points and several channel flakes (Davis and Greiser 1992; MacDonald 2012)

Goshen Complex

The Goshen cultural complex is thought to have existed toward the middle of the Paleoindian period, temporally positioned contemporaneous to and later than the Folsom period. These people were also hunter-gatherers, practicing similar life-ways to those of the Clovis and Folsom Cultures which preceded them. Named for Goshen County in Wyoming, the Goshen complex was so named when toward the end of excavations at the Hell Gap site (located in Goshen Co. Wyoming), in 1966, a distinct and earlier stratified layer was found beneath a recognized Folsom level. Thought to possibly be attributable to Clovis, the debitage and tools found in this layer
were not diagnostic of a specific cultural complex (Frison 1996). After further excavation, a unique projectile point was found which was dissimilar to both Clovis and Folsom; lacking a percussion-generated channel flute and displaying a concave base, yet having pressure flaking in a parallel pattern, similar to that found in Clovis and Folsom. This diagnostically unique technology and cultural complex was named *Goshen* by the investigators of the Hell Gap site due to its distinctive characteristics (Irwin-Williams et al. 1947; Kornfeld et al. 2010 MacDonald 2012). Dating from 10,175 to 10,450 rcybp, according to Waters and Stafford (2014), Goshen sites can be found throughout the Great Plains and into the Rockies with two of the most important sites being The Mill Iron Site and the Upper Twin Mountain Site (Bradley 2010; Frison 2004; Waters and Stafford 2014). The Mill Iron Site is located in southeastern Montana and represents a Goshen-age *Bison antiquus* kill site where at least thirty bison were butchered ~10,450 rcybp (Waters and Stafford 2014). Of the 1,709 artifacts found at the site, 31 were Goshen projectile points and the remainder consisted of bifaces and various other tools utilized in the butchering process (MacDonald 2012). Similarly, evidence collected at the Upper Twin Mountain Site, located near Kremling, Colorado consists of a small bison bone bed of approximately 13 individuals associated with several Goshen projectile points dating to approximately 10,400 rcybp. The Upper Twin Mountain Site also holds the distinction of being the highest elevation Goshen kill site known to exist at approximately 2,548m above sea level (Kornfeld & Frison 2000). This distinction along with the Mill Iron Site which is located at approximately 950m above sea level suggests the repetitive and purposeful use of high altitude locales as well as lower plains areas by these ancient hunter-gatherers of the middle paleoindian period. In addition to the Hell Gap Site, and Upper Twin Mountain Site (both located in Colorado), there are several other sites where Goshen diagnostic projectile points have been
found in Montana, along with those found at the Mill Iron Site. Not far from the Anzick site at ~45 km away to the southwest, in the east end of the Gallatin Valley, near the town of Bozeman, a Goshen point was found at a depth of 39 cm at the Baxter Creek Site. There are also recorded sites from across the state including near Redlodge, Canyon Ferry Reservoir and Pumpkin Creek (Neely 2018). I personally had the good fortune of finding the Goshen point at Lewis Falls in Yellowstone Park (while working for Dr. MacDonald and his archaeological team) as noted by Michael Neely (Neely 2018) in his 2018 paper. That particular point was manufactured on obsidian which was sourced to Teton Pass, a location near Jackson Hole, Wyoming, a distance of ~90 km to the south, providing further knowledge regarding cultural resource use and travel (MacDonald 2018; MacDonald and Nelson 2018; Neely 2018).

Late Paleoindian Complexes

**Hell Gap/Agate Basin Complex**

The people of the Hell Gap/Agate Basin Complex are possibly descendants of the Folsom Culture in the Northern Plains, and were also focused bison hunters, demonstrating similar settlement patterns to those of their ancestors. These cultural complexes are defined by the stemmed, Hell Gap and Agate Basin points. The Hell Gap and Agate Basin complex projectile points are not only similar regarding flaking techniques, they are often found to overlap in chronological position and morphological characteristics. The Hell Gap projectile points exhibit similar flaking characteristics, differentiated by squared basal corners as opposed to the rounded tapered basal element of the Agate Basin Points. The Agate Basin projectile point is a long, narrow, lanceolate blade with convex side margins and a narrow, tapered basal element. The
Agate Basin points are carefully flaked, with a lenticular cross-section and often exhibit basal thinning and grinding. While neither Agate Basin or Hell Gap points are fluted, they are similar to their technological ancestor, the Folsom point, in terms of fine bifacial flaking techniques. The Agate Basin Hell Gap type-site is a bison kill and butchering locale in eastern Wyoming, with a recorded date of 10,430 rcybp (Frison 1978). The Hell Gap type site, also located in eastern Wyoming, provided similar results to those found at the Agate Basin Site regarding bison butchering. A charcoal sample from the Hell Gap Site, taken from below the Hell Gap occupation level suggests an occupation date for Hell Gap at ~9,450 rcybp (Irwin-Williams et al. 1973; Kornfeld et al. 2010; Macdonald 2012). The KXGN-TV Site, located near Glendive, in eastern Montana, yielded three Hell Gap points, further attesting to the presence of this late paleo-complex in the Northern Plains. In addition to this technological continuation, similar subsistence strategies also appear to continue, with evidence indicating a real trend of increasing bison hunting, subsequent to the Folsom and Goshen complexes (MacDonald 2012).

Cody Complex

The Cody Complex existed throughout the Central and Northwestern Plains and is known for its signature stemmed and distinctly “square-shouldered” basal hafting element along with a refined flaking technology. While several diagnostic variants exist, including; Scotts Bluff, Eden, Alberta, and the distinct Cody knife, it was suggested by Wormington (1964) that they all grade into one another and therefore should be collectively referred to as Cody (Wormington 1964). Artifacts diagnostic to the Cody Complex are found included in the context of many Plains archaeological sites dating to between ~8,000 and ~9,500 rcybp. In Montana, the Cody Complex
is represented at the MacHaffie site, located in the intermontane Helena Valley near Montana City. In the writing of his dissertation pertaining to the site as well as site excavations conducted in 1955, Richard Forbis recorded six stemmed Scottsbluff points among other artifacts from the same time period (Forbis 1955). In addition to Forbis, Ruthann Knudson wrote her doctoral dissertation for Washington State University, focused on the Cody Complex component of the Machaffie Site (Knudson 1983; MacDonald 2012). At the Mammoth Meadows Site, in southwestern Montana, Robson Bonnichsen excavated a Cody Complex stratum which yielded bison and other faunal remains along with human hair all of which date to ~9400 rcybp at an elevation of ~2100 meters ams (Bonnichsen 1988). This site is within .8 km of the South Everson Chert Quarry, a location known to have been an important lithic source for these and other cultures of indigenous peoples (Davis et al. 1997; Kornfeld et al. 2009; MacDonald 2012).

**Foothill/Mountain Complex**

Possibly post-dating the Hell Gap/Agate Basin Complex, the Foothill/Mountain Complex (FHMC) features a technology similar to the Hell Gap and Agate Basin Complex; with subtle differences such as slightly concave basal hafting elements as opposed to the convex and straight basal elements found on Hell Gap and Agate Basin projectile points. Along with the Hell Gap/Agate Basin Complex, the FHMC is contemporaneous with the Cody Complex yet diagnostically distinct in terms of technological attributes. The Cody Complex and FHMC may have been present in a transitional period as evidenced by both technologies in FHMC sites (Kornfeld et al. 2009). Based on evidence found at sites such as Mummy Cave (Husted 1969) and Barton Gulch (Davis et al. 1989), the FHMC period dates to roughly the same time period as the Cody Complex at between ~8,000 rcybp and ~9,500 rcybp. While the Cody Complex and
FHMC were contemporaneous, they each represented separate technological and subsistence strategies. This dichotomy is exemplified by the diagnostic similarities in FHMC as compared to Hell Gap/Agate Basin Complex technologies; with the Cody Complex exhibiting similarities of refinement to those found in Goshen and Folsom technologies, excluding the fluting characteristics of the earlier Clovis and Folsom complexes. While Cody Complex subsistence strategies were focused on bison hunting in the Plains areas, the subsistence strategies of the FHMC were much more diverse, with an emphasis on a variety of species such as porcupine, deer, hare and mink to name a few (MacDonald 2012). Together, both Cody Complex and FHMC contribute to an understanding of the apparent cultural continuity that occurred on the Northern Plains and at least the nearby intermontane valleys.

**Plains Archaic Period (8,000-1,500 rcybp)**

At approximately 8,000 rcybp, the end of the Paleoindian Period marked a time of transition in subsistence strategies and projectile technologies in response to the emergence of the Altithermal warming period, which caused environmental fluctuations and corresponding undulations in floral and faunal resources (Antevs 1948; Kornfeld 2010; MacDonald 2012, 2018; Mulloy 1958). These periods of climatic instability during this interval are categorized by subdivisions of the Plains Archaic Period into three main sub-periods: The Early Archaic (from ~8,000 to ~5,000 rcybp); The Middle Archaic (from ~5,000 to ~3,000 rcybp); and the Late Archaic (from ~3,000 to ~1,500 rcybp).

During the Early Archaic Period, the bison population suffered a decline, which was followed by a moderate increase in numbers during the Middle Archaic Period, and again by a substantial bison population increase during the Late Archaic Period. Each of these periods also resulted in
markedly differing styles in projectile technologies as well as a number of innovations throughout the Plains Archaic Period.

*Early Plains Archaic Period*

During the Early Plains Archaic, with the hot and dryer climate of the Altithermal period, the previous focus on bison as a primary source of sustenance changed to one of a more diversified diet breadth. This change was due in large part to a diminishing bison population brought on by these high temperatures and resultant, reduced grasslands also attributed to the Altithermal Period (Antevs 1948). Although the use of atlatls is inferred from at least Clovis, the first definite evidence of atlatl use was established by the discovery of still hafted Early Archaic projectile points in direct association with weighted throwing boards, found in dry rock shelters and caves from locations in the Wyoming and Montana Bighorn Mountains as well as from the Black Hills in South Dakota (MacDonald 2012). These large side-notched projectile points are diagnostic of the Early Archaic Period and are likely a technological adaptation to the diversity in prey selection evident during this period. The expanded diet breadth developed with this environmentally influenced human retreat from the Plains, to the surrounding mountain areas, and included such species as deer, pronghorn, bighorn sheep and other small animals as well as insects and a variety of plants.

While human remains from the Early Plains Archaic Period are not often recorded and understandably rare, there were remains discovered at the Anzick Site that date to this period. These remains, discovered on the surface, ~10 meters to the southeast and uphill from the Anzick Clovis component, date to ~8,600 rcybp (see Appendix B, Figure 57). According to Owsley and Hunt (2001), these remains consisted of “...four articulating pieces of the posterior
left and right parietals and the occipital squamous”. Additionally, Owsley and Hunt state that the remains are those of a child, between 6 and 8 years old (Owsley and Hunt 2001). Although there were no diagnostic artifacts discovered with this set of remains, the dating and analysis conducted by Owsley and Hunt verifies a human presence at this location contemporaneous to the Early Plains Archaic Period. Arguably, one of the most substantial and well documented Early Archaic sites in Montana was excavated by Larry Lahren at the Myers-Hindman Site near Livingston Montana (Lahren 1976, 2006) Recorded along with a large number of side-notched points and other lithic tools, was a grinding stone and large sandstone slab, likely left at the site as “site furniture” according to Binford’s definition (1979), as it was too large to move from site to site. Along with the innovative use of site furniture during the Early Archaic, the use of semi-subterranean pit houses was established and increased toward the end of this period and continued through the Middle Archaic Period. A possible reason for the development of the pit houses was as “a solution to the increased heat of the Early Archaic Period; as it is cooler underground, after all” MacDonald (2012, 62). Along with the Myers-Hindman Site, the Buckeye Site, located a few kilometers north of Warren, Montana, provides evidence of the broad diet breadth of these occupants which included an abundance of locally acquired mussels, prickly pear cactus and biscuit root as well as the use of sagebrush and pine for fire fuel (MacDonald 2012). Additionally, Mummy Cave in Northern Wyoming provides a well-stratified context with three Early Archaic components dating to between ~7,700 and ~5,700 rcybp. In keeping with other Early Archaic sites, these strata of the Mummy Cave Site did not contain bison remains. Lacking the bison remains, the dominant species was Bighorn Sheep followed by lesser dominant species such as elk, deer, marmot and birds (Frison 1978; Kornfeld et al. 2009; MacDonald 2012, 2018; McCracken 1978). While uncommon, bison were apparently taken for
food if the occasion presented itself. One such instance evidently occurred at the Hawken Site, located in the Black Hills of Wyoming during the Early Archaic Period when a herd of over one hundred (now extinct) *Bison occidentalis* were taken in an arroyo. Dozens of side-notched projectile points were recovered at the site by George Frison, the lead archaeologist of the excavation (Frison 1976). In Yellowstone National Park, at the Fishing Bridge Point Site (48YE381), a relatively rare occurrence of Early Archaic Period occupation was discovered during excavations conducted by Dr. Douglas MacDonald of the University of Montana in 2009 (MacDonald 2012, 2018; MacDonald et al 2011; MacDonald et al. 2012). This excavation yielded a cooking hearth as well as an obsidian blade which was analysed for the presence of proteins and found to have been used to butcher a deer. This blade was also subjected to analysis using X-ray Flourescence and was sourced to Obsidian Cliff, a locale in Yellowstone Park, ~32 km northwest of the site.

**Middle Plains Archaic Period**

The Early Archaic Period gave way to the Middle Archaic Period with the environmental transition from the Altithermal period to a cooler and wetter climate known as the Medithermal, more similar to the present-day environment (Antevs 1948). This phase of environmental transition initiated an increase in the range and density of grass species which were more conducive to sustaining large herds of bison in the Plains. With the onset of the cooler, more hospitable environment, the areas previously abandoned by both bison and humans, were inhabited once again. With the burgeoning populations of *Bison bison* moving into these areas, a focus on bison hunting was taking shape, yet not replacing the broad diet breadth common in the Early Archaic Period. This retention of a broad variation in sustenance may be an implication of
continuity between Early and Middle Archaic Periods in Montana (MacDonald 2012). Many sites present remains from non-bison species such as deer, bighorn sheep, pronghorn and a variety of small mammals, plants and insects. According to Frison (1991, 97-101), the Middle Archaic Period is technologically represented by the McKean projectile point, with a distinctive bifurcate basal element in several lanceolate and wasted/notched varieties. Named after the McKean Site, located in northeastern Wyoming, the “true McKean point” is lanceolate in form with a concave, slightly constricted basal hafting element and convex blade margins. Excavated by Mulloy in 1954, the McKean Site yielded a wide variety of projectile point types in addition to the McKean point type described above (Frison 1991; Mulloy 1954). These variants are known by a number of different names some of which are described by Frison:

The projectile points in question include the true McKean lanceolate type with indented base and convex blade edges that are slightly narrower at the base than toward the middle. A stemmed form with sloping shoulders has been called Duncan and a form with distinct shoulders and a slightly expanding stem has been called Hanna and were given the names by Wheeler (1954). Wheeler (1985) named other point types including Koltermann, Harney, Landers, Lewis, Boxelder, Thompson, and Hilton and observed at least six other unnamed styles for the Middle Plains Archaic Period. Even the lanceolate form may vary considerably (Frison 1991, 91).

While arguments over classifications still persist, these variants tend to be found in various sites in strata dated to between ~5,000 and ~3,000 rkybp. It is unclear whether these differing styles represent a number of differing bands or simply an example of cultural artistic license in terms of technology. Along with the McKean point typology, another widely accepted typology associated with this time period is the Oxbow point. The Oxbow points are similar to McKean points as they have bifurcated basal hafting elements but tend to be of smaller proportions. According to MacDonald (2012, 76) “It is conceivable that with extended use and retouching, McKean points become Oxbow points. The same people likely used both varieties (big McKean
points and smaller Oxbow points) depending on the condition of their stone tool kit” (Macdonald 2012).

Widely distributed throughout the Plains during this time period, from Alberta, Canada, to Wyoming and South Dakota, as well as Montana, the Middle Archaic Period occupations have been studied for decades. Several notable Middle Archaic sites have been excavated in and around the State of Montana, one of which is the Airport Rings Site near Gardiner, just over the border within Yellowstone National Park. This site, excavated by a University of Montana crew in 2009, yielded what is possibly the earliest known stone circle in the region, dating to ~4,500 rcybp. Generally post-dating the Middle Archaic Period, this stone circle is likely one of the earliest with a small number of other circles found in the region, dating to between ~3,000 and ~4,000 rcybp (MacDonald 2012). Located approximately 12 km to the northwest of the Airport Rings Site, the Rigler Bluffs Site was minimally excavated by Aubrey Haines in 1966. Haines reported dates of between ~5,040 and ~4,900 rcybp, obtained from a charcoal-laden, bank-eroded hearth. In keeping with Frison’s descriptions of Middle Archaic hearths, this hearth was also lined with rocks and likely used as a game-roasting pit. Haines also recorded the hafting element from a broken obsidian McKean point found within the hearth feature (Frison 1991; Haines 1966, MacDonald 2012). Further north, ~75 km, in the upper-Yellowstone Valley, the multi-component Myers-Hindman Site includes an extensive and well-stratified Middle Archaic component indicating continuity in subsistence and settlement patterns from the Early Archaic period through the Middle Archaic Period (~5,300 to ~3,300 rcybp) (Lahren 2006; MacDonald 2012).
Late Plains Archaic Period

The Late Plains Archaic Period is a time of renewed and focused bison hunting on the Plains, with huge populations of *Bison bison* prospering, due to the continued proliferation of dense grasslands associated with the modern, cooler and wetter Medithermal climatic period (Antev 1948). The abundance of bison on the Plains led to the wide-spread and regular use of jumps as a means to harvest large numbers of the creatures. Native Americans actively altered their environment to facilitate bison procurement, building drivelines, comprised of hundreds of large rocks, often organized into two parallel lines, extending in some instances, for dozens of kilometers from the jump and occasionally included a corral used to trap the post-jump prey. Additionally, the intentional use of fire as a range-management tool by Native Americans, is well-documented during this period, a practice that resulted in renewed vegetation in the bison foraging areas (Brink 2010; Frison 1991, 2004) Yellowstone National Park Superintendent Norris (1880) noted the presence of a several foot-high wooden fence near Swan Lake Flat during his tenure and described it as a probable game drive line, utilized by Native Americans for procuring elk and deer found in the area. According to Norris (1880), the drive-lines extended hundreds of feet to the edge of Rustic Falls where the prey animals likely met their demise (Livers and MacDonald 2009). Although the age is unknown, this example of drive-line use by indigenous cultures provides some insight into the ingenuity and subsistence strategies employed for the purpose of prey procurement.

In addition to the return of communal hunts, this period ushered in a number of other cultural firsts such as: the use of pottery; dog travois; extensive trade networks in the Plains; and the first wide-spread utilization of stone circles. Along with these innovations, there are known links with early indigenous peoples to modern Native American tribes. Additionally, the atlatl is utilized up
until the end of the Late Archaic Period at which time it is replaced by the bow and arrow at ~1,500 rcybp (MacDonald 2012). As the Late Archaic Period marks the terminus of atlatl use, the diagnostic projectile point types indicative of the time period are the Pelican Lake and Besant points. The Pelican Lake point features sharp, straight edges, and corner notches resulting in barbed corners ending in a flat base. The Pelican Lake points date from ~3,000 to ~1,500 rcybp, a bit earlier, yet overlapping the Besant points, which date from ~2,000 to ~1,300 rcybp. Conceivably dating to this relatively later time, Besant points, in contrast to Pelican Lake, are a bit less technologically refined, with primary features being convex blade edges, side notches, and a convex basal element.

In Montana, there are multiple examples of sites which were inhabited by peoples of the Late Plains Archaic Period. The Wahkpa Chu’gn Buffalo Jump is located below a bluff overlooking the Milk River, in Havre, Montana, just behind a shopping mall, and is readily accessible to the public. This site was excavated in the 1960s by the Montana Archaeological Society with the help of archaeologist John Brumley as well as Leslie Davis, a Montana State University professor (Brumley 1976; MacDonald 2012). Literally hundreds of bison were killed at the site with drives occurring repeatedly over a period ranging from ~2,050 to ~1,450 rcybp. With hundreds of Besant projectile points being discovered in association with the bone beds, Wahkpa Chu’gn exemplifies bison jumps of the Late Archaic Plains Period (MacDonald 2012). Another notable bison jump from this time period, The Keaster Site, is located in the Upper Missouri Breaks area of Montana, within the boundary of the Upper Missouri River Breaks National Monument. Dating to ~1,950 rcypb, the site is comprised of a steep terrace embankment, over which bison were driven, then constrained within a wooden sided entrapment, the remains of which were discovered during the excavation. This excavation, led by Leslie Davis and Emmett
Stallcop, took place between 1962 and 1964 and yielded both Pelican Lake and Besant projectile points (Davis et al. 1965; MacDonald 2012). The Antonsen Site, located in the Gallatin Valley of south central Montana, was excavated by Leslie Davis and Charles Zeier in the 1970s and is another example of a Late Plains Archaic Period bison kill which utilized a steep embankment over which the animals were driven and finally dispatched on a lower terrace. The kill site, overlooking the floodplain of Middle Creek and South Dry Creek, featured both Pelican Lake and Besant components which were dated to ~1,700 and ~1,600 rcybp, respectively. As with other similar bison kills from this period, the Antonsen site yielded evidence of hundreds of bison being killed during repeated occupations of the site (Davis and Zeier 1978; MacDonald 2012).

While not located in Montana, another Late Plains Archaic Period Site that bears mentioning, is the Head-Smashed-In Buffalo Jump, located in Alberta Canada. This site is arguably one of the most important bison jumps in the world, so much so, that it is listed as a UNESCO World Heritage Site. In his book *Imagining Head-Smashed-In*, Jack Brink describes the amazing story of the site and how it was used as a bison jump for over 6,000 years. Head-Smashed-In (HSI) was in fact utilized as a bison kill site during the Early Plains Archaic Period, however, it was not until ~3,000 years later that the site use becomes intense, with that intensity continuing well into the Late Prehistoric Period (described in the following section). HSI is comprised of a ~10m cliff which is located at the lower end of a wide gathering basin, with integral avenues, each bounded by kilometers of drive lines, consisting of hundreds of piles of rocks utilized to channel the bison toward and finally over the cliff. Excavations at the site were led by Brian Reeves during the late 1960s and 1970s, with a focus on the area directly below the cliff as well as a campsite, located several hundred feet south of the jump. These excavations yielded evidence of
both Pelican Lake and Besant occupations between ~3,000 and ~1,400 rcybp along with the remains of hundreds of bison and many Pelican Lake and Besant projectile points along with other butchering tools (Brink 2010; MacDonald 2012).

**Late Prehistoric Period (1,500-300 rcybp)**

The Late Prehistoric Period was a time of continuance in terms of bison hunting with the Northern Plains bison hunting culture dominating the region in terms of subsistence strategies. As the use of atlatls ended at the terminus of the Late Plains Archaic Period, the emergence of the bow as the primary projectile launching apparatus for arrows as opposed to the atlatl and darts, resulted in a technological transition in projectile point design. Where the dart points of atlatl periods were quite large and thickset, the points associated with the bow and arrow were relatively small and gracile in design. With an increase in stored energy associated with the bow, and consequently an increase in arrow velocity, an efficient balance of technology was achieved with the bow and arrow. Along with the bow and arrow, other technological innovations occurred during the Late Prehistoric Period, including: ground stone tools; fleshing tools made from bison and elk bone; straight and expanded base drills; and *Olivella* and *Dentalium* shells, presumably obtained through the avenues of expanded and extensive, down-the-line trade networks (Frison 1991, 1996). The innovations in technologies also included the relatively rare but significant introduction of pottery to the region with three main styles being predominant in archaeological assemblages found throughout Montana. According to MacDonald (2012, 129), these styles were: Avonlea pottery, Intermountain (Shoshone) pottery, and Crow pottery.

Avonlea pottery is among the earliest styles in Montana, preceded only by Besant pottery of the Late Archaic period. Dating to approximately 1,500 to 1,000 years ago, Avonlea pottery is globular in shape, tempered with grit and impressed with a net-type pattern and/or grooved exterior design. Avonlea pottery is most commonly found in the northern portion
of Montana, particularly in the northeast, as well as in North Dakota and southern Alberta and Saskatchewan.

Intermountain, or Shoshone pottery was made by Shoshone groups from Wyoming and Utah approximately 1,200 years ago. Primarily found at sites in northern Wyoming and, more rarely, southern Montana, it is also globular but features flanged bases and flat bottoms and lacks rim treatment. Exterior and interior surfaces of Intermountain pottery are smooth. It is often found in association with vessels carved from soapstone. Some sites in Yellowstone National Park and southwestern Montana have yielded Intermountain pottery, suggesting use of these landscapes by Shoshone peoples moving northward from the Great Basin and Wyoming in the last 1,000 years.

Crow pottery was introduced to Montana from the Dakotas approximately 500 years ago. About this time, the Crow split from the Hidatsa and left the Missouri River Valley of North Dakota to become bison hunters in the open plains of Montana and northern Wyoming. Crow pottery has grit temper, a globular form with an S-shaped rim, and a smooth exterior and interior. Parallel incised lines and small dots formed by pointed depressions are common decorations, incised lines are also common on rims. Crow pottery resembles Hidatsa and Mandan pottery, further solidifying the ancestral roots of the Crow. (MacDonald 2012)

At ~900 rcybp, the people of the Plains began to become more sedentary and the first villages were established in the Northern and Eastern portion of Montana and adjacent areas. While relatively few in comparison to the numerous temporary campsites, utilized by the mobile hunter-gatherers of the Northern Plains bison hunting culture, established villages did exist in the Plains.

Dating to ~600 rcybp (MacDonald 2012, 136), The Hagen Site exemplifies a permanent village of the period. Excavated in the 1930s by a number of archaeologists, the Hagen Site data and substantiating documents were subsequently either lost or misplaced in a series of government lab relocations and staff restructuring. It was not until 1940 that William Mulloy began the painstaking effort focused at re-establishing and compiling the invaluable Hagen Site data. Most importantly, Mulloy had recognized the importance of The Hagen Site in the establishment of cultural connections of the Crow to the Hidatsa and farther back in time to their
relatedness with the Mandan (Kinney 1996; Mulloy et al. 1942). The Hagen Site provided a valuable insight into the structure of prehistoric sedentary life on the Plains. Included in their findings were: “numerous bison scapula hoes, human bones and teeth, fleshing tools, two squash or pumpkin seeds, dentalia beads, charcoal and wooden post fragments” along with a wide array of ceramics and descriptions of earthen dwellings as detailed in Kinney’s 1996 Master’s Thesis.

Diagnostically indicative of this time period, the smaller projectile points which tipped the arrows, are readily discernable from the atlatl dart points of previous periods. The earliest of these date to ~1,500 rcybp and are recognized as the side-notched, Avonlea point which typically was of fine manufacture technology, with straight to slightly convex basal hafting element. According to MacDonald (2012, 120), this point represents a transition between the larger Archaic atlatl point and the relatively small points introduced ~1,300 rcybp. Typically, these Late Prehistoric side-notched points are less refined and present with shallow side notches and straight bases with straight to slightly convex blade edges. MacDonald also notes that “some Late Prehistoric hunters added a third notch to the bases of their projectile points “these arrow points are sometimes referred to as Late Prehistoric tri-notch points” (MacDonald 2012).

While The Hagen Site does represent a sedentary village, there are many sites more representative of the period, comprising campsites near the bison kill locales most reminiscent of these bison hunting cultures. While relatively intense in the early part of the Late Prehistoric Period, bison hunting and territorial defense became greatly intensified with the introduction of the modern horse in the mid to latter part of the 18th century. The use of the horse allowed these mobile hunter-gatherers to transport greater weights (food, hide shelter covers, structure poles, personal belongings, etc.) over vast areas in pursuit of game. The remnants of these mobile campsites are visible to this day in the form of groups of stone circles, found throughout the
region. Included in the many sites associated with the Late Prehistoric Period sites are locales previously mentioned in the sections above, including: Wahkpa Chu’gn Buffalo Jump; Airport Rings Site; and the Head-Smashed-In Buffalo Jump. These sites represent examples of cultural use continuity through the millennia, elucidating the importance of bison to these cultures.

One of the most important sites attributed to the bison hunting culture of this period is the Vore Site, located in the Bear Lodge Mountains of northwestern Wyoming. This site does not include the quintessential cliff scenario of typical buffalo jumps, but instead, involves a natural Karst-like sink ~65m in diameter, located in an otherwise seemingly flat plain. Bison were apparently driven in large numbers from any number of directions (depending on wind and pre-drive herd location etc.), toward and into the abrupt sink-hole which comprise either cliff or steep talus slopes to the bottom, a distance of ~15m. With the first kill level estimated to have occurred at ~450 rcybp, and is overlain with 21 subsequent levels reaching a depth of 5.5m. According to Frison (1978, 226) “these levels contain a wide variety of Late Prehistoric period side-notched and tri-notched projectile points along with stone and bone butchering tools” (Frison 1978).

The Late Prehistoric Period concludes at ~300 rcybp in the time of European contact which drastically changed the nature of habitation for Native Americans throughout the entire North American continent (Diamond 1998; Dunbar-Ortiz 2014; Green 1984; MacDonald 2018; Mapes 2009; McEvoy and Conway 2004; Meighan 1984; Silliman 2008; Thomas 2000; Trigger 1980; White 2015; Yu 2008).
2.3 Documented Prehistoric Occupation in the Shields Valley

To further elucidate the prehistoric human presence in the Shields Valley, I contacted Damon Murdo (2019), the Cultural Records Manager, at the Montana State Historic Preservation Office (SHPO); to request an archaeological site files search for the Shields Valley. I focused on files that provided site types exhibiting prehistoric lithic scatters, stone circles or cairns and potentially artifacts that would be diagnostic of a specific time period. Of the 12 sites pertinent to the study, all included evidence of bison utilization or features indicative of prehistoric occupations in the Shields Valley. As water sources are ubiquitous throughout the valley, all sites were located within easy walking distance of water and suitable for short or long-term habitation. While seven of these 12 sites were non-diagnostic of a specific cultural affiliation, the remainder did present with at least some indications of time period designation. All sites listed (Table 2, Figure 6) are within 15 km of the Anzick Site and vary in occupation intensity from one or two stone circles and small lithic scatters to sites displaying at least two occupations temporally distinct with corresponding diagnostic lithic artifacts.

Site 24PA321 and 24PA976 are two sites located to the south west of the Anzick Site and within 5 km of the Anzick Site. Both sites are located in foot-hill basins with spring-fed bottom lands and protection from the winds provided by surrounding hills. According to Napton (1966), Site 24PA321 consists of a combination of occupation and bison kill scenarios with evidence pointing to “serial occupation” where “…at various times in its history, it has served as an occupation site, a kill site, --and a wheat field.” Although Napton only recovered side-notched projectile points likely dating to the Late Prehistoric Period, he relied on evidence collected from the local avocational archaeological contingent, of which was Milt Siebler was a member. Siebler had amassed a collection of artifacts which he claimed to have removed from 24PA321
in the years previous to Napton’s visit. In Siebler’s collection were many lithic flaked tools such as knives, drills, scrapers and projectile points. Along with projectile points diagnostic of the Late Prehistoric Period, Siebler’s collection also included artifacts featuring corner-notches similar to points known as Besant which likely date to the Late Archaic Period, ~2500 rcybp (Kornfeld 2010; MacDonald 2012; Napton 1966). Very similar to 24PA321, 24PS976, which is located approximately 2 km to the southwest of 24PA321, presents with evidence including Late Prehistoric projectile points as well as similar Besant-like points along with dense lithic and bone scatter also indicating both an occupation and bison kill site.

Also dating to the Late Prehistoric period as evidenced by relatively small side-notched projectile points, 24GA328 is a bison kill site located approximately 12 km northwest of the Anzick Site, along Muddy Creek which is a tributary to the Shields River. I have visited this site and note that it consists of a low cliff overlooking a seasonal and spring fed creek, featuring scrub-willow creek bottom surrounded by rolling sage-covered prairie. When I visited the site in the early 1990s, there were many bison vertebrae visible on the creek-bottom meadow below the site with several bison skulls protruding from an eroded creek bank. My observation did not include any cultural materials but such materials were reported by George Arthur in the archaeological survey he recorded in 1957 in the form of small side-notched projectile points associated with the bison remains. Additionally, Arthur noted observing several small rock piles apparently combining to resemble a rock fence presumably used as a fence or wing to guide the bison to and over the cliff. This kill site likely dates to the Late Plains Prehistoric time period (Arthur 1957, 1966).
The reporting of these sites provides additional data to our knowledge of the prehistoric use of the landscape historically known as the Shields Valley. Whether exhibiting large or small lithic scatters, large amounts of bison bone, or stone circles, these sites attest to the use of this valley at least discontinuously from the days contemporaneous to at least as early as Clovis through to contemporary occupations.

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<td>Late Plains Archaic corner-notched Projectile Points</td>
<td>S36 T3N R8E</td>
<td>Arthur</td>
</tr>
<tr>
<td>24PA976</td>
<td>Occupation</td>
<td>Late Plains Archaic corner-notched Projectile Points</td>
<td>S03 T2N R8E</td>
<td>Napton</td>
</tr>
<tr>
<td>24PA349</td>
<td>Occupation</td>
<td>Late Prehistoric Projectile Point</td>
<td>S33 T2N R9E</td>
<td>Jerde</td>
</tr>
<tr>
<td>24PA1204</td>
<td>Occupation</td>
<td>Likely evidence of bison cooking with stone boil pit (non-diagnostic)</td>
<td>S29 T4N R9E</td>
<td>Ferguson</td>
</tr>
<tr>
<td>24PA1309</td>
<td>Stone Circle</td>
<td>Unknown “tipi-ring” (non-diagnostic)</td>
<td>S33 T2N R9E</td>
<td>Ferguson</td>
</tr>
<tr>
<td>24GA328</td>
<td>Bison Kill site</td>
<td>Late Prehistoric Projectile Points</td>
<td>S12 T3N R7E</td>
<td>Arthur</td>
</tr>
<tr>
<td>24PA930</td>
<td>Stone Circle</td>
<td>Unknown “tipi-ring” (non-diagnostic)</td>
<td>S06 T1N R9E</td>
<td>Lahren</td>
</tr>
<tr>
<td>24PA931</td>
<td>Stone Circles</td>
<td>Unknown “tipi-rings” (non-diagnostic)</td>
<td>S04 T1N R8E</td>
<td>Lahren</td>
</tr>
</tbody>
</table>

**Table 2. A Summary of Documented Prehistoric Sites in the Shields Valley**
Figure 6. Map of Documented Prehistoric Sites in Shields Valley (Per Table 2)
2.4 Protohistoric Montana and the Shields Valley

In Montana, the people of the Late Prehistoric Period bison hunting culture continued to practice their hunting traditions well into the early 19th Century. While the Montana bison hunters of the Plains generally continued these traditions, they split into several tribal groups within the region. Although all Montana tribes were not historically known to have practiced these bison hunting traditions, they did range across the areas which became to be known collectively as Montana (Montana was federally established as a state in 1889). These Montana descendant groups of ancient Native Americans include: Kootenai, Pend d’Oreille & Salish; Chippewa; Cree; Blackfeet & Gos Ventre; Assiniboine; Hidatsa/Mandan & Arikara; Sioux; Crow; and Northern Cheyenne.

Before these lands (which now are known as being part of the State of Montana), were given English names, they were home to the ancestral groups of ancient Native Americans, including those listed above. There were no fences, yet boundaries were mutually structured between these groups with or without conflict through the millennia. These lands would be given their current historic names, often by non-Native American adventurers as they traveled through these Native American territories. The Shields River Valley, takes its name from a member of the Lewis and Clark Expedition of 1804-1806, when on returning from the Pacific Coast, they separated, with Clark proceeding to the Yellowstone River. One of the men who joined Clark on this segment of the expedition, was a talented gunsmith by the name of John Shields. So talented was Shields, that he was found to be indispensable by Clark, who as they passed this river valley, a tributary to the Yellowstone, named it *The Shields River* after John Shields and the name continues to this day (Shannon and Thompson 2010).
According to Montana’s Office of Public Instruction and the University of Montana’s Regional Learning Project in the Center for Continuing Education, Tribal boundaries at the time of the Fort Laramie Treaty of 1851 were similar to that displayed below, in Figure 7 (Thompson et al. 2009). Treaties were not yet enforced at that time, but we also see in Figure 7, the ultimate effects of the continued forceful domination of the United States over the Native American Nations, resulting in the ever-diminishing sizes of their homelands to make way for non-Native American expansion.

**Figure 7. Tribal Territories in Montana according to the Fort Laramie Treaty of 1851 and the Flathead and Blackfeet Treaties of 1855**
Chapter 3: Anzick Site Background

The Anzick Site and the town of Wilsall are located in the Shields River Valley in south western Montana and are bounded by the Bridger Mountains to the west, the Crazy Mountains to the east and the Absaroka Range along with the Yellowstone River to the south. Previous to this 1968 discovery, Bill Bray had recovered a large biface from the Anzick property in 1961 while fishing along the river at the site and also described “some bones covered with red stuff” on a rodent back-dirt pile (Lahren 2006, 98). There was also local information regarding a later buffalo kill site north of Wilsall as well as several other known sites suggesting that prehistoric
Native American activities were relatively common in the area. Apparently, these discoveries were not extraordinary enough to the layman to warrant large scale archaeological exploration or excavation. There was an active local contingent of “artifact collectors” in the area at this time, however, the discovery of the Anzick site was independent of such a group and purely accidental in nature. Discovery occurred in 1968 when Ben Hargis was driving a loader/backhoe and Calvin Sarver was driving a dump truck with which he took loads of fill material from the site to the Wilsall High School and then returned to the Anzick location repeatedly. This fill material was being used for the construction of a septic tank drain field at the school approximately 3 km from the site. While digging into the base of the Anzick escarpment to extract the fill with his loader, Ben noticed an unusual powdery material that fell out of the hillside at approximately eye level which he decided to use as fill for some holes in the access road at the site. As he used the loader to fill the holes in the road, a stone that Ben recognized at once as a probable artifact dropped out of the bucket. This find appeared to Ben to be very unusual and upon Calvin’s return from taking a load to the school, they both walked to the spot in the hillside from which this artifact had been removed. The two men continued to dig with hand tools and uncovered a number of stone and bone artifacts. After this initial recovery of some of the artifacts, they moved the excavation operation to the west and continued to remove more fill until the end of the work day. Later that evening, Calvin and Ben returned to the site with their wives to have a closer look at the area where they had found the artifacts. Upon further examination of the location, the two couples removed more stone artifacts, also covered with “red stuff”. According to Sarver, these artifacts were “tightly stacked” in an area approximately one-meter square in dimension. The stacking was such that, as these artifacts were removed, similar to a deck of cards, others would fall in replacement, producing an audible “clink”. Toward the bottom of this stack of artifacts,
they found fragments of human bones which were also covered with “red stuff” (Owsley and Hunt 2001, 117). This discovery had apparently led to a free-for-all of digging on the part of the two couples which unfortunately resulted in a nearly complete obliteration of the archaeological context at the site. During the process of exploration, the men and their wives searched a greater area at the base of the escarpment and in so doing, discovered a portion of an additional human skull on the surface of the ground approximately thirty feet southeast and uphill from the location of the initial discovery. I note that from this point on in this text, I refer to the human remains which were found “toward the bottom of the stack of artifacts”, as *Anzick 1*, and the portion of human skull found “on the surface of the ground…” as *Anzick 2*. The designation of these two separate partial sets of human remains was introduced as Anzick 1 and 2 in the 2014 journal *Nature* article *The Genome of a Late Pleistocene Human from a Clovis Burial site in western Montana* (Rasmussen et al. 2014)

After removing the items from the hillside and placing everything in buckets, they went back to the Sarver residence and proceeded to clean all the “red stuff” off of them. In an interview which I conducted in 2010 with Calvin, I asked him if he might have saved any of the “red stuff” to which he replied: “Nope, it all went down the drain” (Sarver 2011).
Apparently, as mentioned previously, all of the artifacts had been covered in “red stuff” which turned out to be red ochre, a product known to have been used through the past millennia by many cultures in relation to burials (Fagan 2005; Haynes 2002; Lahren 2006; MacDonald 2012; Meltzer 2009; Moreno-Mayar, et al. 2018; Owlsey and Jantz 2014; Potter et al. 2011; West 1996). As this entire assemblage was essentially “painted” with red ochre, Calvin and the others worked hard to wash it all off and to the best of their effort, unfortunately nearly achieved that goal. According to Sarver, he contacted Geoff Skillman, one of the local “artifact collectors” of the time who in turn contacted Larry Lahren, a graduate student at the University of Montana, as he believed the discovery was significant enough to warrant an educated opinion. Lahren viewed the collection at the home of Calvin Sarver in Wilsall, Montana and recorded the site with the Montana State Historical Preservation Office as 24PA506 (The Anzick Site.) Once Lahren

\[\text{Figure 9. Calvin Sarver describes the day of Anzick Site discovery to the author}\]
realized the significance of the site, he contacted Dr. Dee Taylor, who was a professor of Archaeology with the University of Montana. Dr. Taylor investigated the site and identified it as being of Clovis origin but concluded that the true nature of the site and scientific evidence had been disturbed and destroyed to the point of rendering it nearly impossible to adequately prove association with a specific sedimentary layer in situ which would allow verification of the artifacts and bones in the site.

Unfortunately, the Wilsall material was unearthed in such a way that data from several levels could have become thoroughly mixed. Now we can never actually prove that artifacts and bones were definitely associated together in the site. It is unfortunate that our amateur diggers were so thorough and succeeded in finding almost everything that was there, leaving nothing in situ (Taylor 1969).

Undaunted by Dee Taylor’s opinion of the Anzick site as being less than convincing, Lahren contacted a fellow graduate student from the University of Calgary by the name of Robson Bonnichsen to assist in a study of the site and its associated artifacts and remains. Not long after the discovery and a consequential discussion about the ownership of the artifact assemblage, an agreement between Mel Anzick, (the property owner) and Calvin Sarver and Ben Hargis (the contractors) was made. The assemblage was split 50/50 between Anzick and the two contractors by way of a mutual agreement of dispersal. During the same dispersal event, the two contractors evenly split their 50 percent of the assemblage. For a summary of the final owner-inventory, see Appendix A. Additionally, Table 3 summarizes these Anzick, Sarver and Hargis family summary tables with artifact type and numbers owned by each family.

The Anzick site is physically dominated by the aforementioned sandstone escarpment which is in close proximity to Flathead Creek and located in the center of Shields Valley, just south of the town of Wilsall, Montana. The artifacts found at the site consist of over one hundred flaked
stone tools including tabular cores, bifaces, scrapers, blades and projectile points along with osseous rods that were beveled on one or both ends. Based upon my inspection, artifact count depends on the method employed to analyze this assemblage; one might (for instance), mend together purposefully broken fragments to be counted as one artifact or the fragments could be left separated to be counted individually. There has been a fluctuation of final counts regarding the assemblage and a best answer requires a substantial analysis of each individual fragment or artifact from the assemblage to provide a basis to establish true attributes and purpose of these tools. At this time, I observe that there are approximately one hundred and sixteen stone and bone tools or fragments which had been discovered and comprise the Anzick artifact assemblage. Of this number, there were 15 fragments of what appear to be osseous rods, thought to have been manufactured from elk antler (Morrow and Fiedel 2006). Two of these rods are complete and composed of 6 of the 15 fragments. One of the complete rods has two hatch-marked beveled ends, an example of which may be seen in Figure 10, while the other complete rod has only one beveled end with the other end shaped into a blunt, tapered form. The remaining 9 bone fragments represent an unknown number of completed rods and all exhibit either cross-hatched bevels or residual ochre or both.

<table>
<thead>
<tr>
<th>Owner</th>
<th>Biface</th>
<th>Uniface</th>
<th>Point/Preform</th>
<th>Osseous</th>
<th>Lithic Fragments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anzick</td>
<td>38</td>
<td>4</td>
<td>3</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Case</td>
<td>17</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sarver</td>
<td>17</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Totals</td>
<td>72</td>
<td>7</td>
<td>8</td>
<td>15</td>
<td>14</td>
</tr>
</tbody>
</table>

*Grand Total of all artifacts/fragments: n=116

**Table 3. Owner Summary of Anzick Artifacts**
These rods which are believed to have been hafted to projectile points and used as atlatl foreshafts, were highly polished with the cross-hatching on the beveled ends, presumably for increased friction in an attachment process (Lahren and Bonnichsen 1974).

Through the post-discovery years, the Anzick Site, with its archaeological attributes, has been the center of decades-long discussion, and sometimes disputes regarding the interpretations and baseline evidence for those interpretations. Although the context of the site had been destroyed during the 1968 discovery, the artifacts and both sets of partial remains have been studied by a multitude of individuals and organizations, drawing world-wide attention (Canby 1979; Lahren 2006, Lahren and Bonnichsen 1971, 1974; Owsley and Hunt 2001; Peacock 1999, 2013; Rasmussen et al. 2014; Wilke et al. 1991)
The history of travel and documentation regarding the remains and artifacts as well as the site itself, is outlined in the following section. This description contributes to a necessary elucidation of the facts regarding the Anzick Site, meant to properly clarify the how, when, where and why of these artifacts which have been inconsistently interpreted by many through the decades since discovery.

3.1 The Post-Discovery History of the Anzick Site Attributes

Prior to the 1968 discovery of the site by Hargis and Sarver, in 1961, a Wilsall local by the name of Bill Bray, happened upon a large stone biface while hunting woodchucks on the same hillside where the discovery was to be made some seven years later. Bray also mentioned that he had seen some “knuckle bones” (sic) all covered with “red stuff”, in the same locus from which he had recovered the artifact. The “knuckle bones” were possibly elements of the skeletal remains found in 1968, however, Bray left them at the site, to no fault of his own, not realizing their significance. According to Lahren, the measurements of the biface found by Bray are: Length: 149mm; Width 36 mm; Thickness 12 mm and a Weight of 104 grams (Bray & Lahren 2001; Lahren 2006). The chert from which the artifact was made is consistent in color and patination, retaining red colored residue consistent with the ochre found on pieces from the artifacts discovered in 1968 (Bray and Lahren 2001; Lahren 2006). Technologically, the bifacial flaking patterns are in keeping with several of the early-stage Anzick bifaces consistent with a production stage 2.5, (see Callahan 1979). Because of the circumstances as well as the ample similarities between the Bray 1961 and the 1968 Anzick Artifacts, this biface could be considered a member of the group of artifacts found by Hargis and Sarver at the Anzick Site.
The Anzick Site artifacts, as noted above, were accidentally discovered in 1968 by Hargis and Sarver and then split up according to the agreement between the finders and Mel Anzick, the property owner. In the 1970s, Lahren and Robson Bonnichsen worked together, with the Anzick Family’s permission, to document the materials from the Anzick site as well as escorting the artifacts for analysis and review by national professionals and organizations. In 1971, Lahren and Bonnichsen conducted the second archaeological excavation at the Anzick site, essentially to verify that all site evidence was accounted for and documented. As good fortune and meticulous excavation would have it, Lahren discovered a “zone [sic]” of red ochre from which he carefully removed an ochre-covered human clavicle, believed to be an element of the remains which were excavated in 1968 by the original finders (Lahren 2006; Peacock 1999). A final archaeological excavation conducted at the Anzick Site, took place in 1999 and was directed by Lahren, with the help of Doug Peacock and Mark Papworth along with several volunteers. Although some samples of bone (presumably non-human) and rock were removed during the excavation, there was apparently no noteworthy evidence uncovered, according to Doug Peacock’s *The Voices of Bones*, which describes the entire endeavor (Peacock 1999).

The first presentation regarding the Anzick Site, occurred at the Society of American Archaeology’s 1971 conference in Norman, Oklahoma, and was entitled: *The Anzick or Wilsall Site: A Clovis Complex Burial in the Shields River Valley of Southwestern Montana* (Lahren 2006). As the importance of the site became increasingly apparent, the research continued, with Lahren taking the artifacts to be viewed by such notable archaeologists as Marie Wormington (Lahren 2006; Wormington 1957). With the increasing awareness, came additional opportunities to enhance knowledge of the site such as through the casting of the artifact assemblage by the Smithsonian Institute in Washington D.C. which, according to Lahren, was due to his arranging
connections between the Institute and Montana Senator Mike Mansfield (Lahren 2006, 99). In 1974, Lahren and Bonnichsen published *Bone Foreshafts from a Clovis Burial in Southwestern Montana*, a journal article discussing possibilities of use pertaining to the bone rods found at the Anzick Site. The Anzick Site was also featured on the cover of National Geographic Magazine in an article entitled *The Search for the First Americans* (Canby 1979). From this period forward, the importance of the site was established in the field, and a number of other publications were written pertaining to and focusing on various aspects of the site (Becerra-Valdiva, et al. 2018; Jones 1996; Jones and Bonnichsen 1994; Morrow and Fiedel 2006; Owsley and Hunt 2001; Peacock 1999; Morrow and Fiedel 2006; Rasmussen, et al. 2014; Stafford 1994; White 2015; Wilke, Flenniken and Ozbun 1991).

Of these publications, arguably the most substantial (in terms of global impact) piece was the *Nature* article by Rasmussen et al., elucidating the ancient DNA sequencing results of the Anzick 1 remains. Their key findings were:

- Roughly estimated some 80% of all present-day Native American populations on the two American continents are direct descendants of the Clovis boy’s family. The remaining 20% are more closely related to the Clovis family than any other people on Earth.
- The Clovis boy’s family are the direct ancestors to a roughly estimated 80% of all present-day Native Americans. Although the Clovis culture disappeared, its people are living today.
- Clovis did not descend from Europeans, Asians or Melanesians, a theory that a number of scientists have advocated. They were Native Americans – and the Native American ancestors were the first people in America. This is now a fact.
- This discovery by Dr. Willerslev and his team proves something that tribal people have never doubted; they’ve been here since time immemorial and all the ancient artifacts located within their homelands are remnants from their direct ancestors. (Rasmussen, et al. 2014)
The artifacts and remains continued on their own separate journeys, coinciding with several of the above-mentioned research publications. After the casting of nearly all of the non-remain artifacts, the original pieces were periodically in the hands of their owners (the Anzick, Hargis and Sarver families separately) or displayed in locations such as the Yellowstone Gateway, located in Livingston, Montana, or the Montana Historical Society Museum in Helena, Montana. The artifacts may now be viewed, in their entirety, at the Montana Historical Society Museum in Helena.

Previous to the reburial which took place in 2014 (see Chapter 4), neither the Anzick 1 remains nor the Anzick 2 remains had ever been released from the Anzick family, the land owners and proprietors of the remains, even as they have been carried to numerous locations around the world. It has been for the purpose of scientific study and analysis that they have been taken to these facilities over the years, to my knowledge, only temporarily placed in the hands of trusted scientists for limited time. Although my knowledge of the history specific to the remains is not complete, I do have the following partial history as provided to me by Dr. Larry Lahren’s recollection (Lahren 2014; White 2015):

♀ 1968……….The accidental discovery of the Anzick Site (24PA506)
♀ 1968……….Dr. Dee Taylor receives the (Anzick-1) skeletal materials from Hargis and Sarver when he investigates the site.
♀ 1971……….Ben Hargis gives the Early Archaic (Anzick-2) parietal to Dr. Lahren
♀ 1971……….Dr. Lahren discovers the infant clavicle (element of Anzick-1) in Dr. Taylor’s excavation back dirt. At some point ~1971, both sets of remains (Anzick 1, including the clavicle and Anzick 2), are delivered to Dr. Taylor.
♀ 1971……….Dr. Taylor delivers the skeletal remains (Anzick-1, including the clavicle and Anzick-2) to his son, Mark Taylor, at the University of Arizona, Flagstaff.
1971……….Mark Taylor delivers some of the skeletal material (elements of both Anzick 1 and Anzick 2) to Vance Haynes to obtain the first set of dates reported in 1994.

1994……….First radiocarbon dates on the Anzick site are reported (Stafford 1994; Jones and Bonnichsen 1994)

1999……….Per Dr. Lahren’s urging recommendations and efforts with Mel and Helen Anzick, the skeletal remains (all elements of Anzick-1 and Anzick-2) are returned to Mel and Helen Anzick from Dr. Mark Taylor in Arizona.

1999……….The Anzick-1 and Anzick-2 remains are submitted to Dr. Owsley and Dr. Hunt for forensic analysis and documentation (Owsley and Hunt, Clovis and Early Archaic Crania from the Anzick Site (24PA506) 2001).

2000……….Dr. Owsley and Dr. Hunt return remains (Anzick-1 and Anzick-2 to Dr. Sarah Anzick)

Post 2001….Human rib and osseous rod material delivered to Dr. Juliet E. Morrow and Dr. Stuart J. Fiedel resulting in their 2006 paper (Morrow and Fiedel 2006)
Chapter 4: The Reburial

Arguably, one of the most important aspects of the Anzick Site, and its attributes, is the way in which it has been handled through the decades since discovery. It is due to this importance that I provide insight into the issues pertaining to the 2014 reburial of the A1 and A2 remains at the Anzick Site.

Native American Perspectives

The question of how to address the discovery of ancient human remains is one that may be perplexing and overwhelming based on the specific facts surrounding each case. The facts regarding the historic and ancient past and the numerous cultures living in the Americas and specifically, the United States, confound the process and often result in perpetual bad relations amongst the inhabitants and antagonists. It is a fact that this country and these lands, now considered by many to be “the land of the free and home of the brave” were occupied prior to European contact for many millennia. The inhabitants of these lands were indigenous peoples whose populations, depending on the specific time period, varied from relatively sparse numbers, as hunter gatherer cultures, to full-blown agricultural societies with populations totaling in the millions. The indigenous peoples, living on these lands for thousands of years, established their respective cultural ways and sophisticated societies, rivalling and often surpassing those found in all other corners of the world. These were independent societies, living in their homelands with trade networks, politics and traditions governing their life ways and cultural systems. With unlimited variety and depending on the particular society, these peoples worked and maintained the lands, keeping the waters and grasslands producing, the forests clean and the creatures plentiful and healthy. These were sophisticated people, not the “savages” that are portrayed in
many European texts from the time, people living and loving as humans, in a land they understood and appreciated to a spiritual level (Diamond 1998; Dunbar-Ortiz 2014 Fagan 2005; Mapes 2009).

The concept of this New World societal sophistication was contrary to the agenda of the ravenous European machine as it made its way across the Atlantic, looking to profit and expand its ever-widening pursuit for wealth and power at any cost. These “explorers”, the first of which is recognized to have been Columbus, discovered what was thought of as a virgin, unclaimed land when in fact it had been the home of the indigenous peoples of the Americas for thousands of years. From this initial 1492 expedition, Columbus nudged the first domino in an unimaginable sequence of destruction, leading to the downfall of many indigenous societies and cultures. The great cultures of South America, Central America, and North America soon succumbed to the violent attacks of armed men on horseback. The horse, having been extinct since the ice age in the Americas, had been re-introduced and proved to be a devastating implement when used for warfare against the Native Americans. These European armies decimated the relatively vulnerable defenders in relentless pursuit of the natural resources and lands of the area. If this actual contact and destruction were not enough, the real and most devastating killer of all, traveled independently of these invaders in the form of virgin soils epidemics such as small pox and influenza. From the period of this initial contact, to the colonial phase of the United States, the toll of these maladies on the existing populations amounted to 90 percent in some cases, often with the indigenous people never laying eyes on the Europeans. Whether this was in fact the intent of the Europeans, the consequence was that there was little the vastly outnumbered Native Americans could do to deter these “settlers” from taking anything and everything in their path.
From the beginning, the Europeans developed a hegemonic, ethnocentric posture when it came to their taking of these lands and riches. There seemed to be little or no concern for what the process of conquest was doing to these weakened, yet established societies and cultures. They apparently posed a problem and needed to be eradicated. Christianity was acknowledged by the Europeans as the basis of goodness and all that was righteous in the world, and sequentially, it was used as a justifying tool in the removal of these peoples from their lands. This was not new to the Europeans who through the centuries, adapted the “word of god” to rationalize their actions, no matter how extreme.

Bringing a similar mind-set to the scenario in North America from the colonists forward, the manipulation continued and intensified. These colonists were themselves displaced from Europe by the hierarchy and pushed out by similar tactics of long-term oppression and economic despair. As more of these “freedom-seekers” entered the “new world”, the indigenous peoples would be perceived as obstructionists to the European expansion. An old European hegemonic ideology professed that Christians were the “elects” that had a “god-given” right to the lands of the “new world”. This theology-based mind-set dictated that “The key moment in history according to this ideology, involves the winning of ‘the Land’ from alien, and indeed evil, forces” (Dunbar-Ortiz 2014, 48). Essentially, anyone standing in the way of this godly endeavor was in fact, the enemy. Through the centuries of colonization, this philosophy continued and the more the Europeans learned about the Native Americans, the easier this ethos was to employ. These indigenous peoples were unaccustomed to the concept of land ownership and in many cases, misunderstanding the intent of agreements between their societies and the Europeans, “sold” their lands with disastrous results. The wonton displacement of these cultures continued well into the 19th century. We are quite accustomed as “Americans” to recalling scenarios such as
“Custer’s last stand” as being a great tragedy when in fact, it was the rationalization by which the United States seized the lands of the Black Hills, so rich in minerals such as gold. This was a continuation of the same impetus which drove the Corps of Discovery through to the West Coast many decades before (Carmean 2002; Cebula 2003; Diamond 1998; Downey 2000; Dunbar-Ortiz 2014; Josephy, Jr 1997; Mapes 2009; Ruby and Brown 2005).

There is an end result of these centuries of abuse, violence and too many despicable acts against the Native American cultures to address in this one writing; it is a perpetual distrust and disdain, in many cases for the NNA cultures now inhabiting the ancestral lands of these indigenous peoples. To compound this disdain, what many contemporary Americans consider to be old history of this country is in fact a fresh memory to Native Americans who still practice a long-held oral tradition of their recollections of the past. It is a fact that this is not “old history” to these people, they are living the result of these atrocities to this day.

When human remains are found which are conceivably the remains of the ancestors of Native Americans, the importance of an empathetic perspective towards this past by NNA researchers and the public, cannot be overemphasized. Below, I describe three case studies to provide a context for subsequent analysis of the Anzick site remains.

**Tse-Whit-Zen Village**

In August of 2006, the Washington State Department of Transportation (WSDOT) signed an agreement with the Port of Port Angeles, the City of Port Angeles and The Lower Elwha Klallam Tribe that legally ended a bitter dispute, regarding tribal and public rights (State of Washington Department of Transportation 2006). It is of great importance that the actions of the state truly do
reflect the interest of the state and its citizens in the preservation of cultural history. As demonstrated by the State of Washington and the WSDOT, it is possible to “do the right thing” for the right reasons, even at great expense and admission of responsibility for their mistakes.

This case focuses on lands which belonged to the Klallam people for millennia, before contact with eighteenth century Europeans. As happened throughout the Americas, after contact, it wasn’t long before the tribes of the area succumbed to the ravages of virgin soil epidemics introduced by these “explorers” (Mapes 2009: 56; Romanovsky 1992). With the resultant substantial reduction in native population came easier manipulation of these indigenous peoples and their home lands. The Klallam quickly lost their control and foothold on these lands and most specifically in this case, the area adjacent to and including Ediz Hook and the deep-water harbor it protected. This location had been their home and the site of the villages, occupied by their ancestors for centuries. This is the site of Tse-Whit-Zen, a Klallam village and longhouse as well as a substantial burial area, all of which the Klallam considered to be sacred ground. In post-prehistoric times, the deep water of this harbor, now known as Port Angeles, was well suited to the needs of industry and within a time period of approximately 100 years, had seen several industrial enterprises utilize the land in pursuit of monetary gain. In the process of industrialization, the soils which so gently held the “antiquities” of the Klallam people, were hammered into with pilings, dug by hand and machine, and backfilled as though they were a common landfill. The result of the post-prehistoric use of this sacred land was a mixing of the remains of the Klallam ancestors with the waste associated with mills and factories.

After many decades of industrial use, 22 acres of this ground was sold by the latest “owner”, the Port of Port Angeles, to the WSDOT for the purpose of building a dry-dock. This is where the WSDOT planned to manufacture replacement components for the Hood Canal Bridge which
would then be floated to the replacement location. It was during the construction of this dry-dock that many graves were found, the graves of the ancestors of the Klallam People.

Although people, including the Klallam, knew about the burial grounds or at very least the village area, it had not been fully communicated to the WSDOT. Apparently, some early warnings about these lands and their history may have required more attention during consultation and survey. Seemingly sufficiently informed, the WSDOT went ahead with the undertaking, with archaeological monitoring in place, “just in case”. It had been suggested that some graves had been disturbed in the past and these mixed remnants might be found. These remains and then intact remains in undisturbed context, numbering in the hundreds were found and after realizing the situation, the construction was halted.

By the time the construction had been halted, approximately 80 million dollars had been spent, leaving the burial grounds standing between profit and peace. It was then up to the state to do “the right thing” which was to respect the Klallam and the final resting place of their ancestors. The state recognized the importance and sacred nature of the site and in fact, took responsibility for the mistakes which had been made. The subsequent agreement stands as a good example of how a state government should respond to the discovery of culturally sensitive places and materials in the course of an undertaking. The state’s decision to cease all work and assist in proper cultural treatment at Tse-whit-zen introduced the importance of showing respect to Native Americans and the remains of their ancestors. As a result of this case, the Washington State Department of Transportation has affirmatively changed its attitude regarding the importance and preservation of its native cultures. In 2006, an audit was performed to further investigate the chain of events which occurred, leading to a decision to construct the graving dock at the Port Angeles Site. This audit was conducted as a basis from which standard operating procedures may
be structured to mitigate future problems regarding similar projects. Among the key findings disclosed in this audit, it was determined that “WSDOT did not follow a consistent documented protocol for addressing compliance with cultural resources assessment and consultation requirements of Section 106 of the National Historic Preservation Act”. (United States of America, National Historic Preservation Act 1966) Additionally, the audit suggested many other changes that would improve the state’s protocol for future projects. After considering the valuable lessons learned from this lengthy and emotionally charged legal battle, Washington State is apparently making strides toward positive change. (Joint Legislative Audit and Review Committee 2006)

Had the people involved at the inception of this protracted dispute been more sensitive to the situation and issues, there would likely have been a more expedient solution with much less emotional and financial sacrifice. Again, the way we theorize and consider the aspects of an archaeological problem will have an effect on the outcome. With a more emic point of view and an empathetic attitude, the antagonists involved in the Tse-whit-zen Village would have likely been more sensitive to the people of the Klallam Culture. The acceptance of responsibility by the State of Washington and its concern for re-structuring of protocol, provides insight regarding future interactions with Native Americans and the remains of their ancestors. Although the involvement of the federal and state governments in this case are not consistent with the circumstances surrounding the Anzick Site, the need for transparency and empathy applies to this site as well. The A1 remains are those of an individual who was carefully buried by his family regardless of the great depth of time. The descendants of this infant are the Native Americans, who have called the Shields River Valley their home for many millennia. As we learned in the
case of Tse-whit-zen, it is our responsibility to consider the wishes of those who came before us and occupied these lands long before the days of European contact.

The Ancient One (Kennewick Man)

The remains of The Ancient One were discovered in 1996, eroding out of a bank along the Columbia River, on a parcel of land owned by the United States Army Corps of Engineers (USACE) (Bruning 2006; Burke Museum 2013; Chari and Lavallee, 2013; Dewar 2001; Downey 2000; Fiedel 2004; Yu 2008). Upon discovery, the local law enforcement agency was dispatched, soon followed by the Benton County coroner who, realizing the potential “ancient” origin of the remains, contacted a local archaeologist by the name of James Chatters, Ph.D. Following a personal inspection of the remains, Dr. Chatters promptly took control of them, initiating examination for clues of their ancestry and provenance. According to Chatters, his first impression was that the remains were in “unusually good condition with a presence of Caucasoid traits and a lack of definitive Native-American characteristics…” (Chatters 1997). This observation led him to initially consider the possibility that the remains were those of a post-contact, European settler. This idea was quickly dismissed upon the discovery of what appeared to be a lithic artifact partially healed within the right ilium of the remains (Downey 2000:24). What happened next is a bit foggy, depending on which publication is reviewed. (Bonnichsen et al v. United States 2003; United States of America, Archaeological Resources Protection Act 1979; Chatters 1997; Chatters 2002; Downey 2000:24-26).

Regardless of the actual events, the activities involving the remains were perceived by several Native American Tribes and the USACE as being at the very least, non-conforming. It should be
noted that Dr. Chatters did, in fact, establish the age of the remains to approximately 8,500
rcybp. This dating along with the discovery of the lithic object (presumed to be a stone projectile
point) “healed within the right ilium” of the remains, incited heightened interest from the
scientific community, government, and Native American Tribes as well as the media. As the
managing agency, the USACE, in light of the evidence, attempted to direct the handling of the
remains per their interpretation of the law. The USACE determined that the prerequisites of the
Native American Graves Protection and Repatriation Act (NAGPRA) (Bruning 2006; United
States of America, Native American Graves Protection and Repatriation Act, 1990) had been
satisfied and therefore, the law should pertain to the Kennewick Man remains. Also, with this
directional focus, the USACE contacted the claimant Tribes to pursue the avenue of repatriation.
As explained by Bruning, shortly after this action a group of scientists headed by Robson
Bonnichsen promptly sued the United States Government for the right to examine the remains of
Kennewick Man (Bruning 2006:503-504). The basis for this lawsuit focused on the concept that
NAGPRA did not apply due to the great depth of time associated with the remains and that the
remains could not be proven to be of Native American origin. Additionally, as it progressed, the
case was appealed to the Ninth Circuit where the court upheld the district court’s ruling that the
government failed to prove Kennewick Man’s status as a Native American. The ruling
determined that ARPA, and not NAGPRA, governs the disposition of the remains and that the
scientists have the right to examine the remains, pursuant to the ARPA permit (Bonnichsen et al
v. United States 2003; Downey 2000). In accordance with the court ruling, the remains were held
at The Burke Museum of Natural History and Culture in Washington State (Burke Museum
2013:1). As the remains could not be defined as “Native American” by the courts, NAGPRA did
not apply and the scientists were still allowed to analyze them according to ARPA regulations.
While the previous research provided in-depth data from morphological studies pertaining to the remains, no studies included DNA analysis. Due to this lack of essential evidence, a DNA study conducted on the remains by researchers in 2014, provided evidence that The Ancient One was found to “…show continuity with Native North Americans over at least the last eight millennia” (Rasmussen et al. 2015; Rosenbaum 2017). These results led to President Obama signing legislation which allowed the return of the remains of The Ancient One (Kennewick Man) to the people of his now established homeland where he had been found in 1996 (Klinkhammer 2017). According to Rosenbaum (2017), “less than 24 hours after being inventoried in Seattle, the remains of the Ancient One—also known as Kennewick Man—were laid to rest at a private ceremony in an undisclosed location…” (Rosenbaum 2017).

The importance of consultation and discussion between all concerned parties cannot be overstated. I understand the significance of scientific analysis however it should be balanced with the wishes of potential descendants, fully considering their cultural beliefs and opinions.

**On Your Knees Cave (OYKC)**

In the summer of 1996 on Prince of Wales Island, in the Tongass National Forest of southeastern Alaska, the remains of a human were found in a cave by members of the Tongass Cave Project. This project, a paleontological study under the leadership of Timothy Heaton, was in its third year of exploring local caves with the focus of the project being the investigation and potential discovery of ancient animal remains. At one particular cave known as OYKC, Heaton exposed an unusual stratum in which he found what he believed to be human remains. Subsequently, Heaton halted all activity at the site and contacted The United States Forest Service archaeologist, Terry Fiefield (Ferguson 2009; Meltzer 2009; Worl 2005). The day after
being notified, Fiefield proceeded to the cave and made his initial assessment which was that these were in fact human remains. As this discovery was made within the boundaries of the Tongass National Forest and the remains were human, Fiefield immediately contacted the leader of the local Tlingit people, who are known to be indigenous to the area of Prince of Wales Island.

According to the Native American Graves Protection and Repatriation Act (NAGPRA), such a discovery requires the consultation of the local Native American peoples (King 2008:110-116; United States of America, Native American Graves Protection and Repatriation Act 1990). It is important to note that this consultation requires that the government only asks the indigenous tribes how the USFS should proceed but does not necessarily guarantee that their request will be followed. After consultation the evidence, according to NAGPRA, is weighed into any final decision. In this case, the consultation led to a positive collaborative effort and transparency on the part of all involved parties. The result of this collaboration was that the Tlingit passed resolutions which allowed the excavation to continue with the blessing and assistance of the tribal government. The consensus of the tribal members was that the site and remains should continue to be studied as they had much information to offer regarding their cultural heritage. The Tlingit also believe that this ancestor is still teaching his descendants, resulting in a spiritually positive outcome for the tribe (Worl 2005). It is because of the continued research that the remains are now known to be of ancestral origin to contemporary Native Americans, and that the lineage suggested by these remains quite possibly corroborates the human occupation of the Americas at about 15,000 years before present. Of great importance to the Tlingit is the verification that the carbon 14 dating gives to their oral traditions which have always claimed ancient connections to these lands, a fact often questioned by the NNA public.
Considering the varied accounts of activities represented in the case of the Kennewick Man, the actions taken by the paleontologists and archaeologists as well as the government at OYKC, were in exemplary accordance with NAGPRA as well as being respectful of the Tlingit peoples (Worl 2005). With a conscious decision to both follow the intent of the law and proceed with good intentions and respect for the Tlingit, Terry Fiefield did what any responsible archaeologist should do. It is through such transparency and collaboration that we all may find a common ground and work toward a positive future and trans-cultural healing.

**Understanding the Multi-Cultural Issues of the Anzick Site**

The Anzick Site, a multi-component archaeological site, includes the fragmented partial skeletal remains of an infant found in direct association with approximately 116 lithic and osseous artifacts that are diagnostic of Clovis Complex tool technology, all of which was covered with red ochre. Accidentally discovered in south central Montana, this is the only known Clovis Complex burial in the world (Canby 1979; Jones 1996; Lahren and Bonnichsen 1971; Lahren and Bonnichsen 1974; Lahren 2006; Morrow and Fiedel 2006; Owsley and Hunt 2001; Peacock 1999; Rasmussen, et al. 2014; Taylor 1969; Wilke, Flenniken and Ozbun 1991). The partial skeletal remains of a child dating to the Early Archaic period were also found at the site but not associated with the Clovis burial. Since this discovery in 1968, both sets of fragmented skeletal remains have been studied by various individuals and transported to places as distant as Denmark to complete these studies. It is important to note that throughout the history of the process of analyzing these remains, they were never under the ultimate control of any entity other than the Anzick Family, with the family allowing and trusting that proper analytic
procedure was followed. The importance of the Anzick discovery is such that it may verify old
theories or possibly suggest new theories regarding the ancient peopling of the Americas.

Although the Anzick Site is located on private property, it is this same land which was the
ancestral homeland of Native Americans. These lands were occupied for thousands of years by
the ancestors of the people from whom they were seized by the European settlers in the 19th
century. In light of the circumstances, the question of what should ultimately be done with the
remains and the tool assemblage becomes complicated and often emotionally charged. It is a fact
that the lithic assemblage itself is worth a minimum six figures and probably more (Morphy's
Auction House Administrator 2013). With The Anzick Site land owners, Mel and Helen Anzick
enjoying their “golden” years, this could be a great benefit to their retirement after decades of
hard work. Should we de-sanctify these precious remains and artifacts with the mere mention of
a dollar figure? Depending on who we are, and the nature of our cultural perspective there are
many different responses to such questions. I have been deeply involved in the latest research of
the Anzick Site and the remains along with the tool assemblage and I have witnessed personal
struggles regarding the management and proper handling of these remains and artifacts first-
hand. It has been an odd burden that the Anzick family has dealt with since the discovery in
1968, one that is both understood and misunderstood by scientists, archaeologists, Native
Americans, Non-Native Americans and the general public alike. To the ultimate ends of
extremes, should these remains and the assemblage be treated as “stuff” to be scientifically
scrutinized or should they be treated like “sacred items and remains”, with spirituality dictating
the next moves regarding their final placement? It may be questioned whether our current laws
suitably address matters of spiritual treatment and whether it is even possible that laws are
capable of such actions. As residents of the United States of America, citizens are expected to
abide by, and are held to, the state and federal laws; however, the sentiments of some, such as Native Americans may opine that their spiritual beliefs should trump those very laws set forth by these governing bodies.

Regarding the effects of the law on the Anzick remains, the site is atypical, possessing its own unique circumstances and attributes. In mulling through the laws pertaining to the Anzick Site and similar sites such as that of the Kennewick site, I have found that the location of discovery, as fortuitous as it may be, dictates the treatment of the site as well as the remains and or specific objects found at the site. In the particular case of the Anzick Site, it was found on private land in the state of Montana in 1968. Although the Kennewick Man remains were found on federal land and not private property, the findings of the courts may be compared to and considered in the history and future of the Anzick Site. The Clovis-aged Anzick Site remains date to approximately 11,000 rcybp which is of a similar, great depth in time to the remains found at the Kennewick Man site (Owsley and Hunt 2001). Federal laws, such as NAGPRA, do not apply to the Anzick Site, as the site is located on privately owned ground and the ancient materials discovered at the site have never left the control of the Anzick Family, although certain Montana State laws do apply.

Arguably, the site’s primary claim to fame is the large assemblage of Clovis technology artifacts, likely buried in association with the remains of a human infant some 11,000 rcybp. Also of substantial importance, was the aforementioned discovery of a human parietal bone dated to approximately 8,600 rcybp, located uphill and some 50 feet distant from the Clovis materials. The other components of the site and surrounding area consist of eagle traps, drive lines, stone circles and possible cairn locations dating to various prehistoric time periods. With this in mind, we should consider that the site is currently owned by the Anzick family, hence its
name, but this “ownership” of real estate is a relatively new concept, applied to the land in the late 19th century. It is due to the laws of the United States and ownership boundaries that certain sites are treated differently than others. These legal boundaries, which mandate implementation of specific law did not exist until at very least, the concept of real estate ownership was introduced. In the case of the Anzick site, it is privately owned yet within a tenth of a mile from a railroad/highway right of way (see Figure 7.) in addition to its being the location of at least two burials from the ancient past. It was only by chance circumstance that this site came to be located on private ground, not federal or state lands which would have involved a different manner of implementing cultural resource management (CRM) laws. The following chapter describes the legal and ethical ramifications of Anzick.

**Legal topics pertaining to The Anzick Site attributes**

In 1968, at the time of discovery of the Anzick Clovis burial, the existing cultural resource management laws and particularly, those addressing human remains were limited and relatively ambiguous. Although federal laws were in place, governing the treatment of culturally significant sites and materials, they were focused on public lands and those owned by recognized tribal entities. At the present time, matters of cultural heritage and preservation of our human past are recognized to be important concerns relating to activities and undertakings on public, tribal and private lands. This is due in large part to the continued education of the public and a greater understanding and acceptance of cultural differences, leading to a more empathetic position regarding these differences. Although this more liberal view reflects, for the most part, the current (educated) public position, it has not always been the case.
On the day of discovery of this assemblage with its associated remains, the people involved seemed to have been more focused on the excitement of the find than any pertinent legal issues. I do know that there was a local contingent of “artifact hunters” who were actually among the first notified about the find but their archaeological knowledge was very limited and again, they most likely were not concerned with the breaking of any laws. As I lived in Livingston from 1973 through 2005, I have a perspective and knowledge of the people and the social climate of the time. Although I believe there was “respect” regarding the artifacts collected on both public and private land, I am confident that the law aspect was not a focus of their plans or activities. I know of many instances where private land owners allowed people onto their properties to “dig for arrowheads” at their leisure, leaving pits and hills in their wake and usually destroying any proper context in the process. These amateur “archaeologists” were pursuing these artifacts and materials in a slanted quest for knowledge of ancient peoples, with no limitations but, at the same time meaning no harm. Ironically, the involvement of Benny Hargis (the person driving the excavator) with these amateurs may have saved the Anzick materials from total destruction. It occurs to me that without his amateur knowledge of “indian artifacts” he would not have known what to look for and most likely would have continued cutting into the area instead of stopping after “scraping the edge” of this amazing assemblage. He knew when he saw the first biface that it was unusual and obviously an “artifact” at which time they moved to the west, leaving that specific spot alone until they could dig it out by hand later in the day. Once the assemblage and remains were removed from the site, all materials were handled in a manner thought to have been suitable by the “finders”, consequently washing off the precious ancient ochre which was thickly covering the entirety of the collection. It was around this time that they realized the remains discovered with the artifacts were likely human. With the ambiguity of the laws of the
time and the fact that the assemblage and remains were found on private property, there was seemingly no incentive to alert authorities about the remains.

An interesting aspect of the current laws and how they affect archaeological sites is the legal designation of ownership attributed to specific lands. After the Native Americans were dominated and controlled by the United States Government, land was eventually ceded and sold to individuals as well as being retained by the federal and state governments or “reserved” for tribes. The dividing of land to such entities inherently placed “lines” of ownership across the once “open” grounds of pre-contact North America. The concept of land ownership had not provided a barrier to the use of these lands as areas for villages, celebrations, conflict or burial locations etc. Aside from territorial designations, which fluctuated over the millennia, these lands were without “legal” boundaries. The ancient and prehistoric sites were used and placed with no understanding of contemporary issues, and in many cases disregarded by post-contact owners and managers of the lands. Through no intention of these ancient, indigenous peoples, many culturally significant places and sites were now “owned” by those who possessed a “deed” to specific parcels, legally defined by metes and bounds descriptions. Consequently, the site, materials and significance was, essentially “owned” by those with the “deed”. Depending on contemporary ownership designation, anything found on or in the grounds would be owned by the person or entity possessing such a “deed” to the specific real estate tract. The seizure of the grounds from the indigenous people did not remove their past presence and cultural affiliation from the land. Now it is dependent on location, proof of such affiliation and specific law that the descendants of cultures having ties to these ancient places and materials may claim them. What this all means is that the intentions and cultural behaviors of the previous, indigenous occupants of these lands are superseded and mandated by this relatively new concept of land ownership.
These lands and the cultural places and materials which exist within these new boundaries, are in turn subject to the current laws and depending on the status of the ownership, may be dealt with in many ways.

The history of the legalities regarding the Anzick Site are as interesting to me, in many respects, as the ancient materials found at the site. For years I have heard rumblings from various individuals regarding the process of how the site was handled or how it “should have been” handled. It is important to understand the facts of the site, the laws as of the date of discovery, and how the laws have evolved during the post-discovery period. The question also remains regarding, who should have the authority to dictate what will happen to these Clovis burial materials, and what should inevitably be done with the site and/or materials. The Anzick Site is unusual in its ancient nature reflecting a time depth of approximately 11,000 rcybp, making tribal affiliation problematic at best, along with it being located on private property. The complexity of the laws governing archaeological sites and burials are compounded by interactions with land owners, tribes and members of the public. In general, cultural resource management laws are in place to protect the past of the people, more specifically and skillfully explained by Thomas King in the quote below. This quote refers to the federal component of cultural resource management, however, it also conveys the basic intent reflected in state laws as well.

“…the United States Congress has enacted laws aimed at controlling the federal government’s impacts on aspects of the environment. Among these are laws dealing with what have come to be called “cultural resources”-variously defined, but certainly having something to do with human culture. In analyzing impacts on such “resources,” and in considering what to do with them, it should go without saying (but doesn’t) that we must listen to, and try to understand, “the voice of the people” whose cultural values give them meaning.” (King, 2008, p. 2)
Along with the desires and heart-felt concerns of the people having these cultural ties, the scientific community is adamant regarding the study of these same sites and materials, adding to the already difficult issues. Again, specific facts direct the players in these cases, such that there may be several government agencies (federal, state and tribal) involved, as with a burial discovered on federal land. Depending on the location, the specific site might be on private land, with other specific laws applying, possibly involving no one but the property owner and their decision as to how to deal with the site. To add to this already complex set of issues, the Anzick site, being accidentally discovered in 1968, existed before, during and after many important laws were passed. These fluctuating conditions are complex and steeped in emotion on the part of all the “players” with differing opinions and ideas regarding the final treatment of the remains, materials and site. Questions such as; “who owns these remains and artifacts?,” “should they be studied?”, “should they be re-buried or repatriated and if so by whose culture/beliefs?”, have often been asked and the confusion and public sentiments ebbed and flowed with the decades.

The Laws as they pertained to the Anzick Site attributes

To understand the roles of cultural resource management laws and the Anzick site, I think it best to consider first, what was in place at the time of discovery. In 1968, there were no federal or state laws governing the treatment of the remains and materials discovered at the Anzick Site because of it being located on private property, owned by the Anzick family. State and federal laws of the day would have been applicable had the site been located on state or federal lands which it was not. The fortuitous nature of this site being located on private property meant that these state and federal laws were not applicable in this particular case. If the Anzick Site had existed within a boundary line of designation as state or federal property, there were laws that
would have applied such as the Antiquities Act, the Historic Sites Act, the National Historic Preservation Act and The Department of Transportation Act. The Antiquities Act of 1906 established control over the archaeological record, prohibiting the excavation of antiquities from federal lands without a permit from the secretary of the interior. The Historic Sites Act of 1935 (HAS), authorized a continuing program of recording, documenting, acquiring, and managing places important in the interpretation and commemoration of the nation’s history. In 1966, the National Historic Preservation Act (NHPA) was enacted for the purpose of preserving and maintaining “cultural resources” in the face of federal undertakings. The NHPA applies Section 106 and Section 110 to determine how to be better stewards over the land as well as how to determine the way in which the actions of a government agency will affect historic properties and then take those effects into account when planning an undertaking. (King, 2008, pp. 9-18) In 1968, in the State of Montana, these laws would have affected federal undertakings. However, the action to remove gravel for the Wilsall School septic system was not a federal action but was instead a local action and not subject to the NHPA. As it was on private land, ARPA and NAGPRA also do not apply as discussed below.

After 1968 and the discovery of the Anzick Site, new laws were created which provide more specific and effective processes for the preservation and treatment of “cultural resources”. These “post-1968” laws included The Archaeological and Historic Preservation Act of 1974 (AHPA), The Archaeological Resources Protection Act of 1979 (ARPA) and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). There were also environmental laws, executive orders and amendments to the existing laws which adapted policy and tightened definitions to address specific needs and issues. These laws apply to federal lands, Native American lands and in the instances where undertakings involve federal funds and permits. The
Environmental Protection Agency (EPA) and its sub-agencies also preside over issues affecting the environment and may “step in” at federal, state or private property level to stop or control activities which are contrary to the wellbeing of the environment. The AHPA authorizes government agencies to fund archaeological research and attempt mitigation at sites which are affected during the course of an undertaking. In addition to the AHPA, the ARPA was enacted to address the permitting process and impose heavy sanctions and violations on illegal artifact collecting activities on federal and Indian lands. While all of these laws would pertain to the Anzick site if it were located on non-private property, one of the most interesting federal laws which would also apply is NAGPRA. If a site such as the Anzick Site were to be found on federal land or Tribal lands or in the case of an undertaking involving a federal contract or permit, the discovery of remains and funerary materials could possibly qualify under NAGPRA law. Under this law, work would stop after the discovery of the remains at which time the policies of NAGPRA would then be followed. In addition to this NAGPRA component, the law also specifically requires institutions receiving federal funds to inventory “ALL” human remains, grave goods and sacred objects of cultural patrimony and provide the proven descendent group a copy of the document.

A model case of how the Anzick Site discovery might have been handled (if it were not found on private property) could be that of the Kennewick Man remains, as discussed above. In this instance, the property on which these remains were recovered was federal land, managed by the Army Corps of Engineers (ACE). It was the ACE, who halted the plans for the remains to be taken to the Smithsonian Institution for scientific study. The ACE determined that the remains were those of a man having Native American lineage, consequently satisfying the prerequisites for repatriation according to NAGPRA. Because of the speedy work of the Bento County
Coroner’s office, archaeologist James Chatters was contacted early in the process. Chatters examined the remains and found a stone point embedded in the hip of the man, leading to the, then justified, sampling of a small specimen of metacarpal bone. This sample was radiocarbon dated to between 8,000 and 8,500 rcybp and a group of scientists recognized its importance to research (Bruning 2006: 503).

“Following the agency’s denials of repeated requests by archaeologists and physical anthropologists to conduct additional studies, a group of scientists sued the U.S. government, claiming rights under a variety of legal theories to conduct in-depth scientific studies of the remains as “a ‘rare discovery of national and international significance’ that could shed considerable light on the origins of humanity in the Americas” (Bonnichsen et al. v. United States, 2003)

After protracted legal wranglings, the crux of the case was based on the scientific findings and whether NAGPRA applied to the remains of Kennewick Man due to the depth of time and lack of proof regarding identifiable descendants. Although the details of the Kennewick Man case were complex, the ultimate finding was that the remains were determined to be “culturally unidentifiable”, therefore not subject to NAGPRA. Consequently, the remains were taken to the Thomas Burke Museum in Seattle, Washington with the museum serving as a court-ordered, neutral repository (Downey, 2000, p. 174). While being housed at the Burke Museum, the remains of “Kennewick Man” were in the control of the United States government. The human remains popularly known as "Kennewick Man," found on federal lands in Eastern Washington in 1996, have become the subject of a lawsuit between the federal government and a group of scholars. Pending the outcome of this case, the Burke Museum had been chosen by the court, and with the concurrence of the litigants, as the most suitable repository for the safekeeping of these
human remains. As one of the major museums in the United States, the Burke Museum welcomed this opportunity to provide for the security and other conditions necessary for storing these human remains. Policies for access to, exhibition of, and research on these remains were determined by the court and appropriate representatives of the federal government. (Burke Museum, 2013)

Although the Kennewick Man remains were found on public land, the findings of the courts may be compared to and considered in the history and future of the Anzick Site. The Anzick Site remains, as mentioned above, date to approximately 11,000 rcybp which is more than 3,000 years older than the remains found at the Kennewick Man site.

While Federal laws do not apply to the Anzick Site due to specific circumstances, certain Montana State laws do apply. Amended in 1995, Montana Code Annotated (MCA) law 222-3-421 En. Sec., “The Montana Antiquities Act” was established to mandate treatment of “Heritage Properties” discovered on state lands. According to MCA definition, “Heritage Property” means, “any district, site, building, structure, or object located upon or beneath the earth or under water that is significant in American history, architecture, archaeology, or culture.” Additionally, similar to federal laws, the Montana Antiquities Act also applies to non-federal and non-state properties that receive federal or state funding or permitting in the course of the undertaking. In the particular situation with the Anzick Site, this law does not apply as the Anzick Site is on private property and did not involve funding and most significantly, was discovered in 1968, much earlier than the development of the Montana Antiquities Act, amended in 1995. (Montana Code Annotated, Montana Antiquities Act 22-3-421 En. Sec., 2011)
In 1991, Montana legislature passed The Human Skeletal Remains and Burial Site Protection Act (HSRBSPA), (MCA law 22-3-802), mandating treatment of burials and human skeletal remains, including specific objects and materials discovered on state or private lands:

22-3-802. Legislative findings and intent. (1) The legislature of the state of Montana finds that:

(a) the state and its citizens have an obligation to protect from disturbance or destruction all human skeletal remains, burial sites, and burial material, including those in marked, unmarked, unrecorded, registered, or unregistered graves or burial grounds located on state or private lands that are not protected as cemeteries or graveyards under existing state law;

(b) marked, unmarked, unrecorded, registered, or unregistered graves or burial grounds not protected as cemeteries or graveyards under existing state law are increasingly subject to pilferage, disturbance, and destruction for commercial purposes, including land development, agriculture, mining, and the sale of artifacts;

(c) private collection of artifacts may result in the destruction of burial sites. Existing law reflects the value society places on preserving human burial sites, but the law does not clearly provide equal and adequate protection or incentives to ensure preservation and protection of all burial sites in the state regardless of ethnic origin, burial context, or age.

(d) while some human skeletal remains and burial sites may be of interest to science, the needs of the scientific community to gather information and material from burial sites must be balanced with the legal, moral, and religious rights and obligations of tribal groups, next of kin, or descendants;

(e) preservation in place is the preferred policy for all human skeletal remains, burial sites, and burial material; and

(f) notwithstanding any other provision of law, this part is the exclusive law governing the treatment of human skeletal remains, burial sites, and burial materials. (Montana Code Annotated, Montana Code Annotated 22-3-802 En.Sec. , 2011)

MCA 22-3-802 (HSRBSPA), addresses the handling and treatment of materials, remains and sites discovered after 1991. HSRBSPA provides the legal basis by which specific items or remains discovered after 1991 might be repatriated to a legally appropriate entity. Although this law was efficient in regards to handling discoveries from this date forward, it did not provide a mechanism which would protect materials, remains and sites discovered prior to 1991.
“This law protects burial sites on state and private land, providing a procedure to be followed upon the inadvertent discovery, after 1991, of all human remains, regardless of ethnic origin, burial context, or age, and attempts to recognize and balance cultural, tribal, or religious concerns with the interests of scientists, landowners, and developers.” (McClure, 2000, p. 1)

Apparently, there was enough evidence concerning the retention in collections of known burial remains and/or funerary objects etc. that had been collected prior to 1991 to substantiate the need for further legislation. The intent of this further legislation was, in part, to allow for the retroactive application of provisions of the original HSRBSP to provide for the possible return of human skeletal remains and burial objects recovered previously from burial sites. (McClure, 2000, 3) This new legislation was completed in 2001 and was introduced as House Bill No. 165 (HB0165) also known as the Montana Repatriation Act.

HB0165 is in fact the legislation that would most likely affect the Anzick Site which was discovered in 1968 on private land. The history of the handling of the Anzick remains and associated assemblage of lithic and osseous materials has been well documented for the most part, especially after 1971 and the subsequent direct involvement of Dr. Larry Lahren, the long-time primary investigator of the site. As the applicable laws did not come into play until at the earliest, 1991, the remains and assemblage were carefully handled while at the same time researched by various scientific and academic authorities. Under HB0165, the lithic material and other artifacts of nonhuman derivation from the Anzick Site were specifically exempted as exhibited below in the “heading” portion of the law:

2001 Montana Legislature
HOUSE BILL NO. 165
INTRODUCED BY G. GUTSCHE, JUNEAU, JAYNE, BIXBY, SMITH, EGGERS,
It has always been a bit of a mystery to me, how and why this exemption had been implemented, however, it became apparent that some politics were involved which allowed a portion of the “artifacts of nonhuman derivation” to remain in the museum at the Montana Historical Society. At the time, a large portion of the nonhuman assemblage was housed at the museum, providing a powerful public draw to the organization. During the pre-bill proceedings, Arnold Olsen, director of the Montana Historical society, voiced his primary concern to protect the Anzick Site Archaeological Exhibit at the museum. At the first hearing of the bill, The Historical Society demanded a long list of changes that would essentially gut the original measures that had been presented previously. Mr. Olsen noted to those in attendance at the hearing, that “if the collection were guaranteed protection, he would drop his proposed changes to the bill” (McLaughlin 2001). Consequently, the lithic material and other artifacts of nonhuman derivation from the Anzick Site were specifically exempted in HB0165. Although these specific materials from the Anzick Site are protected by this bill, the human remains could have possibly been subject to repatriation if
my understanding of the law is correct. According to HB0165, if remains such as those found at
the Anzick Site are discovered on private property, they could be subject to repatriation if a
claimant can prove, by a preponderance of the evidence; the claimant’s cultural affiliation to the
human skeletal remains and that the possessing entity (in this case, the Anzick Family) does not
have the right to possession. A claim under this section may be made by a claimant who requests
the repatriation of human skeletal remains that are not listed in the inventory of an agency or
museum but are in the possession or control of the possessing entity (the Anzick Family).
Additionally, this would have been applicable to the lithic material and other artifacts of
nonhuman derivation found at the Anzick Site if they had not been exempted under HB0165.
Although there was a potential for repatriation of the remains under this law, it is conceivable
that the denial or acceptance of such an action might hold equal weight in a final determination.
On the one side, the tribes who were certainly ancient occupants of at least the periphery of the
area of discovery of the Anzick Site may have a claim due to their indigenous history. These
tribes would have needed to make a claim, if they believe they had a claim to the remains. If in
fact the claim and evidence were viable, the remains would then be considered for repatriation,
setting into action the repatriation proceedings according to the law. The final determination
would be made by the Burial Preservation Board members who currently consist of 13
individuals, several of whom happen to be of Native American heritage. While I do believe that
the Native Americans tribes who have made their ancient homes throughout the state and in the
area of the Anzick Site, might be able to at least attempt to claim the remains for repatriation,
their affiliation should have been confirmed by a preponderance of the evidence. If there had
been adequate evidence provided by the claimant, that the remains are truly from an affiliated
ancestor of a current culture or tribe, then they might have been repatriated accordingly. If, based
on a preponderance of the evidence, the board had found that a claimant could not prove that
they had a cultural affiliation to the remains, the board could have denied the claimants request
for repatriation and ordered that the possessing entity be granted uncontested control and
possession of the human skeletal remains (Gutsche, et al. 2001, p. 6). From a legal standpoint,
this is also a bit difficult to accept as this designation and granting of control and possession of
the human remains is tantamount to declaring the remains, personal property. Although this
might have been one potential end result, the defining of the remains of a child of any age as
“personal property” might seem at very least, crass and unreasonable. Normally, in the state of
Montana, when materials other than the real estate itself are discovered on private property, they
are considered to belong to the owner of the property. The property rights in human remains are
different and a bit more complex that those governing other personal property. In fact, the notion
that a discoverer of remains might “own” remains could be without merit as skeletal remains are
not considered to have been abandoned when interred. The legalities of this confusing aspect of
human remains are spelled out quite nicely in the following paragraphs:

By common law, ownership of objects located below the land surface is vested in the
landowner. However, human remains and arguably certain burial material are treated
differently than other property under common law. A dead body cannot be “owned” in the
same manner as other objects can. Human remains are considered to be “quasi-property”.
Although an individual can possess certain rights in a dead body, such as control and
disposition after death, the individual does not have the whole “bundle of rights” granted
to an owner of other property. Under this “quasi-property” theory, the descendants retain
certain rights in the dead body, regardless of who owns the land on which the body is
buried. The concept that the descendants retain such property rights in their ancestor’s
remains has also been recognized by the courts.

Similarly, by common law, a “finder” who takes possession of lost or abandoned property
and exercises dominion and control normally acquires title to the abandoned property,
regardless of who owns the land. However, neither landowner nor a finder has title to an
object that the true owner never abandoned. Property is abandoned if the owner voluntarily
and intentionally relinquishes all right, title, claim, and possession without vesting them in
another person. According to this theory, the remains would belong to the person who
prepared the grave or to the known descendants of the deceased. (McClure 2000, p. 3)
In the same paper, the author also reviews and clarifies the rights of the owner of private property and the rights they have as stated in the United States Constitution which provide, “…nor shall private property be taken for public use, without just compensation”. Under the power of the federal government, the Montana Constitution reflects the same limit of powers and they are provided in Article II, sections 17 and 29. These laws prohibit the taking of property without due process and just compensation. “These “takings” provisions do not prohibit the taking of private property, but they do place a condition on the exercise of governmental power by requiring compensation. There is no formula to determine how to calculate financial losses created by such a “taking” and to make things even more confusing, neither the federal nor the state constitutions define what is meant by the term “property”. Property could be described as a “bundle” of rights, such as the rights to possess, use, and dispose of property (McClure 2000, p. 8).

The next issue regarding the Anzick Site pertaining to the applicable law is that of whether and how the remains should be or should have been reported to the “authorities” in or since 1968. To reiterate, neither the Anzick Clovis infant’s remains nor the Early Archaic remains have ever been released from the Anzick family, the land owners and proprietors of the remains, even as they have been carried to numerous locations around the world. It has been for the purpose of scientific study and analysis that they have been taken to these facilities over the years, to my knowledge, only being temporarily placed in the hands of trusted scientists for limited amounts of time. Again, my knowledge of the history specific to the remains is quite limited, however, I do have the following partial history (to “post 2001”) as provided to me by Dr. Larry Lahren’s recollection (L.A. Lahren, Pro Bono Publico 2014):
• 1968..........The accidental discovery of the Anzick Site (24PA506)
• 1968..........Dr. Dee Taylor receives the skeletal materials from Hargis and Sarver when he investigates the site.
• 1971..........Ben Hargis gives the Early Archaic parietal to Dr. Lahren
• 1971..........Dr. Lahren discovers the infant clavicle in Dr. Taylor’s excavation back dirt
• 1971..........Dr. Rob Bonnichsen and Dr. Dennis Stanford exchange the infant clavicle for Anzick artifacts possessed by Dr. Taylor without the permission of Dr. Lahren.
• Post 1971....Dr. Taylor delivers the skeletal remains to his son Mark Taylor at the University of Arizona, Flagstaff.
• Post 1971....Mark Taylor delivers some of the skeletal material to Vance Haynes to obtain the first set of dates reported in 1994.
• 1994........First radiocarbon dates on the Anzick site are reported (Stafford 1994; Jones and Bonnichsen 1994)
• 1999........Per Dr. Lahren’s urging recommendations and efforts with Mel and Helen Anzick, the skeletal remains are returned to Mel and Helen Anzick from Dr. Mark Taylor in Arizona.
• 1999........Based on Dr. Bonnichsen’s Recommendation, Lahren submits the Clovis and Early Archaic remains to Dr. Owsley and Dr. Hunt for forensic analysis and documentation (Owsley and Hunt 2001).
• 2000........Dr. Owsley and Dr. Hunt return remains to Dr. Sarah Anzick
• Post 2001....Human rib and osseous rod material delivered to Dr. Juliet E. Morrow and Dr. Stuart J. Fiedel resulting in their 2006 paper (Morrow and Fiedel 2006)

According to my understanding of HB0165 article 2, sect.5,2(a), the possessing entity (the Anzick Family, not a museum or agency in this case) would need to be contacted by a claimant who would request the repatriation of the human skeletal remains. To my knowledge, over the total 45 years since the discovery of the Anzick Site, such a notice or claim had never been made. Regarding the Anzick Site and its comparison with the Kennewick Man remains, had the Anzick remains been found on federal land, they could have been treated in a similar manner. As NAGPRA did not apply to the Kennewick Man remains because of its designation as “culturally unidentifiable” there could have potentially been a comparable final result for the Anzick remains. As we know, the Anzick remains were in fact found on private property and the laws which do apply to this discovery would be those imposed by the State of Montana. Most specifically, as I mentioned, HB0165 (now known as MCA 22-3-902 en.sec) or “The Montana
Repatriation Act” (MRA) is the legislation that would in fact apply to the remains of the Anzick Site. The house bill passed without change into actual law in 2001 and retained the exclusion for the “lithic material or other artifacts of nonhuman derivation” found at the Anzick Site as; MCA 22-3-921.Exclusions. (Montana Code Annotated, Montana Code Annotated 22-3-902 En. Sec., 2011) Additionally, rules adopted by the Montana Burial Preservation Board (MBPB) affect the way in which the board makes its determination which is in fact, the “muscle” behind The Montana Repatriation Act. The MBPB decides what will happen regarding repatriation or denial of repatriation of remains to a claimant or if a claimant qualifies to claim such remains or specific objects. Until recently, the final rule changes had not been posted to the MBPB website, however, the proposal and acceptance pages #308 and #785 (under Administrative Rules Notices 2-65-480) have been posted (The Montana Burial Preservation Board 2013). One of the most important changes was the addition of rule VI which provides:

NEW RULE VI CRITERIA FOR DETERMINING LINEAL DESCENT AND CULTURAL AFFILIATION WHEN REVIEWING A REPATRIATION CLAIM

(1) A lineal descendant is an individual tracing his or her ancestry directly and without interruption by:

(a) means of the traditional kinship system of the appropriate tribal or other cultural group; or

(b) the common law system of decendance to a known individual whose human skeletal remains or funerary objects are being requested under these rules.

(2) Cultural affiliation is a relationship of shared group identity that may be reasonably traced historically or anthropologically between a tribal group and an identifiable earlier tribe. It may also include a shared identity that can reasonably be traced historically between an individual and an identifiable individual lineal descendant or next of kin. All of the following requirements must be met to determine cultural affiliation between a claimant and the human remains or funerary objects:

(a) existence of an identifiable present-day Indian tribe; and

(b) evidence of the existence of an identifiable earlier group. Support for this requirement may include, but is not necessarily limited to evidence sufficient to:

(i) establish the identity and cultural characteristics of the earlier group; or
(ii) document distinct patterns of material culture manufacture and distribution methods for the earlier group; and

(c) evidence of the existence of a shared group identity that can be reasonably traced between the present-day Indian tribe and the earlier group. Evidence to support this requirement must establish that a present-day Indian tribe has been identified from prehistoric or historic times to the present as descending from the earlier group.

(3) A finding of cultural affiliation should be based upon an overall evaluation of the totality of the circumstances and evidence pertaining to the connection between the claimant and the material being claimed and should not be precluded solely because of some gaps in the record.

(4) Evidence of a kin or cultural affiliation between a present-day individual, Indian tribe, and human remains or funerary objects must be established by using the following types of evidence:

(a) geographical;

(b) kinship;

(c) archeological;

(d) anthropological;

(e) linguistic;

(f) folklore;

(g) oral tradition;

(h) historical; or

(i) other relevant information or expert opinion. (The Montana Burial Preservation Board 2013)

This addition does in fact place much more stringent demands on a claimant to justify a claim of repatriation. Again, such a claim or finding was, to my knowledge, never made by a claimant and consequently, repatriation proceedings were never initiated for the Anzick remains.

In 2009, Dr. Sarah Anzick traveled to Denmark for the purpose of the DNA analysis of two small fragments from each of the individual remains which had been discovered at the Anzick Site. The destination of this journey was the Centre of Excellence in GeoGenetics, Natural
History Museum at The University of Copenhagen, Denmark, headed by renowned international geneticist, Dr. Eske Willerslev.

To Reiterate, on February 14, 2014, the results of the Anzick Clovis remains DNA analysis conducted at the Centre of Excellence in GeoGenetics were published in Nature Magazine, The genome of a late Pleistocene human from a Clovis burial site in western Montana, of which I am honored to have been a co-author. Among the findings are the following:

- Roughly estimated some 80% of all present-day Native American populations on the two American continents are direct descendants of the Clovis boy’s family. The remaining 20% are more closely related to the Clovis family than any other people on Earth.
- The Clovis boy’s family are the direct ancestors to a roughly estimated 80% of all present-day Native Americans. Although the Clovis culture disappeared, its people are living today.
- Clovis did not descend from Europeans, Asians or Melanesians, a theory that a number of scientists have advocated. They were Native Americans – and the Native American ancestors were the first people in America. This is now a fact.
- This discovery by Eske and his team proves something that tribal people have never doubted; they’ve been here since time immemorial and all the ancient artifacts located within their homelands are remnants from their direct ancestors. (Rasmussen, et al. 2014)

With these results, Dr. Sarah Anzick and the Anzick Family were able to consider their options regarding the reburial of these two fragmented sets of remains and how to involve the contemporary Native American Tribes. Keeping in mind that Dr. Anzick is a geneticist, she was understandably conflicted regarding her scientific viewpoints as opposed to those of a more empathetic, humanistic perspective which in many cases is the stance taken by contemporary Native Americans. It should also be noted that in 2000, Dr. Sarah Anzick had visited the Crow and Northern Cheyenne tribes, attempting to glean insight into their perspectives regarding genetic research. As it turned out, the members of the Crow tribe were interested in the analysis and not opposed, however, the members of the Northern Cheyenne did express concerns.
regarding the remains and scientific study. This diversity in cultural beliefs is echoed amongst the numerous Native American Nations, not only in the state of Montana but throughout North and South America. As these remains are in fact ancestral to multiple cultures, a simple treatment of the remains based on one group’s system of beliefs would have been inappropriate. Through the years of association with these remains, which had essentially been most of her life, Dr. Anzick felt strongly regarding their proper and culturally respectful treatment. Along with her concern to fully consider the aspect of cultural sensitivity, she is also a scientist who understood the additional, potential contribution these remains might have made to science and the quest for answers regarding the ancient peopling of the Americas. Forsaking the ability to conduct more study on these incredibly rare remains, Dr. Anzick and her family decided to rebury them on the same property where they were discovered. This decision was not one that had been taken lightly, involving multiple conversations with tribal members and visits to the Montana Burial Board. This lengthy and exhaustive process was not the result of a claimant initiating a repatriation request for these remains, it was due to the Anzick Family’s wish to rebury them with respect to Native American, descendant populations. In preparation of this reburial, Dr. Sarah Anzick and Dr. Randall Skelton assisted Teresa White, M.A., Kirsten Green, M.A. and the author in a final pre-re-interment inventory and assessment of both the fragmented Clovis-age and fragmented Early-Archaic-age remains. This final assessment consisted of visual inspection, final photography and metric analysis with no sampling of the remains occurring and all materials being returned to Dr. Anzick for final re-interment.

The reburial of both sets of remains from the Anzick Site (see Appendix B) took place at the Anzick Site on June 28, 2014. The ceremony, led by Crow Elder, Larson Medicine Horse proceeded in spite of a steady rain, accompanied by the all too familiar winds of the area. The
ceremony was attended by members of several Native American Nations, each of whom was introduced by Mr. Medicine Horse and given an opportunity to pay their respects to these remains (see Appendix C for images of ceremony). Also, in attendance was the Anzick Family, Dr. Eske Willerslev, Dr. Mike Waters, representatives from the State of Montana, as well as my wife, Lilly and I and a small number of members of the local press. The rain continued through a beautiful and heart-felt ceremony, including sacred and indescribably amazing songs and tributes to these two children so that they might pass again to the other side. As spirituality is not foreign to my belief system, I was not surprised to see the cloudy sky open up to blue shortly after the conclusion of the ceremony; and fittingly, we witnessed two ducks gliding by, just above our gathering, long enough to disappear over the ancient ridge (White 2015).

As we now may understand, the effectiveness of interactions between differing cultures depends greatly on mutual respect, tolerance and an empathetic approach to the issues presented. Individual and cultural perspectives are often intensely divergent, conveying spiritual or social undertones especially in anthropological or archaeological themes. The case studies of Tse-whit-zen Village, Kennewick Man and OYKC provide us with examples of differing outcomes. Each of these cases offer comparable issues to those encountered with the Anzick site, especially in regards to depth of time and questions of cultural affiliation which, as we have seen, may be approached with grace or in a potentially, harmful fashion. Each of these cases offers helpful insight into the proper way to approach the handling of human remains when they are associated with questions pertaining to their cultural affiliation and heritage. Due to the great depth of time regarding such ancient remains as those discovered at the Anzick Site, it is often not possible to deduce their ancestral affinity without utilizing DNA analysis. Without these data, the final disposition and lineage of the remains would have been indeterminable, an important factor of
consideration for the Anzick Family as they would not simply return the remains to be rid of them; a lineage needed to be defined and confirmed.

In the case of the Anzick Site, the Anzicks, who own the land, are and always have been the custodians and stewards of the land and thusly, the remains. It has been with the best intentions that they have been the proprietors of the remains as no claimant had stepped forward for repatriation and there had been no obvious or valid alternative to that status (personal communication with Sarah Anzick Feb. 18, 2014). It is due to our understanding of cases such as the Kennewick Man, Tse-whit-zen Village, and OYKC that Dr. Willerslev made the effort to contact the tribal authorities about the details of his study. To assist in this process, Dr. Shane Doyle, a Native American member of the Crow tribe and professor at the University of Montana, was consulted to provide specific cultural guidance towards a potential reburial of the remains (text between Dr. Shane Doyle and Sarah Anzick Oct. 27, 2013). Willerslev and Doyle traveled throughout Montana to discuss the meaning of the remains and the prospect of reburial with the leaders of several indigenous tribes (personal meeting Sept. 21, 2013). During and because of these visits, it was decided amongst these tribes that the Crow would lead the reburial proceedings. It is an important fact that Willerslev, with the blessing of Dr. Sarah Anzick (co-author of the Nature “genome” paper) and the Anzick Family, approached the tribes regarding the results of this latest study. The results of this study are only part of the equation with the other part being Eske and his team's respectful commitment to interacting face to face with tribal communities and listening to Native American leaders, which has lead directly to the reburial of these children (Rasmussen, et al. 2014). As there had been no claimant for repatriation of the remains, there had been no need or law motivating this act except from a human, empathetic and
respectful position on the part of the Anzicks and Willerslev (Sarah Anzick and Eske Willerslev, personal communication 2014).
Chapter 5: Dating The Anzick Site Clovis and Early Archaic Components

The Anzick Site is believed by many notable archaeologists to represent a Clovis Culture Burial which puts it in a category of its own, as it is the only known Clovis Burial in the world (Jones and Bonnichsen, 1994; Lahren and Bonnichsen 1971; Morrow and Fiedel 2006; Owsley and Hunt 2001; Rasmussen, et al. 2014; Waters and Stafford 2007). This designation as a burial would suggest that the interment of artifacts with remains would be for the purpose of specific burial interment, not as a way to “store” the tools for future use. Since the 1968 accidental discovery of the site, the artifacts have been referred to as a “collection; assemblage; and cache” with little consistency. These terms differ in their meaning to the extent that the site and its attributes may be misinterpreted simply by their misuse. There are a number of archaeologists who are not convinced that the artifacts, and two sets of remains are associated due to the manner in which they were discovered and excavated (Adovasio and Pedler 2016; Taylor 1969). Although only vaguely expressed in contemporary academic literature, this position is readily apparent in the archaeological community in terms of personal opinion. At very least, there is some doubt in some circles regarding the association of the remains to the artifacts. This inconsistency in understanding of the site attributes leads me to the first hypothesis.

5.1 Hypothesis 1

Hypothesis 1: The Anzick site and its archaeological attributes, including two sets of remains and a large selection of artifacts, represent two separate events, one being the interment of a human adolescent male approximately 8,600 rcybp and the much earlier interment of an infant, associated with an assortment of artifacts which dates to approximately 10,900 rcybp.
This distinction would mean that the tools would be more properly referred to as an “assemblage” as opposed to a “cache” or “collection”. To clarify, an “assemblage” is deposited during a single event, whereas a collection reflects the deposit of materials during multiple separate depositional events. And, as noted by Wilke, Flenniken and Ozbun, the concept of a “cache” implies safe storage of goods with the intention of retrieving them; with another term such as burial “assemblage” being more properly descriptive of such objects being placed with the dead for specific ceremonial purposes (Wilke, Flenniken & Ozbun 1991). The artifacts discovered at the Anzick site have been labeled as an “assemblage”, “collection” or “cache” depending on a particular chosen narrative (Bamforth 2009; Bradley, Collins and Hemmings 2010; Collins, et al. 2013; Lahren and Bonnichsen 1974; Waters and Stafford 2013). To date, one of the only North American sites comparable in terms of burials of this great temporal depth is the discovery at the Upward Sun River Site of a burial dating to approximately 10,000 rcybp. Although culturally dissimilar and post-dating Anzick, this site contains similarities such as those found at the Anzick Site including bone rods, non-fluted projectile points, and bifaces (Moreno-Mayar, et al. 2018; Potter et al. 2011). Additionally, the use of red ochre in a likely ceremonial treatment of the remains is in keeping with those found buried with the artifacts at the Anzick Site (Fagan 2005; Haynes 2002; Lahren 2006; MacDonald 2012, 2018; Meltzer 2009; Owsley and Jantz 2014; 2015; West 1996).

To test Hypothesis 1, my initial plan, was to run the conventional radiocarbon dates of all dated Anzick materials which I verified, utilizing the appropriate documents as well as through contacting the companies who originally tested the samples. Although similar analyses have been conducted in the past, this analysis was intended to specifically addresses the variations in dates of Clovis and non-Clovis elements from the Anzick Site (Fiedel 2017; Waters and Stafford
After verification of the conventional dates, I intended to run them through the Oxcal radiocarbon date calibration program, utilizing the latest (INTCAL13) calibration curve data to establish the calibrated radio carbon date probabilities. With this group of dates, I then intended to utilize the Statistical Package for the Social Sciences (SPSS) to further establish whether these dates statistically support Hypothesis 1. Through the use of these analyses, I would attempt to establish whether the dates are in fact statistically and significantly different or if they are statistically and significantly similar enough to support either, Hypothesis 1, or the null hypothesis. Although, the site and context were essentially destroyed on the date of discovery, the recorded conventional radiocarbon dates do provide a basis from which to scientifically address the validity of, or invalidity of the association between artifacts and remains.

If Anzick is a burial associated with a Clovis tool assemblage, I would expect that the analysis would support the hypothesis with the calibrated dates being notably and statistically separate between the presumed Clovis and Early Archaic specimens.

Not long after this intended research approach was conceived and before I began this dissertation, a new study was published (Becerra-Valdiva, et al. 2018), which utilized previously attained samples. According to Becerra-Valdiva et al. (p 7003), the samples for this project were harvested during the same process that provided samples for the DNA work completed in 2014 (Rasmussen et al. 2014). Additionally, Becerra-Valdiva et al. note that “All samples supplied to the ORAU have been consumed. With the support of the Anzick family and the research team, all human remains of Anzick-1 and Anzick-2 were reburied during a Native American ceremony in June 2014 (Becerra-Valdiva et al. 2018, 7003). As I will describe below, this article, contributes to the previous data to substantiate and support Hypothesis 1, and verifying that The Anzick Site and its archaeological attributes, including two sets of remains and a large selection
of artifacts, represent two separate events, one being the interment of a human adolescent male approximately 8,600 r.c.y.b.p. and the much earlier interment of an infant, associated with an assortment of artifacts which dates to approximately 10,900 r.c.y.b.p.

To properly address the question of association and dating as it pertains to the attributes of the Anzick Site, I provide a summary of past radiocarbon dating of the Anzick 1, and Anzick 2 human remains as well as the osseous artifacts discovered at the site.

5.2 History of Radiocarbon Dating of The Anzick Site attributes

Throughout the Anzick Site saga, both partial sets of remains, and the artifacts, have been moved from place to place based on the potential to learn about the past as it pertained to the peopling of the Americas. During these times of analysis, they have been subjected to radiocarbon dating by several labs over many decades. Below, I summarize these efforts.

In 1968, shortly after the discovery of the artifacts and remains by Hargis and Sarver, Dr. Dee Taylor, an anthropology professor from The University of Montana investigated the site and was subsequently handed the Anzick 1 remains by the two finders. These remains as well as the clavicle and Anzick 2 remains were in turn, delivered to Dr. Mark G. Taylor (the son of Dr. Dee Taylor), in 1971. Later in 1971, Dr. Mark Taylor delivered some (sic) skeletal material from both Anzick-1 and Anzick-2 remains to Vance Haynes for the purpose of obtaining the first set of dates, through radiocarbon analyses completed at the University of Arizona under the direction of Dr. A. J. Jull, The Department of Physics. These results were later reported on by Dr. Thomas Stafford in his 1994 publication *Accelerator C-14 dating of human fossil skeletons: Assessing accuracy and results on New World specimens* (Lahren 2014; Stafford 1994). In this publication,
Stafford explains the details regarding appropriate parameters and application of the use of accelerator C-14 dating techniques in the dating of ancient human remains. Due to the rarity and often limited datable stratigraphy, the affirmation of a cultural site may depend on the dating of ancient human bone, especially in sites dating to the Late Pleistocene Epoch. As noted by Stafford, “The negative aspect of dating human fossils directly is that bone has the lowest credibility of any organic matter used for C-14 dating” (1994, 46). The Anzick Site, is representative of a site, void of archaeological context, with an assortment of lithic tools, diagnostic of the Clovis Culture, as well as human remains. It is because of this scenario that Stafford included the Anzick-1 and Anzick-2 remains in the study. The results of the study include dates of the Anzick-1 and Anzick-2 remains samples, which were obtained utilizing accelerator mass spectrometer (AMS) C-14 dating. Stafford explicates the difficulty of applying AMS dating techniques to ancient bone, essentially due to the geologic time effect in bone degradation; with increased time during the taphonomic process, bone chemistry changes with organic material being replaced by inorganic minerals.

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Test Number</th>
<th>Description</th>
<th>Radiocarbon Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anzick 1</td>
<td>AA-313A</td>
<td>Raw Bone Collagen (acid Insoluble phase)</td>
<td>8,690 ± 310</td>
</tr>
<tr>
<td>Anzick 1</td>
<td>AA-313B</td>
<td>Raw Bone Collagen (Untreated gelatin)</td>
<td>10,500 ± 400</td>
</tr>
<tr>
<td>Anzick 2</td>
<td>AA-313C</td>
<td>Raw Bone Collagen (acid Insoluble phase)</td>
<td>8,620 ± 340</td>
</tr>
<tr>
<td>Anzick 2</td>
<td>AA-313D</td>
<td>Raw Bone water soluble gelatin (purified gelatin)</td>
<td>8,910 ± 370</td>
</tr>
</tbody>
</table>

Table 4. (Stafford 1994) A-1 and A-2 radiocarbon dates
This natural process creates “an extremely complex and heterogenous bone chemistry (Stafford 1994, 46). Stafford goes on to describe the importance of proper selection in sampling of bone from the subject, as success in analysis is based on the bone’s chemical characteristics.

“Bone can be dated accurately if: (1) the bone has <0.1-0.2% N and a collagenous amino acid composition; (2) the chemical pre-treatment is rigorous and allows for the removal of humic and fulvic acids; (3) individual amino acids are isolated for the verification of dates on total collagen hydrolyzates; and (4) if non-collagenous bones are identified as such and not used for absolute C-14 dating.” (Stafford 1994)

The results of the Anzick portion of this study conducted by Dr. Stafford, are found in Table 4. According to Stafford (Stafford, et al. 1991, 54), “the dates on these collagenous fossils indicate the existence of two different-age burials; one 8500 rcybp and the other 10,500 rcybp.”

This study explains that this is a reasonable assertion because: both A-1 and A-2 remains were of collagenous compositions and; ages on XAD-purified hydrolysates were concordant with dates on individual amino acids (see Figure 1) (Stafford et al. 1991).
In addition, Stafford states:

The Anzick fossils had different dating patterns; the younger Anzick skull (A-2) had concordant ages on all fractions whereas the older skull’s (A-1) unpurified collagen dated 2000 years younger than subsequent fractions. Without dates on individual amino acids, the 2000 years age difference between the skulls could not have been recognized.

It is unknown why there are two age populations for the ocher-stained (A-1) bone: the two-age groups differ by 500 years. Aspartic acid and alanine have an average age of 10,300 years BP, whereas glutamic acid, hydroxyproline and glycine yield an average age of 10,800 years BP. The older age is considered more correct because young-age contamination is more probable than contamination by older age carbon. These results indicate why an age determination on a single chemical fraction is not absolute proof-of-age, even if the dated fraction is a specific amino acid.” (Stafford et al. 1991)

In a 2006 study, conducted by Morrow and Fiedel, new radiocarbon dates were reported pertaining to samples taken from Anzick bone rod artifacts and the ochre-stained clavicle recovered by Lahren and Bonnichsen in their 1971 excavation of the site (Lahren and Bonnichsen 1971; Morrow and Fiedel 2006). This dating was initiated by Morrow and Fiedel, specifically to establish the age of the clavicle as well as the bone rods, removed from the site; these analyses had not been conducted on these samples previous to this study. Morrow and Fiedel submitted the samples to Beta-Analytic, for the analyses. The results of the study indicated that the bone rods date to an amazingly similar radiocarbon dates of 11,040 ± 60 (Beta-163832) and 11,040 ± 40 (Beta-168967) with the clavicle sample dating to 10,780 ± 40 (Beta-163833). As compared to Stafford’s dates in the previous section, the clavicle (Beta-163833), dates to 10,780 ± 40, which overlaps the average date of Stafford’s A-1 samples at two-sigma with an average date of 10,680 rcybp. Morrow and Fiedel state that “the use of different dating protocols cannot account for the difference between the two sets of dates.” The difference is that Beta-Analytic procured their dates on gelatin extracted from collagen, Stafford extracted dates
on XAD-purified amino acids. It is apparent that the Beta-163833 date does fall within the range established by Stafford et al.’s 1991 report (Stafford et al. 1991).

There are five plausible explanations, which need not be mutually exclusive, for the discrepancy between the Anzick antler and bone dates.

1. The bone date is too young because of contamination of the collagen with more recent carbon. Testing of the amino acid ratios of the dated specimens indicated that the clavicle differed more from modern reference samples than did the antler pieces; this result implies probable diagenetic alteration of the bone. This is the most likely cause of the younger bone dates.

2. The antler tools were heirlooms that had been used by the infant’s family for several decades prior to their interment in the infant’s grave. However, their retention in active use for 60 to 150 years, over the course of three to six human generations, seems improbable.

3. The elk that yielded the antler had somehow (for example, by habitual eating of plants growing near a geothermal vent in the nearby Yellowstone region) tapped into a reservoir of old, $^{14}C$-depleted carbon, which in turn made the elk’s collagen appear too old. In view of the nearly identical $^{13}C$ content of the bone and antler samples, this seems unlikely.

4. The feature was created by two discrete depositional episodes; the artifacts were buried first, then, perhaps decades later, the child was interred (fortuitously or deliberately) near them. Although this sequence seems improbable, the proximity of the other, much later child’s skull to the Clovis deposit, together with the lack of provenience documentation during the initial burial discovery, requires some consideration of this scenario.

5. The apparent age difference is only an artifact of $^{14}C$ fluctuations during the terminal Pleistocene (Morrow and Fiedel 2006, 133)

![Figure 11. Example of sampling on Anzick artifact Rod2 (BETA-168967) Morrow and Fiedel 2006)](image-url)
Depending on which explanation for the dating discrepancies, one decides to consider most viable, this study may or may not verify the association of artifacts with remains, one of the most contentious topics pertaining to the Anzick Site. Regardless of the implications, the results for this study are that the tested bone rod segments date to \(\sim 11,040\pm 54\) rcybp and the ochre covered clavicle to \(10,780\pm 40\) rcybp with the methods employed in this study.

In 2007, Dr. Michael Waters and Dr. Thomas Stafford published a paper entitled *Redefining the Age of Clovis: Implications for the Peopling of the Americas* in which they re-analyzed and re-dated both the A-1 and A-2 remains from the Anzick Site. This re-analysis was part of a study focused on an attempt to clarify the temporal parameters associated with the Clovis Culture. The rapid spread and technological persistence of the Clovis Culture in a period of perhaps only two hundred years has been somewhat of an enigma and was a focus of the 2007 study. According to Waters and Stafford, analyses of the corpus of Clovis dates had improperly included the extremes associated with sites which may have overlapped Clovis dates, providing either limited proper context or limited diagnostic technological samples or both, in some cases. The previously acquired selection of dates and data placed a traditional age for Clovis, at between 11,500 and 10,00 rcybp (Waters and Stafford 2007). The over-arching result of Waters and Stafford’s publication indicates a more accurate date for Clovis occupation in North America as between 11,050 and 10,800 rcybp. “This and other evidence imply that humans already lived in the Americas before Clovis (Waters and Stafford 2007, 1122). Pertaining to the Anzick Site specifically, the authors “obtained five ages on human remains from the site (2007, 1123).” As the 2007 study focuses on multiple sites to accomplish a wider goal, I focus on the findings concerning only the Anzick Site attributes in this section.
Waters and Stafford utilized the Center for Accelerator Mass Spectrometry (CAMS) as the lab for the analysis of the Anzick A-1 remains samples. The first of the five samples analyzed by CAMS (CAMS 35912), yielded a date of 11,550 rcybp which was rejected due to perceived inconsistencies in procedure and materials as per the study’s *Online Supporting Materials*, suggesting an unknown source of contamination for the sample (2007, 3). The results from the remaining four samples (see Table 6), “confirm previous date estimates for the skeleton of 10,705 ± 35 rcybp” (2007, 3). With these results, Waters and Stafford recognized the potential for the re-assessment of the Anzick Site and its collective association of remains with artifacts. The results, according to Waters and Stafford, confirmed the temporal and depositional difference between the Early Archaic (A-2) remains and the Clovis Age component. The results also implied that the A-1 remains may in fact, not be associated with the group of Clovis-age artifacts and “…that the foreshaft ages more accurately date the site. The 10,900 year-old human remains could post-date the Clovis cache, but additional research is needed to resolve this issue.” (2007, 3), alluding to Morrow and Fiedel’s earlier foreshaft date of 11,040 ± 60 (Morrow and Fiedel 2006).

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Test Number</th>
<th>Description</th>
<th>Radiocarbon Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anzick 1</td>
<td>CAMS-35912</td>
<td>Human Bone collagen (XAD gelatin)</td>
<td>11,550 ± 60</td>
</tr>
<tr>
<td>Anzick 1</td>
<td>CAMS-80535</td>
<td>Human bone (HCl decalcified)</td>
<td>10,580 ± 35</td>
</tr>
<tr>
<td>Anzick 1</td>
<td>CAMS-80536</td>
<td>Human bone (KOH extracted collagen)</td>
<td>10,525 ± 35</td>
</tr>
<tr>
<td>Anzick 1</td>
<td>CAMS-80537</td>
<td>Human bone collagen (gelatin)</td>
<td>10,610 ± 30</td>
</tr>
<tr>
<td>Anzick 1</td>
<td>CAMS-80538</td>
<td>Human bone collagen (XAD-KOH-gelatin)</td>
<td>10,705 ± 35</td>
</tr>
</tbody>
</table>

*Table 6. (Waters and Stafford 2007) A-1 radiocarbon dates*
This claim of the possibility of non-association between the Clovis-age artifacts and the A-1 remains, by Waters and Stafford, inspired a response from Morrow and Fiedel which was presented by Dr. Morrow at the Paleoamerican Odyssey in Santa Fe, New Mexico in 2013 (Morrow and Fiedel 2013). The presentation of *The Anzick Clovis Burial, a Single Depositional Event*, by Dr. Morrow specifically addressed the issue of association suggested by Waters and Stafford. The following is an abstract of the presentation:

The two-year-old child from the Anzick site near Wilsall, Montana, associated with 115 Clovis lithic and osseous artifacts, is still the only human skeleton attributable to the Clovis culture. As reported at this conference, the skeleton has provided invaluable genetic data for establishing the ancestry of Native Americans. However, the exact date of the burial deposition has been difficult to ascertain. Each of two antler (probably elk) “foreshafts” provided a precise radiocarbon date of ca. 11,040 rcbp (Beta-163832 and Beta-168967), but a date for the child’s rib is 10,780±40 rcbp (Beta-163833). Tom Stafford has run multiple assays on filtered collagen and separated amino acids from the child, obtaining ages ranging from 10,240±120 (AA-2978) to 10,940±90 (AA-2981), with a rejected outlier of 11,550±60 rcbp. He thinks the most accurate date is 10,705±35 rcbp (CAMS-80538). The disparity between ages of the artifacts and the child has raised the suspicion that the artifacts might be centuries-old heirlooms, or that the child’s burial was a later intrusion into the artifact cache. We review eyewitness accounts of the accidental discovery of the deposit to show conclusively that the child lay below the artifact concentration and was not intrusive. The body and the artifacts were deposited in a single ceremonial event and the ostensible age disparity requires some other explanation (Morrow and Fiedel 2013).

In 2018, Becerra-Valdivia et al. published *Reassessing the chronology of the archaeological site of Anzick*, to further contribute to the facts regarding the dating and association of the Anzick Site attributes (Becerra-Valdivia et al. 2018). Becerra-Valdivia et al. present the results of this study, which is, according to the team: “…a comprehensive radiocarbon dating program that utilized different pretreatment methods on osseous materials from the site. Through this comparative approach, we obtained a robust chronometric dataset that suggest that Anzick-1 is
temporally coeval with the dated antler rods. This implies that the individual is indeed temporally associated with the Clovis assemblage” (Becerra-Valdivia et al. 2018, 7000). In this study, the authors substantiate their findings through detailed explanation of chemical utilization protocols and individual amino acid selections with a focus on sample purification. The analysis of the human and artifact samples was completed at the Oxford Radiocarbon Accelerator Unit (ORAU). As discussed previously, Becerra-Valdivia et al. note that “All samples supplied to the ORAU have been consumed. With the support of the Anzick family and the research team, all human remains of Anzick-1 and Anzick-2 were reburied during a Native American ceremony in June 2014” (Becerra-Valdivia et al. 2018, 7003).

The Becerra-Valdivia et al. study utilized four differing preparative protocols on four samples from the Anzick Site which consisted of material from Anzick-1 (SR-8151), Anzick-2 (SR-8147), and two bone rod artifact sections (SR-7599, SR-7602). The study provides a data set of sixteen separate dates utilizing the four differing protocols for each sample. Figure 3 is an image taken from the Becerra-Valdivia et al. study which illustrates the results of the analysis with each sample and date displayed in an OxCal chart, created by the OxCal on-line calibration program. This image clearly shows that there “is strong agreement between the Anzick-1HYP date (10,915± 50 rcybp) at 95.4% confidence; and all the dates obtained from the antler rods which ranged between 10,900 and 11,145 rcybp at 95.4% confidence, as emphasized and enclosed by red-dashed line in Figure 12. In addition to this figure furnished by Becerra-Valdivia using OxCal, I also include my image of the Anzick 1, Anzick 2 and Rod1 and Rod2 HYP samples in an OxCal chart which includes all dates previous to the Becerra-Valdivia et al. study (see Figure 13) In this chart, I have highlighted the rod dates and A-1 dates in red and the A-2 dates in blue.
Figure 12. Becerra-Valdivia et al. OxCal radiocarbon dates (calibrated)
FIGURE 13. OXCal chart of radiocarbon dates (calibrated)
It is a fact that the circumstances surrounding the discovery and the subsequent destruction of the site’s archaeological context precluded an in-situ archaeological excavation and analysis. While we cannot simply verify this association with a pristine archaeological context, we may rely on eyewitness testimony from the day of discovery as well as dating and chemical analyses of the remains and the artifacts. Based on these data, testimony and a preponderance of the evidence, it is a sensible hypothesis that this association is valid. Additionally, these data support Hypothesis 1 and clarify that the Anzick site and its archaeological attributes, including two sets of remains and a large selection of artifacts, represent two separate events, one being the interment of a human adolescent male approximately 8,600 reybp and the much earlier interment of a Clovis infant associated with an assemblage of Clovis artifacts, all of which date to approximately 10,900 reybp.
Chapter 6: The Anzick artifacts represent typical Clovis Technology

As Clovis is thought to have existed specifically in North America and during a very limited time frame, comparing and contrasting data should clarify the nature of the Anzick assemblage in terms of unique or common Clovis technological attributes. To properly compare the artifacts from the Anzick Site, I have chosen several Clovis sites and their associated artifacts which date to, or are diagnostic of, the accepted Clovis time period (Rasmussen, et al. 2014; Waters and Stafford 2007).

The artifacts discovered at the Anzick site consist of several specific forms which should be similar to those found at other known Clovis sites, if in fact, Anzick does represent typical Clovis technology within the assemblage. Of the other Clovis sites, there are many to choose from which have published data suitable for comparison with the data collected from the Anzick artifacts. In the first sub-section of this chapter (5.2), I analyze data from nineteen sites which present with seventeen distinct character states, utilizing PAST and Splits Tree4 analytical programs. In the second sub-section of this section (5.3), I analyze data more focused on a smaller selection (n=5) of sites. I chose these five sites due to their similarity in tool assemblage size and tool types represented within each assemblage, to that found in the Anzick assemblage. I utilize data from these sites which include variations in Clovis technological strategy, both similar and dissimilar to that found at Anzick. Among these variations are bifaces, unifaces, projectile points, bone rods, and evidence of a focused blade technology. In both sub-sections, 5.2 and 5.3, data and associated artifacts from each site are utilized as comparison pieces with the help of documents which elucidate the metric and visual characteristics of each artifact.
The over-arching purpose of this analysis is to compare the artifacts from these sites with the Anzick artifacts to determine if they are representative of what is accepted as typical Clovis technology (Bamforth 2009, 2014; Bradley et al. 2010; Bradley 2010; Callahan 2000; Canby 1979; Collins et al. 2013; Frison 1991; Frison and Todd 1986; Frison and Bradley 1999; Gillespie 2007; Gramley 1993; Jones 1996; MacDonald 2012; Meltzer 2009; Smallwood 2010; Tankersley 2004; Waters et al. 2011; Waters et al. 2013). This analysis considers whether standardization of artifact forms are consistent throughout Clovis sites across North America. These forms are divided into the following attributes: Projectile Points; Bifaces; Unifaces/Scrapers; Osseous Rods, and Blades. In addition, these attributes will be divided into specific sub-sets such as; length, width, weight, maximum thickness, and special modifications to margins such as margin scrapers as mentioned below (see Hypothesis 4).

6.1 Hypothesis 2

Hypothesis 2: The artifacts discovered at the Anzick Site are representative of typical Clovis technology and are consistent with artifacts found in other documented Clovis sites in terms of dimension and description.

6.2 Broad-Based Analysis of Clovis Sites utilizing PAST and Splits Tree4

This sub-section is written with an over-arching framework rooted in Evolutionary Archaeology, specifically concentrating on the Clovis Culture. Evolutionary Archaeology is derived from a combination of Darwinian Evolutionary Theory and Cultural Transmission Theory with a focus on cultural transmission as a parallel process with biological transmission
(in the sense that some cultural transmission increases biological fitness) (Darwin 1859; Jordan 2015; Mesoudi 2011; Prentiss et al. 2011). This focus is further delineated by Broughton and Cannon (2009) as Evolutionary Ecology (EE) which they define as: “the application of natural selection theory to the study of adaptive design in behavior morphology and life history”. The combination of biological and cultural transmission theory; “draws analogies between these parallel mechanisms for inheritance, mutation, selection and drift as they operate on both cultural information and on genes. For example, the genetic system is based on biological reproduction while the cultural one involves transmission of cultural information via teaching, imitation, and other forms of social learning” (Jordan 2015). This basis of theory, known as Dual Inheritance Theory incorporates a modified Darwinian evolutionary approach to concepts of cultural evolution to enable an understanding of cultural transmission between and amongst populations. (Bentley et al. 2008; Boyd and Richerson 1985, 2005; Jordan 2015; Mesoudi 2011).

**Materials and Methods**

As the importance of this subsection focuses on testing for variation between Clovis technology from sites located throughout North America, I relied on several sources for detailed data. For the Anzick Site data, I utilize my data collection, including photographs and metric information which I have compiled through the years. Comparative information was obtained from previously published data (see Table 7) which are readily accessible both online and in various texts. Practical use of these data will be through visual and metric examination with some character states requiring close visual assessment of available photographic evidence.
I first tested for indications of variation between these Clovis sites and Anzick, through cladistic analysis utilizing the data collected from the various sources. As the concepts of dual inheritance theory center on addressing issues of cultural transmission utilizing biological evolution, I have established a data set examining various character states occurring at the Clovis sites, which are considered the taxa in this study. I constructed a binary data matrix (See Appendix B) utilizing these taxa (n=19) and the character states (n=17) which were assigned either a 1 or 0, denoting either present or absent, respectively. The taxa (Table 7) include the following Clovis sites: Anzick; El Fin DeMundo; Busse; Naco; Beach; Eckles; Lehner; JS;

<table>
<thead>
<tr>
<th>Sites (TAXA)</th>
<th>Cultural Layer Sampled</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anzick</td>
<td>Clovis</td>
<td>Lahren and Bonnichsen. 1971.</td>
</tr>
<tr>
<td>El Fin DeMundo</td>
<td>Clovis</td>
<td>Sanchez et al. 2014</td>
</tr>
<tr>
<td>Busse</td>
<td>Clovis</td>
<td>Hofman 1995</td>
</tr>
<tr>
<td>Naco</td>
<td>Clovis</td>
<td>Haury 1953</td>
</tr>
<tr>
<td>Beach</td>
<td>Clovis</td>
<td>Huckell et al. 2011</td>
</tr>
<tr>
<td>Eckles</td>
<td>Clovis</td>
<td>Holen 1998</td>
</tr>
<tr>
<td>Lehner</td>
<td>Clovis</td>
<td>Haury 1959</td>
</tr>
<tr>
<td>JS</td>
<td>Clovis</td>
<td>Bement 2014</td>
</tr>
<tr>
<td>Carlisle</td>
<td>Clovis</td>
<td>Hill et al. 2014</td>
</tr>
<tr>
<td>Mahaffey</td>
<td>Clovis</td>
<td>Bamforth 2009</td>
</tr>
<tr>
<td>CW</td>
<td>Clovis</td>
<td>Muniz 2014</td>
</tr>
<tr>
<td>Simon</td>
<td>Clovis</td>
<td>Kohntopp 2010</td>
</tr>
<tr>
<td>Jake Bluff</td>
<td>Clovis</td>
<td>Bement and Carter 2010</td>
</tr>
<tr>
<td>Fenn</td>
<td>Clovis</td>
<td>Frison and Bradley 1999</td>
</tr>
<tr>
<td>East Wenatchee</td>
<td>Clovis</td>
<td>Gramly 1993</td>
</tr>
<tr>
<td>Hogeye</td>
<td>Clovis</td>
<td>Waters and Jennings 2015</td>
</tr>
<tr>
<td>Gault</td>
<td>Clovis</td>
<td>Waters et al. 2011</td>
</tr>
<tr>
<td>Watts</td>
<td>Clovis</td>
<td>Kilby 2008</td>
</tr>
<tr>
<td>Baller</td>
<td>Clovis</td>
<td>Osborn 2016</td>
</tr>
</tbody>
</table>

*Table 7. Sites (Taxa) for Clovis Site Comparisons*
Carlisle; Mahaffey; CW; Simon; Jake Bluff; Fenn; East Wenatchee; Hogeye; Gault; Watts; and Baller.

The character states are comprised of the following flaking patterns: cortex; convergent; co-medial; trans-medial; diagonal; overshot; concave scraper; original flake characteristics; heat treatment indications; deep concave base; shallow concave base; straight base; flared haft element; constricted haft element; straight haft element; edge retouch and square edge remnant. Following Muniz (2014), the flaking patterns observed in available photographic examples of the artifact assemblages from the 19 taxa (Table 7) were determined to either display these character states or that the character states were absent utilizing the 1 or 0 designations as described above. Once this data matrix was completed, I used PAST and SplitsTree4 as the software for the analysis in hopes of understanding the relationship between these sites which are located throughout western regions of the North American continent. I tested for existing variation between these sites to establish whether Anzick does in fact, represent typical Clovis technology or that the technology represented by the Anzick artifacts is different from that found in other known Clovis sites.

The PAST software was utilized to measure the character states listed above as a way to understand the variation or lack of variation amongst and between the taxa. To be more specific, a parsimony analysis was run on the data matrix in PAST to test for relationships between the taxa which may be indicative of descent with modification, or alternatively, homogeneity between the sites. The purpose of a parsimony analysis is to construct a hierarchical cladogram of the “most parsimonious trees that represent the extent of branchiness which is indicative of descent with modification. This is accomplished through establishing the most parsimonious
### Table 8 Character State Table from Muniz 2014

<table>
<thead>
<tr>
<th>Cortex</th>
<th>Convergent</th>
<th>Comedial</th>
<th>Transmedial</th>
<th>Diagonal</th>
<th>Longitudinal</th>
<th>Overshot</th>
<th>Edge Retouch</th>
<th>Square Edge Remnant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of coriaceous indicating original stone surface</td>
<td>Flake oriented in a radial pattern meeting at the center</td>
<td>Flake oriented perpendicular to long axis with (most) flakes crossing the midline</td>
<td>Flake oriented perpendicular to long axis (most) flakes crossing the midline</td>
<td>Flakes oriented between 30 and 60 degrees to long axis, may stop at or go beyond midline</td>
<td>Flakes oriented parallel to long axis, may stop at or go beyond midline</td>
<td>One or more overshot flakes are present</td>
<td>Fine edge retouched used to standardize margin or remove platform remnants</td>
<td>Presence of squared edges indicating original blank form</td>
</tr>
</tbody>
</table>

### Table 9 Character State Table designed for this study

<table>
<thead>
<tr>
<th>Concave Scraper</th>
<th>Original Flake Evidence</th>
<th>Heat Treatment</th>
<th>Deep Concave Base</th>
<th>Shallow Concave Base</th>
<th>Straight Base</th>
<th>Flared Haft</th>
<th>Constricted Haft</th>
<th>Straight Haft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of concave scraper pattern in tool margins</td>
<td>Evidence of original flake indications such as concentric circle or percussion bulb</td>
<td>Evidence of heat treatment such as waxy appearance or pot-lidding</td>
<td>Deep Concavity at base of bifacial point</td>
<td>Shallow Concave at base of bifacial point</td>
<td>Straight Base at bifacial point</td>
<td>Flared margins toward bottom of hafting element</td>
<td>Constricted side margins toward bottom of hafting element</td>
<td>Straight side margins toward bottom of hafting element</td>
</tr>
</tbody>
</table>
trees and supporting them with calculations of Consistency (CI) and Retention (RI) Indexes. The CI calculates for potential homoplasy (convergence or reversals) in the data and the RI calculates the amount of synapomorphies (shared or derived traits)” (Scott 2016). Accordingly, the CI scores run from 0 to 1 where 0 would represent complete homoplasy and 1 would indicate no homoplasy. The RI scores run from 1 to 0 where 1 represents perfect synapomorphy and an RI of 0 indicates no synapomorphy in the data (Lycett 2009; Prentiss et al. 2014; Scott 2016). As per these parameters, I ran the parsimony analysis with the Heuristic (NNI) algorithm and Fitch optimization; and conducted a bootstrapping test to determine the strength of the branches at a re-sampling rate of 1000 times, assuming a 50% significant rule (Anderson 2001; Scott 2016). Additionally, the data matrix was analyzed using the SplitsTree4 program which examines tokogenetic signals (indicative of lateral transfer of character states through borrowing, admixture, or similar processes) and branching which is indicative of descent with modification, illustrating patterns of borrowing and reticulation between taxa (Prentiss et al. 2011; Scott 2016). If a technological assemblage such as that from Anzick, is typical, I would expect to see indications of tokogenetic signals within the results as this lateral (between taxa borrowing and blending) transmission is consistent with a technology being typical between sites of a corresponding culture such as Clovis.

The PAST analysis of the data matrix provided maximum parsimony results which were illustrated by the generation of a phylogram and trees rooted with the earliest Clovis site, El Fin Del Mundo. The phylogram and trees (Figures 14, 15, 16) were generated using Heuristic (NNI) algorithm, with Fitch optimization and bootstrapping at a rate of 1000 replicates. The phylogram in Figure 14 illustrates the taxa rooted with the El Fin DeMundo site resulting in a modal parsimony analysis that produced 11 trees with a tree length of 47, a calculated CI of 0.3617 and
an RI of 0.6296. Additionally, the bootstrap scores were low throughout this phylogram. These results suggest that there is minimal obvious descent patterning throughout the taxa, instead showing moderate homoplasy which may be indicative of a borrowing/blending phenomenon occurring between the taxa, which is supported by a low CI score of 0.3617. The tree in Figure 15 illustrates the same taxa, rooted with the El Fin Del Mundo site as shown in the Figure 14 phylogram, resulting in a modal parsimony analysis, that produced 11 trees with a tree length of 47, a calculated CI of 0.3617 and an RI of 0.6296. The tree in Figure 16 is a strict consensus tree which provides a more focused image of the apparent homoplasy occurring between these taxa, possibly indicative of a borrowing/blending horizontal transmission relationship between the taxa as opposed to a branching vertical transmission relationship. The bootstrap scores were low throughout these trees as well.

The SplitsTree4 neighbor-net graph (Figure 17) provides insight into the possible blending/borrowing between the taxa. As described by Prentiss et al., “where the neighbor-net plot closely resembles a tree diagram we can conclude that phylogenesis (branching) has been the primary mode of evolution. In contrast, if the plot is complex with many linkages between members producing complex box-like shapes, then we can conclude that horizontal borrowing/blending played a stronger role” (Prentiss et al. 2011). Accordingly, the image (Figure 16) suggests that there was substantial horizontal borrowing/blending of character states between these taxa as represented by the boxiness of the graph. In turn, this boxiness is indicative of little variation between the sites and suggests that Anzick does in fact represent typical Clovis technology.
Figure 14 PAST Generated Image of Clovis Site Phylogram
Figure 15. PAST Generated Image of Clovis Sites Modal Parsimony Tree
Figure 16. PAST Generated Image of Clovis Sites Strict Consensus Tree
FIGURE 17. SPLITSREE4 NEIGHBOR-NET GRAPH
6.3 Analysis of Clovis Sites utilizing SPSS

<table>
<thead>
<tr>
<th>Sites</th>
<th>Cultural Layer Sampled</th>
<th>Reference</th>
</tr>
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<tr>
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<td>Richey Roberts</td>
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<td>Gramley 1993</td>
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<tr>
<td>Simon</td>
<td>Clovis</td>
<td>Kohntopp 2010</td>
</tr>
<tr>
<td>Fenn</td>
<td>Clovis</td>
<td>Frison and Bradley 1999</td>
</tr>
<tr>
<td>Mahaffy</td>
<td>Clovis</td>
<td>Bamforth 2009</td>
</tr>
<tr>
<td>Hogeye</td>
<td>Clovis</td>
<td>Waters and Jennings 2015</td>
</tr>
</tbody>
</table>

**Table 10. Clovis Sites for SPSS Site Comparisons**

I have designed a spreadsheet in Statistical Package for the Social Science (SPSS), into which I have entered all Anzick artifacts, as well as the artifact data from several sites and collections (Table 10). I have utilized these data in comparative study to construct elucidating SPSS displays such as scatterplots and tables to graph the distributions of variables from each collection to those found in the Anzick assemblage. These findings assist in testing the hypotheses proposed above, in relation to the conformity of the Anzick artifacts to typical Clovis Technology. As the previous sub-section (6.2) utilized a broad array of known Clovis sites and their diagnostic data, this sub-section (6.3) focuses on five sites (along with Anzick) that present with attributes which are known to be representative of Clovis Technology (Bamforth 2009, 2014; Bradley et al. 2010; Bradley 2010; Callahan 2000; Canby 1979; Collins et al. 2013; Frison 1991; Frison and Todd 1986; Frison and Bradley 1999; Gillespie 2007; Gramley 1993; Jones 1996; Kohntopp 2010; Lahren and Bonnichsen 1971; MacDonald 2012; Meltzer 2009; Smallwood 2010; Tankersley 2004; Waters et al. 2011; Waters et al. 2013; Waters and Jennings 2015). These sites and attributes are selected due to their collective similarity, as other sites in the previous sub-section, represented various Clovis technological specimens. The Taxa described in sub-section 6.2 (Table 7), are not only large assemblages or caches but also kill sites, camp sites and separate
occasional component finds without being consistent with the more complete suite of bifaces, projectile points and bone rods etc. as was found at Anzick. Although the Anzick Site is arguably an anomaly of sorts, due to the discovery of human remains with the large assemblage of lithic tools, it is similar in terms of tool assemblage composition to the sites selected for comparison in this sub-section (see Table 10). Similarities may include but are not limited to; finished Clovis projectile points, large arrays of bifaces, lithic blades and bone rods, to name a few. Certainly, one of the hallmarks of the Clovis Culture is the fluted “Clovis point”. According to Hill et al. (2014, 91), this fluted point type was established as the diagnostic point type for Clovis due to the discovery of the points with the remains of mammoth at kill sites such as Dent, located in Colorado and Blackwater Draw, in Texas (Bamforth 2014; Bradley et al. 2010; Hill et al. 2014). In addition to the diagnostic fluted point, lithic bifaces are common to the technology and are found in Clovis sites throughout North America. When utilized as tools, bifaces may have served as cutting or scraping implements and are often found to exhibit evidence of re-touch, which was executed to revitalize the cutting edge as per several specialists in the field of ancient lithic tool reduction processes (Andrefsky 2005, 2008; Bradley et al. 2010; Kelly 1988; Odell 2004; Shott 2015; Surovell 2009). As described by R. Kelley (1988), the biface may serve as: a core; or it may be maintained and curated for long periods of time and itself, utilized as a cutting tool; or it could be a by-product of stylistic or shaping concerns (Kelly 1988). As a core, the biface serves as an efficient way to transport and maintain working edges required for the continual cutting processes faced by big-game hunters. As stated by Bradley et al., flakes are the primary cutting tools in the Clovis technology with reduction of bifaces as well as preparation of blade cores, producing usable flakes; as well as the use of large flakes, specifically for cutting tools (Bradley et al. 2010). To further support the concept that bifaces served the function of a core, Kelly and
Todd (1988) argue that a well-maintained biface provides an efficient and transportable source of cutting edge:

“If made from a high-quality raw material, bifaces can have a fairly sharp but durable edge that can be re-sharpened repeatedly, and from which flakes can be removed for expedient use. More usable flake edge can be produced from a biface than from a simple casual core of similar weight because a biface reduction flake has a high edge-to-weight ratio (cf. MacDonald 1968:66). Thus, bifaces maximize the number of tools carried while minimizing the amount of stone carried-a necessity for a highly mobile people” (Kelly and Todd 1988).

In keeping with the prevalent use of bifaces in Clovis technology, the blade technology is, in itself, integral to the culture. Although only one true Clovis blade (Bradley et al. 2010) was found in the Anzick assemblage, the large flake scars associated with the removal of these blades, are found on the surfaces of bifaces (Figure 7) throughout the assemblage (Jones 1996; Lahren 2006; White 2015).

Figure 18. LARGE ANZICK BIFACE featuring flake-blade removal scars
In addition to the lithic tools, bone rods have been found at multiple sites and are well known to have been used by many cultures, through the millennia, from Europe through Asia and into the Americas. In keeping with temporally and spatially broad use of bone rods as points and possibly other tools, the Clovis Culture also readily utilized bone in their tool kit (Alvarez et al. 2016; Averbouh et al. 2015; Borgia et al. 2015; Bradley 1995; Frison and Zeimens 2011; Goutas and Tejero 2016; Gramley 1993; Lahren and Bonnichsen 1974; Painter 2004; Waters et al. 2011).

In the following paragraphs, I summarize the sites I have chosen for this sub-section. As compared to the Anzick Site, the quantity and quality of tools and tool types found at these sites is in keeping with the significance of those found at the Anzick Site.

**Figure 19. Examples of Bone Rods from the Anzick Site**
The Richey-Roberts Cache

The Richey-Roberts Site (45DO482) was discovered in 1987 near the town of East Wenatchee, Washington, in the Columbia River Valley. In the process of digging a trench for an irrigation pipeline within an apple orchard, workers accidently trenched through a cache of some 23 artifacts located ~50cm beneath the surface of the ground (Gramly 1993; Mierendorf 1997). Shortly thereafter, archaeologists from Washington State University, conducted a limited observation of the site findings, summarizing the site as attributable to Clovis due to fluted points found among the artifacts. Additionally, based on the observable stratigraphy of the trenches and the suggested locations of the artifacts as found by the orchard workers; the archaeologists speculated that other Clovis artifacts may remain in situ at the site. As this is highly unusual due to the paucity of Clovis sites they halted excavation. In the spring of 1988, Dr. Peter J. Mehringer, of Washington State University, returned to the site, leading a team consisting of notable archaeologists such as: George Frison; C. Vance Haynes; Richard Daughtery Melvin Aikens; Matthew Root; and Dennis Stanford. This arguably legendary team of experts proceeded with a limited excavation which yielded an additional five finely worked, fluted points, two of which each measured over 230 mm in length (Waitt 2015). After this initial excavation ceased, the site was closed until 1990, when the excavation was reopened by Dr. Michael Gramly, of the Buffalo New York, Museum of Science. According to Waitt (2015), this team recovered additional lithic and osseous tools including one fluted point measuring 245 mm in length. Collectively, Gramly considered the osseous and lithic tools to be an example of a hunting tool-kit used for procuring and processing the large mega-fauna of the Clovis era. According to Gramly’s type designation, the lithic artifacts consisted of: Fluted Clovis Points (n=14) ; Bifacial Knives (n=8); Fluted Point Preforms (n=7) ; Side-Scrapers (n=4) ; Prismatic Blades (n=3) ;
Celts/Adzes (n=3); Gravers (n=2); Flake knives (n=2). While points, bifacial knives, preforms, sidescrapers, prismatic blades, gravers and flake knives are common to Clovis technology, the celt/adze forms, as described by Gramly, are not as common. While it may be that this form is consistent in shape to later period adze tools from throughout North America and globally for that matter, it is Dr. Gramly who proposed their form and design as Clovis and found at the site (Gramly 1993). The osseous artifacts found at the Richey-Roberts Site consist of a number of artifacts of unknown purpose (n=14) which according to Gramly, appear to be made of mammoth or mastodon bone and average 250mm in length with beveled, incised ends. Protein analysis of a number of these artifacts provided evidence of use in the processing of bison, lagomorphs and ungulates, providing a minimal yet interesting view into the diet breadth of this particular group of hunter-gatherers.

The Simon Cache

The Simon Cache was unknowingly uncovered by Bill Simon Jr., in June of 1961 while operating a farm implement in a field near Fairfield, Idaho in the Camas Creek Basin. Several days after the field had been worked, members of the Simon Family, as well as hired hands, discovered what Kohntopp (2010) referred to as the original cache pit from which they removed a number of artifacts that were thickly cemented (sic) together with red ochre, requiring heavy equipment and pics to complete the extraction, which unfortunately led to the fracturing of several artifacts (Kohntopp 2010). It was not until later in the year that the Simons contacted B. Robert Butler of the University of Idaho who conducted the initial archaeological inspection of the site, concluding that “nothing of archaeological value remained at the site” (Butler 1963, 22; Santarone 2014). According to Butler (1963, 23), the artifacts previously removed from the site by the Simon family, consisted of lithic artifacts (n=29), many of which had been damaged
before his examination. Of these 29 lithic artifacts, six were fluted projectile points diagnostic of Clovis technology; 17 were bifaces of various sizes and shapes with additional lithic artifacts consisting of discoidal knives (n=2); a bifacial end scraper; a spoke shave; and a bifacial side scraper (Santarone 2014). According to Santarone (2014, 12), the most extensive excavations of the site occurred in 1967, 1968 and 1969. These excavations were led by Dr. Earl Swanson which did result in the discovery of additional Clovis artifacts, and were evidently documented; however, this report was never published. Further work by Santarone established that the artifact inventory has apparently fluctuated over the years with an additional 35 artifacts (including debitage) having been added according to his study (Santarone 2014). Although this inventory fluctuation is elucidated by Santarone, I rely on the metrics of 33 artifacts as presented in Kohntopp’s *The Simon Clovis Cache* (2010, 53) for the purpose of this study and comparison to the Anzick Site lithics.

**The Fenn Cache**

Discovered at or about the turn of the century, possibly in 1902, (according to Frison and Bradley, 1999) the Fenn Cache was first reported to Frison and Bradley in 1988. According to Forest Fenn, he had purchased the collection of lithic artifacts (n=56) in Santa Fe, New Mexico earlier that year. The story reported to Fenn at the time of the purchase was that the artifacts had been found (again, possibly in 1902) either in the course of plowing a field or in a dry cave, concealed in a leather bag. “Because there are none of the distinctive metal scratches or breaks that occur when stone artifacts are hit with a plow, we think that the second story (the dry cave scenario) is most likely” (Frison and Bradley 1999). Having been passed around the family of the original finder (whose name is not published), and eventually forgotten, the cache was later discovered in a basement, given as a wedding gift and subsequently sold by the recipient in 1988
to Fenn, in Santa Fe. According to the information provided by the seller, the family had recalled that the discovery locale was somewhere in the three-corners area of Utah, Wyoming and Idaho. Although the find location, or context, is not identifiable, Dr. Frison and Dr. Bradley concluded that the cache is authentic and characteristic of Clovis technology (Frison and Bradley 1999).

The Mahaffy Cache

The Mahaffy Cache was discovered accidentally by a landscaping crew working at the Patrick Mahaffy Residence within the city limits of Boulder, Colorado in the Spring of 2008. Within an area estimated to have been 30-40 cm in diameter, a substantial group of artifacts was found tightly packed together and subsequently removed by the landscaping crew. Having been invited by the homeowner the following day, Dr. Douglas Bamforth, an archaeologist from the University of Colorado, Boulder, visited the site. Upon further examination, Dr. Bamforth concluded that there were no indications of a larger site and that the cache “appears to be an isolated feature” (Yohe and Bamforth 2011). According to Yohe and Bamforth (2011, 2338) artifacts discovered at the Mahaffy locale consist of 83 pieces, including bifaces, unifaces, blades and unmodified flakes. The bifaces and other tools from this assemblage were removed from a location (according to the landscape crew) within a layer of sand, the top of which was approximately 45 cm below the surface. The tools removed from the Mahaffy site all resembled tools associated with known Clovis technology, however there were no fluted points, which are the diagnostic hallmark attributed to the culture. While several of the Mahaffy bifaces were large, thin and of high-quality lithic material, indicative of Clovis Bifacial technology; the lack of fluted points, as well as the absence of datable materials left some doubts as to the cultural of the collection. As reported in their paper *Late Pleistocene protein residues from the Mahaffy*
cache, *Colorado* in the Journal of Archeological Science, Yohe and Bamforth recovered evidence in the form of protein residues found on a number of artifacts which tested positive for sheep, bear, camel and horse proteins. The significance of this discovery is that animals in the camel and horse families “have either been locally present as modern species within the last century or as extinct species at the end of the Pleistocene” (Yohe and Bamforth 2011). Considering the circumstances surrounding the discovery, procurement and examination of the artifacts, the latter of the two scenarios is the most likely, and points to the terminal Pleistocene as the time of tool exposure to the proteins. This observation essentially ties the artifact assemblage to the end of the Pleistocene Epoch, which is also in keeping with the accepted Clovis time period (Rasmussen, et al. 2014; Waters and Stafford 2007).

The Hogeye Clovis Cache

The Hogeye Clovis Cache was discovered in an area of sand extraction, approximately five kilometers west of Elgin, Texas in 2003. Accidentally unearthed by heavy-equipment operators, as they removed sand from the sand mine, several large bifaces were recognized as being characteristic of Clovis technology by an astute observer. The initial 2003 discovery yielded 37 bifaces some of which were sold over the next several years; until the discovery was described to Dr. Michael Waters of Texas A&M, who upon further investigation, concurred with the suggestion that the artifacts were likely representative of Clovis technology. After being granted permission to further study the site, Dr. Waters began field investigations in 2010 with the help of student archaeologists, Tom Jennings and Ashley Smallwood. Through background investigations, it was discovered that the Hogeye Site was the find-location of thousands of Archaic and later points over the years. The Texas A&M investigations continued with the
recovery and documenting of over four-hundred post-Clovis artifacts from the Hogeye Site, dating from Early Paleoindian through Late Prehistoric periods; confirming that the location had been repeatedly used during these periods (Waters and Jennings 2015, 16). In summary, Clovis artifacts totaled a minimum of 52 (considering difficulty in accurate count due to several fractured specimens) artifacts, many of which may be considered projectile points due to their fluted basally thinned hafting elements, although definition may differ depending on individual opinion and type designation.

The Anzick Assemblage

As I have mentioned previously in this text, the Anzick site attributes include a large assortment of lithic and bone artifacts. I observe that there are approximately one hundred and sixteen lithic and bone artifacts, or fragments, which had been discovered and comprise the Anzick artifact assemblage. Of this number, there were 15 fragments of what appear to be osseous rods, known to have been manufactured from elk bone (Morrow and Fiedel 2006; Rasmussen et al. 2014). Two of these rods are complete and composed of 6 of the 15 fragments. One of the complete rods has two hatch-marked beveled ends, an example of which may be seen in Figures 24 and 25, while the other complete rod has only one beveled end with the other end shaped into a blunt, tapered form. The remaining 9 bone fragments represent an unknown number of completed rods and all exhibit either cross-hatched bevels or residual ochre or both. These rods which are believed to have been hafted to projectile points and used as atlatl foreshafts, were highly polished with the cross-hatching on the beveled ends, presumably for increased friction in an attachment process (Lahren and Bonnichsen 1974). According to my analysis of the lithic portion of the artifact assemblage, it consists of approximately 80 bifaces, 8 unifaces, 5 fluted projectile points and 7 fragments.
Materials and Methods

Of the 80 bifaces there is obvious visual variation throughout the assemblage. This variation is more generally observed in terms of refinement from the raw blank piece of lithic material, (essentially, a culturally unaltered rock) through several stages of reduction to a finish projectile point. For the purpose of uniformity and understanding of the Anzick artifacts and the other artifacts from sites as listed in this section, I utilize a “stage” designation process suggested and described by Callahan (1979, 35-37) and illustrated on the back cover of the text (Figure 20) (Callahan 1979). Bifaces require specific analysis including stage designation to establish a biface reduction stage in the continual process of reduction (Callahan 2000; Smallwood 2010). The choice to utilize this particular standardized selection of stages is based on their relative simplicity in application, especially to visual designation as is required for this particular subsection. Relying on visual comparison for each artifact to be designated according to Callahan, (1979) as a particular stage, I utilized available visual imagery of each artifact from each site, both online and in text form. I carried this assessment of all bifaces through the entirety of all observed artifacts to compile these data. These stages are based on specific characteristics found in the flake-removal scar patterns left on bifaces due to the lithic reduction process. Callahan’s stages are numbered one through seven (Figure 20) with one representing a rough stone blank and seven being a finished fluted projectile point. The use of the “stage” designation is for the purpose of visually identifying variation in biface reduction throughout the assemblages compared in this subsection. I follow a similar descriptive and pragmatic approach to the use of Callahan’s stages to that described and utilized by Shott (2017, 4) who provides a summarized stage identification and description (Callahan 1979; Shott 2017). Although there is a processing course of reduction from large to small lithic pieces, the reduction process was likely guided by
an essential mental assessment of the material being reduced, according to the perception and abilities of the artisan. The use of high-quality crypto-crystalline materials is pervasive throughout Clovis sites across the continent. Accordingly, a technological focus on economy in material use, was undoubtedly a foremost concern especially in a highly-mobile culture such as
Clovis. The Anzick assemblage exemplifies the “continuum” model of artifact variation as proposed by Hiscock and Attenbrow (2005, 14) which is an alternative to other models proposed by: Dibble (re-sharpening reduction as main factor in variation) and Whallon & Brown (segmented model of implement variation, ‘discontinuous morphological variation’) (Dibble 1984, 1987; Hiscock 2005, 2015; Shott 2017; Whallon and Brown 1982). In keeping with Kelley’s 3 sides to a Biface, it is likely that the artifacts found in the Anzick assemblage represent the stages proposed by Callahan as Cores, Preforms and Projectile points as well as any conceivable and required tool in the course of daily activities (Callahan 1979; Kelly 1988). As noted by Goodyear (1979, 4) in reference to Binford’s “situational contingencies” (Binford 1978), a skilled lithics knapper would follow a mental template to create a needed tool from the corpus of an existing core such as is found in the Anzick assemblage. Goodyear goes on to explain this as a “flexible technology” where:

“...Flexibility means creating tools with lifespans long enough to be used on a number of occasions if necessary. With chipped stone tools this means designing tools which can be continuously and reliably rejuvenated. Flexibility also means the capability for redesigning tools as other tools and otherwise re-casting the raw material of the tool kit into wholly new tools or cores for the derivation of tools if necessary” (Goodyear 1979).

In the course of analysis and categorizing the sites and the integral tool types recorded at the sites, it is clear that projectile points, and bifaces are the most abundant artifacts types with which to compare the selected sites. Considering the paucity of bone rods, throughout the Clovis sites, including those sampled, I did not include them in this comparison but do recognize that they are indeed common in the Clovis toolkit. Additional lithic artifacts that are ubiquitous throughout many but not all sites (Table 10) include yet are not limited to: blades, gravers, piercing tools, crescents, margin scrapers, and essentially any needed form that may be devised and produced by the artisan. While these types were included in the study, they were included in
the totality of the compared assemblages and not recognized as individual types as they were not represented in all sites sampled.

After entering a total of the initial, only-Clovis sites as listed in Table 10 (n=6, total-304 lithic artifacts), I decided to include an additional number of non-Clovis sites (see Table 11), (n=5, total-339 lithic artifacts), to be certain there was not a measurable similarity outside of the Clovis technology that may appear to be similar to that found in Anzick. These additional non-Clovis sites include: Bobtail Wolf (Folsom); The Casper Site (Hell Gap); Lake Theo Site (Folsom); Mill Iron Site (Goshen); Texas Folsom Artifact Compilation (Folsom). The inclusion of the artifacts from these sites provides a heavily clustered signature of the non-Clovis pieces as compared to the Clovis site artifacts. This clustering (see Figure 21) provides clear evidence that the samples of Clovis technology are notably different from the non-Clovis (Folsom, Goshen and Hell Gap) samples. Although there are some outliers and overlapping specimens, the overall size of the Clovis technological artifacts is considerably more robust as compared to the relatively refined

<table>
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<tr>
<th>Sites</th>
<th>Cultural Layer Sampled</th>
<th>Reference</th>
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<tr>
<td>Bobtail Wolf Site</td>
<td>Folsom</td>
<td>MacDonald 1998</td>
</tr>
<tr>
<td>Casper Site</td>
<td>Hell Gap</td>
<td>Frison 1974</td>
</tr>
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<td>Folsom</td>
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<td>Mill Iron Site</td>
<td>Goshen</td>
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<tr>
<td>Texas Folsom Compilation</td>
<td>Folsom</td>
<td>Largent et al. 1981</td>
</tr>
</tbody>
</table>

TABLE 11. NON-CLOVIS SITES INCLUDED FOR SPSS COMPARISON
and diminutive Folsom and Goshen technologies. The Hell Gap technological suite as represented in this image, illustrates the more robust yet similarly refined attributes of the technologies of Folsom and Goshen. The Casper Hell Gap technological attributes are shown to over-lap the Clovis attributes in metrics which is in keeping with their projectile point length and width being more similar to that of Clovis. Although the lithic attributes may overlap morphologically, the Clovis technological/metric profile is quite distinctive from these other technologies which is likely due in part to the wide-spread use of large bifacial cores, on which the mobile technology relied for stored cutting edges in bifacial cores, as described earlier in this text. Figure 21 demonstrates the fit of Anzick artifacts well within the heavy clustering of

![Figure 21. Image of all Clovis lithic tools from all sites (n=304) and all non-Clovis tools from all non-Clovis sites (n=339)](image)

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138
artifacts from the other Clovis sites, further identifying the technology found in the Anzick assemblage as being representative of typical Clovis technology.

In a comparison of Clovis with non-Clovis projectile point metrics, Figure 22 clearly illustrates the difference in morphology between the technologies with the five Anzick points being positioned solidly within the Clovis cluster to the extent that one is nearly obscured by several of the Hogeye projectile point dots.

To further elucidate the extent to which Anzick falls within the category of Clovis technology, Figure 23 (based on Length and Width), illustrates biface stages similarity within and between the sites. Based on this plot, width to length variability is consistent throughout the sampled sites.
In Figure 24 (Length and Thickness), I analyze the same samples of Clovis bifaces and projectile points which also presented with a similarly consistent signature throughout the samples. Figures 23 and 24 also illustrate the number of biface stage examples for each Clovis site and accordingly, the Stage 4 bifaces appear as most numerous throughout the sites with only one example of Stage 1 attributed to the Richey Roberts Site and relatively few Stage 2 Bifaces, the most being found in the Simon Cache. This would be a sensible observation, as according to Callahan’s Stages (Figure 20), Stage 4 is the stage at which a transition from removal of bifacial tertiary thinning flaking gives way to flaking pattern directed toward a pointed biface trajectory.
Figure 24. Comparison of Clovis Bifaces and Fluted Points (Length and Thickness)

Figure 25. 3D Rendering of all Clovis Lithic Samples
Figure 25 is the three-dimensional rendering of all sampled lithic Clovis artifacts, which I created to further illustrate homogeneity within the technology, between all sampled sites, with Anzick (red dots) fully and centrally mixed within the cluster.

Chapter Conclusions

In this chapter, analyses were completed using PAST, Splitstree4 and SPSS programs to determine if in fact the Anzick Site artifact assemblage does represent typical Clovis Technology. In sub-section 5.2, I provide a broad-based study examining data from 17 known Clovis sites (Table 7) and recording whether certain specific character states (n=19) exist within the artifact collections from the sites. With these data, I developed the data matrix which was subsequently entered into the PAST and SplitsTree4 programs. I utilized both Dual Inheritance Theory and an Evolutionary Archaeological approach to establish if there in fact was either consistent technological sharing across the Clovis landscape, with technological homoplasy occurring between groups including Anzick; or if Anzick is essentially not typical of Clovis Technology. The phylogram and tree results suggest that there is minimal obvious descent patterning throughout the taxa, instead showing moderate homoplasy which may be indicative of a borrowing/blending phenomenon occurring between the taxa as opposed to a branching vertical transmission relationship (Figures 14, 15,16). Accordingly, the Splitstree4 Neighbor net image (Figure 17), suggests that there was substantial horizontal borrowing/blending of character states between these taxa as represented by the boxiness of the graph. In turn, this boxiness is indicative of little variation between the sites and suggests that Anzick does in fact represent typical Clovis technology.

In 6.3, I utilized SPSS to compare the Anzick artifact metrics with a selection of known and documented artifacts from various Clovis sites (Table 10). The analysis resulted in a number of
illustrative graphs (Figures 21-25) which, along with the descriptions, demonstrate how similar the Anzick artifacts are to those found in the other Clovis sites.

In addition to these computer-generated analyses, the use of visual comparison cannot be under-estimated, and I therefore include images of three-quarters of the Anzick artifact assemblage (Figure 26 and images in Appendix G) to provide an additional method of comparison. In combination with the results of sub-sections 6.2 and 6.3, these photographs further support my finding that the artifact assemblage discovered at the **Anzick Site, is in fact typical of Clovis Technology**. After conducting this study to determine if the Anzick assemblage is *typical* of Clovis technology, it occurs to me that it is not only *typical of*, but in fact, is quintessentially representative of Clovis.
Figure 26. Artifacts from the Anzick Assemblage
Chapter 7: Protein Analysis of Selected Anzick Artifacts

This chapter pertains to the question of whether the Anzick artifacts had been produced for normal daily, utilitarian use; or if they in fact had been produced for the express purpose of use as burial goods for the interment of the Anzick Clovis child. I posit that this problem may be addressed by testing for proteins that (an analysis which has, to my knowledge, never been completed on the Anzick artifacts) may potentially be found on the margins of selected Anzick artifacts (Cnuts and Rots 2017; Gerlach 1996; Kooyman et al. 2001; Loy 1983, 1993, 1998; Sappington 2010; Newman and Julig 1989). The purpose of testing for the proteins from the selected artifacts of the Anzick assemblage, is that if discovered, they would provide insight regarding species selection and diversity in subsistence strategies of this particular segment of the Clovis Culture. I further posited that if no proteins were found, it may suggest that the assemblage was purposefully dedicated and manufactured as a burial assemblage, having not been used for the actual butchering of prey.

7.1 Hypotheses 3a, 3b

Hypothesis 3a: The Anzick Clovis artifacts were not manufactured for the specific purpose of interment as burial goods. The collection was in fact used prior to interment as evidenced by the proteins of extinct, terminal Pleistocene Megafauna existing on the pieces selected for testing.

Hypothesis 3b The Anzick Clovis artifacts were manufactured only for the purpose of interment and were not used prior to the interment with the human remains as evidenced by a lack of ancient proteins existing on the Anzick pieces selected for testing.
In October 2018, I traveled to PaleoResearch Institute (PRI), in Golden Colorado, the lab that conducted the analysis on several of the Anzick artifacts. This analysis was independently funded by Bone and Stone Anthrosciences LLC of Missoula, Montana. The work plan included the examination and analysis selected lithic artifacts (n=6) from the assemblage which is currently on loan (in its entirety) to the Montana Historical Society Museum in Helena, Montana. These selected artifacts represent a cross-section of variation in lithic materials which also possess physical attributes thought to be conducive to the extraction of ancient animal proteins from micro-crevices and surfaces alike.

**Figure 27. Anzick Artifacts Submitted for CIEP Analysis at PRI**
I chose the selected artifacts (Figure 27) as likely candidates for protein retention and sufficient for analysis due to their unifacial and bifacial characteristics which likely conceal microscopic proteins along and within their working edges. Potentially, these samples were used as cutting and/or scraping tools, and conceivably could retain the original animal proteins from the terminal Pleistocene. The purpose of the protein analysis was two-fold, one being the potential for identification of extinct mega-faunal species such as proboscidea or camelidae, similar to work completed by Dr. Bamforth on the Mahaffy cache (Bamforth 2009). Due to the potential of contamination since the Anzick discovery, the analysis focused on the possibility of discovering proteins from proboscidea and camelidae as they are the species which existed in Montana during the Pleistocene and did not exist in the area after the extinction of mega-fauna at the end of the Pleistocene. If discovered, the identification of these species would further connect the assemblage to the terminal Pleistocene and lend insight into prey acquisition practices as well as diversity in dietary resources (Waguespeck and Surovell 2003). Furthermore, such proteins discovered on these artifacts would assist in the determination of whether the assemblage was made specifically for providing burial goods or if these artifacts in fact, represent a “working toolkit”.

There are three common methods which have been utilized regarding ancient protein analysis to determine speciation; these include hemoglobin crystallization, immunological analysis and DNA amplification. According to several studies, hemoglobin crystallization and DNA amplification appear to be less feasible and more restrictive in terms of purification and sample size, leaving immuno-electrophoresis (CIEP or COE), an immunological-based analysis, as the most viable choice (Gerlach 1996; Kooymen et al. 2001; Loy 1983, 1993, 1998; Sappington 2010).
Due to specific recommendations and past contact, I decided (with the permission of the owner of the artifacts, Sarah Anzick) to pursue the analysis through PRI, directed by Dr. Linda Scott Cummings. The following is an excerpt of her description of CIEP analysis:

“…Protein residue analysis is used to identify the presence of prehistoric, historic, or even modern proteins, both animal and plant. Proteins are present in plant tissues and in all body fluids and tissues, including blood, urine, saliva, fecal material, etc. This analysis has been applied most commonly to lithic artifacts, such as scrapers and projectile points. Samples are tested using an immunologically-based technique referred to as counter (or sometimes cross-over) immunoelectrophoresis (CIEP or COE).

The technique involves the reaction of an antigen and antibody. An antigen is any molecule that can bind to an antibody. When an antigen, such as blood or plant extract, is injected into a host, often a rabbit or goat, the immune system of the host produces specific antibodies to various regions of the antigen molecule (epitopes). For archeological purposes, an antigen is the unknown protein or proteins adhering to an artifact after its use. An antibody is a protein made by the immune system with very reactive areas specific for a single epitope on the antigen. Polyclonal antibodies are commonly used with immunoprecipitation reactions, because they will react with multiple sites or epitopes on the antigen. Blood is composed of many different proteins, including hemoglobin (red blood cells), albumin, alpha globulins, beta globulins, gamma globulins, etc.

Antigens are removed from an artifact using a Tris hydrochloride (a buffer), sodium chloride, and Triton X-100 (a detergent) solution. Buffers and detergents are chemical disruptors that help break the hydrogen bonds holding the proteins onto the artifact surface. Samples also are placed in an ultrasonic bath because previous studies have shown that use of physical disruptors (sound waves) will result in recovery of more residual protein than just soaking the artifact in solution. Use of both chemical and physical disruptors together yields the best recovery of proteins…” (Cummings 2013).

To reiterate, in pursuing the analysis of the proteins from the selected artifacts of the Anzick assemblage, if discovered, they would provide insight regarding speciation and diversity in subsistence strategies of this particular segment of the Clovis Culture. If there were in fact no proteins found, it may suggest that the assemblage was purposefully dedicated and manufactured as a burial assemblage, having not been used for the actual butchering of prey prior to the interment as proposed above in Hypothesis 3b.
7.2 The PRI CIEP Analysis

The CIEP Analysis was conducted at PRI, Golden, Colorado by analyst, Caitlin A. Clark, MS under the direction of Linda Scott Cummings, PhD and with the assistance of Samuel S. White, MA. The analytic methods utilized at PRI by the analysts were specific and conducted according to appropriate scientific protocol; accordingly, I include the Methods section of the PRI report as Appendix D (Cummings and Clark 2019).

Figure 28. Caitlin Clark, MS, Analyst for PRI; extracting ancient proteins from Anzick Artifact #99
7.3 The PRI CIEP Analysis Results

The CIEP analyses performed by PRI analysts, yielded the following results as noted in the 2019 report (Cummings and Clark 2019).

“Protein analysis produced positive reactions at the 1:10 dilution that suggest using rabbit blood or tissue as a binder with the ochre on Lithic 18, using Lithic 23 to process rabbit, and Lithic 99 was used to process camel. Other reactions at the 1:10 dilution, were not sufficient to sustain interpretations of use. If rabbit hide or camel (or other animal) hide was part of the burial they could have contributed proteins to this lithic collection.” (Cummings and Clark 2019).

As per the afore-mentioned CIEP methods protocol followed by PRI, it is important to note that there was no sediment control specimen provided with these artifacts for the analysis, due to the manner in which the artifacts were recovered in 1968. The purpose of analyzing a sediment control specimen is to test for organic substances which might interfere with the artifact residue analysis (Grayson 2002; Kooymann 200; Loy and Dixon 1998; Newman and Julig 1989). Cummings and Clark contribute: “Due to the fact that these lithics were not removed during a controlled excavation it is possible that several of the positive reactions to proteins is the result of handling through the years. Initial screening is conducted with antisera mixed at a 1:5 dilution with reverse osmosis deionized (RODI) water. Reactions observed at this level, whether definitive or confusing, identify antisera of interest for additional testing using a 1:10 dilution. Only the reactions at the 1:10 dilution level should be considered interpretable” (Cummings and Clark 2019). In the case of the Anzick artifacts which initially tested positive for proteins at the 1:5 dilution (see protocol), they were then again tested at a dilution of 1:10 to establish their interpretation of use validity. Additionally, it should be noted that only artifact #99 (see Figure 20) tested positive for Camelidae proteins at the 1:10 dilution. Although there was no sediment control sample, the fact that Camelidae proteins were not found on any other specimens from the
same ancient assemblage, supports the interpretation presented by PRI. Additionally, the PRI findings report that artifact #23 and a sample of ochre from artifact #18 both tested positive for rabbit proteins at the 1:10 dilution. An excerpt (Appendix E) from the report regarding the PRI protein analysis of the selection of Anzick artifacts provides a review of ethnographic animal utilization as well as a review of the ethno-zooarchaeological background of the animals identified through this analysis:

While the analyses included the testing of 6 selected artifacts from the Anzick assemblage, the recovery of viable ancient animal proteins only pertained to 3 of the artifacts (Figure 29).
While it is widely understood that members of the Clovis Culture are known to have utilized Mammoth, Mastodon and a variety of other megafaunal species (Bonnichsen and Lepper 2013; Broughton and Weitzel 2018; Buchanan, et al. 2018; Clark, et al. 2009; Fiedel 2004, 2009; Faith 2011; Faith and Surovell 2009; Gauntney 2018; Haynes 2013; Meltzer 2009; Waters et al. 2015; West 1996), the hunting of Pleistocene camels is rare but known to have occurred at Wally’s Beach, Alberta Canada, (Kooyman et al. 2001, 2012; Waters et al. 2015). Found at this location, were the butchered remains of seven Pleistocene horses (Equus conversidens) and one Camel (Camelops hesternus), in association with non-diagnostic lithic artifacts. The discovery of the

![Figure 30. Anzick in relation to Wally's Beach and Mahaffy (~11,000 radiocarbon years before present)](image-url)

152
Mahaffy Cache in Colorado (Figure 30) also provided insight regarding the utilization of camel in the days of the terminal Pleistocene, with artifacts testing positive for Camelidae proteins. These findings effectively date the artifacts to be contemporaneous to Clovis although no artifacts diagnostic of a specific culture such as Clovis, were identified in the cache. (Bamforth 2009, 2014). Further pointing to the likely procurement of camels as a focus of early hunter-gatherers, the remains of camel are prevalent near many archaeological sites such as Carter/Kerr McGee, Colby or the Lehner Site to name a few, even without concrete evidence tying them specifically to artifacts or sites (Grayson 2002; Haynes and Stanford 1984). The results of the PRI protein analysis pertaining to this selection of Anzick artifacts, provides the only positive results of Camelidae (Figure 31) proteins being found on an artifact from a definitive Clovis tool assemblage.

*Figure 31. Artistic Rendition of Camelops Hesternus (Image from La Brea Tar Pits Museum)*
The discovery of proteins on these selected artifacts from the Anzick assemblage has significant implications regarding the artifacts, Anzick Clovis group and Anzick Site. In this chapter, I focus primarily on the implications as they apply to Hypotheses 3a and 3b, with further discussion regarding broader impacts later in this dissertation. To restate, Hypothesis 3a posits that: The Anzick Clovis artifacts were not manufactured for the specific purpose of interment as burial goods. The collection was in fact used prior to interment as evidenced by the proteins of extinct, terminal Pleistocene Megafauna existing on the pieces selected for testing and; Hypothesis 3b posits that: The Anzick Clovis artifacts were manufactured only for the purpose of interment and were not used prior to the interment with the human remains as evidenced by a lack of ancient proteins existing on the Anzick pieces selected for testing. The animal proteins discovered on these artifacts supports Hypothesis 3a and suggest that the artifact assemblage found at the Anzick site was not manufactured specifically for the burial with at least a portion of the tools being utilitarian in nature and used for butchering game, prior to interment.
Chapter 8: Margin Scrapers

Here, I consider the use of margin-scrapers, in the manufacture of ovoid rods included in the artifacts discovered at the Anzick Site. The Anzick assemblage includes fragments of and complete antler rods (Lahren & Bonnichsen 1974; Morrow & Fiedel 2006), as well as eighty large bifaces representing various stages of reduction. Lahren and Bonnichsen, suggest that the bone rods contained in the burial assemblage were utilized foreshafts for hafting fluted, stone projectile points to lance shafts (Lahren & Bonnichsen, 1974, p. 149). According to this interpretation, a projectile point was hafted to a foreshaft and this foreshaft was then placed into the pre-fitted end of a main shaft, the combination of which was used to take down the targeted species.

As there is a great likelihood that more than one projectile point penetration was required to take down a mammoth, for instance, there was a need for multiple rapid strikes. Each foreshaft/bone rod was either hafted with a projectile point or possibly fashioned into a bone
point, and all were relatively uniform in design, and form which could be efficiently placed into the main-shaft in quick succession to facilitate a “rapid fire” system of atlatl launching. At least one and presumably all bone rods discovered in the Anzick assemblage are manufactured from elk bone according to DNA sampling (Rasmussen et al. 2014). According to Morrow and Fiedel, this identification is additionally supported by an independent assessment of the foreshafts by Illinois State Museum faunal specialists (Morrow and Fiedel 2006). Effective and consistent design of the Anzick assemblage bone rods is very important as they would have needed to fit tightly and precisely enough into the main shaft for proper and accurate use. This need for uniformity in design suggests a method of manufacture of these foreshafts which would require a tool that I define as a “concave margin scraper” to achieve the correct form in the bone material. The concave margin scraper is a retouched semicircular concavity, flaked into the edges of three bifaces in the Anzick assemblage. The purposeful flaking and shaping of the margin scrapers is evident with the retouching of the scraper edge. These purposeful tools have not been widely described at this time nor attributed to this process however, they are in fact closely related in size and shape and were likely used to make a uniform group of foreshafts as are found in the Anzick assemblage. At least four of them exhibit concave margin scrapers which have been purposefully produced on bifacial and unifacial edges (White 2015). About 5% of the total number of bifaces and unifaces in the Anzick assemblage were used for the purpose of margin scraper manufacture. To differentiate between common percussion or pressure flaking scar patterns and the scraper design, I am focusing on a pattern of an additional percussive removal localized to one flaking episode with inclusive inter-marginal pressure flaking/retouch scars within the scraper boundary. This additional pressure flaking creates an abrupt face with a steep, unifacial verso side culminating in a sharp edge capable of rigorous scraping. The scraper region
conspicuously transects the curvilinear margin of the bi-face edge to give the appearance of a “u” shape removed from the biface. These scrapers are located on bifaces representing early and mid-stage biface reduction sequences as delineated by Ashley M. Smallwood’s “flaking index” which fits a similar description by Callahan (Callahan 2000; Smallwood 2010). The precise technology and attention to specific conservation of these high-grade materials further suggests the purposeful nature of the knapping patterns used to produce the scrapers. The margin scrapers that I have identified in the Anzick assemblage represent two sizes which I posit, were used to independently shape the narrow and wide portions of the ovoid bone rods (Figures 33, 34, 35, 36).

**Figure 33. Images of Anzick Artifacts #78 and #2 with Wide and Narrow Concave Margin Scrapers**
I also posit that the antler rods found in the Anzick assemblage, namely the double-beveled pieces, represent a pre-form for two bone points, (Figure 34, 35) being symmetrical up to the initiation of a purposeful, mid-section break, followed by simple point sharpening of the two broken ends. These forms would be quite consistent in dimension with single-beveled bone projectile point forms found in other documented Clovis assemblages (Figures 34, 35)) and similar to one which was found embedded in a mastodon rib bone at the Pre-Clovis, Manis Mastodon Site (Collins et al. 2013; Lyman and O’Brien 1998). I posit that both the narrow and wide margin scrapers were used to produce this uniform design with each scraper shaping the corresponding dimension by reducing the bone segment which was possibly softened by soaking in boiling water as postulated by Lahren and Bonnischen:

...an identical morphological pattern can be created by drawing a steep angled edge of a stone tool parallel to the longitudinal axis of a long bone which has been softened by boiling in water. This softening procedure has been recorded in ethnographic accounts. A planning procedure such as this was probably used to shape the bone blanks (Lahren & Bonnischen, 1974, p. 149).
**Figure 35. Relative Comparison of Anzick Double-Beveled Rod and Sheridan Cave Bone Points (to scale)**

**Figure 36. Sketch of Ovoid Bone Rod from Anzick Assemblage**
The ovoid shape of these rods is in part dictated by the natural structure of the bone from which they were fashioned. The cannon bone is a long bone that evolved in the skeletal lower leg structure of many ungulates and more specifically artidactylae (even toed ungulates), such as elk. These bones are the product of an evolutionary process which resulted in the fusion of two metapodial bones into one metacarpal in the case of the elk cannon bone. The resultant form of this fusion is a bone with a “groove” running the length of the bone which is the remnant of the two ancestrally separate bones (Gilbert 1990). In cross-section the remnants of these dual ancestral bones, now fused as one, present as complementing structures on the lateral and medial margins of the bone. These structural elements are continued along the diaphysis (shaft, midsection) from epiphysis (proximal end bone) to epiphysis (distal end bone), resulting in two natural, roughly ovoid structures of bone running the length of the diaphyseal portion of the bone, one each on the medial and lateral sides of the bone mid-line. Apart from these two structures, the diaphysis is mostly tubular in cross-section, composed of compact (hard) bone surrounding a layer of cancellous (spongy) bone subsequently surrounding the central, medullary cavity which contains the marrow (Figure 37).
The ability to shape the bone blanks with the concave margin scrapers allows for a more controlled and consistent manipulation (see Figure 38) throughout the manufacturing process. Following the process described above, the margin scrapers would facilitate the shaping task. There are tools commonly referred to as “spoke-shaves” which are of a similar design to these margin scrapers, however, their specific use for narrow and wide edge manipulation of bone rods has until now, not been postulated. The term “margin scraper” is dissimilar to the term “spoke-shave” as the use of a spoke-shave has, to my knowledge not been tied to ovoid shaping, utilizing two tools, which is an important part of repetitive and efficient manufacturing of uniformly shaped foreshafts.

**Figure 38. Anzick bone rods exhibiting consistency in manufacturing**
The margin scraper use is specific to separate, manipulation of the tools which purposefully differ in size and together, form the “shoulders and body” of the shaft. This use of the two sizes of scrapers (Figure 39) would have enabled consistent manipulation of the rod shape around the entirety of the cross-section of the shafts in a relatively quick and accurate process. Figure 39 shows the fit of narrow margin scraper to narrow portion of bone rod and wide margin scraper to wide portion of bone rod. This illustration is not intended to suggest that these two scrapers were utilized simultaneously to form both margins, they would be more effective in separate manipulation of the wide and narrow bone rod margins.

**Figure 39. Cast of Anzicck artifact #78 and authentic Anzick Artifact #2 with Authentic Ovoid Bone Rod**
8.1 Hypothesis 4

Hypothesis 4: The osseous rods found alongside other Anzick artifacts, were possibly manufactured using the process described above, utilizing the margin scraper patterns found on several Anzick bifaces.

Methods

To investigate the validity of this hypothesis, I replicated the process of manufacture of similar osseous rods utilizing modern elk metacarpal bones and chert on which I manufactured the margin scrapers to facilitate in completing the task. I attempted this process according to Semenov (1976), who presents a reputable and substantial narrative of the consecutive stages in a manufacturing process pertaining to osseous rods.

The points were made out of long bones: first one epiphysis was knocked off, and then grooves were cut with a burin along the shaft of the bone so as to make four rough-outs from each bone. The bone was split into narrow strips along these grooves for their full length including the remaining epiphysis. The thickened end of the latter served as a handle, which was trimmed only after the final work on the tapering part of the tool. The next step was to work the rough-out on a rough stone block to remove superfluous material and grind the bone into shape. The final stage was to sharpen up the tip on a fine-grained stone plaque, a touch-stone (Semenov 1976, 160).

The general approach I followed was to procure modern elk metacarpal bones (5) as well as several pounds (6 lbs.) of high-quality fine-grained chert as my primary materials for the project. In addition to these raw materials, I utilized a set of knapping tools which I fashioned from antler and river rock used for percussion flaking as well as several copper rods which I inset into oak dowels to be used as pressure-flakers. Additionally, I utilized a two-burner Coleman camp stove which served the purpose of boiling the bones, as described previously (Lahren and Bonnichsen 1974). To reduce the boiled bones, I utilized several triangular chisel-shaped flakes of quartzite,
one of many types of rock, readily available throughout the Americas that is easily broken to shape an expedient wedge, also referred to as a pieces ésquillees (Frison 1991, 1996; Kornfeld et al. 2010; Semenov 1976). As quartzite is relatively brittle, I was concerned about using metal (not known to have been used in the days of the terminal Pleistocene) as a hammer material to force the pieces ésquillees into the bone and opted for a large hand-carved pine burl mallet which worked well as a hammer in the process (Figure 41) In addition to these portable tools, I utilized a block of sandstone from the cliff at the Anzick Site which I utilized as an abrader for further reduction and polishing of the bone rods similar to that described by Semenov (1970, 160).

**Figure 40. My modern work area for bone rod replication**
To begin this process of reduction and shaping of these elk bones to the finished bone rods and points, I used the Coleman burner to simulate a boiling pit which would have been lined with hide into which heated rocks were placed to super heat water and subsequently soften the bone as per Lahren and Bonnichsen (1974). And, I had the benefit of utilizing a mid-winter, relatively warm (50° Fahrenheit) garage in which to complete this rod manufacturing process (Figure 40). I allowed the elk bones to stay in the boiling water for a period of 4 hours to facilitate a level of softening, which made the bone less resistant to reduction. While the heating was occurring, I chose the pieces équillees from a collection of miscellaneous rocks, kept from years of rockhounding, now, finally serving a functional purpose. Following the heating of the bone, I

**Figure 41. Mallet, Sandstone Block and Pieces Esquille in Bone Reduction Process**
utilized the pieces ésquillees to split one of the bones longitudinally as illustrated in Figure 33. As material economy was not a focus of this study, I chose not to utilize a burin to create longitudinal grooves as described above by Semenov (1976, 160). The use of the pieces ésquillees to split the elk metacarpal was straight-forward and time efficient, leaving two even, largely usable halves of the metacarpal as seen image in Figure 42 and consistent with Figure 37.

**Figure 42. Splitting of Elk Metacarpal with Piece Esquilles**
The next step was to select several chert flakes on which to fashion the wide and narrow margin scraper patterns. This particular part of the process is quite easy and requires a minimal amount of knapping ability and some good quality chert as material. The process for creation of this form is simply either with percussion of pressure flaking tools, to remove one “u” shaped flake from

**Figure 43. Wide and Narrow Margin Scrapers Used to Rough-Shape the Bone Blank**
the edge of a large flake. Next, simply repeat in the same location to deepen the “u” to the desired width. This width is determined based on the surface being worked, such as the narrow or wide margins of the rough-split bone rods separated during the last step using the pieces ésquillees. Drawing the margin scraper down the length of the bone blank, the angle is adjusted of scraper to bone until the scraper edge digs into the bone material (instantly recognized when proper angle is attained) which results in rapid reduction of material off the subject bone blank. Once the bone has been roughly shaped by using the wide and narrow margin scrapers, it is then worked vigorously against the course stone block, to facilitate precise, desired shaping as illustrated in Figure 44.

**Figure 44. Stone block used for shaping rough bone rod**
This process of stone and bone manipulation resulted successfully in the replication of bone rods found in the Anzick assemblage. The resultant images from this replication are very similar to those found in the Semenov 1976 study (see Figures 45 and 46). The bone point at the bottom of Figure 45 is a projectile point cast from Sheridan Cave for comparison to the point I manufactured which is just above the Sheridan Cave point cast in this image.

**Figure 45. Image illustrating reduction sequence from raw bone to finished point**
Figure 46. Image of reduction sequence from Semenov 1976
Figure 47. Concave margin scrapers, replication (top) and Anzick assemblage original (bottom)
Not only are the final products manufactured in this study, similar to ancient bone rods found in Anzick as well as other sites, I examined one of the concave margin scrapers from the Anzick assemblage and compared it to a concave margin scraper utilized in this study. For this portion of the study, I photographed both pieces with Carson MM-840 75x-300x Digital microscope at approximately 50x magnification. The images (Figure 47) clearly show similar crushing and dulling of working surface and edge of the replicant (top) as well as the original Anzick artifact (bottom).

Conclusion

The replication of the concave margin scrapers and their experimental use for the production of bone rods similar to those found in the Anzick assemblage took two days with several additional hours of image preparation and microscopic analysis. The manufacturing process I attempted resulted in the successful creation of the bone rod and a bone point, utilizing all tools described above. Due to the integral part played by the concave margin scrapers in this manufacturing process, and the similar use-wear found on the authentic and replicated concave margin scrapers; I accept Hypothesis 4 and find that the osseous rods discovered alongside other Anzick artifacts, were possibly manufactured using this manufacturing process, utilizing the margin scraper patterns found on several Anzick bifaces. The images found in Figure 48 further illustrate the level of manufacturing ability, attainable when using these minimalist lithic tools and raw bone from the metacarpal of an elk.
FIGURE 48. A COLLAGE OF IMAGES FROM THIS REPLICATION STUDY
Chapter 9: Anzick Group as High Technology Foragers?

The people of the Clovis Culture were hunter-gatherers living in a time of dynamic environmental change during the last days of the Pleistocene Epoch. To have a more thorough understanding of Clovis, we must consider more comprehensively what it means to be a hunter-gatherer (HG) and what variables are currently accepted as representational of Clovis as HGs (Bamforth 2002; Binford 1980; Gillespie 2007; Hill 2007; Jones et al. 2003; Kelly 1983, 2013; Kelly and Todd 1988; Kilby and Huckell 2013; Nelson 1991; Newman 1994; Tankersley 2004; West 1996). In one of his seminal pieces regarding HGs “Willow Smoke and Dogs’ Tails”, Binford (1980) provides a pragmatic and ethnography-based frame of reference with which to elucidate the HG systems. Essentially, Binford suggests that HGs may be categorized in two sub-groups, namely Foragers and Collectors, with each having its own settlement characteristics. Foragers are recognized for “mapping on” to the landscape, utilizing specific resource “patches” often during seasonal rounds while practicing little to no food “storage” in the process. Binford also points out that Foragers leave a unique archaeological record comprising two basic types of occupation areas, namely “Residential Base” and the “Location” (Binford 1980, 9). According to Binford, the Residential Base is “the hub of subsistence activities”; “the locus out of which foraging parties originate and where most processing, manufacturing and maintenance activities take place”. He also goes on to state that the “Location” is “the location where extractive tasks are exclusively carried out”. In summary, Foragers “generally have high residential mobility, low-bulk inputs and regular daily food-procurement strategies” (Binford 1980, 9). In contrast, Binford suggests that Collectors are characterized by a strategy which includes food storage and logistically organized food-procurement parties. These HGs were not simply passing across the landscape, searching for resources on an “encounter” basis, they were “seeking to procure...
specific resources in specific contexts” (Binford 1980, 10). Due to the organizationally intensive nature of the Collector strategies, there are additional occupation and use areas to those associated with Foragers. These additional areas are proposed by Binford as the “Field Camp”, “Station” and “Cache”. Both Foragers and Collectors utilize Residential Base and Location areas, but due to the more intensive and organized large group strategies to acquire food for storage, the Field Camp, Station and Cache are often present in the archaeological record associated with Collectors. The Field Camp is “a temporary operational center for a task group”; the Station is “where special-purpose task groups are localized and may consist of ambush locations, hunting stands etc.; the Cache is a location of temporary field storage of resources due to variability in resource availability both temporally and spatially (Binford 1980, 12). Foragers generally travel as a group to resources and occupy multiple short- term residences with minimal storage practice; Collectors often transport resources to their group from procurement locations and occupy more long-term residential locations while practicing substantial storage of resources.

While these two strategies can be applied to many known HG groups, the concept of a High Technology Forager (HTF) strategy may serve to more accurately define the archaeological record left by ancient cultures such as Clovis. The HTF concept is based on a “location-free”, highly mobile strategy first introduced by John Wittoft (1952) in his description and analysis of the Shoop Site, located in Eastern Pennsylvania (Kelly and Todd 1988; Todd 1983). Wittoft notes that; “Almost every sharp-edged chip and flint scrap was used as a tool; they had not yet learned to use the local flints, and they were, more-over, stingy with the flint they did have” (Wittoft 1952, 494); furthermore, Goodyear (1979) considers the inherent need for these hunter-gatherers to have a notably “flexible” technology capable of creating lithic tools which “can be
continuously and reliably rejuvenated”; with the ability to be modified or changed into other tool forms to serve multiple purposes (Goodyear 1979). Goodyear presents his concepts based on the perceived need for a consistent and reliable toolkit which is both readily portable and flexible in its ability to address specific tasks such as butchering, or the manufacture of other tools such as bone projectile points or projectile shafts. According to Goodyear, the crux of this concern is in the focused successful procurement of high-quality cryptocrystalline lithic materials either by direct or embedded procurement. The reason for the specific focus on such a toolkit is that the landscape traveled by these early hunter-gatherers was broad and relatively unpopulated which likely increased the need for self-sustaining approaches to survival without the security of reliance on a trade network, or knowledge of local lithic sources. As Goodyear discusses, the availability of lithic materials is more predictable and reliable than that of animals.

“…some environments such as coastal plains and alluvial valleys have no lithic raw materials whatsoever. Although geographical discrete in distribution, the occurrence of lithic raw material is a stable therefore predictable phenomenon. This contrasts with the location and availability of many biotic resources, especially animals, (see Yellen 1977: 30-35) which are much harder to predict. Although there might be suitable raw material of some type (not just cryptocrystalline) in the immediate vicinity of a resource encounter, such as a kill, the search time involved ant the strong likelihood of failure to find raw material would insure the efficiency of carrying technologies” (Goodyear 1979).

Goodyear continues with the description of another “major constraint” which pertains to the need to adapt to situational contingencies on a daily basis. This requires an inherent flexibility in the lithic toolkit which means, for instance, having adequate mass in core materials that would allow the production of anything from concave margin scrapers (for osseous or wood shaft manufacture as described in Chapter 7 of this text) to gravers or expedient blades as a situation may require. According to Goodyear (1979, 4), early hunter-gatherers addressed this requirement by designing a toolkit that would include tools and cores having the ability to be continuously...
and reliably rejuvenated. Additionally, this requires the high-quality and sometimes referred to as “exotic” isotropic (isotropic refers to a material having identical values of a property in all directions, such as in these high-quality lithics) materials which allow for precise removal and shaping of raw materials into needed tools with little material waste in the process. Utilizing high quality lithics in a non-segmented lithic reduction process allows groups to efficiently rely on their technology and the specialized knowledge of a specific prey resource to dictate appropriate and logistical tasks. The HTF concept incorporates and combines aspects of both Collector and Forager to logically address the environmental hardships often faced by low-density, high mobility hunter-gatherers, such as might be found in the terminal Pleistocene Epoch. The HTF concept (Kelly and Todd 1988) is based on the premise that these people were focused more on tool-technology and prey habits than on specific landscape “place” knowledge which may fit well with relatively low variation in bifacial technology throughout the Clovis era (Bamforth 2002; Beck and Jones 2013; Binford 1980; Gillespie 2007; Haynes and Hutson 2013; Hill 2007; Jennings 2015; Jones et al. 2003; Kelly 1983, 2013; Kelly and Todd 1988; Kilby and Huckell 2013; Kornfeld and Frison 2000; Kornfeld et al. 2001; Metin et al. 2015; Nelson 1991; Newman 1994; Tankersley 1991, 2004; West 1996).

Kelly and Todd (1988) suggest that the first inhabitants of North America were indeed entering a continent which at the time of the terminal Pleistocene Epoch, was undergoing rapid change, forcing an essential adaptation to the environment to facilitate at least their survival. In keeping with Goodyear’s concepts (1979), this survival and adaptive response to the environment required high mobility, a focus on high-quality lithic procurement and a tool technology incorporating both flexibility and plasticity. In addition, this adaptation included an adherence to Kelly and Todd’s concept of a “location-free” (1988) technological orientation,
which amounted to an essential focus on toolkit completion, maintenance and curation as well as a focus on prey procurement as opposed to a general orientation to place as is practiced more readily by Collectors and Foragers (Binford 1980; Goodyear 1979; Kelly and Todd; 1988) In a study of the Vail and Debert paleoindian sites in Maine, Speiss (1984) also describes the lithic technology of paleo-arctic/subarctic hunter-gatherers as being characterized by highly evolved workmanship, use of high quality lithics, tool forms being both well-defined and capable of being transformed readily to address multiple other functions. The archaeological record described by Speiss regarding these ancient caribou hunters is indicative of hunter-gatherers incorporating an HTF subsistence strategy, focused on technology and prey acquisition and location-free high mobility.

Archaeologists may recognize the characteristics of the HTF model in the archaeological record by analyzing artifacts for specific signs of curation, recycling, maintenance and the use of high-quality lithic materials as described by Goodyear (1979, 6).

“If the foregoing ideas have any validity for Paleo-Indian groups in North America, then at a minimum, the following expectations should be met in their archaeological records. First, there should be some demonstration of mobility among those widely varying groups archaeologists call “Paleo-Indian.” If it can be shown that, in fact, such groups were not very mobile, then adaptive advantage of cryptocrystalline raw materials would be significantly lessened. Second, evidence should exist that such materials are more easily controlled than coarser grained materials and that such flaking qualities do enable the production of tool forms and edges with greater precision and reliability. Third, there must be evidence that tools based on these raw materials were manipulated in such a way as to extend their use live, and in some cases, were recycled or “liquidated” into entirely new forms (Goodyear 1979)

In keeping with these concepts described by Goodyear and, Kelly and Todd, and Speiss, the HTF model suggests that; “the earliest inhabitants of North America were heavily dependent on terrestrial fauna though, not exclusive hunters of megafauna. Additionally, these hunter-gatherers
were technologically oriented as opposed to being place-oriented, essentially amounting to a “location-free” orientation. The HTF model also includes a proclivity for curation, recycling and long-term maintenance of these high-quality lithic materials with a focus on flexibility and plasticity (Goodyear 1979; Kelly and Todd 1988; Speiss 1984).

In the following section, I compile the data from specific analysis of the Anzick artifacts which will elucidate its purpose and meaning in terms of the aforementioned strategies.

### 9.1 Hypothesis 5

Hypothesis 5: If Anzick represents an HTF strategy, through specific analysis of the artifacts, I could expect to find evidence of curation, recycling, maintenance, exotic material use with a focus on utilizing flexibility and plasticity as described by Goodyear (1979).

As described in previous chapters, the Anzick assemblage includes 80 bifaces, eight unifaces, five projectile points and seven fragmented lithic remnants along with fifteen bone rod sections and fragments. The Anzick assemblage lithic artifacts are manufactured from materials not native to the Anzick Site locale; and although the sources are not verified, it is believed that the raw material originated from possibly 65 km to 200km distant from the site depending on a particular researcher’s opinion (Jones 1996; Lahren 2006; Morrow 2006; Wilke et al. 1991). The exotic nature of the high-quality stone from which the Anzick lithic assemblage is manufactured, is undisputed. These materials consist of fine-grained cryptocrystalline stone from several different sources, again argued to be from between four and seven separate sources depending upon the opinion of a particular researcher. Scott Jones, in his Masters Thesis *The Anzick Site: Analysis of a Clovis Burial Assemblage* (1996); typed the materials as Chalcedony, Moss Agate,
Phosphoria Chert and Porcellanite. By this accounting, chalcedony comprises 66% of the assemblage, moss agate 31.4% and both phosphoria chert and porcellanite each comprising 1% of the totals in type identification (Jones 1996). These high-quality materials were obviously sought out specifically for their composition, some of which approach gem-quality both in aesthetic and practicable value. In addition, as described by Kelly and Todd (1988, 237); “…If made from a high-quality raw material, bifaces can have a fairly sharp but durable edge that can be re-sharpened repeatedly, and from which flakes can be removed for expedient use. More usable flake edge can be produced from a biface than from a simple casual core of similar weight because a biface reduction flake has a high edge-to-weight ratio (cf.MacDonald 1968:66) (Kelly and Todd 1988). The use of high-quality, exotic materials for manufacture of artifacts is characteristic of the HTF model (Goodyear 1979; Kelly and Todd 1988; Spiess 1984; Witthoft 1952).

In terms of curation, recycling and maintenance, the Anzick assemblage presents evidence of these HTF characteristics in the form of visible use-wear, and retouch on the edges and surfaces of the artifacts. I examined the lithic artifacts and found that 79.8% of the assemblage exhibited some form of use-wear (Figure 49) of either working edge and surface (flake ridges) smoothing or crushing/chipping associated with being worked against another object in the course of use such as that described in Chapter 7 regarding the use of the concave margin scrapers, one of which appears in Figure 51. The smoothing I refer to is the smoothing or dulling of the otherwise sharp edges which would exist when the artifact was first made and before being used; depending on the specific task, this use would likely result in the wearing of the edges to a smoothed form. The 20.2% of the Anzick artifacts that did not show the same level of use-wear consisted of several unifaces and all of the projectile points. This could be due to the projectile
points being more or less the final form allowable from a particular lithic specimen such as a biface, small core or uniface. The projectile points have sharp edges and surface ridges to suggest that they were not used, did not need curation, and additionally, this optimal final form would not likely be recycled into another less specialized form such as a scraper or graver. Regarding retouch, only one of the 94 lithic artifacts from the Anzick Assemblage did not show signs of retouch (Figure 50), as the edges of one projectile point were not pressure flaked past the need to produce the finished form. All bifaces and unifaces and all but this one projectile point exhibited flaking patterns which suggest retouch, meaning that they were purposefully re-sharpened to provide a fresh cutting edge on a particular tool. This said, it is difficult to identify final flaking on finished projectile points as opposed to retouch; for instance, due to the possibility of needed finite detailing to perfectly finish a piece, based on the expertise and precision of the craftsman, it is after all, flaking of natural stone which may be inherently difficult to form precisely. In keeping with Kelly’s 3 sides to a Biface, it is likely that the artifacts found in the Anzick assemblage represent the stages proposed by Callahan as Cores, Preforms and Projectile Points as well as any conceivable or required tool, recycled from bifaces or unifaces, in the course of daily activities (Callahan 1979; Kelly 1988). In the Anzick assemblage, this recycling is evident in forms such as the concave margin scrapers, and various unifacial and bifacial forms manufactured in a virtual continuum of reduction throughout the assemblage as needed by the artisan. As noted by Goodyear (1979, 4) in reference to Binford’s “situational contingencies” (Binford 1978), a skilled lithics knapper would follow a mental template to create a needed tool from the corpus of an existing core, biface or uniface, such as is found in the Anzick assemblage. According to Smallwood (2010, 2417), Clovis lithic knappers at the Topper Site crafted bifaces (similar to those found at the Anzick Site) with a mental
“projectile-point trajectory” allowing for a process of recycling, producing a wide range of flake tools and bifacial tools in the interim (Smallwood 2010). This pattern of reduction based on specific task use, is reliant upon the flexibility of the technology as proposed by Goodyear (1979):

If the problem of geographic incongruences can be solved through portable technologies, the problem of situational contingencies can be alleviated through flexible technologies. Flexibility means creating tools with lifespans long enough to be used on a number of occasions if necessary. With chipped stone tools this means designing tools which can be continuously and reliably rejuvenated. Flexibility also means the capability for redesigning tools as other tools and otherwise re-casting the raw material of the tool kit into wholly new tools or cores for the derivation of tools if necessary. If we place such requirements for flexibility as just defined within the additional and prior stricture of portability, I believe the form and variable condition of North American Paleo-Indian technologies become potentially more understandable (Goodyear 1979).

Such flexibility in utilization of lithic materials in the manufacture of the Anzick assemblage is evident in the form of retouch and signs of wear that point to the curation, maintenance and recycling of the Anzick lithic artifacts. These artifacts exhibit patterns of use pertaining to these reduction processes which are visible to the naked eye on nearly all pieces in the assemblage (Figures 51,52,53,54). These patterns of use are indicative of the HTF model, as is the use of high-quality lithic material throughout the entirety of the Anzick assemblage. During this analysis, I visually examined the photographic data I have compiled pertaining to the Anzick artifacts with a focus on the existence of pressure-flaking within their working edges. Additionally, I utilized low-power (using a Amscope 40x-100x stereomicroscope with a high output light source) microscopic images from my data collection such as those displayed in Figures 51 and 52. This pressure flaking is apparent as relatively small, uniform scarring, within the larger, original tertiary percussion flake scars. The original edge would have appeared as sharp, with no smoothing or crushing on the working surface. Use-wear appears as a crushing,
and/or smooth area on the working edge which is curated and re-sharpened with specific pressure-flaking, exposing sharp fresh edges, once again capable of effective cutting and or scraping.

**Figure 49.** Graph displaying Use-Wear found throughout the Anzick Lithic Artifact Assemblage
Figure 50. Graph displaying retouch found throughout the Anzick Lithic Artifact Assemblage
Figure 51. Anzick Concave Margin Scraper with Use-Wear Evidence on Working Edge
Figure 52. Unifacial Scraper with Use-Wear on Working Edge
Figure 53. Image of several Anzick Lithic Artifacts exhibiting smoothed flake-scar ridges and use-wear/retouch on working edges.
Figure 54. Image of Largest Anzick Biface exhibiting smoothed/worn flake scar ridges and bifacial retouch on working edges
Figure 55. Anzick Bone Rod Exhibiting Long-Term Reuse Hafting Scar Patterns
In Figures 53 and 54, I illustrate evidence on several samples from the Anzick lithic artifact assemblage which exhibit smoothing across the tertiary flake-scars as well as retouch found on most working biface, uniface and flake tool edges. I have focused on the occurrence of evidence found in the Anzick assemblage for curation, recycling and maintenance pertaining to the lithic tools, however similar patterns also occur on the bone rods included in the assemblage. Figure 55 illustrates evidence of at least one reuse and curation episode in the form of multiple striations across the body of the rod, likely resulting from multiple hafting or use events.

**Conclusion**

Past research has shown that the Clovis Culture was highly proficient in terms of human behavioral ecology and likely employed a “high technology forager” (HTF) land use system, incorporating attributes of both “forager” and “collector” hunter-gatherer strategies (Binford 1980; Jones and Beck 2003; Kelly and Todd 1988; Steward 1955). In keeping with the HTF model, the Clovis Culture was very mobile, and focused primarily on technology as it applied to prey acquisition and the availability of raw materials required for tool manufacture (Goodyear 1979; Kelly and Todd 1988; Spiess 1984; Witthoft 1952).

When considering whether the Anzick Site artifacts may reflect this HTF model, I examined the assemblage and considered the integral technological attributes as they pertain to this study. I find that the data supports Hypothesis 5 and I accept this hypothesis. In keeping with this hypothesis, the data support my expectations of evidence of curation, recycling, maintenance, and exotic material use throughout the assemblage. Additionally, the assemblage is consistent with the characteristics described by Goodyear (1979) pertaining to the flexibility and plasticity of the technology utilized by hunter-gatherers employing an HTF strategy (Goodyear 1979). The Anzick Artifact Assemblage is representative of the High Technology Forager model.
Chapter 10: Discussion and Conclusion

Discussion

Accidentally discovered in 1968, the Anzick Site findings have caused as much confusion and disagreement, as they have provided additions to knowledge regarding the Clovis culture. With the destruction of the site context on the day of discovery to the passing of artifacts and remains from person to person for decades; the ability to verify association, dating and lifeways of the people who created the site, nearly 11,000 rcybp has proven to be difficult at best. With the passing of over 5 decades since the discovery, we may rely on the newest scientific innovations as well as the latest theoretical perspectives as continued avenues of advancement in archaeological research. It is through these possibly overlooked and new opportunities that I have attempted to enhance the understanding of, arguably, the most important of all Clovis Culture sites, The Anzick Site.

As described in the previous chapters, the Anzick Site is believed by many notable archaeologists to represent a Clovis culture burial that puts it in a category of its own, as it is the only known Clovis Burial in the world (Jones and Bonnichsen, 1994; Lahren and Bonnichsen 1971; Morrow and Fiedel 2006; Owlsley and Hunt 2001; Rasmussen, et al. 2014; Waters and Stafford 2007). This designation as a burial would suggest that the interment of artifacts with remains would be for the purpose of specific burial interment, not as a way to “store” the tools for future use. Since the 1968 accidental discovery of the site, the artifacts have been referred to as a “collection; assemblage; and cache” with little consistency. These terms differ in their meaning to the extent that the site and its attributes may be misinterpreted simply by their misuse. There are a number of archaeologists who are not convinced that the artifacts, and two
sets of remains are associated due to the manner in which they were discovered and excavated (Adovasio and Pedler 2016; Taylor 1969). Although notably vague in contemporary academic literature, this position is readily apparent in the archaeological community in terms of personal opinion. At very least, there is some doubt in some circles regarding the association of remains to artifacts.

Yet another lingering question pertaining to the Anzick Site is whether the artifacts are in fact representative of the Clovis culture; this doubt, brought on once again, due to the haphazard (not intentionally, but accidently according to the original discoverers) way in which they were found. While the dating of the osseous artifacts does in fact coincide with the accepted time period associated with Clovis, there again has been doubt regarding the lithic artifacts even with the Clovis diagnostic points being but one factor in the substantiation of this assemblage as a Clovis assemblage.

As these problems have been on-going with the site and its attributes, I focused on ways to either prove or disprove the issues pertaining to the site. I decided to have a selection of the artifacts tested for ancient animal proteins (Chapter 6) in hopes of proving or disproving the use of these ancient tools prior to the interment or possibly if they had been made specifically for the interment. I reasoned that if I did find proteins, it may provide support to the assemblage being at least partially utilitarian in nature. If I didn’t find proteins, if may support the theory that the assemblage was in fact produced only as burial goods. It has been suggested conceptually and often off-record that this assemblage was meant to represent a “how-to” example of manufacture of Clovis technology for the Clovis aged boy buried with the assemblage. It has also been suggested (off the record) that the boy may have been a sacrifice to the spirits to appease them during the environmentally tumultuous days of the Terminal Pleistocene. Additionally, I have
been asked if this child could have in fact been left with this assemblage of artifacts to protect
them (the artifact assemblage) until the return of the group for later use? While these questions
may seem to be harsh or unfathomable in modern terms, it may be that the belief systems
observed by these ancient peoples included practices such as infanticide to provide relief from
environmental incongruences in the form of food shortages brought on by harsh climates
(Claasen 2013; Eller 2006; MacDonald 1998, 2004). As always, researchers should be motivated
to not impose their contemporary values on these ancient peoples in an effort to understand the
past.

While we may not have a verifiable understanding of the facts pertaining to the burial of these
artifacts with this small boy, nearly 11,000 rcybp, the artifact assemblage provides insight into
the Clovis Culture regarding technological manufacture and use. With close analysis and
processes of replication as attempted in this study, theoretical feasibility may be approached
practically with results contributing to the understanding of ancient practices. Comparing and
contrasting tool forms and uses between sites and assemblages such as the concave margin
scrapers discussed in this text, may provide valuable insight into technological adaptation to
environmental incongruities. These studies also contribute to a deeper understanding of what it
meant to be a Clovis Culture hunter-gatherer and how people such as those who created the
Anzick Site, followed a subsistence strategy in keeping with the HTF model.
Conclusion

While we cannot completely verify the association of the human remains found at the Anzick Site with a pristine archaeological context, we may rely on eyewitness testimony from the day of discovery as well as dating and chemical analyses of the remains and the artifacts. Based on these data, testimony and a preponderance of the evidence, it is a sensible hypothesis that this association is valid. Additionally, these data support Hypothesis 1 and clarify that the Anzick site and its archaeological attributes, including two sets of remains and a large selection of artifacts, represent two separate events, one being the interment of a human adolescent male approximately 8,600 rcybp and the much earlier interment of a Clovis infant associated with an assemblage of Clovis artifacts, all of which date to approximately 10,900 rcybp.

Based on results described in Chapter 5, I find that the artifact assemblage discovered at the Anzick Site is, in fact, typical of Clovis Technology. After conducting this study to determine if the Anzick assemblage is typical of Clovis technology, it occurs to me that it is not only typical of, but in fact, is quintessentially representative of Clovis. Additionally, through the process or replication utilizing the Concave Margin Scraper forms found in the Anzick assemblage, the probable use of these tool forms in Clovis technological processes to form other tools such as bone rods, has been confirmed. This fluidity in exotic material use along with evidence of long-term curation, recycling of tools and tool maintenance with a focus on prey as opposed to location, essentially implementing a “location-free” all is in keeping with the HTF model. These characteristics strongly suggest that the people who created the Anzick Clovis Burial Site, existed as High Technology Foragers.

The discovery of proteins on sampled artifacts from the Anzick assemblage has significant implications regarding the artifacts, Anzick Clovis group and Anzick Site. In Chapter 7, I
focused primarily on the data collected from these artifacts to possibly establish the meaning of
the assemblage in terms of the burial as described in that chapter. I find that the assemblage was
used prior to interment as evidenced by the Camel and Rabbit proteins found on lithic tools
according to the findings described in Chapter 7. The discovery of the proteins on these artifacts
supports Hypothesis 3a and suggest that the artifact assemblage found at the Anzick site was not
manufactured specifically for the burial with at least a portion of the tools being utilitarian in
nature and used for butchering game, prior to interment. Additionally, to support the claim that
this assemblage was at least partially utilitarian in nature, I point to evidence of tool use-wear
and retouch described in Chapter 9 of this text.

Based on the results described above, I find that the Anzick Site represents a Clovis Culture
burial. Additionally, the people who interred the remains of this child ~11,000 rcybp, employed a
subsistence strategy which was indeed, in keeping with the HTF model as described in previous
chapters. Although the context of the site was destroyed on the day of discovery, the continued
work of researchers, has contributed greatly to the understanding of the Anzick Site as well as
the Clovis Culture in general.

Epilogue

The question of who populated the Americas and when and how it occurred has fueled
research and speculation for many decades. With continued discoveries throughout the world,
including the powerful addition of aDNA sequencing, we are slowly understanding more about
the ancestral affinity of the ancients to contemporary cultures. With further precise and articulate
understanding of ancient cultural life-ways, such as described in the examples above, the
archaeological record will become more decipherable utilizing the ever-expanding specific databases and techniques. Not only does science benefit from understanding these ancient cultures more thoroughly, the multi-cultural public of the Americas also stands to benefit from these discoveries. Further understanding will potentially verify theories of who indeed were the “first peoples”, a question already answered by Native Americans but the verification of which will substantiate the notion to others that “they have been here since time immemorial” (Rasmussen et al. 2014). Elucidating and substantiating indigenous origins along with a mindset supporting collaborative multi-cultural research and transparency in study, will allow humanity to benefit from the inherent healing such efforts may generate.
## APPENDIX A: Anzick Artifact Metrics and Ownership

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APPENDIX B: PAST and Splitstree4 Clovis Site Data Matrix
APPENDIX C: Pre-Reburial Data for A-1, A-2 Remains

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Figure 57. Anzick A2 Remains
FIGURE 58. THE AUTHOR DOCUMENTING A1 REMAINS BEFORE FINAL RE-INTERMENT
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<td>2</td>
<td>1) Parietal, 2) Occipital</td>
<td>1) Left, 2) Medial</td>
<td>39.9 grams</td>
</tr>
<tr>
<td>A1</td>
<td>3</td>
<td>1 Occipital</td>
<td>Medial</td>
<td>5.2 grams</td>
</tr>
<tr>
<td>A1</td>
<td>4</td>
<td>1) Parietal, 2) Temporal 3) Occipital</td>
<td>1) Left, 2) Left, 3) Medial</td>
<td>9.3 grams</td>
</tr>
<tr>
<td>A1</td>
<td>5</td>
<td>1 Frontal</td>
<td>Right</td>
<td>3.4 grams</td>
</tr>
<tr>
<td>A1</td>
<td>6</td>
<td>1 Parietal</td>
<td>Right</td>
<td>1.8 grams</td>
</tr>
<tr>
<td>A1</td>
<td>7</td>
<td>1) Frontal, 2) Parietal</td>
<td>Both Right</td>
<td>14 grams</td>
</tr>
<tr>
<td>A1</td>
<td>8</td>
<td>1 Parietal</td>
<td>Left</td>
<td>.9 grams</td>
</tr>
<tr>
<td>A1</td>
<td>9</td>
<td>1 Temporal</td>
<td>Left</td>
<td>1.2 grams</td>
</tr>
<tr>
<td>A1</td>
<td>10</td>
<td>1 Clavicle</td>
<td>Left</td>
<td>1.1 grams</td>
</tr>
<tr>
<td>A1</td>
<td>11</td>
<td>3 Rib Fragments</td>
<td>1 Left, 2 Right</td>
<td>2.9 grams</td>
</tr>
<tr>
<td>A2</td>
<td>1</td>
<td>1) Occipital, 2) Parietal</td>
<td>Both Left</td>
<td>17.2 grams</td>
</tr>
<tr>
<td>A2</td>
<td>2</td>
<td>2 Parietal</td>
<td>Both Left</td>
<td>6.1 grams</td>
</tr>
<tr>
<td>A2</td>
<td>3</td>
<td>1 Parietal</td>
<td>Right</td>
<td>5.1 grams</td>
</tr>
<tr>
<td>A2</td>
<td>4</td>
<td>1) Parietal, 2) Occipital</td>
<td>Both Right</td>
<td>11.5 grams</td>
</tr>
</tbody>
</table>

*Table 12. Anzick A1 and A2 Remains Re-interment Summary*
APPENDIX D: Protein Residue Protocol

“Successful recovery of proteins from lithic artifacts relies on the biological activity of those proteins (Hyland et al. 1990:105) and recovery method. Protein residue analysis for lithic artifacts used counter immunoelectrophoresis (CIEP). We note that both cross-over and counter are used in the literature to describe this type of immunoelectrophoresis. This method is based on an antigen-antibody reaction, where a known antibody (immunoglobulin) is used to detect an unknown antigen (Bog-Hansen 1990).

Culliford’s (1964; 1971) forensic CIEP methods used at the Royal Canadian Mounted Police Serology Laboratory, Ottawa, and the Centre of Forensic Sciences, Toronto, were modified by Newman and Julig (1989) for use on archaeological materials. Subsequently, PaleoResearch Institute enacted changes following the advice of Dr. Richard Marlar of the Thrombosis Research Laboratory, VA Medical Center, Denver, and the Health Sciences Center, University of Colorado. Although several different protein detection methods have been employed in archaeological analyses, including enzyme-linked immunosorbent assay (ELISA) and radioimmunoassay (RIA), the CIEP test is demonstrated to be extremely sensitive, with the detection of 10-8 g of protein possible (Culliford 1964:1092). Testing unknowns against non- immunized animal serum screens for the presence of reactive proteins that bind indiscriminately with numerous antisera, but are not species, genera, family, or group specific. Sediment controls are necessary to address the potential for false positives caused by compounds in sediments, including chlorophyll; bacteria; and metal cations, i.e. manganese, copper and iron oxide (Evershed et al. 1996); or proteins from modern animal activity, such as feces and urine.

Proteins preserved on stone tools of considerable age have been detected by researchers using CIEP at unrelated institutions (Gerlach et al. 1996; Hogberg et al. 2009; Kooyman et al. 2001; Seeman et al. 2008; Yost and Cummings 2008). For example, Gerlach et al. (1996) reported 45 positive reactions obtained on 40 of the 130 stone tools tested from an early North American Paleoindian site (ca. 11,200–10,800 years BP). In an archaeological context, an antigen is the unknown protein adhering to an artifact after its use. Although ancient proteins break down into small fragments over time, antibodies can recognize small regions of antigens (Marlar et al. 1995). Sensabaugh, Wilson, and Kirk (1971:566) demonstrate that proteins undergo chemical and physical modification, breaking down into smaller molecules (polydispersing), and contributing to high molecular weight aggregates of dried blood’s insoluble fraction. Hyland et al. (1990:105) hypothesized “protein molecules may be conjoined with fatty tissues, resulting in an insoluble complex” resistant to water’s disintegrative properties. Although the mechanism for protein preservation is not fully understood, proteins demonstrate a remarkable ability “to retain a level of biological activity over a long period of time” (1990:106). They also demonstrate an affinity for adhering to silica (Marlar, et al. 1995), which likely assists with preservation.
The lithics were washed using a sonicating toothbrush with a new head for each artifact or area and 0.25–0.75 ml of a Tris/NaCl/Triton solution (0.02M Tris hydrochloride, 0.5M sodium chloride, and 0.5% Triton X-100). The artifact and toothbrush head were rinsed with reverse osmosis de-ionized (RODI) water to recover all of the protein wash solution. The solution recovered was centrifuged using a short-duration spin (10 seconds at 3000 rpm) to remove sediments, then was decanted into new centrifuge tubes. After the protein residue sample was obtained the lithics were rinsed copiously with RODI water to repair them for the next extraction of material for analysis. No sediment control accompanied the lithic samples.

The first step tests all residue washes extracted from artifacts and the sediment controls, when present, against pre-immune goat serum (serum from a non-immunized animal) to screen for the presence of non-specific, indiscriminate binding of proteins. All of the artifact washes tested negative against pre-immune serum. Next, the samples were tested against prepared animal antisera obtained from a variety of commercial and private sources. Appropriate positive and negative controls were run for each antiserum. The blood of an animal for which the antiserum tests positively constitutes the positive control, while negative controls use the serum or blood of the type of animal in which the antiserum was raised, either rabbit or goat.

Agarose gel poured onto GelBond® film acts as the medium for CIEP. Four columns of paired wells (2 mm in diameter separated by 3 mm of gel) organized in a series of eight rows were punched into the gel. The anodic (-) well contained the antiserum while the cathodic (+) well held the artifact’s protein extraction. The sample was electrophoresed in Barbital buffer (pH 8.6) for 45 minutes at 130 V to drive the antigens and antibodies toward each other. Overnight, a 1 M NaCl bath removed extraneous proteins from the gel. The next morning the gel was pressed for 10 minutes, rinsed with RODI water for an hour, and then pressed for an additional 10 minutes to remove extraneous water and provide a rinse to remove the NaCl. A Fisher Isotemp 500 Series oven at 48 EC finished drying the gel samples.

A positive reaction appears as a vertical line of precipitation between the two wells. Coomassie Blue stain was used to make the line of precipitation easier to see in the gel. When a positive reaction was obtained between the artifact wash (antigen) and an antiserum at the 1:5 dilution, the antigen from the artifact was retested using dilute antiserum at a concentration of 1:10. Retests distinguish between true and false positives, identifying a true positive when they replicate the initial positive reaction and when that reaction is not observed in the accompanying soil control sample. Positive reactions obtained after the second test with dilute antisera were reported.

Many archaeological samples do not produce the expected clear vertical lines of precipitation that are observed with positive blood-based controls. Therefore, descriptions,
based on the presence and pattern of precipitation lines, and reaction strengths for each dilution level were recorded to help monitor consistency and viability of the reactions between antisera and archaeological proteins. A recorded “positive” result displays a clear vertical precipitation line between the antiserum and the sample (antigen), indicating the sample wash contained proteins related to the animal represented by the antiserum, or a member of its family group/order. A “very weak positive” demonstrates a faint vertical precipitation line. This suggests presence of deteriorated proteins similar to the antiserum animal’s family or order. “Probable positive” samples produce a curved precipitation line or curved concentrated cloud of stain during testing. These reactions suggest the presence of degraded proteins related to the animal represented by the antiserum. However, this reaction cannot be assigned as a definitive positive. Reactions lacking vertical precipitation lines, such as a dense cloud of stain concentrated between the anodic and cathodic wells, are recorded as “questionable positives.” These results suggest the sample washes contain proteins, but do not definitively identify their presence. If there is no visible reaction, the sample is categorized as “negative,” indicating the absence of proteins related to animals represented by the antiserum in the sample wash. All reactions are recorded during testing to better guide retesting. Substantiated positive results are reported.

Identification of animals represented by positive results is usually made to the family level. All mammalian species share serum protein antigenic determinations (epitopes or sites on the surface of an antigen molecule to which the antibody binds); therefore, some cross-reactions occur between closely and sometimes distantly related animals (Gaensslen 1983:241). Examples of closely related reactivity include bovine antiserum reacting with bison blood, as well as deer antiserum reacting with other members of the Cervidae (deer) family, such as elk and moose. Positive reactions between distantly related (at the order level) animals include guinea pig antiserum reacting with squirrel blood. This similarity in epitopes (binding sites) is the reason that all labs test their antisera against the blood of many animals, not simply the one to which the antiserum was created. This testing builds lists of animals whose blood is recognized by each antiserum” (Cummings and Clark 2019).
ETHNO-ZOOARCHAEOLOGICAL REVIEW

Ethnographically documented animal uses suggest possible or even probable prehistoric animal exploitation. Records of widespread historic animal utilization may demonstrate continuation of prehistoric practices into the historic era, acknowledging the likelihood that European contact affected hunting and animal use practices, resulting in loss of indigenous knowledge. A wide breadth of ethnographic sources, both inside and outside the study area, was consulted to permit a more exhaustive review of potential human and animal interactions. Ethnographic literature serves only as a guide, not as conclusive evidence of resources’ occurrences or specific uses. When compared with archaeological materials (artifacts and features), protein residues are interpreted as use indicators. We provide the following ethnozoological background to discuss animals identified through protein residue analysis.

Camelidae (Camelids)

Camelidae includes species of extinct North American camelids. Camelops (western camel), Hemiauchenia (long-legged llama), Palaeolama (stout-legged llama), and Titanotylopus (giant camel) existed during the Late Rancholabrean. Camelops and Titanotylopus occupied western North America. C. hesternus remains have been recovered from archaeological sites at Burnet Cave, Jaguar Cave, Tule Springs, Casper, Lubbock Lake, Sandia, and Clovis but are rare at Paleoindian sites. Hemiauchenia macrocephala remains have been recovered throughout the continent but not in association with archaeological sites. Palaeolama mirifica was adapted to rough terrain and subsisted on leaves, shoots, and grass. Its remains have been found in Florida, Texas, and Southern California, though never in association with man (Anderson 1989:71-72).

Leporidae (Rabbit and Jackrabbits/Hare Family)

Leporidae (rabbit and jackrabbit/hare family), including rabbits and hares, are small grazing mammals that generally have long ears, side facing eyes, long hind legs, soft fur, and short tails. Hares (Lepus sp.) are larger than rabbits and prefer open habitats where they can attempt to outrun predators. Jackrabbits tend to inhabit open desert scrubland, prairies, and on occasion stray into woodlands. Rabbits, however, are not as fast and prefer environments with dense cover where they can “freeze” and hide from carnivores (Burt and Grossenheider 1980:202-212; Whitaker 1980:346-364). Cottontail populations thrive in areas with bushy cover as well as poorly drained bottom lands. All of these long-eared jumpers have adapted to a wide range of environments and are found across North America (Cummings and Clark 2019)
APPENDIX F: Images of The Anzick Reburial

Figure 59. The excavation for the re-interment of A1 and A2 remains
Figure 60. The Author Screening the Re-interment Excavation Soils
FIGURE 61. SHORTLY BEFORE THE RE-INTERMENT CEREMONY COMMENCED
Figure 62. The rain starting, just before the ceremony
FIGURE 63. A TIME OF CONNECTION
Figure 64. A time of reflection
Figure 65. Men called to share in contributing soil to the burial.
FIGURE 66. WOMEN CALLED TO SHARE IN CONTRIBUTING SOIL TO THE BURIAL.
Figure 67. Bud Anzick and the author permanently seal the tomb box containing the ancient remains.
Figure 68. Eske Willerslev and Shane Doyle finish filling in the grave with Anzick family members standing in observance.
Figure 69. Mike Waters, the author, and Mel Anzick after the ceremony
FIGURE 70. A TIME OF RESPECT, REFLECTION AND RENEWAL
Figure 71. Below the cliff, a time of peace and connection
FIGURE 72. AT REST ONCE AGAIN
FIGURE 73. A DRAMATIC SENSE OF TIMELESSNESS
APPENDIX G: Images of Selected Anzick Assemblage Artifacts

FIGURE 74. SELECTED GROUP ANZICK LITHIC ARTIFACTS 1
Figure 75. Selected Group Anzick Lithic Artifacts 2
FIGURE 76. SELECTED GROUP OF ANZICK OSSEOUS RODS
Figure 77. Anzick Artifact #10 Top
Figure 78. Anzick Artifact #10 Verso
Figure 79. Anzick Artifact #4 Top
FIGURE 80. ANZICK ARTIFACT #4 VERSO
FIGURE 81. ANZICK ARTIFACT #25 TOP
FIGURE 82. ANZICK ARTIFACT #25 VERSO
Figure 83. Anzick Artifact #36 Top
Figure 84. Anzick Artifact #36 Verso
Figure 85. Anzick Artifact #34 Top
Figure 86. Anzick Artifact #34 Verso
FIGURE 87. ANZICK ARTIFACT #18 Top
Figure 88. Anzick Artifact #18 Verso
Figure 90. Anzick Artifact #99 Verso
Figure 91. Anzick Artifact #23 Top
Figure 92. Anzick artifact #23 Verso
Figure 93. Anzick Artifact #21 Top
FIGURE 94. ANZICK ARTIFACT #21 VERSO
Figure 95. Anzick Artifact #12 Top
Figure 96. Anzick Artifact #12 Verso
Figure 97. Anzick Artifact #2 Top
Figure 98. Anzick Artifact #2 Verso
Figure 99. Anzick Artifact #70 Top
Figure 100. Anzick Artifact #70 Verso
Figure 101. Anzick Artifact #82 Top
FIGURE 102. ANZICK ARTIFACT #82 VERSO
Figure 103. Anzick Artifact #89 Top
Figure 104. Anzick Artifact #89 Verso
Figure 105. Anzick Artifact #72 Top
Figure 106. Anzick Artifact #72 Verso
Figure 107. Anzick Artifact #88 Top
FIGURE 108. ANZICK ARTIFACT #88 VERSO
Figure 109. Anzick Artifact #77 Top
Figure 110. Anzick Artifact #77 Verso
Figure 111. Anzick Artifact #71 Top
FIGURE 112. ANZICK ARTIFACT #71 VERSO
Figure 113. Anzick Artifact #84 Top
Figure 114. Anzick Artifact #84 Verso
Figure 115. Anzick Artifact #78 Top
Figure 116. Anzick Artifact #78 Verso
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