BAYOU GULCH: GEOARCHAEOLOGY OF A MULTICOMPONENT SITE
IN CENTRAL COLORADO

by

KEVIN PHILIP GILMORE


A thesis submitted to the
Faculty of the Graduate School of the
University of Colorado in partial fulfillment
or the requirements for the degree of
Master of Arts
Department of Anthropology
1991
This thesis for the Master of Arts degree by
Kevin Philip Gilmore
has been approved for the
Department of
Anthropology
by
Frank W. Eddy

Douglas B. Bamforth

Date 6/13/91
DEDICATION

To my parents, Brandy and Shirls, who never lost faith and gave me all the support I needed; and to my grandmother, Dorothy Gilmore-

"Hey, remember this is your cross old grandmother speaking. Let me hear right away that the thesis is a done deed."

Hey Nana, it's done.
Gilmore, Kevin Philip (M.A. Anthropology)
Bayou Gulch: Geoarchaeology of a Multicomponent Site in Central Colorado
Thesis directed by Associate Professor Frank W. Eddy

The Bayou Gulch site (5DA265) is a multicomponent site located on the northern edge of the Palmer Divide of central Colorado. Material culture recovered from excavations indicate occupation of the site from Early Archaic through the Protohistoric periods. A sequence of eolian depositional events and periods of landform stability for the Front Range is suggested by diagnostic artifacts, radiocarbon ages, and pedologic data recovered from Bayou Gulch. This sequence is correlated with regional eolian sequences from Northeastern Colorado, the Rocky Mountain basins, the Nebraska Sand Hills and the Llano Estacado, which are thought to reflect both regional and local paleoclimatic fluctuations. Low-angle eolian sand sheet deposits are usually overlooked in favor of large areas of active dunes when making these reconstructions, but results from Bayou Gulch indicate that the low angle eolian deposits that form the site matrix reflect episodes of regional dune activity, which allows for the construction of a model of paleoclimatic fluctuations during the Middle to Late Holocene for the Front Range.
ACKNOWLEDGMENTS

There are numerous individuals that deserve recognition for the assistance and support that I have received during the writing of this thesis in particular, and during my graduate career in general.

As tradition warrants, I would like to first thank my thesis committee, Dr. Frank Eddy, Dr. Douglas Bamforth and Dr. James Hester. Frank served as my thesis advisor, and along with providing sage counsel on topics both archaeological and philosophical, provided much needed perspective during the completion of this difficult and frustrating project. I don’t suppose I’ll ever again laugh as hard about stratigraphy as I have in Frank’s office. As is fitting to his role as the young and enthusiastic new assistant professor in the Anthro Department, Doug never allowed me to forget that it’s not the distribution of rocks that’s important, it’s the human behaviors that resulted in the distribution of rocks that we’re trying to interpret. Most of the interpretation of the material culture presented in this thesis is a result of discussions I had with Doug. If I’ve learned one thing from Jim, it’s how to make the
system work to your advantage - valuable information for anyone, let alone an up and coming archaeologist.

My family has always been more than generous in both their moral and financial support of my graduate career. My parents, Brandy and Shirley Gilmore encouraged me to become a scientist because they wanted me to be happy, if not rich. They have invested an incredible amount of time in this project, from inputting encoded artifact information into a data base and commenting on draft chapters to listening to an almost endless series of gripes. They also provided a substantial amount of money in the form of loans and an almost endless supply of high quality leftovers. My sister Anne has always given me her unqualified support, and here at last is the public acknowledgement for this support she deserves. My grandmother and patron, Dorothy Gilmore, provided support for my studies through regular contributions from the Gilmore Grandchildren Scholarship Fund, and in addition inspired my efforts through a series of short phone conversations and longer letters exhorting me to complete my degree. My love to all.

Deb Angulski and O D Hand of the Colorado Department of Highways Archaeological Unit provided access to the Bayou Gulch collection as well as encouragement and support services throughout this
project. I owe a debt of gratitude to these two patient professionals for giving me much of my practical training as a field archaeologist, and for allowing me the opportunity to do a little more science than was strictly necessary for compliance during my tours of duty with the Highway Department.

William Butler of the U.S. Park Service allowed use of his coded data on the Bayou Gulch artifacts.

Last but by no means least are all of my friends and colleagues in graduate school, companions in adversity that universally gave me the same wise advise - "it doesn't have to be great, but it does have to be done!" Especially supportive and helpful were Mark Chenault, Clay Dillingham, Sandy Karhu, Brenda Martin, Lisa Staten, Dr. Nicky Teufel and Dave "The Merciless" Tucker. A big smiley face to Sarah "Art Girl" Harman who helped with the artifact photographs.
CONTENTS

CHAPTER

I. INTRODUCTION. ........................................ 1
   Organization. ..................................... 6

II. METHODOLOGY ....................................... 10
   Site History. .................................... 10
   Problems with the Data. ......................... 15

III. ENVIRONMENT ...................................... 21
   Physiography. .................................. 22
   Climate ........................................ 23
   Flora .......................................... 24
   Fauna .......................................... 26

IV. CULTURAL OVERVIEW ................................. 28
   Paleoindian Period. ............................. 29
   Early Archaic Period. ........................... 30
   Middle Archaic Period ........................... 31
   Late Archaic Period ............................. 32
   Late Prehistoric Period ....................... 33
   Early Ceramic ................................ 33
   Middle Ceramic ................................. 35
   Late Ceramic .................................. 36

V. GEOLOGY AND STRATIGRAPHY ....................... 38
   Geology ........................................ 39
Stratum 2a. ............... 81
Stratum 2a/2b Interval. ....... 82
Stratum 2b. ............... 82
Stratum 2b/3 Interval ....... 83
Stratum 3 ............... 83
Discussion .................. 84

VI. MATERIAL CULTURE ............... 86

Hafted Bifaces ............... 88
Type 1. .................. 90
Type 2. .................. 95
Type 3. .................. 97
Type 4. .................. 100
Type 5. .................. 103
Type 6. .................. 105
Type 7. .................. 107
Type 8. .................. 111
Type 9. .................. 117
Type 10 .................. 119
Type 11 .................. 122
Type 12 .................. 125
Type 13 .................. 127
Type 14 .................. 130

Unhafted Bifaces ............... 132
Drills .................. 136
Unifaces .................. 139
Miscellaneous Worked Stone .... 144
TABLES

Table

5.1 Particle Size Distribution for Sediments at Bayou Gulch. .................. 59
6.1 Hafted Biface Types Per Stratigraphic Provenience Unit. ................. 91
6.2 Hafted Bifaces Per Lithic Material Type ... 92
6.3 Unhafted Bifaces Per Stratigraphic Provenience Unit. ..................... 134
6.4 Unhafted Bifaces Per Lithic Material Type .................. 135
6.5 Stratigraphic Distribution of Drills Per Lithic Material Type. .......... 138
6.6 Unifaces Per Stratigraphic Provenience Unit. ......................... 141
6.7 Unifaces Per Lithic Material Type ............. 142
6.8 Stratigraphic Provenience of Miscellaneous Worked Stone Per Lithic Material Type ... 146
6.9 Stratigraphic Provenience of Retouched Flakes Per Lithic Material Type .... 147
6.10 Stratigraphic Provenience of Debitage Per Lithic Material Type .......... 150
6.11 Stratigraphic Provenience of Ground Stone ......................... 154
6.12 Stratigraphic Provenience of Manos by Type. ..................... 157
6.13 Stratigraphic Provenience of Hearth Features. ..................... 162
7.1 Stratigraphic Provenience of Flaked Lithic Tools Per Energy Investment Category. . . . 169
FIGURES

Figure

1.1 Location of the Palmer Divide ............ 2
1.2 Location of the Bayou Gulch Site ......... 3
2.1 Map of Excavation Units at Bayou Gulch .... 12
5.1 Generalized Stratigraphic Profile of the Sediments at Bayou Gulch ....... 65
5.2 Comparison of Eolian Deposits in the Plains and Rocky Mountains ....... 74
6.1 Type 1 Hafted Bifaces ...................... 93
6.2 Type 2 Hafted Bifaces ...................... 96
6.3 Type 3 Hafted Bifaces ...................... 98
6.4 Type 4 Hafted Bifaces ...................... 101
6.5 Type 5 Hafted Bifaces ...................... 104
6.6 Type 6 Hafted Bifaces ...................... 106
6.7 Type 7 Hafted Bifaces ...................... 108
6.8 Type 8a Hafted Bifaces .................... 112
6.9 Type 8b Hafted Bifaces .................... 113
6.10 Type 9 Hafted Bifaces ..................... 118
6.11 Type 10 Hafted Bifaces ................... 120
6.12 Type 11 Hafted Bifaces ................... 123
6.13 Type 12 Hafted Bifaces ................... 126
6.14 Type 13 Hafted Bifaces ................... 128
6.15 Type 14 Hafted Bifaces ................... 131
6.16 Drills. ......................... 137
CHAPTER I

INTRODUCTION

Excavations at the Bayou Gulch site (5DA265) on the northern edge of the Palmer Divide (Figure 1.1) in eastern Douglas County, Colorado (Figure 1.2) revealed evidence that indicates prehistoric habitation of the site from the Early Archaic period and possibly the Plano period through the Protohistoric period. Artifactual information, radiocarbon ages and pedologic data allow for the correlation of a series of thin eolian deposits that make up the site matrix with episodes of eolian activity from Northeastern Colorado, the Rocky Mountain Basins and the Nebraska Sand Hills. These episodes are thought to represent periods of local and regional paleoclimatic fluctuation, and have been compared to regional models of paleoclimatic fluctuation with some success. The climatic model used for these comparisons is taken from both prehistoric settlement pattern information and the Front Range cirque glacial geochronology of Benedict (1978, 1981, 1985). Although comparison of Bayou Gulch to regional eolian/climatic sequences indicates comparability with some events in
FIGURE 1.1
Location of the Palmer Divide.
FIGURE 1.2
Location of the Bayou Gulch Site.
these sequences, other aspects of the Bayou Gulch geochronology deviate from the regional geochronology. These deviations are believed to represent local climatic fluctuations that are on a scale small enough as to not be represented in the regional sequence. These small scale episodes of climatic fluctuation may have implications for the interpretation of prehistoric utilization of the Palmer Divide area in particular and the Front Range and adjacent areas in general. One would expect these climatic fluctuations to be reflected in the settlement patterns and population dynamics of the prehistoric occupation of the area. In addition, the geochronology of Bayou Gulch has implications for site formation processes and differential preservation of archaeological materials of different ages in the Palmer Divide. Episodes of eolian deposition may have served to obscure the archaeological records of the same settlement patterns and population dynamics that are themselves being effected by these climatic fluctuations.

The majority of recorded prehistoric occupations in the Palmer Divide area are surface sites that date to the Late Prehistoric period. A paucity of evidence for earlier occupation may indicate differential preservation of earlier sites, differing settlement patterns, less utilization of the area prior to the Late
Prehistoric, or in all probability, a combination of some or all of these factors. Although much of the cultural material recovered from the Bayou Gulch site is attributable to the Early Ceramic (1600 - 850 BP) Period, a significant percentage of the material can be assigned to the Middle Ceramic (850 - 400 BP) and the Early (7000 - 5000 BP), Middle (5000 - 3000 BP) and Late (3000 - 1600 BP) Archaic Periods.

Although the Early and Middle Ceramic occupants of Colorado apparently had cultural affiliations (as represented by material culture) with midwestern sedentary horticulturalists, archaeological evidence for horticulture in eastern Colorado is scant. Summaries of Early Ceramic occupations along the Front Range (Cassells 1983; Eighmy 1984) indicate that the these people probably maintained a more broad-based hunting and gathering economy similar to that practiced during the previous Archaic stage, with the addition of horticulture contributing only a small percentage of total subsistence. This thesis examines the similarities and differences in material culture between the Archaic and Late Prehistoric occupations at Bayou Gulch, and attempts to interpret the human behaviors associated with these materials and how they relate to adaptive response to paleoenvironmental fluctuations.
Organization

This thesis presents information, analysis, and conclusions from research at the Bayou Gulch site. The first chapter has presented the premise of the thesis, the site history and organization of the document as a whole.

Chapter II is a summary of the methodology used both during and after excavations, and also presents some of the problems encountered in interpreting data recovered years after the end of excavation. The difficulties of determining the association of artifacts to particular occupations is discussed, and it is determined that the limits inherent in the methodology used during data recovery at this site are such that the determination of assemblages from individual occupations is impossible. However, it is possible to make general statements about changes in the relative frequency of certain artifact classes and change in site use and activities between the Archaic and Ceramic stage occupations of the site.

Chapter III is an overview of the natural environment of the Palmer Divide area; aspects of the physiography, geology and ecology of the area that may have been relevant to the prehistoric inhabitants of the area are described and the present environment in the Palmer Divide is used as a model for a discussion of the
differences and similarities between the present environment and paleoenvironments. The unique nature of the Palmer Divide as an extension of mountain environments, primarily the Transitional forest, into the Plains is discussed.

Chapter IV is a summary of the culture history of the Colorado Piedmont, with the special focus on the prehistoric occupation of the environmental zones along the foot of the Front Range.

Chapter V discusses the geology and stratigraphy of the Bayou Gulch site using pedologic, artifactual and radiocarbon ages to construct a geochronology of the site. A summary of the Holocene geochronology for the Front Range explicated by Scott (1963) is presented, and data from excavations, coring, and local geomorphology at the site are synthesized to determine the origin of the site matrix at Bayou Gulch and how the sediments at the site conform to the Front Range geochronology. The second part of the chapter relates the site geochronology to other eolian sequences within the region and compares these sequences to the paleoclimatic record represented by the Front Range cirque glacial chronology of Benedict (1978, 1981, 1985).

Chapter VI is a presentation of the material culture recovered from Bayou Gulch. A morphological cultural-historic typology is constructed for the hafted
bifaces, and comparisons of these types are made between Bayou Gulch and other sites within the Front Range. A morphological/technological typology is constructed for non-temporally sensitive flaked lithic artifacts, groundstone and hearth features. These data are viewed in the context of time and energy invested in manufacture and construction, with the ultimate goal being the determination of how human behavior changed over time.

The dominant theory in Colorado archaeology concerning the transition between the Archaic and Ceramic Stages is that, aside from the introduction of ceramics and the bow, there is little documented evidence to indicate much change in subsistence pattern between the Archaic and Ceramic stages in the northeastern part of Colorado (Eighmy 1984:86). Evidence for domesticates in Early and Middle Ceramic period archaeological contexts is sparse and inconclusive, as is the evidence for sedentism. In Chapter VI an attempt is made to determine if there are differences in the nature of the artifact assemblages and in site use between the Archaic and Ceramic stage occupations at Bayou Gulch.

Chapter VII contains the summary and conclusions, and is devoted to discussion of the material recovered from excavations and how they add to
our knowledge of the prehistoric occupation of the Palmer Divide area, how prehistoric inhabitants of the area responded to the environmental fluctuations indicated by the site geochronology, and how these responses may be reflected in the material recovered during excavations.