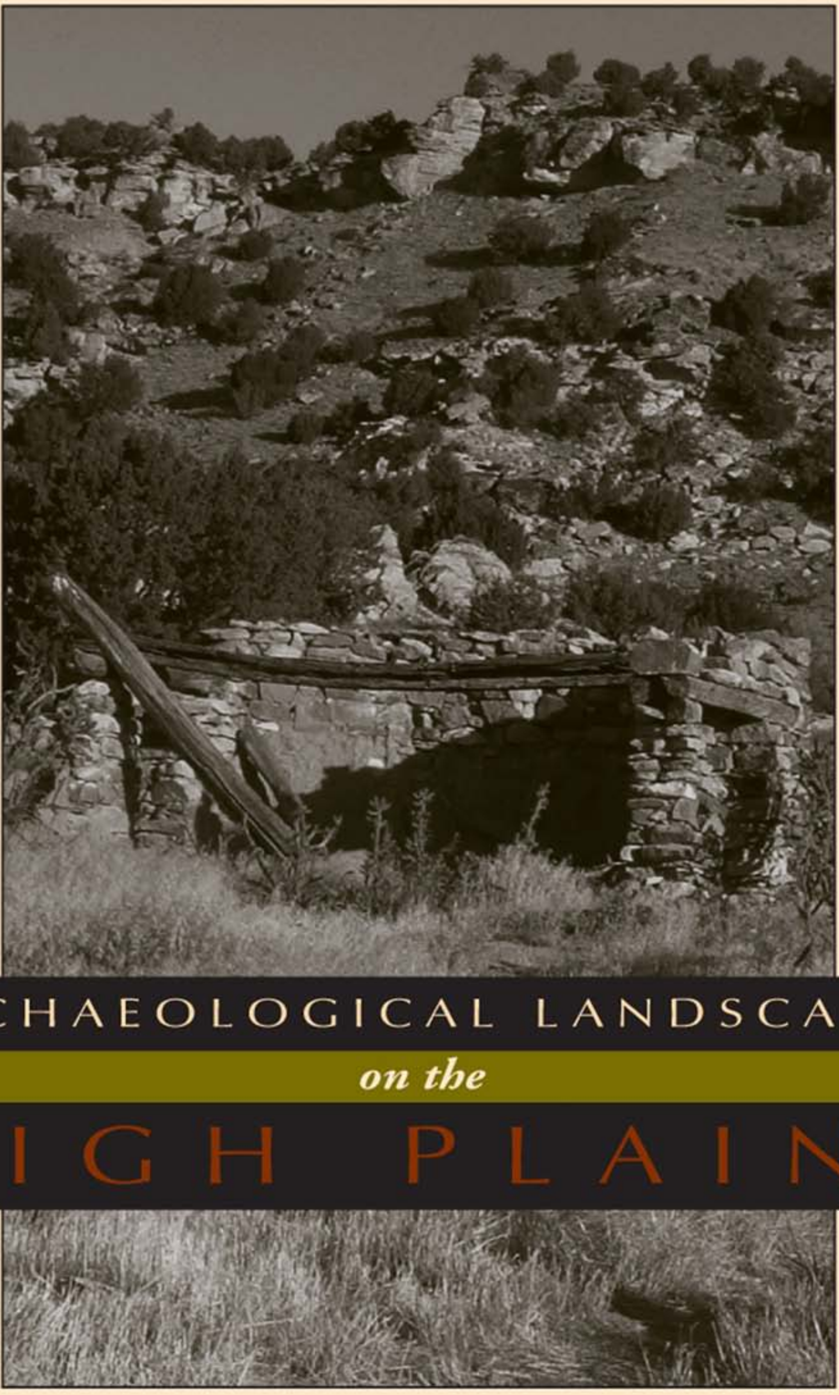
edited by

LAURA L. SCHEIBER *and* BONNIE J. CLARK



# ARCHAEOLOGICAL LANDSCAPES *on the* HIGH PLAINS

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UNIVERSITY PRESS OF COLORADO

This book is dedicated to
Willa Cather
(1873–1947)
Pioneer and Observer of the Plains

"Elsewhere the sky is the roof of the world;
but here the earth was the floor of the sky"
(*Death Comes for the Archbishop,* 1927)

Published by the University Press of Colorado
5589 Arapahoe Avenue, Suite 206C
Boulder, Colorado 80303


Printed in the United States of America

The University Press of Colorado is a proud member of
the Association of American University Presses.

The University Press of Colorado is a cooperative publishing enterprise supported, in part, by Adams State College, Colorado State University, Fort Lewis College, Mesa State College, Metropolitan State College of Denver, University of Colorado, University of Northern Colorado, and Western State College of Colorado.

The paper used in this publication meets the minimum requirements of the American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials. ANSI Z39.48-1992

Library of Congress Cataloging-in-Publication Data

Archaeological landscapes on the High Plains / edited by Laura L. Scheiber and Bonnie J. Clark.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-87081-931-5 (alk. paper)
1. High Plains (U.S.)—History, Local. 2. High Plains (U.S.)—Antiquities. 3. Excavations (Archaeology)—High Plains (U.S.) 4. Historic sites—High Plains (U.S.) 5. Landscape archaeology—High Plains (U.S.) 6. Archaeology and history—High Plains (U.S.) 7. Social archaeology—High Plains (U.S.) 8. Indians of North America—High Plains (U.S.)—Antiquities. 9. Human ecology—High Plains (U.S.)—History. I. Scheiber, Laura L. II. Clark, Bonnie J.
F590.7.A73 2008
978'.01072—dc22
2008029530

Design by Daniel Pratt

17 16 15 14 13 12 11 10 09 08 10 9 8 7 6 5 4 3 2 1

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ONE

# A Sloping Land: An Introduction to *Archaeological Landscapes on the High Plains*

*Bonnie J. Clark and Laura L. Scheiber*

Did they choose this place or did the land choose them?

—KATHLEENE WEST

In 2006 history buffs celebrated the 200th anniversary of the moment when explorer Zebulon Pike first saw the mountain that would later bear his name. A great deal of effort was expended in historical detective work, using Pike's accounts and maps to relocate the spot from which he first spied Pike's Peak. Hoping for a clear day, celebrants returned to this location on the High Plains (just outside Las Animas, Colorado) to read his journal and, for a moment, to attempt to see the world through his eyes. Of course, for thousands of years preceding Pike, the vista he encountered was well-known to the many indigenous groups of the Arkansas River Valley.

We begin with this historical sidebar because it illustrates some of the particular facets of the High Plains as a region. The story highlights something about the nature of the geography of an area tucked between the Rocky Mountains and the vast interior Plains of North America. Here one encounters topographical surprises such as incised canyons, slanted escarpments, playa lakes, buttes, and views of mountains. This is not the sea-like, tall-grass prairie of the Northern and Central Plains. Occupied for at least 12,000 years, the High Plains geography is inscribed by human history. When celebrants attempted to return to the exact spot where Pike stood and wrote, they returned to an important locale as a way to link to the past and in so doing to refresh memories, writing them anew with a different cast of characters. As readers of this volume will discover, the writing of the past in places is something the people of the High Plains have been doing for almost as long as there have been people in the region. The stone marker placed at the Pike vista is the materialization of this ritual of renewal and memory, with a strong family resemblance to a number of the sites and features that will be discussed in the pages to come.

Landscape perspectives in archaeology focus on the relationships and intersections between land and people. Although traditionally interested in issues of spatial variation at a broad scale, archaeologists have recently addressed cultural construction of the landscape as it shapes and is shaped by people's lives. This edited volume presents recent case studies on this topic by archaeologists working in the North American High Plains. A meeting ground of different geographic regions, the area supported a wide variety of people in the past, making the region at times a crossroad and at others a frontier. Multiple generations traveled across the High Plains, while others settled and made it their home. It is cattle country, cowboy country, Indian country. It is also an area rich in ethnographic and historical heritages that are still very much present.

This book, which focuses on the archaeological landscapes of, as well as the archaeology of landscapes in, the High Plains, is an exploration of a specific place using a particular set of theoretical and methodological tools. In it we present research that bridges the arbitrary division between history and prehistory. The decision to focus on long-term change allows the authors to consider both ethnographic literature and environmental data of a deep time depth, which are strengths of Plains research. The result is a cohesive and synthetic group of case studies spanning thousands of years of human occupation. What is unique about this book is that it focuses on one particular geographic region, and it explores the different and changing ways people interacted with that place.

## THE HIGH PLAINS

The High Plains lie between the Rocky Mountains to the west and the tall-grass prairies to the east and include portions of the modern states of Wyoming, Colorado, Nebraska, Kansas, Oklahoma, New Mexico, and Texas. The standard spatial definition of the High Plains follows definitions of the section of the Great Plains physiographic province, extending from the Pine Ridge Escarpment at the South Dakota/Nebraska border to the Llano Estacado in the Texas and Oklahoma panhandles (Fenneman 1931; Holliday et al. 2002). Because of great physical, climatological, and cultural similarities between the High Plains section and the area between it and the Rocky Mountains, we have expanded our area of concern to the three westernmost physiographic regions of the Great Plains as well—the Colorado Piedmont, Raton, and Pecos Valley sections (Figure 1.1). When we write of the High Plains in this volume, we are referring to that expanded area.

A tilted landscape, the High Plains gently slope as they rise from a low elevation of around 750 m (2,461 ft) above sea level along their eastern edge to 1,800 m (5,906 ft) where they meet the foothills of the Rockies (Trimble 1980). The area is a remnant of a vast plain formed by sediments deposited by streams flowing east from the ancestral Rocky Mountains. On much of the High Plains, a Miocene-Pliocene sandstone called the Ogallala Formation is the surface geological unit, which when exposed can be either sandy or gravelly. On the western edges, earlier sediments have been revealed by erosion from rivers and streams, especially of the three major High Plains river systems—the Platte, the Arkansas, and the Pecos. In some places farther to the east, erosion divides the vast tableland into buttes and mesas. Especially in northern areas of the High Plains, Quaternary aeolian deposits that include sheet sands, dune sands, and loess can overlie the Ogallala Formation sandstone.

The High Plains are the land of the short-grass prairie. Trees are relatively scarce, generally found only along waterways and in upland zones. The dominant native plant species are grasses: buffalo grass (*Buchloe dactyloides*), blue grama (*Bouteloua gracilis*), and hairy grama (*Bouteloua hirsuta*). The short-grass vegetation community supported large herbivores such as bison (*Bison bison* and prehistorically *Bison antiquus*) and pronghorn (*Antilocapra americana*), as well as smaller inhabitants such as rabbits (*Sylvilagus* spp. and *Lepus* spp.) and the signature Plains rodent species, the prairie dog (*Cynomys ludovicianus*). A wealth of amphibians, especially toads and snakes, as well as both migratory and non-migratory birds, also make the region home. This ecosystem supported several prey species, especially coyotes (*Canis latrans*) and a variety of hawks, eagles, and falcons. In specific niches within the High Plains, other, less widespread animal and plant species can be found.

Anyone who has spent a significant amount of time in the High Plains knows that climatological factors greatly affect the region. Flanking the east of the Rockies, the area is home to convective systems that produce winds

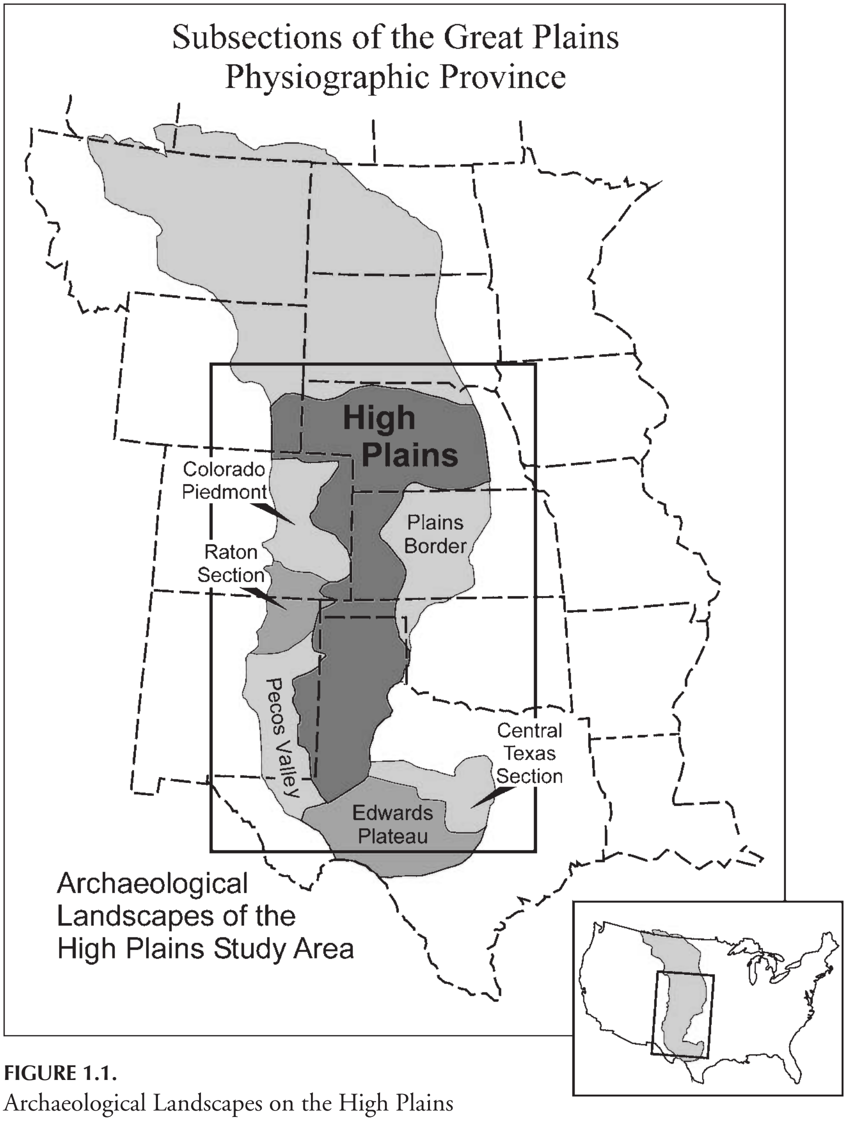


**FIGURE 1.1.**
Archaeological Landscapes on the High Plains *study area based on Great Plains physiographic subsections. Illustration by Kevin Gilmore.*

both stronger and more common than in areas to either the east or the west (Klimowski et al. 2003). It is a semiarid region with a mean annual precipitation that ranges from about 25 cm per year along the western margins to 50 cm in the east. Temperatures in the area are highly influenced by season and time of day. For example, in the center of the High Plains near the border of Kansas, Colorado, and Oklahoma, over 100 years of historical climate data for the town of Elkhart, Kansas, indicate that in the coldest month, January, low temperatures average 19° F, with an average high of 48° F. During July, historically the hottest month, the low temperature averages 64° F, climbing through the day to an average high of 93° F. The average annual precipitation since January 1, 1900, is 43 cm (High Plains Regional Climate Center 2008). As with much of the American West, however, averages capture only a part of the picture, as both temperature and precipitation can widely fluctuate seasonally. Indeed the highest temperature ever recorded in the High Plains is 121° F, and the area is periodically subjected to both flooding and drought.

## LANDSCAPE AS PLACE AND PERSPECTIVE IN ARCHAEOLOGY

The concept of landscape has exploded in the literature of social thinkers since the mid-1990s. As numerous others have concluded, a single landscape approach does not exist (e.g., Fisher and Thurston 1999; Hicks 2002; Stoddart and Zubrow 1999) but is instead encompassed in several perspectives, theories, and epistemologies. In considering the meaning of the word *landscape* itself, a multitude of definitions emerge:

- "Meaning imputed by local people to their cultural and physical surroundings" (Hirsch 1995:1).
- "Created out of people's understanding and engagement with the world around them" (Bender 1998:5) and "[p]eople's engagement with the material world" (Bender 2002:S103).
- "Interdependent relationships that people maintain with the physical, social, and cultural dimensions of their environments across space and over time" (Anschuetz, Wilshusen, and Scheick 2001:159).
- "An entity by virtue of its being perceived, experienced, and contextualized by people" (Knapp and Ashmore 1999:1).
- "A set of real-world features, natural or cultural, which give character and diversity to the earth's surface" (Zvelebil, Green, and Macklin 1992:194).
- "A dynamic component of the physical, natural environment," "a record of that environment and of environmental changes," and "an important influence on site formation process" (Holliday 2004:234).

What most of these definitions have in common is an emphasis on the negotiation between people and their physical surroundings. Each of our authors uses or provides a definition of landscape that shares this concern with humans and the material world, ranging from traditional geomorphic views of landscape to more phenomenological or cultural visions. A few of our authors take pains, however, to deconstruct typical definitions of landscape. Mark Mitchell, for example, delves into the history of the western concept of landscape, pointing out that the term assumes an ontological division between the environment and the humans in it. On the other hand, Oskar Burger, Lawrence Todd, and Paul Burnett take issue with anthropocentric definitions, reminding readers that the landscape is always the result of a complex and ongoing relationship among cultural, climatological, and geological processes, as well as biological entities beyond humans.

The definitions of landscape used by our authors are operationalized through what we call Landscape Perspectives, approaches taken, in this case, to better understand the archaeology of the High Plains. Given the diversity of the definitions of landscape, what then do we mean by Landscape Perspectives in archaeology? Interest in the relationships between people and the land is obviously not new to archaeology (Feinman 1999; Trigger 1989:279–303). Today, Landscape Perspectives are often explicit in several distinctive contexts. The first approach incorporates traditional settlement pattern studies, land use models, and regional-scale approaches with methodological advances in spatial analysis, Geographic Information Systems (GIS), and non–site-based applications (Rossignol 1992; Wandsnider 1998). These studies often emphasize economic, political, and ecological issues and macro-scale models (Stoddart and Zubrow 1999; Wandsnider 1998). This way of looking at the landscape is emphasized in a number of the regional-scale studies in this volume, especially Eileen Johnson's and Michael Peterson's chapters.

The second approach explicitly considers landscapes to be the loci of social and symbolic interactions between people and the environments within which they live. These perspectives often emphasize memory and continuity (Bender 1998, 2002; Head 2000), ritual and sacred places (Parcero Oubiña, Criado Boado, and Santos Estévez 1998; Zvelebil 1997), and links among people, pathways, and places (Cooney 1999). The relationship people have with the land is always active and dynamic (Bender 2002). It involves something done *with* the environment, not something done *to* it. People often have a connection to the land in which they live and work, what Keith Basso (1996) calls a "sense of place." An emphasis on a sense of place (Basso 1996; Ingold 1993; Lovell 1998) brings to the forefront the historical contingency of people's relationships with the land. Because of the concern for the active role of human communities and individuals in the creation of these landscapes in their daily lives, agency and practice theory also play a role in shaping interpretations about the past (Bourdieu 1977; Giddens 1984; Tilley 1994), an approach that informs many of the chapters in this volume, most explicitly that by Mitchell. Landscape is inextricably involved in the recursive relationship among identity, community, and daily activities (Fisher and Thurston 1999). A number of chapters in this volume engage with individual and group identity and the landscape, especially the one by Kevin Gilmore.

A final way Landscape Perspectives assist in interpretations of the past relates to the contemporary practice of doing archaeology. At the most fundamental level, our methodologies overdetermine our later interpretations. In their chapter, Oskar Burger and coauthors present thought-provoking experiments with one of the most basic tools of landscape archaeology: surface survey. Landscapes are always simultaneously both past and present. We made an explicit decision with this volume to concern ourselves with the full temporal breadth of the High Plains cultural landscape. This approach allowed for insights about place that breach the prehistory/history divide, such as those presented in the chapter by Bonnie Clark. By not removing our own present from the past we study, we come to better understand how archaeologists are just one set of stakeholders, which also include government officials, landowners, and descendant communities, each of whom have different relationships with the land and the people who lived on it. Our engagement with archaeological places, both on an academic and a personal level, is explored in Laura Scheiber's chapter. Such an acknowledgment makes it difficult to step away from the fact that all landscapes—past and otherwise—are in some ways contested in the present world (Bender 2002). The ways one such past contestation became materialized in places is explored in this volume by Minette Church.

Although we have presented these three views of landscape (landscape ecology, lived places, and simultaneous landscapes) as different, one of the uniting factors of alternate Landscape Perspectives is the ability to expose artificial boundaries and unnecessary dichotomies—between history and prehistory, nature and culture, environmental archaeology and built environments, processual and post-processual archaeologies, and time and space—and to bridge the gaps between them (Anschuetz, Wilshusen, and Scheick 2001; Bender 2002; Conkey 2002; Ingold 1993).

## LANDSCAPE RESEARCH ON THE HIGH PLAINS

Although landscape archaeology and Landscape Perspectives are not new, they are most commonly applied in European contexts, in agricultural societies of the New World, and at sites with visible surface architecture and features.

We believe they can also be fruitfully employed to conceptualize the past of nomadic hunter-gatherer societies of North America, as well as other peoples of the High Plains. In particular, Landscape Perspectives can be useful for linking macro-scale and micro-scale analyses.

The study of relationships among people, environments, and resources is certainly not new to Plains archaeologists (Blouet and Luebke 1979; Frison 1991; Wood 1998). Indigenous Plains inhabitants were highly mobile and often moved onto the High Plains from near and distant lands. Macro-scale analyses and settlement pattern studies are needed to understand these seasonal and permanent excursions. Knowledge of the land and its resources was essential information for past peoples, and models from landscape ecology can be helpful in conceptualizing these relationships (Foreman 1995).

On the other hand, more active and contextualized micro-scale Landscape Perspectives enrich interpretations of activities at particular locales. Specific places were intricately tied to ritual calendars in numerous Plains societies (Connor 1962; Finley 2002; Grinnell 1922; Jorgensen 1972; Lowie 1922; Parks and Wedel 1985). Hunter-gatherers primarily conceptualize rather than construct their landscapes, that is, they imbue features on the land with meaning rather than physically alter the land itself. Archaeologists tend to think of hunter-gatherer movements in terms of their relationships with subsistence resources. However, people regularly return to certain places for many reasons—some of them practical, some of them social, some of them ritual. The concepts embodied in a social landscape perspective highlight many reasons for how and why (and to where) people choose to move across the land. The landscape is not just practical but is also given ritual, sacred, and other significant meaning (Anschuetz, Wilshusen, and Scheick 2001; Basso 1996; Zvelebil 1997). People have ongoing sets of relationships with the physical, social, and symbolic aspects of landscapes (Head 2000; Ingold 1996), which provide archaeologists with additional means to conceptualize embedded strategies.

Explorations of long-term culture change and continuity (the *longe durée*) in particular regions beg for multiscalar perspectives, moving back and forth between single occupations and regional patterns (see Duke 1992 for an application to the Northern Plains). Barbara Bender and coauthors (1997) call this moving-between "Nested Landscapes," and in fact several of the authors in this volume invoke a nested view of landscapes (see also Knapp and Ashmore 1999). Alison Wylie (1989) calls this tacking back and forth between analytical levels. Reviewers of Landscape Perspectives have commented on the diversity of approaches that "lack a unifying metaphor" (Fisher and Thurston 1999:631). On the High Plains, we believe the metaphor is the land itself.

## THIS VOLUME

This book began in a series of conversations between the two editors, Scheiber and Clark, about the archaeology of the High Plains. Although we both had worked on the Colorado prairie, we met in California. Our talk often turned to the High Plains. Both of us were homesick for that part of the world, as described by Willa Cather in *Death Comes for the Archbishop,* where the earth is the floor of the sky. Like our contributors Philip Duke (Duke and Wilson 1995) and Mark Mitchell (2006), we were concerned with the way Plains archaeology engages with theory. We knew many of our colleagues were doing really good work, both theoretically engaged and methodologically challenging, but that they, and the region where they worked, received too little attention. We decided to organize a session for the Society for American Archaeology meetings in the spring of 2003 to showcase a particular arena in which the archaeology of the High Plains was pushing the field: the archaeology of landscape. The session, "Landscape Perspectives on the North American High Plains," was very well attended, and our presenters agreed that the synergy of those meetings should reach an even wider audience. Chapters by most of the original presenters can be found in this volume, with other contributors brought in to expand the scope of the book. A final summary chapter is provided by Philip Duke, who served as the discussant when many of these chapters were first presented in Milwaukee.

The literature on archaeological landscapes is voluminous. This volume was never intended to serve as an overview, something a number of authors have provided quite effectively (see, for example, Anschuetz, Wilshusen, and Scheick 2001; Ashmore and Knapp 1999; Ucko and Layton 1999). Rather, we wanted to present the way a cross-section of researchers are applying the concepts in their own work in a region with which we are familiar. As illustrated in Figure 1.2, the case studies gathered here range across hundreds of miles of the High Plains. As with all compendiums, we have not been able to include all examples of such work, and we are well aware that other people are conducting interesting research in the area. Still, we feel we have presented to our readers an enticing sampler plate, providing examples of a wide array of approaches to various types of resources at a range of scales.

One of the best reasons for pursuing a landscape approach to archaeology is the holistic view it enforces. It forces researchers to keep in mind multiple scales of analysis, both spatially and temporally. Thus a landscape approach is ideal for the North American High Plains. Here aridity, largely stable landforms, and open vistas create a landscape record that is particularly visible. Settlement and agriculture in some areas have erased earlier marks on the land.

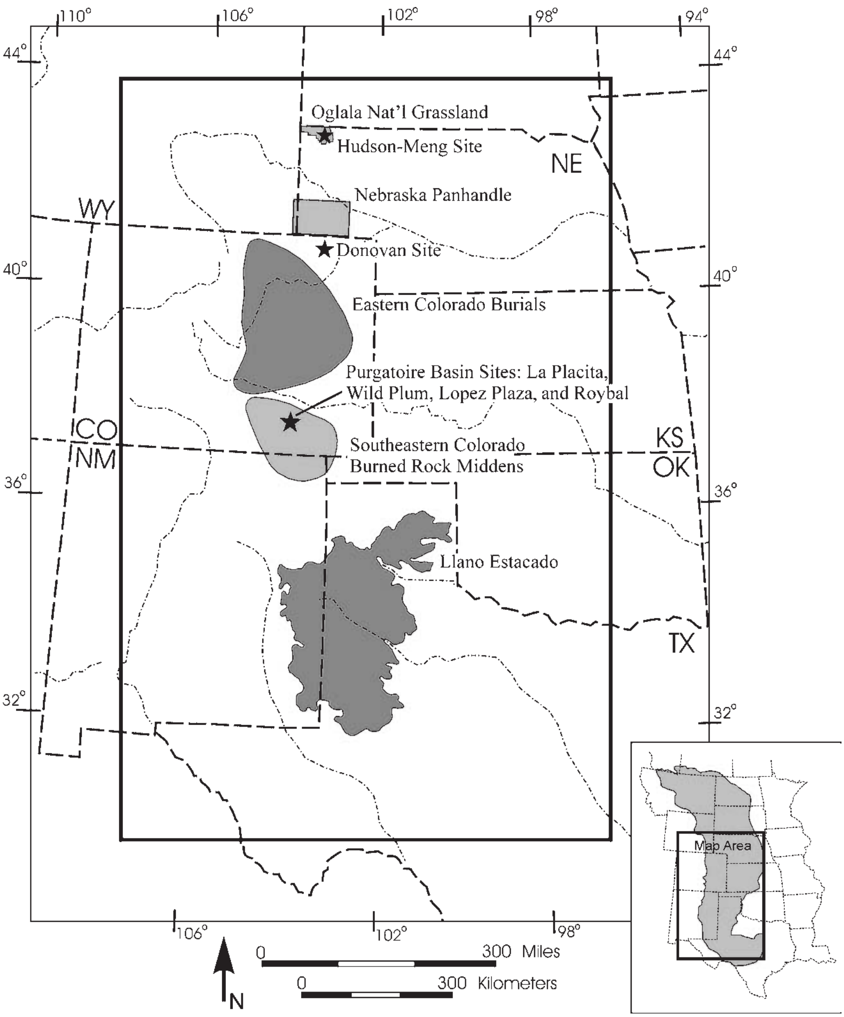


**FIGURE 1.2.**
*Map of the High Plains, highlighting case studies discussed in this volume. Illustration by Kevin Gilmore.*

But the lion's share of the High Plains has a population of under twenty-five people per square mile of land, a situation quite unlike areas east of the 100th meridian or in the mountain valleys and coasts to the west (Riebsame 1997). Low population, when coupled with relatively low-impact land use such as grazing (see Burger, Todd, and Burnett, this volume), has helped preserve the record of at least 12,000 years of use. These prairies hold a cultural landscape that is remarkably legible. Our authors have taken advantage of this fact to read various pages of that record.

There was no consensus about how best to approach the landscape of the High Plains, nor did we expect one. Gilmore and Mitchell engaged with the High Plains as possessing a suite of features of ritual importance. Excavation data provided the grist for detailed life histories of High Plains places for both editors in our individual chapters. Explicitly multiscalar were Johnson's and Church's approaches, as they placed individual sites within a regional and, in Church's case, international context. Similarly, for Burger and his coauthors, the High Plains is both a macro-environment and a micro one, where a crawling survey reveals a world missed from the view of a typical standing surveyor. For Peterson, the High Plains are a series of overlapping ecotones, each drawing prehistoric peoples in at least mildly predictive ways.

Given the variety of approaches, the way these chapters coalesce on particular themes is both surprising and illustrative. Many were concerned with place-based identity, others with how landscapes are mnemonic devices. Some were concerned with what it means to be a person of the High Plains, of vistas and wind. The predominant theme is that the High Plains contain important locales, ones to which people, over either generations or millennia, return. Sometimes this appears to involve collective memory, as in the revisitation of burial sites discussed by Gilmore. Sometimes this plays out, as it does in Scheiber's and Mitchell's research areas, in the way features are used in strikingly similar ways over time, suggesting generational teaching and learning. In other cases, as at the multiple component sites discussed by Johnson and Clark, later users were likely culturally unconnected. Yet more recent users appear to have read the histories inscribed into landscape and used them to inform their own understandings of place. When those histories are in written form, as discussed by Church, we can see how different understandings of and claims to the same place can be contested through something as seemingly simple as repeated renaming. And while Peterson presents factors with which we might predict where important locales may be found, Burger and his fellow authors remind us that often what we identify as an archaeological place may have more to do with our sampling strategy than with behavior in the past. Taken as an ensemble, the chapters in this volume grapple with, as so eloquently phrased by a local resident, the "elementary gravity of the place" (see Scheiber, this volume). All of the assembled authors have long-term personal and professional connections to this land, which shows in their individual works and in the collection as a whole.

Archaeologists commonly feel the place where they work is special and unique in a number of ways, and we are no exception. Our desire to present this volume is not just due to our belief about the special characteristics of the archaeology and landscape of the High Plains but also because both are relatively unknown. We hope that, like Zebulon Pike, readers unfamiliar with this area will discover it for themselves. For those who know about the High Plains and its human occupation, we hope you come to understand it in a new way, one keenly aware of how complex the relationship is among a sloping land, a grassy plain, and the people who made their mark on it.

## ACKNOWLEDGMENTS

The author-editors would like to thank all the contributors for their dedication to finishing this volume. We also acknowledge the original participants of the Society for American Archaeology symposium, some of whom were not able to submit chapters in the final book. We thank Darrin Pratt, director of the University Press of Colorado, whose patience and cheerfulness throughout the process of completing this project were much appreciated. Two anonymous reviewers greatly strengthened the coherence of this edited volume as well as the individual chapters. Kevin Gilmore drafted all the base maps used in each chapter, which provide a unifying visual spatial element in tying together the individual case studies. We also thank the anthropology departments at our respective institutions, the University of Denver and Indiana University, for their support. We each have unique archaeological foundations in Colorado and Wyoming, but it was in California that our mutual interests in the High Plains were jointly explored. We would lastly like to acknowledge the many influential friends and colleagues from UC-Berkeley: Steve Archer, Kevin Bartoy, Margaret Conkey, Kathy Corbett, Emily Dean, Carolyn Dillian, Kathleen Hull, Scott Hutson, Rosemary Joyce, Jenny Kahn, Stacie King, Kent Lightfoot, Jeanne Lopiraro, Amy Ramsay, Steve Silliman, Kathy Sterling, Kathy Twiss, Barb Voss, Bill Whitehead, and Laurie Wilkie.

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TWO

# Intersecting Landscapes in Northeastern Colorado: A Case Study from the Donovan Site

*Laura L. Scheiber*

THE STUDY OF LANDSCAPE incorporates holistic approaches for looking at the relationships among people, environments, and resources (Anschuetz, Wilshusen, and Scheick 2001; Layton and Ucko 1999). In my research, invoking a landscape perspective means considering multiple scales in space and time. I have been particularly inspired by the theoretical work of Barbara Bender, Tim Ingold, and Keith Basso and also by the firm methodological commitment to spatial analysis by High Plains archaeologists such as Lawrence Todd, David Rapson, and Charles Reher. In this chapter, I discuss how an emphasis on landscape shapes interpretations at one case study in northeastern Colorado.

The Donovan site (5LO204) is a prehistoric bison-processing locality located on a small terrace on the west side of a side canyon of Lewis Canyon, Logan County, Colorado (Scheiber and Reher 2007) (Figure 2.1). Lewis

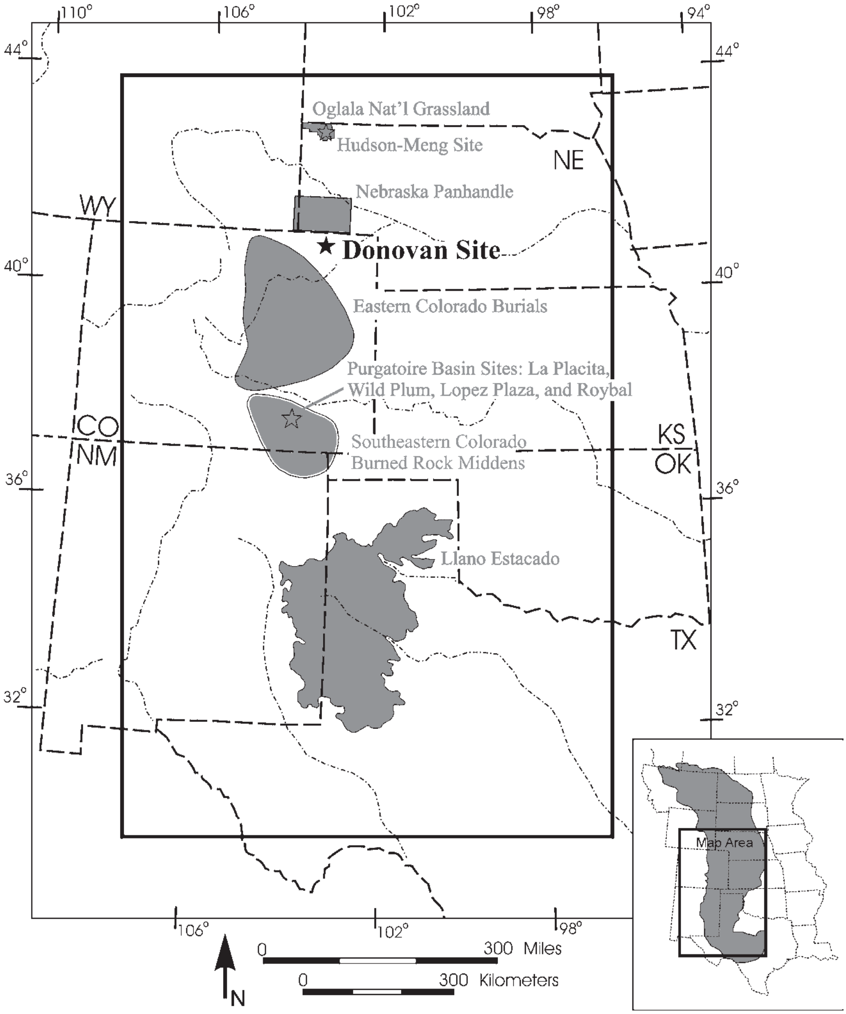


**FIGURE 2.1.**
*Map of the High Plains, highlighting Donovan site study area. Illustration by Kevin Gilmore.*

Canyon is composed of a series of canyons adjacent to a plateau upland known as the Peetz Table, approximately thirty-two km (twenty miles) north of the South Platte River (Conklin 1928:175). For thousands of years, people and animals have been attracted to this unique topography and to several freshwater springs still present in the area today.

The Donovan archaeological site was first occupied approximately 1,000 years ago by mobile people who carried distinctive pottery more commonly associated with the Central Plains tradition to the east, known as the Upper Republican phase or High Plains Upper Republican (Roper 1995, in press; Scheiber 2007). What is remarkable about this site is that it was revisited by what appear to be the same group of people over the course of several hundred years between A.D. 1000 and A.D. 1300, in a deposit that has one of the best-preserved late Holocene geoarchaeological signatures on the High Plains. During nine field seasons from 1992 through 2003, crews from the University of Wyoming's High Plains Archaeology Project documented at least eleven Upper Republican occupations (Scheiber 2001; Scheiber and Reher 2007). Because of the detailed recording methodologies employed at the site and the complex micro-stratigraphic sequences, which in some areas are more than two m deep, a total of only twenty square m has been excavated.

Although every occupation level slightly differs, they share similar characteristics: (1) cultural deposits often cluster around a hearth or group of hearth features; (2) highly fractured bison bones dominate the assemblage along with abundant quantities of lithic debitage; (3) the majority of the lithic material is from the nearby Flattop quarry; and (4) numerous expedient flake tools, end-scrapers, projectile points, some formal tools, ceramic sherds, and worked bone implements are usually present. People probably spent the majority of their time there butchering animals, cracking open bison bones to obtain fat-rich marrow, preparing food and hides, and sharpening and finishing tools. The site is a processing site, not a kill site, and probably represents secondary butchering and pemmican production after opportunistic bison hunting by small groups of related individuals. Given the similarity in organization of space and redundant patterning of butchering and secondary processing, we can expect that people participated in repetitive tasks while at the site, tasks that were reinforced through these daily activities and probably taught to successive generations (Scheiber 2005). We can envision small groups of families continually returning to the same favored place for several centuries. I began considering landscapes and people's possible perception of them when considering this multigenerational phenomenon. My own interests revolve around how and in what ways group and individual identities were shaped by practices of animal hunting, carcass processing, and food preparation (Scheiber 2001).

Much of our research has focused on excavation of the stratified deposits. However, we have also identified other nearby sites, isolated artifacts, and features in the wider canyon locale. For example, High Plains Archaeology crews located and mapped thirty separate bone scatters that aid in interpretation of bison taphonomy in the canyons (Reher, Liebe-Harkort, and Telldahl 2001). Some of the bones identified throughout the canyon probably represent the remains of kill sites associated with the main processing area where animals were processed for meat, marrow, hides, and bone tools.

## LANDSCAPE APPROACHES AT THE DONOVAN SITE

The landscape concepts I find particularly useful in my research at the Donovan site include a sense of place and life history of place. I spent ten summers excavating the Donovan site, considering prehistoric residents' return within the context of my own physical return. I share Brenda Bowser's sentiments that understanding "multiple perspectives on archaeological places is critical to the practice of archaeology today" (Bowser 2004:1). Some researchers may expect an archaeological landscape study to include large-scale settlement patterns, Geographic Information Systems (GIS), and geophysical survey. I support the use of these methods, although in this study I hope to broaden the relational dimension between land and people. I see these approaches as complementary interpretive methodologies at multiple scales that lead to different ways of perceiving landscape.

Archaeologists often investigate a site for years. Fieldwork alone can entail spending months at a time, year after year, at a particular location. Archaeologists also leave material traces. But rarely do researchers explicitly write about how these experiences shape their interpretations or about the field experiences themselves. This sense of self-reflection is well established in cultural anthropology (Royce 2002). Aside from thanking local landowners and dozens of crew in acknowledgments often published years after the work has been completed, little is said of the experience of fieldwork, especially the feeling of returning to the same site year after year on what feels like an annual pilgrimage or migration cycle. In discussing landscape, I find it essential to include the author's voice, my voice, and to add some self-reflexivity. An interest in reflexive methodology is growing in archaeology, although my work here addresses later interpretations after leaving the field as opposed to what Ian Hodder (2003) calls interpretation at the trowel's edge. In the following sections, I discuss several ways landscape perspectives can be used to address the past in this case study: as landscapes on the move, as daily practice, as sense of place, as contested places, and as narrative. This approach is meant to demonstrate how an emphasis on landscape can assume many forms even at one particular place, and all of the examples presented here are but brief glimpses into larger studies.

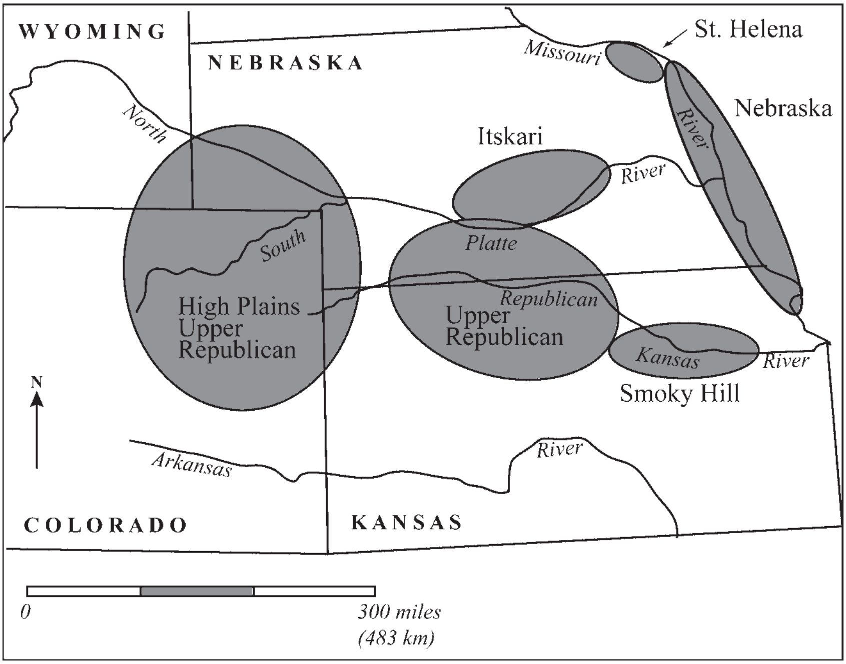


**FIGURE 2.2.**
*Map of the Central and High Plains, showing locations of the five phases of the Central Plains tradition and High Plains Upper Republican.*

## UPPER REPUBLICAN FRONTIERS: LANDSCAPES ON THE MOVE

The people who returned to the Donovan site nearly 1,000 years ago participated in a wider phenomenon that extended throughout much of the High Plains, in southeastern Wyoming, northeastern Colorado, western Nebraska, and western Kansas (Reher 1973; Scheiber 2006) (Figure 2.2). Although western High Plains people used materials diagnostic of small farming hamlets in the Central Plains province of central and eastern Kansas and Nebraska, that is, distinctive pots and projectile points, we have no evidence that they practiced agriculture or lived in earthlodge houses, characteristics of the Upper Republican phase as traditionally defined (Steinacher and Carlson 1998). Archaeologists have proposed several models for considering the relationships between these two areas: that eastern farmers left their villages during certain times of the year to hunt buffalo on the western Plains (Bell and Cape 1936; Strong 1935; Wood 1969), that indigenous western nomads received their materials through trade with farmers or copied their manufacturing techniques (Reher, Liebe-Harkort, and Telldahl 2001; Roper 1990; Wedel 1970; Wood 1971, 1990), or that mobile farmer-foragers seasonally moved across the landscape and gradually formed separate communities, maintaining contact with their cousins and perhaps sometimes traveling back and forth between regions (Roper 2002; Scheiber 2001; Scheiber and Reher 2007). I favor the last possibility because the western sites are relatively common, because of stylistic similarities between artifacts in both areas, because of broad seasonal use of the High Plains, and because of evidence for continued contact between areas in the form of ceramic and lithic sources. Additionally, despite a 200-year or more separation between the first and last occupations at the Donovan site, the levels look remarkably similar to one another and to regional site assemblages—more than one would expect from either summer hunts or indigenous emulators. This kind of shifting land use strategy is not unknown on the Plains. For instance, the historically recognized Crow migrated west into Montana from Hidatsa villages in North Dakota ca. A.D. 1500 (Frison 1967; Sutton 2002; Wood and Downer 1977).

Inspired by new research in frontiers, I see interactions with both new people and new places to be fundamental actions in forming and maintaining identity and in shaping cultural change and continuity. I consider a frontier as not just a place but also a process of establishing new identities (Klein 1997; Moore 1985). Studies of frontiers and landscapes intersect because both highlight the ways people encounter new places and spaces and the ways they construct and reconstruct new identities from these experiences. Barbara Bender (2001, 2002) uses the term "landscapes on the move" to refer to the process through which people adjust to new unfamiliar places that are often far from home. People living on peripheries can also be considered active participants in culture change, not just passive recipients of neighboring materials (Lightfoot and Martinez 1995).

The Donovan residents were people on the move, mobile residents of the High Plains. The first occupants in particular were far from home when they established a new place to which they would then return for many years. These people and sites are not peripheral to Central Plains tradition activities but are now seen as integral for interpreting the better-known farming communities (Roper 2002, in press; Scheiber 2001). Dates from Donovan confirm that people were there at least as early as the first farming hamlets were established. This transition to more settled horticultural life may best be understood by including the wider variety of daily lived experiences, which include so-called hunter-gatherer sites on the High Plains.

## DAILY LIVES: LANDSCAPE AS PRACTICE

Whether small-scale or large-scale, a focus on landscape is inherently a focus on space, place, and the relationships between them. A more fine-grained spatial analysis may consider landscapes as locations of daily practices. Material culture found in archaeological contexts is generated from the performance of daily tasks. The organization of daily life is studied archaeologically through redundancies in spatial distributions, the structure of events related to domestic tasks, and discard practices (Lightfoot, Martinez, and Schiff 1998:216–217). Because of detailed excavation methodologies at the Donovan site, we have a rich understanding of spatial patterning and site structure, which allows for a more complete discussion of everyday activities such as stone tool production and maintenance, bone tool and ornament manufacture, hide working, meat drying, intensive bone grease extraction, cooking, and hearth maintenance.

The organization of space is culturally variable (Kent 1984; Lightfoot, Martinez, and Schiff 1998; Marciniak 1999), and thus spatial patterning of discard is an important component of such an analysis. The material culture at the site represents both the structures of everyday life (*habitus*) and the efficiencies involved in doing repetitive tasks (Leroi-Gourhan 1993). The Donovan site is the embodiment of both of these guiding forces, thus demonstrating entrenched patterns of redundancy and the efficiency of skilled individuals, drawn together within a set of cognitive approaches to tasks (the cultural context). I am interested in demonstrating continuity and change through time in people's activities at the site. By studying the variability and distribution of material discard, especially faunal remains, I hope to consider the structured nature of daily activities at Donovan. My interpretations are derived from evidence using traditional data in the form of spatial distributions, bone counts, and bone surface modification.

For example, the distribution and kinds of materials from the first occupation at the Donovan site closely resemble hunter-gatherer campsites, multiple activity sites, and terminal processing loci (Bartram and Marean 1999; Binford 1978; Sivertsen 1980) (Figure 2.3). The occupants made choices as to what parts of the animals to bring back with them, and these choices were reflected in the way the animals were segmented into butchery units. Once these items were brought to the site, people further subdivided the portions, stripped and dried the meat, prepared the hides, and broke the bones into smaller pieces. They extracted the marrow, smashing the bones even more so the fragments could be placed in ceramic vessels that were set in fires to boil and skim the bone grease. When the pot was full and the grease was extracted, the contents were dumped out and the process was repeated.

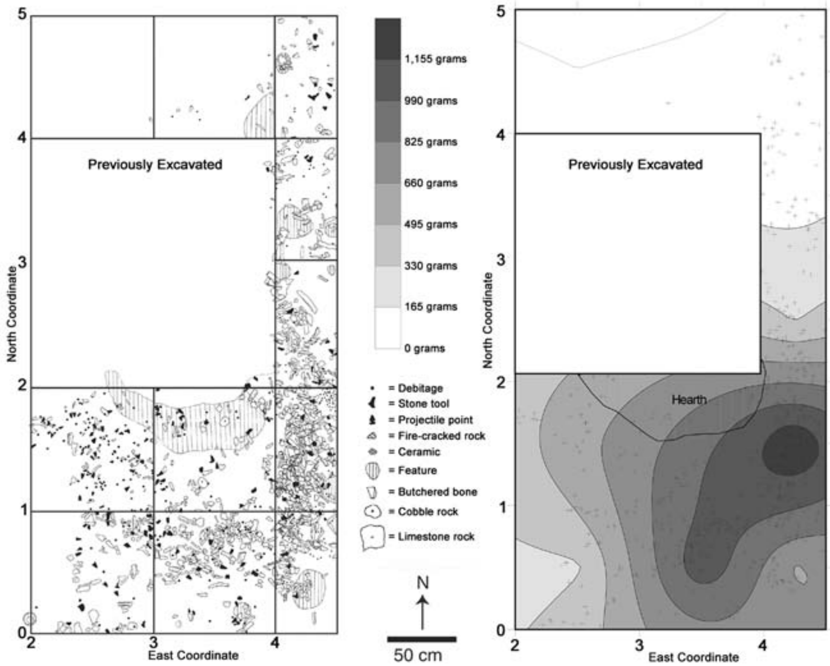


**FIGURE 2.3.**
*Donovan first occupation plan view* (left) *and density contour of bone weight for bones less than 3 cm* (right) *(+ indicates bone fragments; contours represent smallest bone fragments indicating processing and discard areas).*

The discard areas are not clearly demarcated from the smashing or secondary butchery areas. From the evidence in the excavated part of the Donovan site, the material manifestations of all these activities are concentrated in one area, with a gradual decline in the number of bone fragments radiating from it. The technique or process of marrow and bone grease extraction was well designed and patterned. Through time, people would return to work within and around distinctive processing areas, even using the same location for placement of their hearths. The combined evidence of numerous features, relatively high cutmarks, and burned bone indicates culinary processing and meat drying in addition to intensive bone grease extraction. These families probably occupied the site during the summer, after the buffalo had calved but before the rutting season.

The structural duality of procurement and processing on the North American Plains both reflects and creates economic behaviors and symbols of human action (Duke 1992). The process of butchering and secondary processing and cooking is a landscape in and of itself, a landscape that is constructed through social experience and is based on factors such as gender, age, and status (Perry and Potter 2002; Potter 2004). Tim Ingold (1993) has called these suites of activities “taskscapes.” Animal carcasses themselves can be viewed as landscapes or places of spiritual and practical meanings (Potter 2004; Whitridge 2004). The repeated tasks of bending and twisting the body to obtain animal products embed themselves in the butchering process. People move across the landscape and interact and identify with natural resources they encounter but also with a sense of place or cultural landscapes. Animal processing is an activity that probably occurred every day and is a daily task that involves natural resources in animal acquisition, but it also represents food practices, which are inherently social phenomena.

## SENSE OF PLACE: LANDSCAPE AND TIME

Continued reuse of a particular site during several years of one’s life may be a means of reckoning time, age, and social memory (Bender 2002; Gosden 1994), as a symbolic and material marker of the physical life cycle (Gilchrist 2000). The continued use of the same place on the landscape by the same group of people is “a critical element in their encounter with time” (Myers 1986:25), which both produces and in turn reproduces cultural identity. Each return in turn “rewrites” the landscape with new memories and a sense of identity (Parcero Oubiña, Criado Boado, and Santos Estévez 1998). As individuals move across the landscape, they create their own unique relationships with the land (Bender 2001; Knapp and Ashmore 1999). Passed on through years and generations, this multilayered connection with specific places becomes part of the social memory of individuals and the group as a whole. Multiple-occupation archaeological sites such as Donovan can therefore be conceived as a series of stories about past occupants (McBryde 2000).

A combination of seasonal variation, water drainage, sedimentation, and repeated human modification to the land caused the Donovan landscape to change over time. We can consider each new occupation as an opportunity to consider and remember the activities that occurred in the past and to re-create and reinterpret the processing locale. The hearths and hearth areas at the Donovan site served as focal points and were used repeatedly for several visits. High Plains peoples chose to use the same features on the landscape, whether visible or not, each time they arrived. These activities may have involved ritual or spiritual significance, but they were also important components in their everyday subsistence acquisition tasks. They are embodied landscapes in these occupants' memories (Bender 2002). Julian Thomas (1996:90) has stated that "while people often move in cyclical patterns in the course of routine activities, returning to the same location again and again . . . the places . . . are themselves continuously being physically altered and decaying, as well as continuously being re-evaluated and re-interpreted." Each subsequent return also means an appropriation of the past and of past landscapes (Gosden and Lock 1998). The very fact that Donovan residents returned to the exact same location shows that the past was used to legitimate the present (Bender 1998) and to create and re-create a sense of identity.

People at the Donovan site repeatedly returned to the fire hearths the first residents constructed. The successive generations of individuals returned to the same terrace in the same small side canyon to process buffalo meat and hides, to gather other important resources, possibly to re-create or reaffirm their places in their families and in their world. When the last Upper Republican occupants came to the site, they were separated from the first visitors by several hundred years and perhaps by several generations. They structured their practices much the same way their ancestors had, even while limiting their range of activities (Scheiber 2001). Upper Republican people disappeared from the High Plains at the same time their eastern cousins left the Central Plains, as they presumably traveled north in search of new homes and new spaces (Roper 2006).

## NEW ARRIVALS: CONTESTED LANDSCAPES

Several hundred years after the Upper Republican people at Donovan first traveled to the site, their descendants hunted, butchered animals, cooked and ate food, and told stories there for the last time. Archaeologists do not know where they went or why they no longer returned. The saga of the Upper Republican people probably continued in the eastern portion of the Plains as they migrated north. But that is not the end of the story at Donovan. Several hundred years later, probably about A.D. 1700, another group of people who may be Protohistoric Plains Apache (assigned to the Dismal River aspect) (Gunnerson 1960) found the small terrace on the small side canyon and surrounding area, again hunting and processing buffalo. Ceramics and projectile points found in the main site area as well as the wider vicinity bear further witness to this new occupation at the Donovan site, a new group of people to inscribe meaning onto the landscape.

Does the story end here, then, at the twilight of prehistory? Not so, if we acknowledge the many historically recognized Native American groups who traveled through the canyons at least until the 1870s in what became a contested landscape between indigenous and non-indigenous occupants. Early American pioneers describe Indian presence in the canyons, today evidenced by occasional trade beads and historical artifact scatters. The Arapaho, Cheyenne, Pawnee, Lakota, and Ute passed through Logan County at least until the 1860s and 1870s (Conklin 1928). The historic battle of Summit Springs was fought between Cheyenne Dog Soldiers and the Fifth U.S. Cavalry in 1869, only forty-eight km (thirty miles) southeast of the Donovan site (Reher, Weathermon, and Finnell 2006; Werner 1991). Several years after most Indian tribes had been forcibly relocated, thousands of Lakota camped along the South Platte River, just south of the Donovan site (Wells 1976). As late as the summer of 1874, a group of Lakota Sioux left the Red Cloud Agency in Nebraska to hunt buffalo in Logan County (cited in Conklin 1928:68).

Settlers occasionally mention Lewis Canyon by name in their recollections of early pioneer life (Conklin 1928:71, 316, 337). W. L. Henderson stated that early Logan County residents often thought Indians hid in Lewis Canyon or went there to obtain water. Mr. McConley found Indian beads in the bushes near the springs at Lewis Canyon. Mrs. Susan Powell Deveau recalled that "one morning in the spring of [18]76 . . . he [Mr. E. Cole], with three of his men, started for Lewis Canon [sic] to pick up some stray cattle. They stopped in the canon at noon and were attacked by a bunch of Indians, begrimed and bedecked. Three of the men were killed instantly" (Conklin 1928:337).

Lewis Canyon, and the by-then largely buried Donovan site, were part of the open range when 16-year-old Len Sherwin began taking care of the family cattle there in the early 1890s (Figure 2.4). Len lived in a sod dugout he built in the canyons, which is still visible today as a grass-covered, rectangular-shaped mound near one of the springs. In his 1899 autobiography, he wrote: "I had my dogs, my horses and traps so I did not get very lonesome. . . . I had it all my own way at the canyons. Sometimes I would not see anybody for two or three weeks" (cited in Garst ca. 1993:102). He later homesteaded the area with his wife, Hilma Anderson, and their seven children (Propst 1986). Len and his family originally moved west from Ohio and Kentucky, and he loved all things associated with the Old West. In 1918 he bought three buffalo at the Denver Stock Show and reintroduced them to the Lewis Canyon area, inspired by his sense of nostalgia for the Old West (Figure 2.5). For a short while, buffalo once again lived on the Peetz Table, and some of the buffalo bones still found eroding from the banks of the canyons may be from this small historical

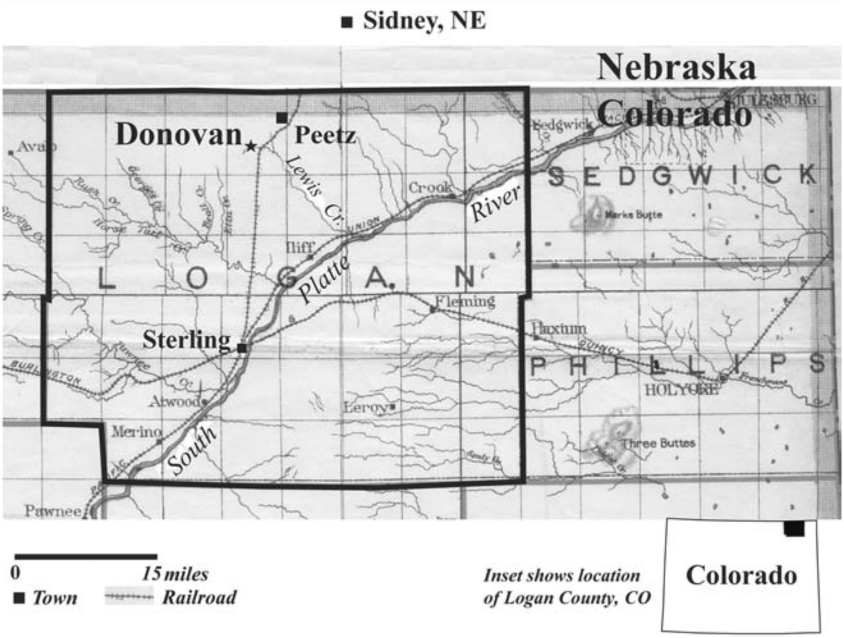


**FIGURE 2.4.**
*Historic map of Logan County, Colorado, and vicinity (modified from Dinsmore 1905).*

herd. Several years later he bought twenty more head of buffalo and moved the operation (Wells 1976). Len Sherwin died in 1929 when he was 53. Several local newspaper stories memorialized the man, his nostalgia for western history, and his efforts to reintroduce bison to the Plains long before contemporary bison conservation efforts. Not much is said, though, about Hilma, who at age 45 became a widow with seven children ranging from 6 to 18 years old. She managed the ranches, the herds, and the kids for over 30 years after her husband died. Her daughter Marguerite later married Tim Donovan, and they all ran the ranch together. It is said that their children were "no lovers of conventional employment; [they] scattered and returned to the ranch, drawn by some elementary gravity of the place" (Garst ca. 1993:139). Len's children and grandchildren ranched in the canyon for 100 years. Although landownership has since changed, the Donovan family still considers this place an important part of their heritage.

The land continues to hold its allure and contested nature even today. For years, people from surrounding Colorado towns came to this place to

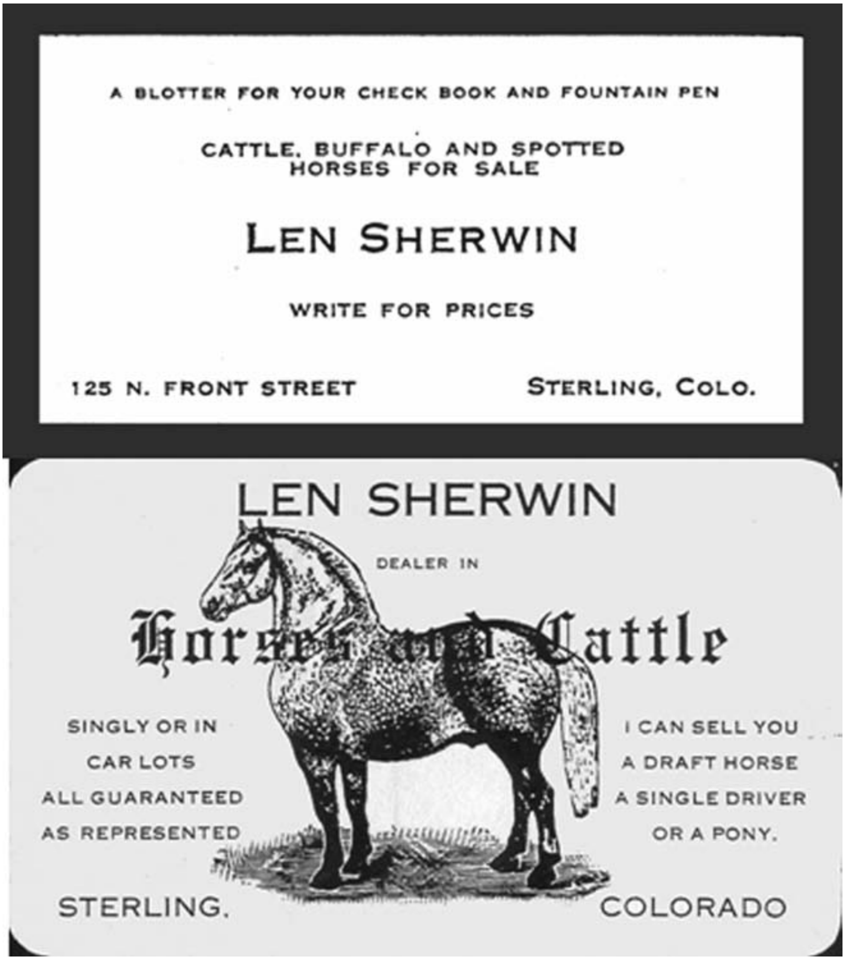


**FIGURE 2.5.**
*Historic business card and check blotter advertising Len Sherwin's ranching operations.*

camp, hike, and explore, lured by the presence of rare canyons in otherwise flat farmlands (but not always having the landowner's permission). It was during one of these excursions in the 1980s that Lloyd Hobbes, a local resident of Sterling, Colorado, discovered artifacts eroding from the bank of one of the dry sand arroyos of Lewis Canyon. Avocational archaeologists from the Colorado Archaeological Society excavated the site during several weekends between 1982 and 1985. Bill Tate wrote in the *All Points Bulletin* that "this is the chance to work on a site quite different from others in which our group has been involved. It is a chance, too, to meet some fine, knowledgeable people" (Tate 1982:3). Because of the efforts of Mike Toft and Mike Dollard, Sterling residents who believed the Donovan site contained enormous research potential, Charles Reher, a professor at the University of Wyoming and principal investigator of the High Plains Archaeology Project, was given permission to begin a professional archaeological excavation at the site in 1990. These excavations continued as an ongoing project almost every summer throughout the 1990s and into the early 2000s. To the local community, we may be seen as outsiders studying an Indian past, a fact that may not resonate with the mythology constructed by the grandparents of those living there today. Some still think we are digging up ancient Indian skulls, not butchered buffalo bones. Our continued presence at this site reminds us that the landscape is always in process and constantly redefined (Basso 1996). We "cannot disentangle time from place and landscape" or determine whether, perceived or not, the past is always contested in the present (Bender 2001, 2002:S111).

## THE MAKING OF AN ARCHAEOLOGIST: LANDSCAPE AS NARRATIVE

For a final perspective on landscape, I return to a reflexive narrative. My accumulated knowledge of and experience with the Donovan site and surrounding canyons exist as a contemporary palimpsest today, undifferentiated nooks and crannies that take on meaning by my connection to them. I remember the first time we drove south from Wyoming, interlopers from another state, driving along gravel roads in the hot summer past bluffs and buttes, not yet knowing the features as we drove by. As archaeologists, we want to learn from the past, yet we are also the latest people to come to a place with the belief that we have a unique connection to the land by our interest in what is below it. And as such we bring our own ideas about the place, and the landscape becomes part of our own memories and creates our own identities. Our lives as researchers are not static. Even archaeological fieldwork is historically and socially situated (Berggren and Hodder 2003; Gero 1996). The methods and techniques used in 2003 were not the same ones we used in 1992 or the ones the amateur archaeologists used in 1985. Landscapes of the past intersect with the landscapes of the present. At least 95 archaeologists and archaeologists-in-the-making have worked at this site. That's almost 100 people. I wonder if that is more than the total number of Indian people who stayed at the site. My students have since trained their own students, and the cycle of knowledge has continued, as I imagine it did for the original residents who trained the next generation how to be at this place. We archaeologists have now spent more than ten years investigating the canyon, leaving our own traces and creating our own experiences of place.

Many of the features in the vicinity are embedded with meaning, and my mental map references both places and events (Figure 2.6). We camped down by the springs near the old sod dugout and later camped around the bend from the site near the historic Indian camp. We gathered water and screened dirt at the old stock tank. We tried to make the stock tank into a personal Jacuzzi. We hiked everywhere in the country. We became "plum relaxed," content to be back at our favorite place. We watched dozens of summer lightning storms, some of which became tornadoes, roll across the Plains. We got to know every channel and butte. I personally spent days, the equivalent of six months, at the bottom of a two-meter-square hole where 1,000 years earlier, people continued their daily business (Figure 2.7). I point to the stratigraphic levels and remember personal events in my own life. The levels of the site are like a mnemonic device for me and how I experienced life in those ten years. I went from being a recently graduated college student to a field school instructor to a graduate student writing my dissertation, to bringing my own students, to being a young professor. This time shaped the archaeologist I am now: I think all artifacts should be mapped to the nearest millimeter; I think students need to camp in remote places to truly experience the past; I separate all bone into bison and non-bison categories; I see scale as particularly relevant for archaeological research; I am dogmatic about data-recording consistency; I view community outreach as a key element of good fieldwork; I believe a decent shade can make all the difference in the success of an archaeology project. The people who once lived in Lewis Canyon did not leave written records of their journeys. Their stories have become my stories, to tell and to experience. I will bring my experiences from Donovan with me, even as I work in completely different areas. Connections among memory, identity, and landscape will continue to play a prominent role in the way I conduct archaeology.

## CONCLUSIONS

The title of this chapter is "Intersecting Landscapes," and I think this intersectionality is what makes studying landscapes in general and the Donovan site more specifically interesting. Scale continues to be a critical component in this approach, linking coarse- and fine-grained narratives. For me, landscape and social memory act as a bridge between macro-scale models of frontier

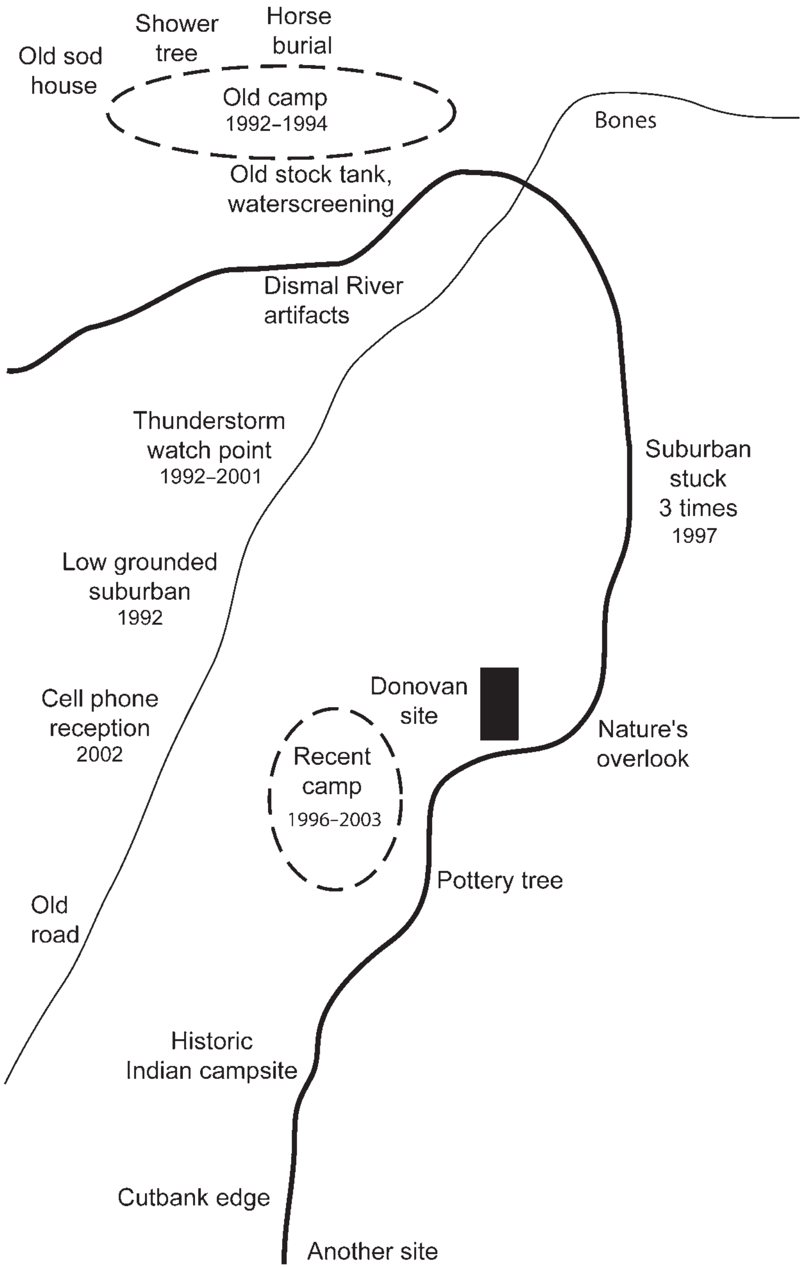


**FIGURE 2.6.**
*Laura Scheiber's mental map of the Donovan site and Lewis Canyon.*

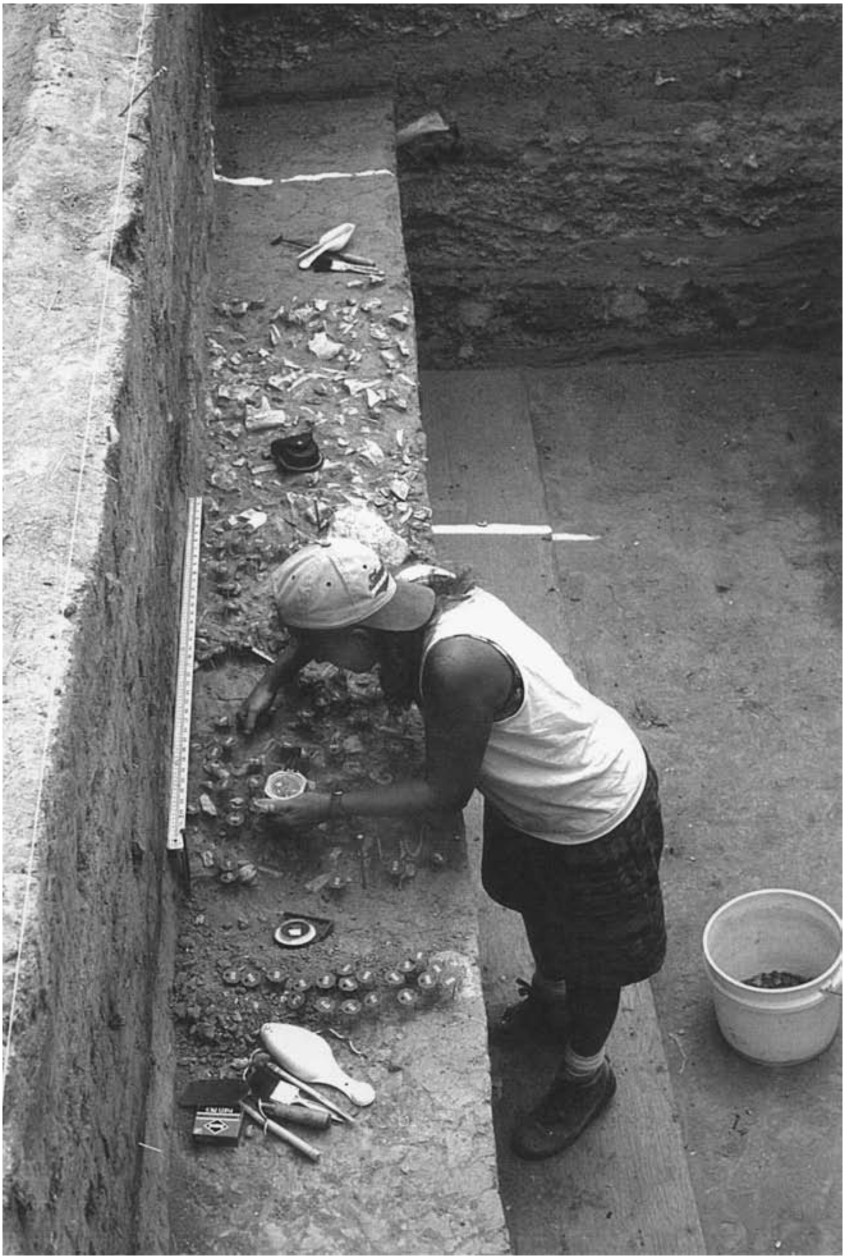

**FIGURE 2.7.**
*Donovan site excavation units, July 1997.*
*Photograph by Charles A. Reher.*

process and forager-farmer interaction on the one hand and micro-scale daily activities at a site with multiple occupations spanning several generations on the other. At the same time, I am fascinated by a grounded sense of place and the contested nature of past and present occupations of the Old West. Wendy Ashmore advocates studying the use of a place throughout its existence (Ashmore 2002:1178), and I have attempted to do this here.

In the final analysis, does having knowledge about the possible Lakota or Cheyenne campsites and the Sherwin ranching activities change or strengthen interpretations about ancient buffalo processing? Do my memories of staring at dirt profiles in the bottom of an excavation unit help explain the archaeological record? I think they provide a broader context for interpreting the results by reminding us of connections between time and space, and for helping us to thus people (and humanize) the past. The study of the land and our knowledge of it connect us to those who came before us. Perhaps it is because many of us have lost a connection to the land in which we live that we think it is profound. Landscape exists as a physical reality but also as a metaphor, for place and for time. The combined outcome is a more holistic view of the Donovan site. I think this is a critical dimension of research for all archaeologists, including those working on the High Plains, with its characteristic landscape.

## ACKNOWLEDGMENTS

My work at the Donovan site is pivotal to my development as an archaeologist, a scholar, and an individual. I sincerely thank everyone who made this experience possible for me—landowners, students, professors, volunteers, and friends. I especially thank Charles Reher, Kate Maxfield, Oskar Burger, Judson Finley, Gina Zavala, Kili McGowan, Margaret Conkey, Mike Toft, Mike Dollard, and Bob McKenzie. The University of Wyoming and High Plains Archaeology sponsored the research, and the Donovan and Nelson families provided permission to excavate in Lewis Canyon. Student participation has been critical to this project, and I greatly appreciate the help of dozens of students from the University of Wyoming, University of California–Berkeley, University of California–Santa Cruz, and Indiana University. Additional funding was provided by the Stahl Endowment of the Archaeological Research Facility, the Lowie and Olson Funds of the Department of Anthropology, and the Vice Chancellor for Research, all of the University of California–Berkeley, as well as the George C. Frison Institute for Archaeology at the University of Wyoming and Mike Toft of Sterling, Colorado. Mikey, Bev, and Megan Donovan kindly provided unpublished family papers during the summer of 1999.

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THREE

# Making Places: Burned Rock Middens, Feasting, and Changing Land Use in the Upper Arkansas River Basin

*Mark D. Mitchell*

Research on the relationships between human groups and the places they inhabit has a long history in American archaeology. In the 1930s and 1940s, scholars working in the Great Plains, the Southwest, and the Great Basin began to investigate the interactions between culture and the environment (e.g., Steward 1938; Wedel 1953). By the close of the 1960s, the study of human ecology, often conducted by interdisciplinary teams, had become an important aspect of archaeological research throughout the Americas.

An integrated landscape approach emerged in the 1970s, as archaeologists began to recognize the importance of understanding activities taking place away from residential settlements. This approach encouraged scholars to combine and compare disparate lines of evidence, including data on the organization of technology; on the location, structure, and size of residential sites; on the form and permanence of residential architecture; and on the occupational or life histories of sites and features (Wandsnider 1992). More recently, the increasingly widespread use of remote sensing data (Kvamme 2003) and Geographic Information Systems has greatly amplified the power of archaeological landscape analyses.

As landscape research has progressed, many scholars have come to recognize that land use strategies are affected as much by the meanings and values people assign to the places where they live as they are by the physical properties of the environment (Ashmore 2002; Ashmore and Knapp 1999; Basso 1996; Bender 1993; Gosden 1994; Hirsch and O'Hanlon 1995; Ingold 1993, 2000; Lemaire 1997; Thomas 1996; Tilley 1994; Ucko and Layton 1999). Proponents of this view argue that the landscape is more than simply a neutral backdrop for human activity. It is also experienced and interpreted by the people who inhabit it, and those experiences and interpretations guide the ways it is used. The cultural "decisions and dispositions" governing mobility strategies, resource exploitation patterns, or the design and placement of constructed features reflect shared ways of seeing the land, which in turn reflect the social relations and material practices through which resources are appropriated (Ashmore 2002:1172; Cosgrove 1998; Pred 1984). Explanations for changing land use strategies must therefore focus not only on the material settings in which human action takes place but also on the cultural practices through which human groups create resources.

In this chapter, I explore the implications of this new approach for interpreting hunter-gatherer land use in the upper Arkansas River Basin in southeastern Colorado (Figure 3.1). To do so, I focus on the life histories or biographies of one prominent class of food-processing facilities. I argue that these features, known archaeologically as burned rock middens, played important roles in shaping land use and mobility patterns in the region, not because of their spatial relationships to particular plant and animal communities but because they marked socially valued places. I frame the discussion by first briefly considering the historical roots of functional landscape analysis. I then sketch the outlines of the social landscape approach. Finally, I compare and contrast interpretations of southeastern Colorado's burned rock middens derived from each of these models, concluding that an understanding of the history of human engagement with place is critical for explaining changing mobility strategies.

## DECONSTRUCTING THE ENVIRONMENT

At least since the 1960s, hunter-gatherer subsistence practices and settlement systems have been explained as adaptations to the physical properties of the

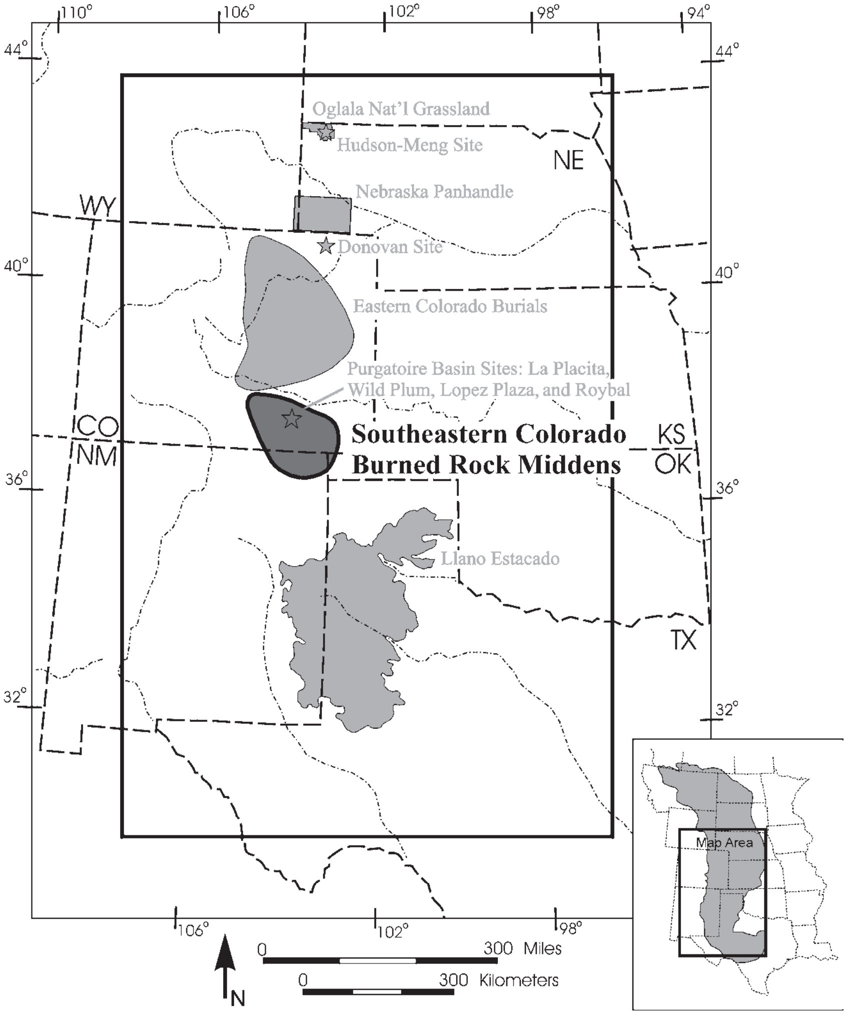


**FIGURE 3.1.**
*Map of the High Plains, highlighting southern Colorado burned rock middens. Illustration by Kevin Gilmore.*

environment (Bettinger 1991; Kelly 1995; Winterhalder and Smith 1981). In this view, the organization of production is determined by environmental variables, including the location, density, or predictability of resources (Winterhalder 2001). Decisions about where to live and how to move across the landscape can be explained by relating them to the properties of the environment (Binford 1980) and secondarily to the land use decisions made by competing groups

(Cashdan 1992). As records of those decisions, the design, placement, and life histories of constructed features are believed to reflect long-term environmental trends (Binford 1982).

Critical to this functional approach is an ontological distinction between the landscape, defined as an arrangement of resources whose distributions are governed by natural processes that can be objectively described and measured, and the human actions through which those resources are exploited. Because the structure of the natural world explains the organization of the cultural worlds of the people who inhabit it, nature and culture must constitute distinct and separable domains. It must be possible, for example, to define resources without reference to the cultural functions they fulfill. It must be possible to view the land as if it were unsettled, empty, unpopulated. Nature must be an object that can be perceived directly.

The genealogy of this view of landscape, as ontologically distinct from human culture, can be traced at least to the 1400s (Cosgrove 1998; Gosden and Head 1994; Hirsch 1995; Knapp and Ashmore 1999; Lemaire 1997; Tilley 1994). The emergence of the natural world as a distinct object of study was first reflected in Renaissance pictorial and cartographic techniques designed to set the landscape apart from human observers. Drawing on Euclidean geometry (Cosgrove 1988), European artists during the fifteenth century began experimenting with linear perspective. By creating the illusion of three-dimensional space, perspective establishes a literal and metaphorical point of view and, implicitly, a viewer located outside the scene. The emergence of modern cartographic techniques at about the same time helped solidify the partition between nature and culture by replacing descriptions of the land in terms of routes or other sequences of human action with descriptions rooted in the abstract principles of distance and arrangement (Certeau 1984:120). These new conceptual systems were encouraged by the simultaneous invention of new technologies for seeing, including the telescope, the camera obscura, and the microscope (Cosgrove 1998). Over time, these methods and technologies firmly established the division between an active, cultural observer and the passive, natural landscape (Bender 1999). They became ways of perceiving the world that encoded particular ideas about the relationship between nature and culture, ideas that made possible the notion of abstract nature—existing outside human action—separated from an autonomous, disengaged observer (Barrett 1999a:22; Tilley 1994).

The recognition that the functional approach to landscape is predicated on a particular way of representing the land, one that can be traced to a particular cultural and historical setting, has led many scholars to question whether it can be applied to the study of the ways non-Western peoples perceive and use their land (Bender 1993, 1999, 2002; Head 1993; Hirsch 1995; Johnston 1998a; Knapp and Ashmore 1999; Lemaire 1997; Tilley 1994; Ucko and Layton 1999). But rejecting the universality of functional analysis does not entail accepting a definition of landscape only in terms of perception and experience. In fact, such a definition threatens simply to replace the "naturalistic fallacy" of functional models—the notion that the landscape is nothing more than a passive substrate—with the "culturalistic fallacy" that the landscape is nothing more than a social construct (Lemaire 1997:11; see also Johnston 1998b). However, a closer look at the history of Western landscape representation points up an altogether different approach.

The objectification of nature expressed in early modern landscape painting, map making, and other disciplines was critically important to the growth of capitalism in Europe (Cosgrove 1998; Lemaire 1997:6–7). Capitalism fundamentally altered the ways Europeans both used and perceived the land. The development of markets for buying and selling property necessitated new systems for describing and recording locations. New technologies affected the nature and scale of resource extraction. Changes in the organization of production transformed people's connections to places. Thus, the new modes of representation arose with and facilitated a new mode of appropriation. Capitalism remade the ways Europeans used the land, prompting new ways of seeing the land. In turn, the objectification of nature helped make the expansion of capitalism possible. In short, perceptions of the environment are bound recursively to the appropriation of resources.

Archaeologists can reconcile the fact that people perceive their environment in culturally conditioned ways—and act on the basis of those perceptions—with the ineluctable materiality of the world by abandoning an analytic approach that treats nature and culture as discrete and separable domains (Ingold 2000:58–60). Instead, landscape should be understood and analyzed as a synthesis of the world's physicality and the human meanings with which it is permeated (Lemaire 1997). Landscape is not equivalent to the environment, nor is it merely an imaginative representation of the environment. Rather, it can be defined in terms of spatially differentiated social practices, which structure, and are in turn structured by, physical spaces and natural materials (Ingold 1993). Landscape emerges from the acts of appropriation or dwelling. It is not simply a matter of different perceptions of the world but of different ways of acting in the world. In short, landscape is neither culture nor nature but "the material manifestation of the relationship between humans and the environment" (Crumley 1994:6; see also Fisher and Feinman 2005).

## CONSTRUCTING THE SOCIAL LANDSCAPE

Two important avenues for research are opened up by the view that landscape comes into being through human occupancy and appropriation. Since the early 1990s, archaeologists increasingly have come to appreciate the role played by human action in shaping the earth's ecosystems and have realized that ecological change cannot be understood apart from changing cultural practices and perceptions (Barnes and Williamson 2006; Delcourt and Delcourt 2004; Denevan 1992; van der Leeuw and Redman 2002). At the same time, the social landscape approach has stimulated research on the ways symbolic systems and social relations affect land use decisions (Gosden and Head 1994; Pauketat 2001; Tilley 1994). In the following paragraphs I outline some of the major features of the latter work.

In making their living, all human groups engage the land. They draw from it the materials necessary to sustain themselves biologically, socially, and culturally. But the transformation of materials into resources for the satisfaction of human needs is a cultural act. That is, resources are brought into being by processes of extraction and manipulation carried out by individuals and groups that have defined relationships with one another and that hold particular beliefs about the world in which they live. Moreover, these processes employ particular kinds of technologies, which themselves require particular organizational modes and skills to operate. Materials become "social utilities," resources necessary for the fulfillment of individual physiological needs as well as the reproductive requirements of social life, in ways dictated by the forces and relations of production (Godelier 1979) and by cultural systems of value. For this reason, resources cannot be defined without reference to technological practices, social relations, and symbolic systems.

The land acquires social and symbolic value in the same way. The livelihood of a group entails the performance of a variety of productive tasks. Each task derives its significance and meaning from the "taskscape," the aggregate of tasks carried out by the group (Ingold 1993:158). To the extent that the taskscape is distributed across the land, the landscape becomes its material manifestation, its "congealed form" (Ingold 1993:162). Because the landscape comprises resources brought into being by extractive acts or tasks structured by social rules, then it must also embody social relations and cultural meanings. This is what is meant by the "socialization" of the landscape, the cumulative impact of human action distributed over the land (Bradley 1993; Tacon 1994).

Thus, landscape is not simply a passive arrangement of objectively defined resources, a Cartesian terrain that exists outside human action. Rather, it comprises an array of interlocking places, created through social practice, that exhibit varying degrees of economic, social, and ideational potential. Places become significant for social reproduction by virtue of their relationships to materials, people, and the cosmos. The potential of a place can therefore be defined in terms of technologies, the relations of production, and cultural values.

This reproductive potential emerges over time from sequences of action that are structured as much by prior social action as by the physical properties of locations and materials (Bender 2002; Gosden and Head 1994; Ingold 1993). Three temporal scales can be identified in the analysis of social landscapes. The smallest scale reflects local experience and individual learning, where observation and repetition combine to produce routine social action (Shennan 1993). Such practices range from habitual bodily movements (Bourdieu 1977; Mauss 1973 [1935]) to the complex practical competencies that make everyday life possible. Such routine activities, both sacred and secular, are carried out within the spatial and temporal limits of individual lives. At this scale, the appropriateness of particular social practices is often taken for granted or "misrecognized" as natural; however, in some cases, particularly during periods of social disruption, they may become objects of conscious scrutiny (Bourdieu 1977; Giddens 1979).

At a somewhat larger scale, landscapes can be understood in terms of social memory. Memory situates the routine actions of daily life within broader cultural contexts, thereby locating social action within a wider field of "mythic and moral principles" (Knapp and Ashmore 1999:13; Van Dyke and Alcock 2003). Individuals locate personal memories within specific places and with specific objects that embody shared social meanings. Social memory maintains continuities of practice that bridge generational divisions and transcend local places. At this scale, landscapes are a subject of discourse, as people make meaningful connections between places and the systems and structures they embody. Public ritual events are one important context through which connections are made between places on the landscape and valued meanings and social relationships. Sacred and secular rituals and the places in which they are performed reproduce one another (Connerton 1989).

Landscapes can also be understood in terms of persistent cultural traditions, which reflect both long-term ecological processes and the symbolic meanings given to human action (Duke 1991). This largest scale is perhaps most familiar to archaeologists because it most clearly reveals the long-term organizational principles that structure the creation of places. Large-scale structure results from interactions between the physical constraints of locations and materials and the dominant mode of production that transforms them into resources.

Such constraints and organizational principles are instantiated in action even as they form the context for future action.

Because the landscape can be equated with the content and structure of social action through time, it can be explained in relation not only to the physical arrangements of locations and materials but also to the processes of social appropriation. To illustrate how this definition of the social landscape can be used to explain the life histories of archaeological features, I now turn to data on land use in the upper Arkansas River Basin and on the life histories of burned rock middens.

## LAND USE PATTERNS IN THE UPPER ARKANSAS RIVER BASIN

Between 3000 B.P. and 500 B.P., people living in southeastern Colorado pursued a dynamic, broad-based hunting-and-gathering subsistence strategy (Kalasz, Mitchell, and Zier 1999; Zier 1999). Although the makeup of faunal and macro-floral assemblages varies somewhat from place to place, the subsistence system appears to have been remarkably stable throughout this long period, and no evidence suggests that particular groups pursued exclusive procurement strategies. Maize first became available in small quantities about 2,600 years ago (Zier 1999:137), but while the dietary importance of maize and other cultigens likely increased after about 1800 B.P., it never exceeded that of meat and gathered plants.

However, during this period, distinct changes did take place in the ways people used the landscape. During the Late Archaic period (3000 B.P.–1850 B.P.), human groups exploited all of the region's diverse ecological zones, from mountain valleys to open steppes to deep canyons (Zier 1999:132). A few sites, particularly those located in large rock shelters, appear to have been occupied repeatedly and may have served as base camps at which a comparatively wide range of activities were carried out (Zier 1999:133). Nevertheless, most Late Archaic sites appear to have been occupied briefly.

Features dating to this period consist almost exclusively of burned rock concentrations ranging up to about 1.5 m in diameter. These features were likely used for a variety of tasks. Small, rock-filled basins up to 50 cm in diameter and 25 cm deep are especially common. Deeper, steep-sided, slab-lined basins have also been recorded, as have surface concentrations of fire-cracked rock; some of the latter may represent secondary deposits resulting from hearth cleaning (Zier 1999:135).

No unequivocal Late Archaic storage features have been documented in the region (Zier 1999:135). Only one habitation structure (a shallow house pit with a ramp entryway) has been recorded (Shields 1980). Although this feature has been interpreted as part of a "village," no other habitation features have been recorded at the site, and no other similar features have been attributed to the Late Archaic elsewhere in the region (Zier 1999:134).

These data, especially the near absence of storage features and substantial habitation structures, indicate that during the Late Archaic, residential mobility was relatively high. Little investment was made in the construction of facilities. Some sites were periodically reoccupied, but sites in different ecological zones often contain functionally comparable assemblages.

This long-standing pattern began to shift during the subsequent Developmental period (1850 B.P.–900 B.P.). About 1,500 years ago, hunter-gatherer groups began building single-room, semi-subterranean stone and brush shelters in open settings and rock walls or partitions in rock shelters (Kalasz, Mitchell, and Zier 1999). The freestanding structures, which are typically circular in plan and range in diameter from about 3.5 to about 8 m, are found mostly on canyon rims. Partitioned rock shelters vary greatly in size, although most are low and shallow. Small storage features, consisting of bell-shaped pits or rock-lined cists, are frequently associated with these structures.

Like their Late Archaic predecessors, Developmental-period hunter-gatherers exploited a wide variety of environmental settings. But Developmental-period artifact assemblages and feature types are more variable, suggesting greater task differentiation and greater variation in occupation duration (Kalasz, Mitchell, and Zier 1999:175). Rock shelter sites and open sites lacking architectural features exhibit a wide range of attributes. Architectural sites are comparatively uncommon, but those that are known differ from one another in important ways. Many small sites appear to have been used for specialized plant-processing tasks.

These trends continued during the Diversification period (900 B.P.–500 B.P.). Architectural features became larger and more complex, and storage features became more numerous. Structures containing up to ten rooms were built in some locations (Gunnerson 1989). Some rooms or partitioned spaces were probably used for communal activities, while others may have served as storage facilities. The sizes and forms of both architectural and non-architectural features vary across the region, suggesting that different groups pursued distinct economic strategies. Maize is present on some sites, but as previously noted the overall contribution of cultigens to the diet was limited. Macrofloral data attest to the importance of gathered plants, especially goosefoot (*Chenopodium*). Most faunal assemblages are dominated by deer and cottontail, although significant variation is evident between open sites and rock shelters (Kalasz, Mitchell, and Zier 1999).

These data indicate that residential mobility began to decrease after 1500 B.P., likely reaching a minimum at the end of the Diversification period, about 500 years ago. During this period, hunting-and-gathering groups made greater investments in the construction of domestic structures and storage facilities, suggesting that certain localities were used more frequently and perhaps for longer periods. The simultaneous increase in assemblage diversity indicates that as residential mobility decreased, the spatial segregation of productive tasks increased, with some activities restricted to particular settings. Especially after 750 B.P., the settlement system may have incorporated brief periods of population aggregation. Nevertheless, the absence of extensive accumulations of cultural debris indicates that most sites and structures were occupied intermittently. The sporadic occurrence of cultigens, along with the lack of agricultural tools and the frequent placement of habitation structures away from arable land, supports the view that hunting and gathering, involving some degree of residential mobility, remained the primary subsistence strategy throughout the period.

## BURNED ROCK MIDDENS

Along with stone and brush enclosures and storage features, large burned rock middens also first appeared during the Developmental period. These features differ in both size and content from simple domestic hearths and plant-processing features (Table 3.1). Each consists of an exceptionally dense and compact accumulation of burned and fractured rock. Most are circular or slightly elliptical in plan, with well-defined margins. Two forms have been documented: mounded or dome-shaped, which is the most common, and annular or ring-shaped. Excavated middens range from just over 3 m to 12 m in diameter. The rocks comprising the middens range in size from large slabs and blocks to irregular cobbles and pebbles. Some of the largest stones are flat-lying, but most are randomly oriented and tightly interlocking (Figure 3.2). The extent of heat alteration varies among stones. In most middens the matrix is black because of the presence of abundant, finely divided charcoal. All of the middens for which there are data were built in shallow pits.

Unlike hearths and other small burned rock features, which typically contain few artifacts, southeastern Colorado's burned rock middens contain large and diverse artifact assemblages (Kalasz 1990; Mitchell 2001). Both burned and unburned flaking debris is abundant, as are chipped stone tools and tool

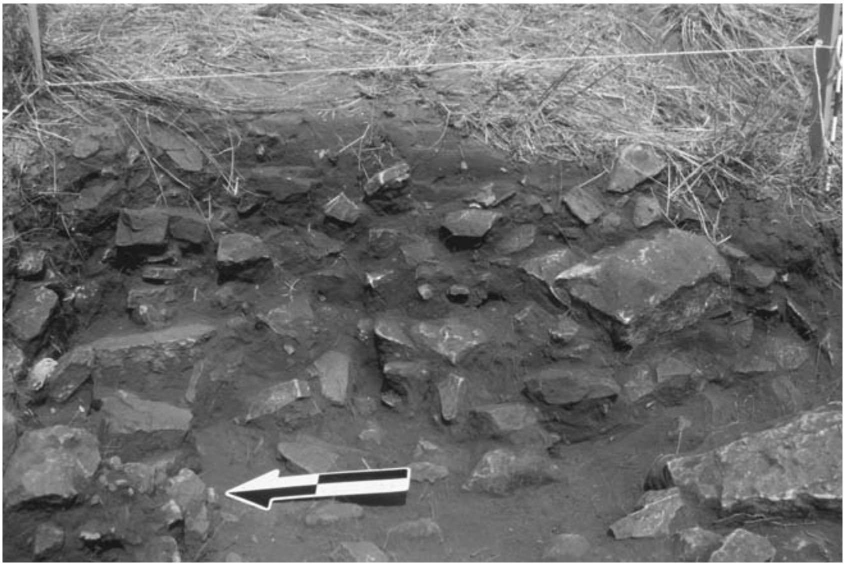

**FIGURE 3.2.**
*The large burned rock midden at 5LA5840.*

fragments. Groundstone tools, including handstones, millingstones, and enigmatic multifunction abraders, are common. Pottery is typically present. Decorative items, including shell and bone beads, occur frequently. Charred botanical remains are present in most middens, but faunal remains are notably rare or absent. Artifacts are generally more abundant in middens than they are in nearby contemporaneous cultural deposits.

Although widely distributed, large burned rock middens are relatively uncommon in the upper Arkansas River Basin. In one extensively surveyed part of the basin, just 1.5 percent of recorded fire-related features (11 of 733) fall into the largest size class (32 to 53 $m^2$) (Kalasz 1999:XII-79). Most middens are located on high terraces in canyons, but they also occur on canyon rims, mesa tops, and steppes. Many are located adjacent to clusters of domestic architectural features, in what can be interpreted as small plazas or communal work areas (Figure 3.3). Generally, in such cases only one midden is present. All of the excavated middens were constructed between about 1870 B.P. and 515 B.P., although most of the associated dates fall between 1220 B.P. and 855 B.P.

The functions of burned rock accumulations such as these have long been debated (Black 1997; Collins 1994). From the beginning, it has been assumed

Table 3.1. Data on Excavated Burned Rock Middens in the Upper Arkansas River Basin.

| *Site and Feature* | *Max. Diameter (m)* | *$^{14}$C Age(s) (B.P.)* | *Relative Artifact Density* | *Reference* |
|---|---|---|---|---|
| 5LA2169 | 9 | 1130±65<br>1220±50<br>1220±65 | Moderately abundant | Nowak and Jones (1984) |
| 5BA320, Hearth B | 7 | 900±60 | Abundant; some bone | Nowak and Jones (1986) |
| 5BA346, Feature 2 | 3.2 | 890±60 | Abundant | Nowak and Jones (1985, 1986) |
| 5HF289 | 5 | 870±50 | Moderately abundant; little bone | Chenault (1982) |
| 5LA5840, RS 1 | 12 | 855±50<br>1110±50 | Abundant; little bone | Mitchell (2001) |
| 5BA320, Hearth A | 6 | 630±50<br>1870±70 | Abundant | Nowak and Jones (1985) |
| 5LA1045 | 9.4 | 515±65 | Moderately abundant; little bone | Greer (1966) |

that they are palimpsests, representing one or more activities carried out repeatedly in the same location over an extended period of time. Some scholars have argued that they represent the amalgamation of comparatively small, discrete hearths. Others have viewed them as communal dumps for burned rock and other debris removed from primary domestic contexts. However, research conducted since the late 1980s in central Texas and elsewhere has demonstrated that many such compact accumulations of burned rock represent the remains of recurrently used earth ovens (e.g., Black et al. 1997).

Earth oven food processing uses the thermal inertia of heated stones to cook a variety of foods, especially plants rich in complex polysaccharides and meats rich in fat (Wandsnider 1997). These foods require relatively long cooking times at relatively high temperatures; both of these conditions can be achieved in an earth oven. Typically, an oven consists of a shallow pit lined with cobbles or slabs (Ellis 1997). The oven is fired, after which charcoal and unburned wood are removed. Food items are wrapped or covered to protect them from scorching, placed in the pit, and covered with more stones and earth. When cooking is complete, the oven is opened by removing the covering layer or lid. The repeated use and periodic reconstruction of the oven result in a progressive accumulation of burned, fractured rocks, as well as tools and debris related to food preparation, which are deposited in a symmetrical toss

**FIGURE 3.3.**
*A burned rock midden, approximately 4 m in diameter. Note circular stone enclosure located immediately behind the midden.*

zone. The resulting burned rock midden is therefore not a structureless accumulation but rather a "center-focused cooking facility," the size of which is a function of its duration of use or life history (Black 1997:85).[1]

Problem-oriented research designed to determine the functions of southeastern Colorado's large burned rock middens has yet to be undertaken. However, data from two recently excavated features bolster the inference that the large, compact accumulations of burned rock described in this chapter represent the remains of earth ovens. The clearest evidence comes from 5LA3186 (Kalasz et al. 2007). There, excavation revealed the presence of two superimposed slab-lined basins, surrounded by a scatter of burned rock several meters in diameter. The slabs forming each of the basins or heating beds fit tightly together, and some of the stones comprising the lower basin were later incorporated into the upper basin. A well-developed oxidation rind is present beneath the feature, which dates to the late Developmental and early Diversification periods. A similar arrangement was observed at 5OT430, a Late Archaic site where a shallow basin hearth surrounded by a burned rock scatter 3 m in diameter was superimposed directly over an earlier, smaller accumulation of rock (Mueller, Zier, and Brown 1994). Interestingly, the earlier feature had been buried under 24 cm of nearly sterile sediment prior to construction of the later feature.

However, significant differences also exist between the features observed at 5LA3186 and 5OT430 and the region's large burned rock middens, indicating that they may have been used in different ways. All of the excavated middens contain abundant plant remains, but in the features at 5LA3186 and 5OT430 charred plant parts are virtually absent. The vagaries of preservation may play a role in this difference, but it also seems likely that different food preparation methods were used, perhaps involving different types of foods. Artifacts, too, are nearly absent from the burned rock accumulations at 5LA3186 and 5OT430. By contrast, excavated middens contain numerous artifacts, including tools and debris not directly related to food preparation. This suggests that, in addition to food preparation and cooking, a comparatively wide range of activities was carried out adjacent to large middens (Collins 1994).

It is not clear what types of foods were prepared in southeastern Colorado's burned rock middens. None of the plants commonly associated with earth oven cooking, such as camas (*Camassia* sp.), agave (*Agave* sp.), and sotol (*Dasylirion* sp.), currently grows in the upper Arkansas River Basin. However, at least three species (yucca [*Yucca glauca*], cholla [*Opuntia imbricate*], and prickly pear [*Opuntia* sp.]) known from ethnographic and historical accounts to have been processed in earth ovens do grow in the region. In addition, there are tubers such as bush morning glory (*Ipomoea leptophylla*) that exhibit compositional characteristics similar to those known to have been processed in earth ovens (Mitchell 2001). *Ipomoea* roots are processed by the Alyawara in similar roasting pits (O'Connell, Latz, and Barnett 1983).

The plant parts most frequently recovered from burned rock middens in southeastern Colorado are goosefoot seeds. In some cases, goosefoot leaves may have been consumed directly, but they may also have been wrapped around meats or tubers to prevent scorching. Other genera represented in midden deposits include *Amaranthus* (amaranth), *Portulaca* (purslane), and *Echinocereus* (hedgehog-type cactus). Starch granules present in at least one midden may derive from either *Zea* (maize) or *Ipomoea* (Puseman and Cummings 2001), both of which likely were relatively minor dietary components owing to their sparse, uneven distributions. Animal bones are absent or uncommon in all of the upper Arkansas River Basin middens for which excavation data are available. If meat was cooked in southeastern Colorado's middens, then butchery must have taken place elsewhere.

Taken together, these data suggest that southeastern Colorado's large burned rock middens were used by momentarily aggregated groups for preparing special foods. Ethnographic accounts often associate earth oven cooking with supra-household food preparation and consumption (Wandsnider 1997), and the archaeological data presented here suggest that middens represent persistent locations of communal activity. Many are situated in open areas adjacent to clusters of intermittently occupied habitation structures. The size and diversity of the associated artifact assemblages indicate that a wide variety of tasks were carried out there, concomitant with food preparation. Given the diversity of tool types present, it seems likely that family groups, rather than specialized task groups, used them. Limited macro-botanical data suggest that they were used differently than hearths or other small accumulations of burned rock.

## CLIMATE AND BURNED ROCK MIDDENS

How well does the functional approach to landscape explain the life histories of large burned rock middens? Functional models predict that the structure and distribution of archaeological features will mirror the structure and distribution of the resources they were created to utilize or the materials from which they were constructed (Dewar and McBride 1992; Smith and McNees 1999). In this view, the location and form of Arkansas Basin middens were determined by the locations and densities of particular kinds of foods, which in turn are affected by climate, topography, soils, and so forth.

In a semiarid region like southeastern Colorado, the abundance and distribution of many plant and animal species vary significantly both spatially and temporally. Such patchiness is a product of both synchronic and diachronic variation in temperature and precipitation. Modern meteorological records hint at the magnitude of this variation. For example, during an eighty-year period-of-record for Rocky Ford, Colorado, annual precipitation varied between 5.9 inches and 22.4 inches (Siemer 1977). Similarly, in 1998, a total of 26.3 inches of rain fell at the Campo 7S weather station in southern Baca County, while during the same period only 14.8 inches fell at the town of Stonington, just 25 miles (40 km) away.

Paleoenvironmental data, although sparse, suggest that similarly variable, patchy conditions prevailed in the past. Most climatic reconstructions suggest that approximately modern rainfall and temperature regimes were in place at the end of the Altithermal. Essentially modern floral and faunal assemblages have been recovered from both Middle Archaic (5000 B.P.–3000 B.P.) and Late Archaic rock shelters (Hand and Jepson 1996; Zier and Kalasz 1991).

During the Developmental period, eastern Colorado may have been somewhat cooler and wetter than at present, but the departures from current conditions are not thought to have been dramatic (Painter et al. 1999).

Stochastic fluctuations in temperature and precipitation affect the diversity and abundance of available plant and animal species. Even minor variations in the timing of precipitation can affect the species composition of particular patches. For mobile human populations, the resulting instability and unpredictability can prevent the establishment of a routine annual subsistence round in which particular places are used repeatedly for particular purposes. Under such circumstances, functional models predict that resource-processing features will be widely distributed across the landscape, particularly if they are inexpensive to build. Most burned rock features should be relatively small, reflecting the small likelihood that any given feature could be profitably reused. Even comparatively minor variations in the abundance of key species should result in a relatively unstructured arrangement of features. This is particularly true in open settings (Wandsnider 1998).

Although this model likely explains the form and wide distribution of the region's small burned rock features, it does little to explain the life histories of large burned rock middens. On the contrary, their compact, sharply defined morphology, a product of the complete spatial congruence of specific activities carried out periodically over an extended period of time (Dewar and McBride 1992), suggests that the decision to reuse them was made despite environmental instability. Their life history is particularly striking if it is the case that they were built to process widely and unevenly distributed resources, such as *Ipomoea* tubers, or low-yield resources such as sotol (Dering 1999).

The decision to reuse a burned rock midden likely was not dictated by the costs of building and operating them. Earth ovens are simple to construct. The necessary materials would always have been available within or immediately adjacent to a productive resource patch. Stones for the heating bed and cobble covering could be obtained on-site. The fuel consisted of common trees and shrubs such as juniper (*Juniperus* sp.), rabbitbrush (*Chrysothamnus nauseosus*), and four-wing saltbush (*Atriplex canescens*) (Puseman and Cummings 2001). Considerable effort was likely needed to gather sufficient fuel (Dering 1999), but the labor required would not have been diminished by reusing an existing facility. In fact, much of the effort involved in earth oven cooking is spent on harvesting, transporting, and processing food items; it is difficult to imagine that the perhaps slightly lower cost of reusing an existing oven would have offset the cost of transporting food items from distant patches. Moreover, reuse of a particular locality could entail costs that increased with the number of site visits. Superimposition of activity areas can lead to a buildup of domestic debris, which in turn can attract a variety of undesirable pests (Wandsnider 1992). Depletion of fuel resources could increase the time and effort needed to obtain them.

The contrasts between the morphological expectations derived from functional landscape analysis and data on burned rock middens in the upper Arkansas River Basin suggest that factors other than climatic conditions or the distributions of plant and animal species must be invoked to explain their life histories. As the social landscape model suggests, one of the most important factors is the history of human engagement with the land.

## FEASTING AND BURNED ROCK MIDDENS

Dedicated settings for communal social activity, whether natural or constructed, are crucial for human social and biological reproduction. In such places, social relations are enacted and reenacted, establishing and maintaining relationships among people and between people and the cosmos (Barrett 1999b). Ceremonial or ritual events are often the most important social practices linking people to places and to each other (Spielmann 2002). Ritual events provide a context for sustaining connections between individuals and groups and for negotiating social identity and status. Communal ceremonies also connect social groups to particular places by directly linking the processes of social reproduction to particular landscape features or constructed facilities. Over time, the places where such ceremonies occur take on the social and symbolic meanings those ceremonies are meant to invoke, providing a focal point for shared memories (Connerton 1989). Indeed, it is partly through ceremonial practice that the social landscape comes into being.

Supra-household food preparation and consumption often accompany communal ceremonial events (Dietler 1996; Hayden 2001; Joyce in press; Wills and Crown 2004). Such ceremonial meals or feasts often feature special foods that are rare, difficult to procure, and laborious to prepare (Hayden 1996). Specialized tools, such as oversized cooking and serving vessels, and specialized features, such as large earth ovens (Hayden 1996:138), are frequently used in the preparation of ceremonial meals. Feasts are often carried out inside special structures or in suitably large public spaces. Ceremonial or ritual meals may involve the preparation of large quantities of food, resulting in the formation of unusual archaeological deposits (Wills and Crown 2004).

Recently, considerable attention has been paid to the connections between feasting and social power (e.g., Clark and Blake 1994; Dietler 2001; Phillips and Sebastian 2004). Many scholars have argued that feasts are "political tools," by which status-seeking individuals or groups build and reinforce social relationships based on debt (Dietler 1996:87). Such competitive feasting, along with associated communal ritual activities, provides a venue for aggrandizing individuals to amass status and political power. However, supra-household food consumption need not entail the creation of obligation; nor is status differentiation the principal axis around which feasting necessarily revolves (Potter 2000; Potter and Ortman 2004; Spielmann 2002). Feasts are also a venue for the "symbolic representation of social relations" (Dietler 1996:89). Such "minimally distinctive" feasts serve to negotiate and reaffirm social relationships among people (Hayden 2001). They can establish and maintain group cohesion, build cooperative alliances between disparate social groups, mobilize communal labor, or compensate for social transgressions. Although feasts may have been less common among some hunting-and-gathering groups than among food-producing groups, they nevertheless may have played a role in promoting social solidarity (Hayden 2001), redistributing food or other items, and enhancing group prestige (Lindauer 2000).

Although research on southeastern Colorado's burned rock middens is just beginning, the data discussed previously suggest that they were hubs of communal activity. The diversity of the artifacts associated with them indicates that they were associated with a wide variety of concurrent tasks. Given the ethnographically documented uses of earth oven cookery, it is likely that several households cooperated in procuring and processing the food items prepared in them. Macro-botanical data suggest that those items could have included maize, which would have been rare and perhaps highly valued, and bush morning glory, which is difficult to procure and prepare (Mitchell 2001). Large burned rock middens are also frequently located in what can be interpreted as public spaces adjacent to clusters of small domestic structures.

Thus, the compact structure of these features, a material expression of their unique life histories, reflects the intimate connections between them and the social purposes they served. Through repeated use, large burned rock middens became associated with the productive and reproductive functions of communal food preparation and related activities. This was a historical process. As the number of uses increased, the power of these places to invoke particular social relations and cultural meanings also increased. Over time, these features became the spatial embodiment of the social relations they were built to enact and sustain, perhaps including relations of debt. Their potential to reproduce the social or cosmological order lay not in their proximity to economic resources but in the values they epitomized and the social bonds they created.

## BURNED ROCK MIDDENS AND CHANGING MOBILITY PATTERNS

In the upper Arkansas River Basin, the appearance of the earliest large burned rock middens coincided with the beginning of a gradual reduction in residential mobility and a correlated increase in the spatial segregation of productive tasks. Paleoenvironmental data indicate that these processes, as well as the broader technological changes defining the Developmental period (ceramics and the bow and arrow), were not accompanied by directional changes in climate. The end of the Late Archaic period and the beginning of the Developmental period may have been somewhat wetter than at present, but the transition itself did not coincide with a climatic shift (Hall 1982; Zier and Kalasz 1991; but see Butler 1992 for evidence of regional variability). Instead, the interpretations discussed in this chapter suggest that these changes were bound up recursively with changes in the ways people conceptualized and engaged with the land. The construction and use of earth ovens, perhaps during a period of relative resource abundance (Wills and Crown 2004:156), initiated the sedimentation of social and symbolic meanings and potentials onto specific, restricted portions of the landscape. Through repeated communal inhabitation, these places became socially valuable. In turn, a desire to sustain and elaborate the social meanings those places engendered encouraged repeated use. Burned rock middens, therefore, mark socially and symbolically important places. The fact that they first appeared in the absence of directional climatic change suggests that the fixation of social or ideational meanings may have initiated, rather than simply reflected, the trend toward decreased residential mobility. Thus, periodic feasting and the growing social value of particular places may have contributed to long-term changes in the relations and organization of production.

It is not clear whether the periodic population aggregation that marked the end of the Developmental period and the Diversification period was accompanied by population increases. No evidence suggests that people moved into the region from elsewhere during the Developmental period (Kalasz, Mitchell, and Zier 1999:171). The large number of architectural sites dated to the Diversification period may reflect population increases, but the distribution of such sites is rather patchy (Kalasz, Mitchell, and Zier 1999:191). Moreover, despite modest increases in the use of cultigens, subsistence practices appear to have been relatively stable throughout this period. In any case, even if regional population increases took place, they postdate the first appearance and initial growth of many of the region's large burned rock middens.

## MAKING PLACES: CONSTRUCTING SOCIETY, CONSTRUCTING THE LANDSCAPE

Significant places cannot be defined solely in terms of abstract distributions of natural resources. Rather, places are "mediations" between the physical properties of the land and the processes of human occupancy (Lemaire 1997:11). Social landscapes are made up of resources brought into being by social action. Over time, the landscape comes to embody productive practices and as a consequence the social order responsible for those practices. In a very real sense, the landscape as occupied is the material manifestation of rights to resources and relationships among social actors. However, the landscape is not merely a reflection of such relationships; it is constitutive of them. The land both structures and is structured by the everyday practices of dwelling or inhabitation (Bourdieu 1977; Certeau 1984; Fisher and Feinman 2005; Giddens 1984; Ingold 2000).

Socialized landscapes embody history. Traces of human action accumulate over time, in the manipulation of plant and animal communities (Barnes and Williamson 2006), the placement of symbols and signs (Tacon 1994), the construction of features (Bradley 1993), and the habitual use of paths and spaces (Robin 2002). In these ways, the landscape is shaped by long-term cultural processes. In turn, the landscape as inhabited enables and constrains further action. Neither the physical properties of the land nor the structure of human settlement systems can be explained without an understanding of the history of human extractive practices. For this reason, research on the life histories of places is critical to the study of landscape (Ashmore 2002; Wandsnider 1992).

The development of a recursive, historical view of landscape has been stimulated by the recognition that "the natural world" is a recent invention. But the dwelling perspective applied in this chapter moves analysis far beyond a simple dichotomy between Western and non-Western ways of perceiving and experiencing the world. Rather, it is the foundation of a comprehensive human ecology capable of integrating the study of human cultural practices and the study of environmental change (Crumley 1994; Fisher and Feinman 2005; Ingold 2000; McGlade 1995; van der Leeuw and Redman 2002). The recognition that landscape and society are mutually constitutive provides a more complete understanding of the factors affecting both environmental change and human land use decisions. In the case at hand, the social landscape approach explains the life histories of southeastern Colorado's burned rock middens more fully than the functional approach.

The recognition that the history of human engagement with the land can affect patterns of sedentism and mobility has direct implications for understanding change and continuity in hunter-gatherer settlement systems. By focusing on the ways people inhabit their surroundings over long periods of time and on the critical role social relations play in determining mobility strategies, archaeology can make important contributions to a new human ecology.

## ACKNOWLEDGMENTS

I thank Laura Scheiber and Bonnie Clark for the opportunity to participate in the original Society for American Archaeology symposium and to contribute to this book. Thoughtful comments provided by Arthur Joyce, Steve Kalasz, Casey Carmichael, the members of the University of Colorado's Graduate Writers Group, and two anonymous reviewers greatly improved the chapter's clarity and content. Partial funding for this research was provided by a National Science Foundation Graduate Research Fellowship.

## NOTES

1. The period over which middens accumulated in the upper Arkansas River Basin has not been estimated, nor has their tempo of use. However, the dispersion of radiocarbon dates associated with the midden at 5LA5840 suggests that at least several generations may have elapsed between the first and last uses (Mitchell 2001). Based on Phil Dering's (1999) experimental data, a midden 7 m in diameter and 40 cm thick could have been used about 230 times; one 9 m in diameter could have been used about 380 times.

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FOUR

# Ritual Landscapes, Population, and Changing Sense of Place during the Late Prehistoric Transition in Eastern Colorado

*Kevin P. Gilmore*

Until recently, the study of prehistoric hunter-gatherer landscapes has focused on the distribution of different functional site types and their topographic and environmental contexts rather than on the relationship of people to their landscape. This is the case because the study of nomadic people, whose effect on non-site environments is (for the most part) imperceptible, is difficult within the limits of current methodologies because of a combination of low population density, a highly mobile, scattered population, and individualistic, family-centered technologies (Johnson 1989:214). This site-centered focus on environment has shed little light on these people's ideology and attitudes and has made examination of changing prehistoric perceptions of landscape seem out of reach.

Traditional human geography posits that the creation of cultural landscapes from natural landscapes was the natural outgrowth of human residence.

Thus, to the educated observer, cultural landscapes contain information that provides insight into the cultures that transformed them. Although developing the ability to "read the landscape" like a book was a goal of traditional cultural geographers, they thought this task was far more difficult because (unlike books) landscapes were never *meant* to be read (Lewis 1979:12). I disagree with the belief that reading the landscape is difficult. In fact, for much of human history humans have not only been familiar with the meanings attached to landscape, but we were *of* the landscape: an essential part of both the natural and the built environment. All landscapes in which people live have meanings attached to them at the individual, family, and community levels. These landscapes contain a multitude of places that serve as the subject and source of narratives, and these narratives are especially important to preliterate societies. Places serve as "durable symbols of distant events and as indispensable aids for remembering and imagining them" (Basso 1996:7). In this way, with or without the discernible presence of modification, *all* landscapes in which people live are cultural landscapes in that they contain information meaningful to their inhabitants.

In traditional cultural geography, space is neutral and is subject to measurement and physical division according to mathematical principles or models (Sahlqvist 2001). More recent study of landscapes has involved more symbolically oriented approaches (e.g., Tilley 1994). As theories, these two approaches have often been dichotomized. But Sahlqvist correctly contends that "constructive analyses of cultural landscapes rarely benefit from being polarized into a theoretical corner" (Sahlqvist 2001:79). Individual sites have meaning, as does the pattern of sites on the land. The perception and meaning of landscapes can be discerned through the analysis of the changing spatial patterns of ritually significant sites, as well as by the changes observed in these rituals through time.

In this chapter I examine the changes in technology, economy, and demography—and the context they provide for explaining changing ritual and its manifestation in landscape—during the transition from the Archaic stage (6400 B.C.–A.D. 150) to the Late Prehistoric stage (A.D. 150–1540) on the western High Plains. More specifically, this transition comes between the Late Archaic period (1200 B.C.–A.D. 150) and the Early Ceramic period (A.D. 150–1150), which correlates to the Developmental period (A.D. 100–1050) in the Arkansas River Basin (Zier and Kalasz 1999). The western High Plains during this time period has long been considered peripheral to the Plains Woodland societies of the Central Plains of Kansas and Nebraska, and researchers have explained cultural similarities between the two areas as the result of spatial diffusion of cultural traits from east to west. But similarities between these two areas may in fact be evidence of parallel development of cultural institutions influenced by region-wide demographic forces that came into play at the end of the Archaic stage. These developments are reflected in, among other things, mortuary practice—primarily changes in spatial and cultural contexts of burials and burial sites at the regional, site, and individual burial levels.

Mortuary ritual is among the most complicated human behavior that can be interpreted from the archaeological record. It is not the result of a functional process and therefore forms "deliberate, planned, sacred spaces that serve to symbolically integrate families and communities and to provide continuity in the deep time of buried descent groups" (Hutchinson and Aragon 2002:28). So the changing contexts of mortuary ritual as indicated by burial practice reflect fundamental changes in the perception and meaning of landscapes and sense of place between the Late Archaic and Early Ceramic periods on the High Plains of eastern Colorado.

## THE LATE PREHISTORIC TRANSITION IN EASTERN COLORADO

This chapter discusses portions of both the South Platte and Arkansas river basins of eastern Colorado. For these purposes, the western High Plains is defined as the portion of these basins from the base of the Southern Rocky Mountain foothills north, south, and east to the Colorado state line (Figure 4.1). This area contains portions of both the High Plains and Colorado Piedmont sections of the Great Plains Physiographic Province (Fenneman 1931).

The transition from the Late Archaic period to the Early Ceramic period in eastern Colorado is defined archaeologically by the appearance of new technologies, new economies, increasing population, and new social and ritual structures (Gilmore et al. 1999; Mitchell, this volume; Zier and Kalasz 1999). Archaeologists have often explained the appearance of new technologies in terms of simple spatial diffusion; technologies were adopted when they became available because of the adaptive advantage they represented. However, I contend that the acquisition of some of these technologies was not passive but instead occurred actively as a response to population pressure. These demographic changes have a deep history, beginning with the amelioration of climate at the end of the Pleistocene and gaining momentum throughout the early and middle Holocene. This trend of slow but relatively steady population increase culminated in a period of a much greater rate of increase that started ca. 500–200 B.C., just prior to the beginning of the Early Ceramic period,

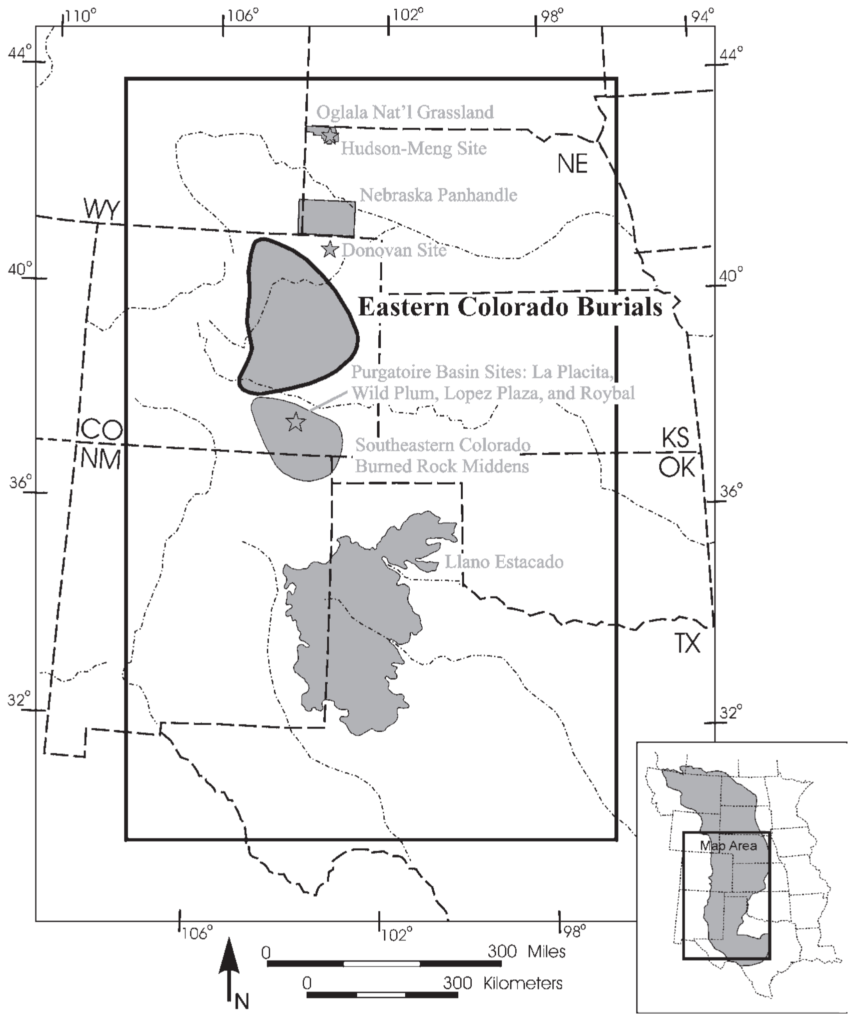


**FIGURE 4.1.**
*Map of the High Plains, highlighting distribution of burials in the Platte and Arkansas river basins. Illustration by Kevin Gilmore.*

and peaked in the later part of the period, ca. A.D. 1000–1200—just prior to the transition between the Early Ceramic and Middle Ceramic periods in the Platte Basin and in the middle of the Diversification period at A.D. 1300 in the Arkansas Basin. I also argue that changes in ritual and landscape percep-

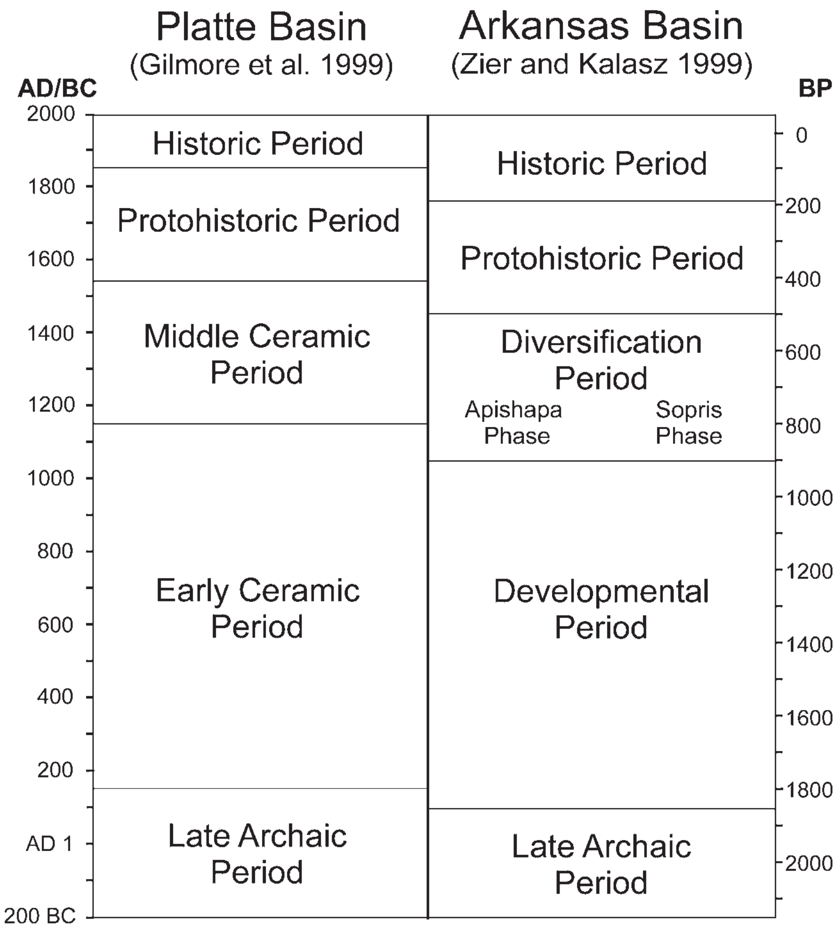


**FIGURE 4.2.**
*Post-Archaic (Late Prehistoric–stage) cultural chronology for eastern Colorado used in this chapter.*

tion reflected in mortuary practice can be best explained within the context of demographic and social changes, which in turn lead to redefined concepts of community.

The cultural chronologies for the Arkansas and South Platte basins of eastern Colorado are in relative agreement concerning the timing of major cultural events (Figure 4.2). The transition from the Late Archaic period to the Early Ceramic/Developmental period is the most easily recognizable of these transitions because it was accompanied by the most obvious changes.

These changes include the replacement or addition of basic technologies (e.g., replacement of the atlatl by the bow and the appearance of ceramics), increases in population and sedentism, changes in economy (more intensive processing of natural resources and increased use of cultigens), and changes in mortuary practice that echo the practices of Plains Woodland cultures of the Central Plains (Gilmore 1999; Kalasz, Mitchell, and Zier 1999).

Although relatively popular among archaeologists in the past, simplistic models invoking contagious diffusion that have been used to explain culture change in the western High Plains are inadequate because they assume that cultures are essentially passive. This assumption is not warranted; some technological and economic innovations were probably available to prehistoric residents of eastern Colorado for a long period of time prior to their adoption. For instance, counter to the unilinear diffusion model in which many have postulated the arrival of the bow from northeast Asia, recent research suggests that the bow may have been introduced to North America as early as 5,000 years ago, may have diffused to some groups but been independently invented by others, and was adopted, relinquished, and subsequently readopted by other groups over time (Nassaney and Pyle 1999). The same is true for ceramic technology, which was independently invented several times in North America and dates to as early as 3200 B.C. in the southeastern United States (Sassaman 1998) and to 2600–1600 B.C. in sites affiliated with the Late Archaic Nebo Hill complex of northwestern Missouri and eastern Kansas (Reid 1984). Early Woodland cord-marked, paddle and anvil manufactured Crawford Ware ceramics date to 470–70 B.C. in western Iowa (Benn 1990), yet ceramics do not appear in the archaeological record of eastern Colorado until ca. A.D. 400. These examples speak against simple, unilinear models of contagious diffusion in favor of models that support the active acquisition of technological innovations from the pool of available knowledge as the need arose. I believe the appearance of these technologies at the beginning of the Late Prehistoric stage in Colorado was a result of population pressure.

Ester Boserup (1965) argued that the evolution of agriculture was a process ordinarily pushed by increasing population density, that is, more advanced tools and techniques could squeeze more food from a given amount of land. However, she also demonstrated that the law of diminishing returns comes into play when more advanced techniques are used: more advanced technologies require a greater labor input for each unit of production compared with more traditional methods. Taking his cues from Boserup, Mark Cohen (1977) posited that the origins of agriculture on a worldwide scale could be attributed to resource stress as a result of population pressure resulting from amelioration of climate at the end of the Pleistocene. These models of population pressure as a forcing mechanism have since been used to explain the adoption of many technological innovations. These models assume that cultures are in essence conservative, and a forcing mechanism is necessary (or at least highly likely) for new technology to be widely adopted.

Population increase precedes (or is perhaps coincident with) the appearance of some technological innovations in the archaeological record of the western High Plains, which fits the models of cause and effect between population pressure and the adoption of technology described here. However, does population pressure contribute to higher-level culture change, especially changing ideology as reflected in ritual? It is difficult to reasonably explain changes in landscape perception, ritual, or other aspects of ideology in terms of spatial diffusion of ideas from elsewhere or as a result of population pressure. However, it is more meaningful to posit these changes within the context of other changes in social structure and economy that may actually have their roots in changing demography. To determine the context in which the changes occurred, the dynamics of hunter-gatherer populations and the relative scale of changes in population, if not actual numerical estimates of population, must be estimated for the western High Plains.

## ESTIMATING POPULATION SIZE OF PREHISTORIC HUNTER-GATHERERS

Estimates of prehistoric hunter-gatherer population are rarely attempted, for several reasons. Unlike populations of sedentary people for whom momentary population estimates can be made based on the floor areas of contemporaneous habitations and can be dated to a narrow time period using ceramic chronologies, hunter-gatherer groups were often highly mobile, and their impact on the landscape was ephemeral. The consequent meagerness of the archaeological record of these people, coupled with the less precise chronologies derived from radiocarbon ages, renders momentary estimates of their population by standard methods difficult. The few attempts that have been made to measure the population of prehistoric hunter-gatherers have met with mixed results. Measures of prehistoric human population based on environmental factors, such as carrying capacity derived from estimates of the biomass for a given environment, are a useful starting point (i.e., Hassan 1981). However, these models only provide a measure of the *potential* population of a given environment. Further, they make assumptions about both cultural adaptations and resource use that are almost always difficult, if not impossible, to make based on archaeological data and also assume that environment and culture are static. These mathematical methods strive to derive the precise population number for a given region and usually result in a predicted range of population so large as to be of little practical use or in a specific figure that is impossibly precise (see Upham 1992). Yet even if the derivation of actual population numbers is beyond current methodologies, I believe *proportional* changes in prehistoric hunter-gatherer populations can be determined by several methods.

The number of archaeological components cross-dated to a particular cultural-historical period has been used widely as a rough measure of relative size of population, and the frequency of radiocarbon dates through time has also been used as a more detailed indicator of the relative size of population or intensity of occupation in large areas (Chatters 1995; Gilmore et al. 1999; Prentiss et al. 2005; Reed and Metcalf 1999; Zier and Kalasz 1999). Of course, issues of site formation, differential preservation of landforms, and research bias in a particular geographic area could potentially skew these data. However, the large size of the regions investigated and the resulting wide variety of depositional contexts (fluvial, aeolian, and colluvial) within the mountain, foothills, and Plains environments represented, coupled with the large number of sites recorded during cultural resource management projects (which document all the sites within a specific project area), militate against these biases. Even taking all these issues into consideration, archaeologists recognize that the number of components recorded for a certain period of time in a large area does in some way reflect the number of people who lived in an area at that time.

Based on this measure, archaeologists have hypothesized an increase in population in eastern Colorado between the Late Archaic period (ca. 1250 B.C.–A.D. 150) and the Early Ceramic period (ca. A.D. 150–1150) in the Platte Basin and the Developmental period (ca. A.D. 100–1050) in the Arkansas Basin. This increase in population culminates at the end of the Early Ceramic period in the Platte Basin but continues through the Developmental period and into the Diversification period (A.D. 1050–1450) in the Arkansas Basin. However, since the length of different cultural periods varies widely, the number of components cross-dated to a given period is not directly comparable to the number for any other period unless these counts are normalized using the amount of time during which the components accumulated—the length of the cultural period. Dividing the number of components assigned to a given cultural period by the length of the period in years and then multiplying the resulting quotient by 1,000 results in the Index of Occupational Intensity (IOI) (Larmore and Gilmore 2006). Graphing the IOI by period within the prehistoric cultural chronologies of the Platte and Arkansas river basins of eastern Colorado supports what archaeologists have suspected: that the number of components per unit of time increases and peaks in the Early Ceramic period in the Platte Basin and in the Diversification period in the Arkansas Basin. This result is somewhat at odds with the distribution of uncorrected radiocarbon dates for the Arkansas Basin, which indicates a peak in population toward the end of the Developmental period (Figure 4.3).

These different lines of information suggest an increase in population after the Late Archaic period in both basins and a subsequent drop in population after the Early Ceramic period in the Platte Basin and the Diversification period in the Arkansas Basin. However, because it is based on the number of components recorded for cultural periods lasting hundreds of years, the level of resolution of IOI data is so low that it has limited utility in determining the nature and structure of these hypothesized fluctuations in population. Although closer to a continuous measure of population, the distribution of uncorrected radiocarbon dates also seems at odds with the component and IOI data, showing a drop in population in the Developmental period rather than in the Diversification period.

Using the summed probability distribution of calibrated radiocarbon dates as a proxy for population has an advantage over the other methods described. Although not a representation of actual population numbers, the summed probability distribution associated with the set of calibrated radiocarbon dates from archaeological sites in the Platte and Arkansas basins does provide a visual representation of the rise and fall of population, occupational intensity, or both; the higher the peaks in the curve, the higher the probability contributed by radiocarbon ages from dated features created by prehistoric people. The resulting aggregated probability curves serve as a high-resolution proxy for relative size and concentration of prehistoric population for a given area (Figure 4.4). However, the nature of the calibration curve suggests that caution should be exercised with this method. As a result of fluctuating concentrations of atmospheric $^{14}C$ through time, the calibration curve is not a straight line but a series of peaks and valleys that document these fluctuations. As a result, some of the lower amplitude peaks and valleys on the population curve are artifacts of the calibration and not a reflection of population changes. For example, "wiggle matching" (Mauquoy et al. 2004; Ramsey, van der Plicht, and Weninger 2001) the summed probability curves to the radiocarbon calibration curve makes some of these artifacts explicit. This is especially obvious in the summed probability curve for the Arkansas Basin after A.D. 1300 (and to a lesser extent in the curve of the Platte Basin for the same time period), which reflects the calibration curve rather closely. Several flat sections of the calibration curve are

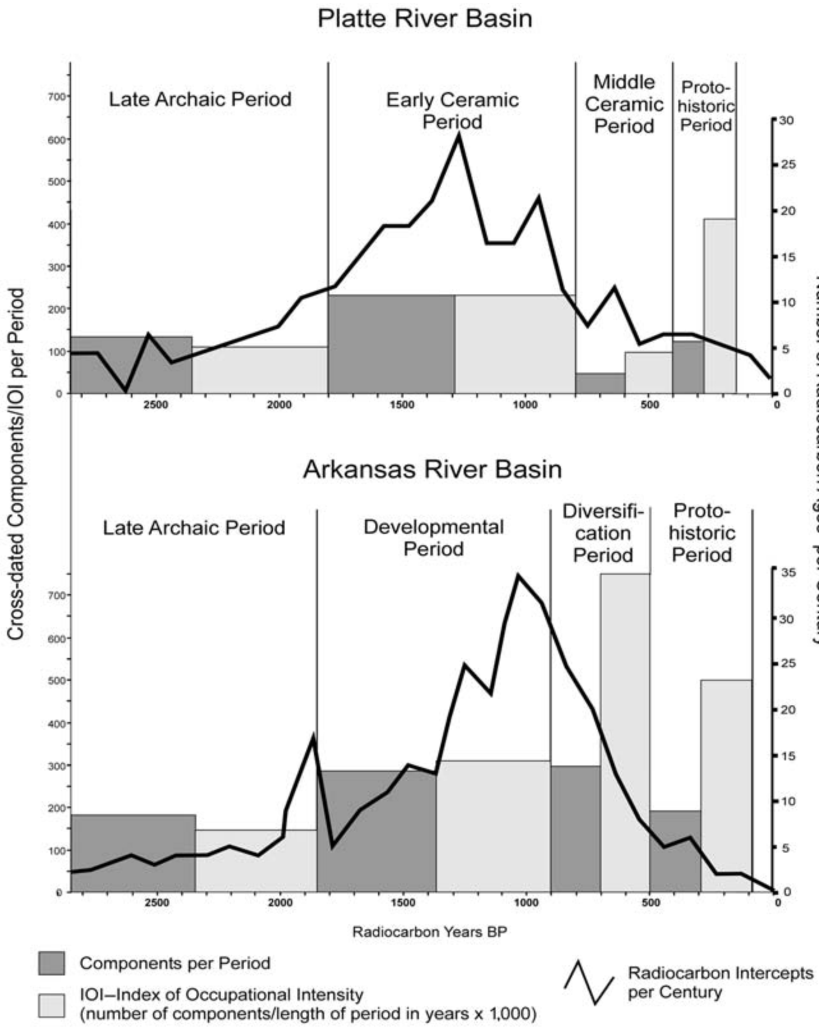


**FIGURE 4.3.**
*Distribution of prehistoric radiocarbon ages (number of intercepts per century) in the Plains subregion of the Platte and Arkansas river basins, with number of components and Index of Occupational Intensity (IOI) per cultural period. Data compiled from Gilmore et al. (1999) and Zier and Kalasz (1999).*

also reflected in the summed probability distribution curves for both basins. However, the larger trends do not reflect the calibration curve, and these higher amplitude changes are the ones that document population.

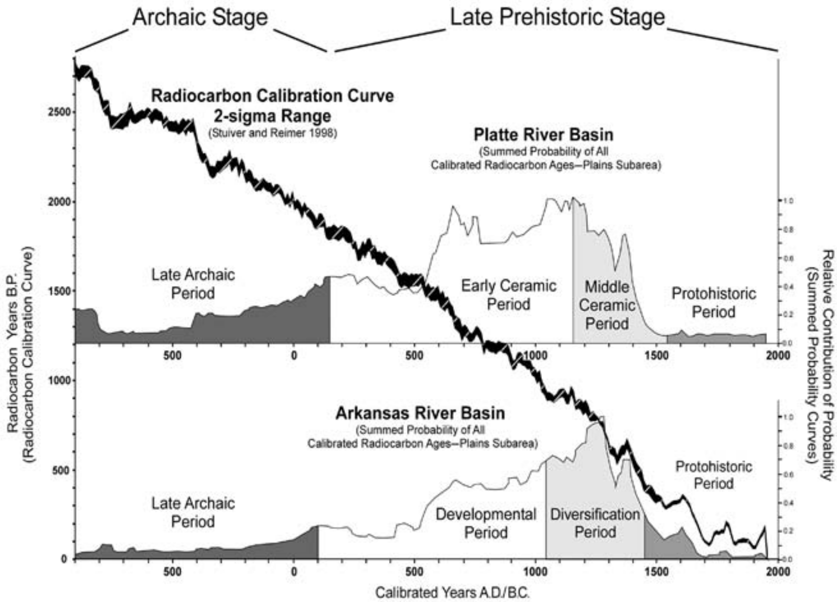


**FIGURE 4.4.**
*Summed probability distributions of archaeological radiocarbon ages (proxy population) for the Plains subregion in the Platte (n=124) and Arkansas river basins (n=163), compared to the radiocarbon date calibration curve of Stuiver and Reimer (1998).*

Calibration of radiocarbon ages and the generation of summed probability distribution curves for this study were accomplished using CALIB version 5.0 (Stuiver and Reimer 1993; Stuiver et al. 1998). Summed probability distribution curves generated from radiocarbon dates have been used elsewhere as proxy measures of the relative size of prehistoric populations, but the foci of most of these studies were relatively small geographic areas, such as a portion of the Southern Rocky Mountains in Colorado (Benedict 1999), the so-called Vacant Quarter of the lower Ohio River Valley (Cobb and Butler 2002), the Cherry Creek Basin of Colorado (Gant 2007), eastern Colorado (Gilmore 2004), and the southern coast of British Columbia (Lepofsky et al. 2005). The studies of larger regions to date have focused on late Pleistocene to middle Holocene populations in Europe (Gamble et al. 2005; Shennan and Edinborough 2007). All of these studies stress the relative nature of this method as an indicator of population trends and not as representing actual numbers. Lynn Gamble and colleagues (2005) and Stephan Shennen and Kevan Edinborough (2007) have pointed out that these curves are remarkably stable and maintain the same general shape even when generated from large random samples of radiocarbon dates from a particular region.

Focusing on the last 2,900 years in the Platte and Arkansas basins, the summed probability of calibrated radiocarbon curves for both areas suggests that some changes in population were in phase during this period, while some changes were out of phase (Figure 4.4). These data reflect the population patterns posited for eastern Colorado but deliver them at a level of resolution that allows for a more detailed examination of the archaeological record. An increase in summed probability at the transition between the Late Archaic and the Early Ceramic/Developmental periods ca. A.D. 1–200 suggests that population increase coincided with, and therefore may have been a factor contributing to, the adoption of the technological innovations and social restructuring that characterized the Archaic/Late Prehistoric transition in Colorado. After approximately 800 years of population increase, population peaked in the Platte Basin ca. A.D. 1000–1150. This came at the end of the Early Ceramic period, which is characterized in the archaeological record by evidence of larger group size, decreased residential mobility, and limited evidence of incipient corn horticulture. A relatively precipitous decrease in population followed this peak into the Middle Ceramic period (A.D. 1150–1540), which is characterized in the archaeological record by smaller, more ephemeral sites indicative of smaller group size and a more dispersed and mobile population (Brunswig 1996; Gilmore 1999). Proxy population peaked somewhat later in the Arkansas River Basin (ca. A.D. 1200–1300) in the middle of the Diversification period (A.D. 1050–1450). This period was characterized by a general trend toward increased sedentism and more substantial and clustered habitation structures, limited corn agriculture, and aggregation of Apishapa-phase populations in larger (and sometimes fortified) village sites (Kalasz, Mitchell, and Zier 1999). Populations in the Arkansas Basin were higher and more aggregated for a century beyond the point when Early Ceramic populations in the South Platte Basin began to disperse.

## POPULATION AND INNOVATION ON THE WESTERN HIGH PLAINS

Although determining cause-and-effect relationships among culture, technological and economic innovation, and population is problematic, it is obvious that a correlation often exists between population and the adoption of technology and other cultural changes observed in the archaeological record. Within a model of population growth as the forcing mechanism, innovations are assumed to have been adopted because they imparted increased efficiency in the procurement and processing of resources, such as the introduction of the bow and ceramics, or because of the need to supplement existing resources, such as the adoption of limited corn horticulture. Evidence for this contention comes from the South Platte Basin, where the initial appearance of both the bow and arrow and corn horticulture in the archaeological record seems to coincide with periods of population increase, peaks in population, or both (Figure 4.5a, 4.5b). This model of technological innovation in response to population growth has some utility in explaining the adoption of basic technologies, but can it explain other, more subtle and complex changes in ritual that are also part of the Archaic to Late Prehistoric transition?

Most cultures possess a unique set of rituals associated with the treatment of the dead, and these rituals are used to "express and intensify a network of social, political, and economic transactions" (Krause 1995:131). It is in this way that burials, as artifacts of ritual, offer one of the clearest views in the archaeological record of how prehistoric people perceived themselves as a social group. Because of this feature, burials also have the potential to provide cultural information that could shed light on issues of ethnicity and social identity of the mobile Late Prehistoric hunter-gatherer people of eastern Colorado. Geography is an important characteristic of many ritual activities, and selection of location is one aspect of prehistoric behavior preserved in the archaeological record.

## PLAINS WOODLAND MORTUARY PRACTICE

Based on similarities in burial offerings, placement on the landscape, topographic situation, and treatment of the remains, many parallels can be drawn between the mortuary practices of the Plains Woodland cultures of the Central Plains and those of the Hopewell Culture of the midwestern and eastern United States. Hopewell mortuary practice includes multiple primary and secondary interments and occasional cremations placed in constructed earthen mounds, some containing dry-laid masonry vaults, and inclusion of decorative grave goods. Plains Woodland mortuary practice includes all of these features, although mounds are relatively uncommon on the Central Plains and lack the formal masonry vaults characteristic of Hopewell burial mounds. However, mounds along the lower Republican River in Kansas were situated on high terraces overlooking the river valley (similar to the situation of Hopewell mounds),

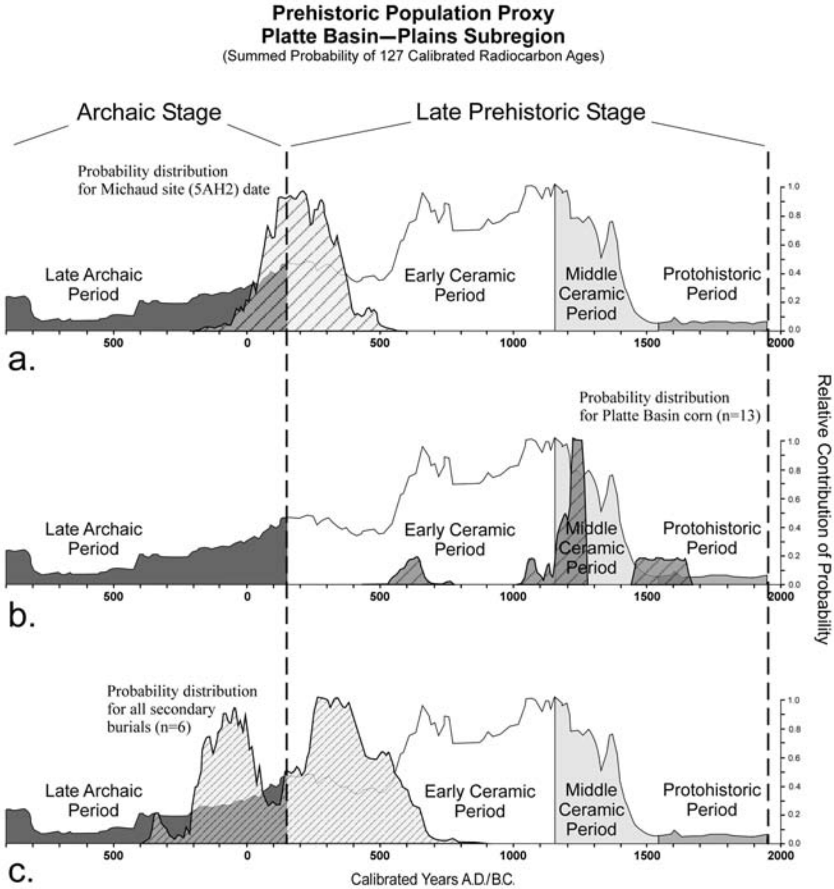


**FIGURE 4.5.**
*Comparisons of proxy population curve for the Plains subregion of the Platte River Basin with the probability distributions of (a) the radiocarbon date from the Michaud site, which dates the earliest presence of small arrow points in the Platte Basin; (b) the radiocarbon dates associated with corn in the Platte Basin; and (c) dated secondary burials in the Platte Basin.*

and some contained central depressions lined with stone slabs. In a few mounds these slabs formed walls similar to the dry-laid masonry chambers contained within the mounds built by the Kansas City Hopewell to the east (Wedel 1943, 1986:82–83). The burial mounds of the Republican River contained a combination of both flexed and extended primary burials, secondary bundle burials, scattered secondary disarticulated remains, and fragmentary cremated remains (Phenice 1969). Burial accompaniments were often included in an apparently random pattern within mound fill and included numerous disk beads manufactured from freshwater mussel shell, tubular bone beads (some with incised annular or spiral patterns), beads made from marine shells such as conch and *Olivella*, pendants manufactured from freshwater shell, unmodified shell, and corner-notched and stemmed types of arrow and dart points (Wedel 1986).

The expression of Plains Woodland culture on the Republican River upstream in Nebraska was similar to that of the mound sites in Kansas, with the notable exception of burial mounds and a "somewhat more limited material culture inventory" at both burial sites and associated habitation sites (Wedel 1986:81). Despite the lack of mound construction, some of the burial sites were fairly substantial ossuaries containing the remains of dozens of individuals, and grave goods of the types described earlier are often found in great abundance (Kivett 1953:135). Although no evidence indicates that these sites had any durable aboveground features that would have made them as readily visible as sites with earthen mounds, many ethnographic accounts of the mortuary ritual of Native American groups on the Plains describe a variety of grave markers that would not necessarily be preserved in the archaeological record. These markers include poles with clan standards, scaffolds, small turf mounds, and log structures (DeMallie 2001). These examples demonstrate that there are ways other than the construction of burial mounds that would have served the purpose of marking burial locations without necessarily leaving obvious traces in the archaeological record. Even if the location of these burial sites was not obvious to outsiders, the living kin and descendants of the people buried there would have known their location, as evidenced by the multiple interments separated in time. These new modes of burial and the repeated use of burial sites represent a considerable increase in the investment of both time and economic resources over mortuary practice during the previous Archaic stage.

## MORTUARY PRACTICE ON THE WESTERN HIGH PLAINS

Mortuary practice during the Late Prehistoric stage on the western High Plains is similar to that of the Plains Woodland cultures of the Central Plains, and some archaeologists have identified this pattern as the Colorado Plains Woodland Mortuary complex (Breternitz and Wood 1965; Butler, Chomko, and Hoffman 1986; Scheiber 2008; Scheiber and Gill 1997; Scott and Birkedal

1972; Wendt 2004). Just as Plains Woodland mortuary practice seems to be an attenuated version of the practices of Hopewell groups to the east, so the Late Prehistoric mortuary practice on the High Plains seems to be an attenuated version of the practice of Plains Woodland groups. This east-to-west trend is also reflected in the generally decreased complexity of habitation sites (suggesting increased residential mobility) and the diminished quantity and variety of material culture found at these sites. Although perhaps less obviously elaborate than the practices of contemporary groups to the east, mortuary practice of the Late Prehistoric people of the western High Plains was still significantly different from that of the people of the previous Archaic stage. Several of these differences are specific to the preparation and interment of the individual, and others are specific to the cultural and spatial context of the burial site. The most readily apparent differences in the treatment of individual burials between Archaic and Late Prehistoric mortuary practice are the increase in material culture elaboration and the presence of secondary burials. The changes in the cultural and spatial contexts of burial sites between the Archaic and Late Prehistoric stages are primarily in topographic situation and functional context (habitation site versus specialized burial site). Another difference is the significant increase in multiple burials from the Archaic stage to the Late Prehistoric stage. In addition, some archaeologists believe there was a shift in the location of burials from the foothills to the Plains between the Archaic and Late Prehistoric stages.

Support for any discussion of changing attitudes toward the landscape through time, as reflected in burial ritual, requires a critical examination of the available data. The observed differences between Archaic and Late Prehistoric burial practice have defied statistical analysis to date because of the relatively few sites containing burials, the small number of individual burials found at these sites, and the lack of detailed information recorded for some of the burials. While there is sufficient information to include a particular burial in the sample for a specific statistical test, the necessary information in support of a different test may not exist. Hence, the sample size for different statistical tests varies depending on the information available for individual burials and burial sites.

Statistical analysis of many of these trends is somewhat problematic because of the small sample size in some of the categories and the relative power of nonparametric tests compared to parametric tests. However, at this writing there are enough burials with sufficient associated information recorded for eastern Colorado to perform statistical tests on the data. The data set used for the present analyses includes 10 Archaic burial sites, with 13 individuals, and 31

Late Prehistoric (Early Ceramic–period) burial sites, with over 113 individuals (Table 4.1). Developmental-period burials from the Arkansas River Basin are included in the Early Ceramic sample. Statistical analysis is only a tool that helps confirm the validity of observed patterns of phenomena, and as such, a significant test does not necessarily confer significance to the pattern tested. However, these tests do allow the identification of meaningful relationships and differences. Although several of the statistical tests performed on the data suggest that there were no significant differences between the samples compared, the results of these tests are included because I believe they do suggest trends in the data. The chi-square tests were performed using JMP version 4.0; all chi-square tests were two-tailed, and the significance level was set at $p=0.05$. The Mann-Whitney *U* tests were performed according to the method outlined by Sidney Siegel (1956), and the significance level for these tests was also set at $p=0.05$.

All of the demonstrated differences in burial practice discussed later reflect significant changes through time in the rituals associated with death and the burial process, which in turn belong to a greater pattern of changes in technology, demography, settlement pattern, and economy that characterize the transition from the Archaic stage to the Late Prehistoric stage in a large geographic region from the Midwest to the High Plains. I believe these changes were accompanied by a fundamental reorganization of worldview, including essential alterations in how people constructed their cultural landscape. The specific transformations in burial ritual that seem to represent these changes are increases in material elaboration, the adoption of the practice of secondary burial, and changes in the cultural and physical contexts of burial sites.

## Material Elaboration

One of the principal changes in burial practice between the Archaic and Late Prehistoric stages involves the type of goods interred with individuals. Archaic burials in eastern Colorado for which accompaniments can be determined (n=8) contain either utilitarian items (n=5, 63%) or no grave goods at all (n=3, 37%), with none containing goods thought to have a strictly decorative function. Although many Early Ceramic–period burials were also devoid of accompaniments (n=15, 29%), several contained what are construed as strictly utilitarian accompaniments (n=8, 16%). However, the majority of Early Ceramic burials contained decorative items for personal adornment (n=28, 55%), either in addition to utilitarian items or as exclusively decorative items. These decorative items are similar to those found in contemporary

Table 4.1. Archaic and Early Ceramic Burials Recorded in Eastern Colorado.

| *Site #* | *Period* | *Site Name* | *# Ind.* | *Burial Type* | *Accompanying Artifacts* |
|---|---|---|---|---|---|
| JF.148 | Early Archaic | Crescent | 1 | primary | none |
| AM.1733 | Late Archaic | none | 1 | n/a | none |
| JF.052 | Late Archaic | Bradford House III | 1 | primary | util |
| JF.211 | Late Archaic | Falcon's Nest | 1 | primary | none |
| JF.211 | Late Archaic | Falcon's Nest | 2 | primary | util |
| JF.211 | Late Archaic | Falcon's Nest | 3 | primary | util |
| WL.2055 | Late Archaic | Webster | 1 | unk | n/a |
| AH.006 | Middle Archaic | Witkin | 1 | primary | util |
| CR.001 | Middle Archaic | Draper Cave | 1 | primary | util |
| JF.321 | Middle Archaic | Swallow | 1 | primary | n/a |
| JF.321 | Middle Archaic | Swallow | 2 | unk | n/a |
| AM.014 | Archaic | Badger Hill | 1 | primary | n/a |
| BL.285 | Archaic | none | 1 | unk | n/a |
| AH.002 | Early Ceramic | Michaud | 1 | primary | util |
| AH.120 | Early Ceramic | Baumgartner | 1 | unk | none |
| AH.244 | Early Ceramic | Aurora | 1 | secondary | none |
| AH.244 | Early Ceramic | Aurora | 2 | primary | decorative non-shell |
| AM.003 | Early Ceramic | H. Heights | 1 | primary | none |
| AM.003 | Early Ceramic | H. Heights | 2 | primary | shell |
| AM.003 | Early Ceramic | H. Heights | 3 | primary | n/a |
| AM.003 | Early Ceramic | H. Heights | 4 | primary | none |
| AM.003 | Early Ceramic | H. Heights | 5 | primary | none |
| AM.003 | Early Ceramic | H. Heights | 6 | primary | shell |
| AM.003 | Early Ceramic | H. Heights | 7 | primary | shell |
| AM.003 | Early Ceramic | H. Heights | 8 | primary | n/a |
| AM.003 | Early Ceramic | H. Heights | 9 | primary | n/a |
| AM.004 | Early Ceramic | Byers | 1 | primary | n/a |
| BL.062 | Early Ceramic | Sadar | 1 | unk | shell |
| BL.062 | Early Ceramic | Sadar | 2 | unk | shell |
| DA.1687 | Early Ceramic | C and A | 1 | secondary | decorative non-shell |
| DA.1687 | Early Ceramic | C and A | 2 | secondary | decorative non-shell |
| EL.66 | Early Ceramic | none | 1 | unk | util-ceramic |
| EL.67 | Early Ceramic | none | 1 | unk | n/a |
| EL.67 | Early Ceramic | none | 2 | unk | n/a |
| EL.67 | Early Ceramic | none | 3 | unk | n/a |
| EL.67 | Early Ceramic | none | 4 | secondary | n/a |
| EL.67 | Early Ceramic | none | 5 | secondary | n/a |
| EL.67 | Early Ceramic | none | 6 | secondary | n/a |
| EL.67 | Early Ceramic | none | 7 | secondary | n/a |
| EL.67 | Early Ceramic | none | 8 | secondary | n/a |
| EP.1177 | Early Ceramic | East Fork | 1 | primary | shell, bone, util |
| EP.773 | Early Ceramic | Red Creek | 1 | primary | none |
| JF.1780 | Early Ceramic | Lena Gulch | 1 | primary | shell |
| JF.1780 | Early Ceramic | Lena Gulch | 2 | primary | shell |
| JF.223 | Early Ceramic | Magic Mtn. | 1 | primary | decorative non-shell |

| Age | Sex | Functional Context | Topographic Context | References |
|---|---|---|---|---|
| 30–40 | F | habitation | shelter | Finnegan (1997) |
| indet. | indet. | burial | low hill | Centennial Archaeology (2004) |
| 45–55 | M | habitation | shelter | Finnegan (1978) |
| 50–60 | M | habitation | shelter | Finnegan and Kilgore (1997) |
| 35–45 | F | habitation | shelter | Finnegan and Kilgore (1997) |
| infant | indet. | habitation | shelter | Finnegan and Kilgore (1997) |
| 20–30 | F | habitation | high terrace | Wanner and Brunswig (1992) |
| 25–35 | F | habitation | hill/high terrace | Swedlund and Goodman (1966) |
| 25 | M | habitation | shelter | Finnegan (1976); Hagar (1976) |
| indet. | indet. | habitation | shelter | Rathbun (1991) |
| indet. | indet. | habitation | shelter | Rathbun (1991) |
| n/a | n/a | habitation | hill | Prillwitz and Rathbun (1988) |
| n/a | n/a | habitation | n/a | OAHP Compass |
| 35–55 | F | habitation | 1st terrace | Wade (1971); Wood (1971) |
| 19–20 | indet. | habitation | 1st terrace | Hand (1986) |
| 5 | indet. | burial | 1st terrace | Guthrie (1982) |
| 35–39 | M | burial | 1st terrace | Guthrie (1982) |
| adult | indet. | burial | 1st terrace | Buckles et al. (1963) |
| 30–35 | F | burial | 1st terrace | Buckles et al. (1963) |
| indet. | indet. | burial | 1st terrace | Buckles et al. (1963) |
| adult | indet. | burial | 1st terrace | Buckles et al. (1963) |
| adult | indet. | burial | 1st terrace | Buckles et al. (1963) |
| 13–17 | indet. | burial | 1st terrace | Buckles et al. (1963) |
| 7 | indet. | burial | 1st terrace | Buckles et al. (1963) |
| infant | indet. | burial | 1st terrace | Buckles et al. (1963) |
| infant | indet. | burial | 1st terrace | Buckles et al. (1963) |
| 17–20 | F | habitation | n/a | Wilshusen (2001) |
| adult | indet. | burial | 1st terrace | Biggs (1966) |
| infant | indet. | burial | 1st terrace | Biggs (1966) |
| 12–18 | F | habitation | 1st terrace | URS (2003) |
| 6–8 | indet. | habitation | 1st terrace | URS (2003) |
| adult | indet. | habitation | hill | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| n/a | n/a | burial | terrace | Gilmore (1999) |
| 35 | F | burial | 2nd terrace | Chomko (1986) |
| 20–25 | F | burial | alcove | Butler, Chomko, and Hoffman 1986 |
| 35–45 | M | burial | 1st terrace | Jepson and Hand (1999) |
| 35–39 | F | burial | 1st terrace | Jepson and Hand (1999) |
| unk | unk | habitation | shelter | Irwin-Williams and Irwin (1966) |

*continued on next page*

Table 4.1—*continued*

| *Site #* | *Period* | *Site Name* | *# Ind.* | *Burial Type* | *Accompanying Artifacts* |
|---|---|---|---|---|---|
| JF.223 | Early Ceramic | Magic Mtn. | 2 | primary | n/a |
| JF.223 | Early Ceramic | Magic Mtn. | 3 | primary | shell |
| JF.223 | Early Ceramic | Magic Mtn. | 4 | primary | n/a |
| LR.042 | Early Ceramic | Carter Lake | 1 | primary | none |
| LR.097 | Early Ceramic | Hutcheson | 1 | primary | decorative non-shell |
| LR.097 | Early Ceramic | Hutcheson | 2 | primary | n/a |
| LR.097 | Early Ceramic | Hutcheson | 3 | primary | decorative non-shell |
| LR.1683 | Early Ceramic | Roberts Ranch | 1 | primary | shell |
| LR.284 | Early Ceramic | Lightning Hill | 1 | primary | shell |
| LR.284 | Early Ceramic | Lightning Hill | 2 | secondary | none |
| MR.378 | Early Ceramic | Gahagan-Lipe | 1 | primary | n/a |
| MR.378 | Early Ceramic | Gahagan-Lipe | 2 | primary | shell |
| MR.378 | Early Ceramic | Gahagan-Lipe | 3 | primary | util |
| MR.378 | Early Ceramic | Gahagan-Lipe | 4 | primary | util |
| MR.378 | Early Ceramic | Gahagan-Lipe | 5 | primary | shell |
| MR.378 | Early Ceramic | Gahagan-Lipe | 6 | primary | shell |
| MR.617 | Early Ceramic | Howard Rollins | 1 | primary | shell |
| MR.617 | Early Ceramic | Howard Rollins | 2 | primary | shell |
| MR.617 | Early Ceramic | Howard Rollins | 3 | primary | shell |
| OT.124 | Early Ceramic | Ancell | 1 | primary | none |
| PE.009 | Early Ceramic | Beacon Hill | 1 | secondary | shell |
| PE.079 | Early Ceramic | Dave Fountain | 1 | primary | util |
| PE.079 | Early Ceramic | Dave Fountain | 2 | unk | n/a |
| PE.1746 | Early Ceramic | Bronquist | 1 | primary | util |
| PE.420* | Early Ceramic | Muldoon Hill | 1 | secondary | util |
| PE.420* | Early Ceramic | Muldoon Hill | 2 | secondary | util |
| Whitman Ranch | Early Ceramic | Whitman Ranch | 2+ | unk | shell, bone |
| WL.047 | Early Ceramic | Kerbs-Klein | 1 | secondary | none |
| WL.047 | Early Ceramic | Kerbs-Klein | 2 | secondary | decorative non-shell |
| WL.047 | Early Ceramic | Kerbs-Klein | 3 | secondary | none |
| WL.047 | Early Ceramic | Kerbs-Klein | 4 | secondary | none |
| WL.047 | Early Ceramic | Kerbs-Klein | 5 | secondary | n/a |
| WL.047 | Early Ceramic | Kerbs-Klein | 6 | secondary | n/a |
| WL.048 | Early Ceramic | Kersey | 1 | secondary | none |
| WL.1813 | Early Ceramic | Ehrlich | 1 | secondary | util |
| WL.1813 | Early Ceramic | Ehrlich | 2 | secondary | none |
| WL.1986 | Early Ceramic | Garcia | 27 | unk | shell |
| WL.4840 | Early Ceramic | Newcomb | 1 | primary | none |
| MR.003 | Early Ceramic | none | 16 | primary | decorative non-shell |

Abbreviations: H.—Hazeltine; indet.—indeterminate; Mtn.—Mountain; unk—unknown; util—utilitarian

* The Muldoon Hill burial was evaluated as Middle or Late Archaic in the available documentation. However, because the burials are secondary and are accompanied by a large corner-notched projectile point, it is given an Early Ceramic affiliation.

| *Age* | *Sex* | *Functional Context* | *Topographic Context* | *References* |
|---|---|---|---|---|
| n/a | n/a | habitation | shelter | Irwin-Williams and Irwin (1966) |
| indet. | indet. | habitation | shelter | Kalasz and Shields (1997) |
| 35–45 | M | habitation | shelter | Kalasz and Shields (1997) |
| 45–55 | F | habitation | 1st terrace | Gleichman and Mutaw (1994) |
| 35–40 | F | burial | 2nd terrace | Wade (1966) |
| 30–35 | M | burial | 2nd terrace | Wade (1966) |
| 45–50 | F | burial | 2nd terrace | Wade (1966) |
| 50+ | F | burial | 1st terrace | Black (1997) |
| adult | M | habitation | low terrace | Morris and Marcotte (1977) |
| adult | M | habitation | low terrace | Morris and Marcotte (1977) |
| 45–55 | F | habitation | sand hill | Scott and Birkedal (1972) |
| 16–18 | F | habitation | sand hill | Scott and Birkedal (1972) |
| adult | M | habitation | sand hill | Scott and Birkedal (1972) |
| 18–20 | M | habitation | sand hill | Scott and Birkedal (1972) |
| juvenile | indet. | habitation | sand hill | Scott and Birkedal (1972) |
| infant | indet. | habitation | sand hill | Scott and Birkedal (1972) |
| n/a | n/a | burial | terrace | Breternitz and Wood (1965) |
| n/a | n/a | burial | terrace | Breternitz and Wood (1965) |
| n/a | n/a | burial | terrace | Breternitz and Wood (1965) |
| 37–51 | M | habitation | 1st terrace | Black, Spurr, and France (1991) |
| 45–55 | M | burial | high terrace | Black, Spurr, and France (1991) |
| 47–61 | F | burial | low dune | Simonich (1979) |
| n/a | n/a | burial | low dune | Simonich (1979) |
| 23–35 | M | burial | 1st terrace | McMahon and Sullivan (1994) |
| 50 | M | burial | 1st terrace | Burner and Simonich (1984) |
| 50 | M | burial | 1st terrace | Burner and Simonich (1984) |
| n/a | n/a | burial | hill or mound | Irwin-Williams and Irwin (1966) |
| adult | indet. | habitation | sand hill | Scott (1979) |
| juvenile | indet. | habitation | sand hill | Scott (1979) |
| indet. | indet. | habitation | sand hill | Scott (1979) |
| 40+ | indet. | habitation | sand hill | Scott (1979) |
| 40+ | M | habitation | sand hill | Scott (1979) |
| 40+ | F | habitation | sand hill | Scott (1979) |
| juvenile | indet. | habitation | 1st terrace | Lutz (1974) |
| 24–28 | F | habitation | 1st terrace | Brunswig and Wanner (1993) |
| 21–23 | M | habitation | 1st terrace | Brunswig and Wanner (1993) |
| n/a | n/a | burial | 1st terrace | Gilmore (1999); Greenway (1961) |
| young adult | F | burial | 2nd terrace | Wanner and Brunswig (2004) |
| n/a | n/a | burial | hill | Gilmore (1999); Shalkop (1950) |

Plains Woodland burials of the Central Plains, which were accompanied by strings of bone beads, such as those found at the Bisterfeldt site (25SF3) in Sioux County, Nebraska (Breternitz and Wood 1965; Mattes 1965; see also Peterson, this volume), or shell ornaments manufactured from both freshwater (most often freshwater clams of the genus *Lampsilis*) and marine species (often snails of the genus *Olivella*). The most common shell ornaments found in Late Prehistoric burial contexts are disk beads and clamshell pendants (some triangular and drilled with two suspension holes, similar to Hopewell gorgets) manufactured from freshwater species. As mentioned earlier, decorative materials do not accompany all Early Ceramic burials (in fact, a single site can contain burials that range from the most elaborate to the least elaborate burial types), but they do represent the addition of a unique type of burial to the established Archaic mortuary practice (Gilmore 1999:277).

Marvin Kivett (1953:118) observed that in Plains Woodland burials, ornaments—especially shell beads, bone beads, and shell pendants—were found more frequently in sub-adult burials than with adults. William Butler and colleagues (1986:23) also made this observation with regard to Late Prehistoric burials in eastern Colorado. A second perceived trend was that more female than male burials contained shell accompaniments. Burials of males often contained chipped stone tools, atlatl weights, and unmodified flakes, while ground stone and items of personal adornment were associated with females (Butler, Chomko, and Hoffman 1986:table 6). However, this pattern is not absolute; there are examples of males buried with both shell disk beads and *Olivella* beads (Black, Spurr, and France 1991; Jepson and Hand 1999; Morris and Marcotte 1977; Morris and Mayo 1979) and females buried with chipped stone tools, including a cache of tools that included both scrapers and projectile points, among other items (Jepson and Hand 1999).

In addition to the material elaboration of burials, some of the most compelling evidence of the cultural connections between the Plains Woodland and Early Ceramic peoples of eastern Colorado is similarities in how certain items are placed with the body. The placement of shell pendants and beads within the oral cavity in both Plains Woodland and Late Prehistoric burials on the western High Plains suggests a shared concept of the specific symbolic significance of placing decorative shell items in the mouths of the dead. This pattern has a relatively widespread geographic distribution and temporal duration; it was documented at Woodruff Ossuary in Kansas (Kivett 1953), as well as at the Early Ceramic–period Hazeltine Heights (Buckles et al. 1963) and Roberts Ranch (Black 1997) sites and the Middle Ceramic–period Chubbuck-Oman (Tipton 1967) site in Colorado. These burials have a temporal range of

600–1,000 years, from 1305±100 B.P. (2-sigma cal. range of A.D. 560–970) at Hazeltine Heights to 400±95 B.P. (2-sigma cal. range A.D. 1320–1800) at Chubbuck-Oman.

A statistical comparison of burials by accompaniment type (decorative, utilitarian, or no accompaniments) between the Archaic and the Early Ceramic was highly significant (chi-square=13.289, n=59, p=0.001), but the low expected frequencies within the cells containing the Archaic-stage sample make this result suspect. However, the lack of any Archaic-stage burials containing decorative items, compared with the 55 percent of Early Ceramic burials that do, would seem to be a significant difference. The same problems with insufficient sample size were encountered when testing the relationship between class of individual (male, female, or sub-adult) and type of burial accompaniments (decorative items versus utilitarian or no accompaniments) within all Early Ceramic burials. This was not possible because of the small size of each of these classes; only thirty-three burials have information on accompaniments, gender, and age. When the classes of females and juveniles are combined, and the classes of utilitarian and no accompaniments are also combined within a two-by-two contingency table, the comparison is not significant (chi-square=1.807, n=33, df=1, p=0.18), although a probability of 0.18 suggests a slight trend in the data toward different treatment of females and juveniles versus males. While this information may be statistically equivocal, an obvious change takes place in the range of items that accompany burials between the Archaic and the Late Prehistoric stages, and this is related to a changing social environment and the part burial of the dead played within that changed environment.

## Secondary Burials

In addition to the increase in material investment in burial accompaniments from the Archaic stage to the Late Prehistoric stage on the High Plains, there is an increase in the amount of time invested in burial ritual, represented by the practice of secondary burial. Examples of secondary burials include bundle burials, interment of scattered disarticulated bones in ossuaries, and secondary articulated burials (Brunswig and Wanner 1993). All of these forms of interment require either exhumation of primary burials for reburial, the gathering of bones from scaffold or other aboveground burials, or the active postmortem removal of the flesh and disarticulation of the body. These actions require a period in which the body is allowed to decompose, which indicates a significant increase in the time and effort invested in the ritual preparation of the body after death—including disinterment—and collection and cleaning of the remains. Of these activities, the secondary burial itself represents only the final act of the ritual process (Blick 2000; DeMallie 2001; DeMallie and Miller 2001; Hutchinson and Aragon 2003). As such, secondary interment suggests greater community involvement in mortuary ritual and process than primary interment does (Gold 2003). Secondary burial is not so much about the death of an individual; it has more to do with issues of group identity. Mortuary rituals consisting of several stages in a lengthy ritual cycle are often practiced by societies in which kinship is the principal means of social organization (Hutchinson and Aragon 2002:27). In this way, Early Ceramic–period secondary burial indicates a *qualitative* rather than a *quantitative* change in mortuary ritual from the Archaic stage, so there is no basis for statistical comparison between secondary and primary burials.

In Plains Woodland sites, secondary burials occur with primary burials in the same burial sites, sometimes in the same burial pits. On the High Plains of eastern Colorado, secondary burials are most often found associated with other secondary burials at sites with more than one burial, although not exclusively so. Of the nine documented sites that contain secondary burials, three also contain primary burials (Table 4.1). This is consistent with ethnographic accounts of the burial practice of Native Americans on the Plains. Many groups historically practiced both scaffold and earth inhumation, and the ultimate disposition of the body was often determined by individual choice before death (Brown and Irwin 2001; DeMallie 2001; Newcomb 2001; Schweitzer 2001; Stewart 2001; Wood and Irwin 2001). Differences in the form of interment could also be related to differences in practice between kin groups within the same social group (Buikstra and Charles 1999). Within archaeological contexts, it is difficult to determine whether contemporaneous secondary and primary burials at a particular site represent the end result of different burial practices or different stages in the same multistage mortuary ritual (Hutchinson and Aragon 2002:47). Accompaniments are usually absent from secondary interments, possibly as a result of loss or deterioration during the extended period of time the body is aboveground.

Secondary burials appear in the archaeological record prior to the end of the Archaic stage in Colorado, and the few dates available cluster in the terminal Late Archaic period and the initial part of the Early Ceramic period. The summed probability distribution for secondary burials is also bimodal, extending from the terminal Late Archaic and overlapping the Archaic/Late Prehistoric transition (Figure 4.5c). The dates for secondary burials place them at a time when population was growing in the later part of the Late Archaic period and into the initial Early Ceramic period, just prior to a rapid increase in population that began ca. A.D. 500. Based on these data, it is tempting to posit the migration of a population to eastern Colorado from the Central Plains during the terminal Late Archaic period (ca. 200 B.C.) that practiced secondary burial and was subsequently pushed out of the region ca. A.D. 500 by the expansion of local populations practicing primary inhumations. However, in the absence of additional data (cultural or genetic), further discussion is purely speculative.

## Site Context

In addition to changes in the treatment of individual burials, changes took place in the spatial and cultural contexts of the sites where burials were placed. The location of burials changed from primarily habitation sites during the Archaic to almost exclusively burial sites during the Late Prehistoric. These later sites were also situated topographically in ways that were more visible within the surrounding landscape. In addition, the number of both multiple-burial sites and interments at these sites increased. All of these factors suggest that changing rituals and the growing social importance of those rituals were reflected in the increasing importance of burial sites, which became specialized locations often used exclusively for interment and situated prominently within the landscape.

Perhaps the most meaningful evidence of the changing social context of burial ritual in Early Ceramic society is the increase in the number of sites used exclusively for burial. While the vast majority of Archaic burials are found in habitation sites (n=9, 90%), the number of Late Prehistoric habitation sites that also contain burials represents the minority of all Late Prehistoric burial sites (n=13, 42%). This difference is highly significant (chi-square=7.513, n=38, df=1, p=0.006) and suggests a developing attitude through time toward society's need for the dead to occupy a space exclusive to them.

Not only does the creation of a special place for interring the dead indicate the growing importance of the associated ritual, but the reuse of these places also amplifies their social and ritual importance. Of all the Archaic burial sites, only one (Falcon's Nest) contains as many as three interments (10%), whereas one-third (n=11, 35%) of Early Ceramic burial sites contain three or more interments, with a maximum of nine individuals at well-documented sites and at least twenty-seven individuals at the incompletely documented Garcia site (Table 4.1). Using the Mann-Whitney *U* test for large samples, a rank order comparison of the number of interments at Archaic-stage and Early Ceramic burial sites indicates that the difference in the number of burials at sites dating to different periods is significant, at a 95 percent level of confidence ($p=0.0212$, $n_1=10$, $n_2=31$, $U=212$, $z=2.03$).

Although the number of Late Prehistoric burial locations that are also habitation sites (n=13, 42%) is not substantially different from the number of locations used exclusively for burial (n=18, 58%), the latter group of sites contains 74 percent of all burials. When a rank order comparison of the number of interments is made between habitation sites and specialized burial sites for Archaic- and Early Ceramic–age sites using the Mann-Whitney *U* test, the difference is significant, with an associated probability of less than 0.001 ($n_1=13$, $n_2=18$, $U=92$). Not only were special sites for the interment of the dead created during the Early Ceramic period, but these sites were also used repeatedly through time as part of burial ritual.

The creation of a place of ritual significance or other importance is the product of a sequence of actions; both the initial decision and the subsequent practice are reinforced by these actions. Thus, these places are "both informed by particular structures of meaning as well as constitutive of such structures. As such, sequential social action derives from preexisting meanings that are either reinforced or modified through practice" (Mitchell, this volume). With this in mind, the selection of a burial place that was used repeatedly by mobile hunter-gatherers is the end result of a series of decisions that took into consideration both human agency and the contingencies of death. Where and how an individual was ultimately buried depended on many factors in hunter-gatherer societies, including time of year, the individual's location at time of death, the individual's status and perceptions of the individual by the family and social group, and individual preference (Bailey 2001; Brown and Irwin 2001; DeMallie 2001; Schweizer 2001; Stewart 2001; Wood and Irwin 2001). The return of a body to a designated burial site was the end result of what was potentially a long and involved process for hunter-gatherers prior to the introduction of the horse.

As a part of this pattern of increasing meaning of place, special topographic situations were also selected for burial locations. The number of Archaic and Early Ceramic sites containing burials is approximately split between prominent topographic situations, such as the crest of hills or high terraces, and less prominent locations, such as low terraces and rock shelters. However, the majority of Early Ceramic sites with three or more burials (n=8, 73%) are situated in topographically prominent locations. In the Midwest, Woodland burials were often placed in constructed mounds that accentuated the visibility of burial locations already situated on topographic high points. Other Early Ceramic–period burials on the High Plains of Wyoming and Nebraska, especially multiple-burial sites, are associated with constructed mounds (Scheiber 2008), although only two poorly documented sites in eastern Colorado, Sadar and Whitman Ranch, are recorded as possibly having mounds constructed over them. Mound construction is only one method, albeit the most permanent one, that has been used over time to signify burial sites. As mentioned earlier, historical accounts of burial ritual on the Plains abound with references to wood structures, poles with clan insignia, and turf mounds and rock mounds erected over burials (Liberty, Wood, and Irwin 2001).

Besides noting the shift from habitation to specialized site reserved exclusively for burial, some archaeologists working in eastern Colorado have suggested a shift in the geographic context of burials between the foothills for Archaic burials and the Plains for Late Prehistoric burials (Johnson and Adkins 1997:157). Although there is a higher proportion of Early Ceramic burial sites on the Plains (n=20, 71%) compared with Archaic burial sites (n=5, 50%), that difference is not statistically significant (chi-square=1.458, n=38, df=1, p=0.22). Rather than the result of conscious placement of burial sites in the foothills or the Plains, the impression that Archaic people buried their dead more often in the foothills and Early Ceramic people more often on the Plains is probably related to more general changes in settlement patterns that began in the Early Archaic period and lasted through the Protohistoric period. The location of the geographic mean centers for all Archaic and Early Ceramic sites suggests a general west-to-east trend in the location of all sites through time (Figure 4.6). Thus, the impression that Early Ceramic people chose burial sites out on the Plains more often than people did during the Archaic stage may just be a reflection of this more general settlement pattern. However, while the geographic mean centers of all Archaic sites and sites with burials occupy almost the same point, suggesting no difference in the selection of burial sites versus all site locations, the geographic mean centers for the spatial distribution of burial sites versus the mean center for all Early Ceramic–period sites are spatially distinct, which suggests a difference in the way burial sites were selected relative to the way habitation sites were selected.

In summary, measurable and significant differences exist in the geographic and cultural contexts of burial sites between the Archaic and Late Prehistoric in eastern Colorado. Are these differences culturally meaningful? Statistics are a useful tool for testing hypotheses, and in this way they provide a somewhat arbitrary mathematical measure of "significance" per se; however, they are only a tool for analysis and do not actually confer significance on a set of observations. With this in mind, statistics do provide a method that can reinforce the validity of trends in the burial site location and cultural context perceived over

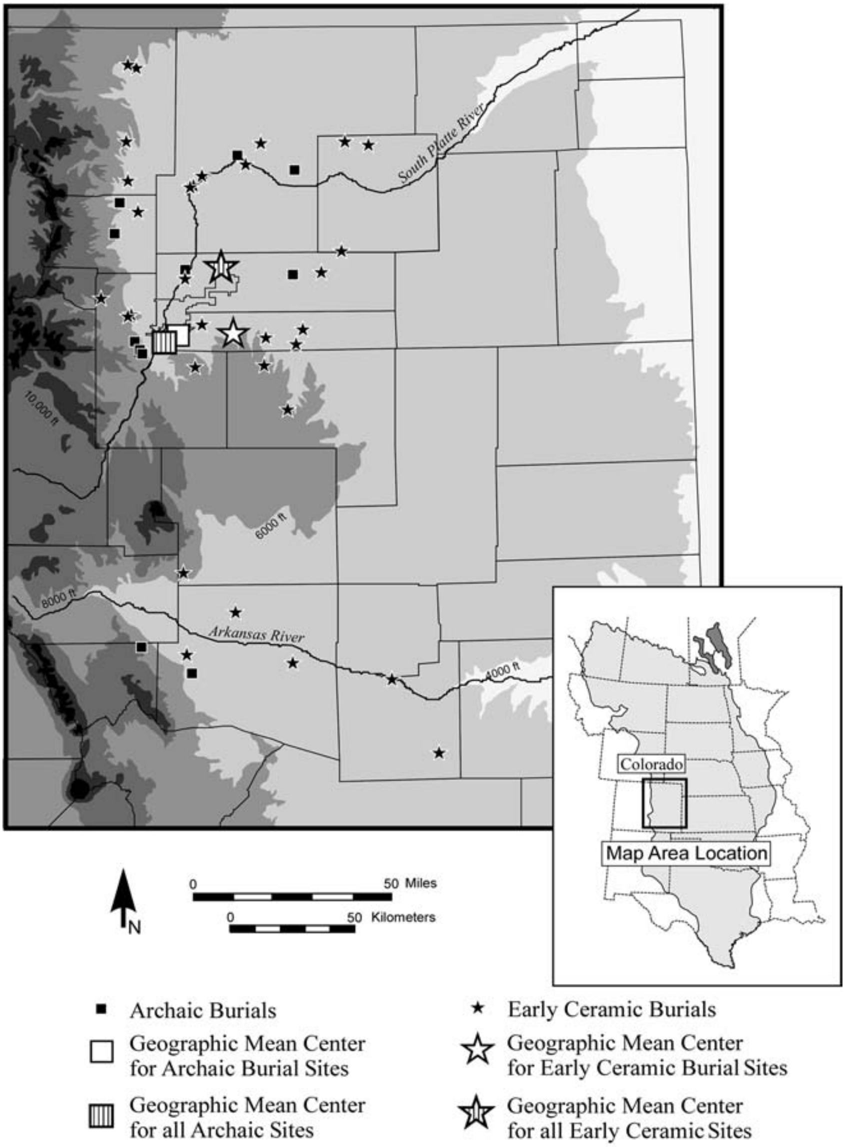


**FIGURE 4.6.**
*Elevation map of northeastern Colorado with the locations of both Archaic and Late Prehistoric sites containing burials. The geographic mean centers (average location) for burial sites and all sites for both periods are also indicated.*

the years (Breternitz and Wood 1965; Butler, Chomko, and Hoffman 1986; Scott 1979; Scott and Birkedal 1972). In all, changes in burial ritual from the Archaic stage to the Late Prehistoric stage suggest greater elaboration of the rituals surrounding the burial process, and this suggests a qualitative change in the concepts of death, community, and ethnic identity.

## DISCUSSION AND CONCLUSIONS

For millennia in North America, the places where the dead are buried have been used to mark the landscape "in ways that carried social, political, and religious meaning" (Buikstra and Charles 1999:203). This is true on the High Plains of eastern Colorado. Archaic mortuary practice—for which evidence for elaborate ritual is absent and which is characterized by the predominance of single burials located in habitation sites with either utilitarian or no burial accompaniments—reflects what I interpret as site-centered identification with the landscape. As such, it suggests that Archaic people identified the band as the primary social unit. In contrast, Late Prehistoric mortuary practice—which included repeated use of specialized burial sites, more prominent topographic situations, exotic accompaniments, and postmortem manipulation of the body (as in secondary burials)—suggests profound changes in the rituals surrounding death and an extension of social ties beyond the local area, possibly reflecting identity based on a larger social entity. All of this suggests a fundamental change in the socially constructed concept of landscape.

The shift to multiple burials interred in specialized mortuary sites suggests a fundamental change in attitude toward death that reflects greater community integration. These sites were reserved for the dead, and as such they were set aside as sacred ground, separated both spatially and functionally from economic and social activities of the living. Multiple interments on a site over time indicate a traditional association with those sites and a greater time depth of use. The practice of returning to a burial site, not because it was convenient but as a ritual requirement soon after the time of death (in the case of primary inhumations), reinforces the importance of place. The multiple number of individuals interred in these specialized sites (n=82, 74%) suggests that larger communities identified them as sacred, and placement in topographically prominent positions both reinforced the uniqueness of the place and sent a message declaring to whom this land belonged to those outside the group, as well as reinforcing that message to members of the group. Contingencies that interfered with completion of the ritual or decisions made by groups or individuals (including personal preference of the deceased) that contradicted the established ritual could account for the 26 percent of all Early Ceramic burials found at sites containing fewer than three burials.

The increased use of shell ornaments as burial accompaniments during the Early Ceramic period suggests greater contact with cultures to the east and southwest through trade in exotic goods. These trade relationships would also have served as conduits for ideas as well as goods. The inclusion of exotic materials in burials suggests a different conceptualization of the dead and their importance and needs. Differences in the quantity and variety of burial accompaniments are best understood in terms of the roles and status of the living as well as those of the dead (Buikstra and Charles 1999:211; Hutchinson and Aragon 2002:46), so this trend toward an increased number of shell ornaments accompanying female and juvenile burials during the Early Ceramic period could be an indication of changing cultural attitudes and perhaps changing social stature and roles of women and children. Likewise, it could also indicate incipient economic stratification, a possibility suggested by the quantity and exotic nature of many of the shell items. Economic status is often related to the number of regional trade partners, and the importance of those relationships would be communicated by the inclusion of exotic goods in burials. Shell ornaments may also have had symbolic meaning beyond economics. The inclusion of shell ornaments and ceramics depicting water birds in burials in Hopewell mounds and the situation of these mounds next to rivers have been interpreted by some as reflecting the importance of water in the acts of bathing and cleansing incorporated in world renewal rituals. In addition, water may have been the symbolic entryway into the underworld and therefore important to mortuary ritual (Buikstra and Charles 1999:215–216). Changing ideology that emulated that of the Hopewell may explain the shift in burial site location from rock shelters in the Late Archaic period to stream terraces in the Early Ceramic period.

Shell items found in burial contexts on the western High Plains are from several sources. The items include species of marine shell such as *Olivella,* which are most often sourced (when identified to species) to the Gulf of Mexico, with some shells sourced to the Gulf of California and the Pacific Ocean (Kozuch 2002). The majority of shell disk beads and pendants found in eastern Colorado burials are manufactured from freshwater species of *Lampsilis* or other freshwater mollusks. Although freshwater mollusks do inhabit the western High Plains of eastern Colorado, the species native to the region do not possess shells of sufficient thickness to have provided the material for the manufacture of the disk beads observed in burials (Wu 1989). In this case, even the freshwater shells found in burials would have to have been acquired from the Central Plains through trade or long-distance travel.

The increase in the amount of exotic shells and the specialized way these goods were placed on the body are indicative of two things. First, there seems to have been greater regional interaction during the Early Ceramic period than during the Archaic stage in the trade of both materials and ideas. Second, the exotic materials acquired through this trade would have possessed great economic value because of their rarity and the difficulty in acquiring them. The inclusion of items of this nature in burials marks them as "sacra," that is, items of and for ceremonial display that are related to cult institutions (Knight 1986, in Krause 1995). The manipulation of the bodies and bones of the dead also marks the burials themselves as sacra (Krause 1995:137). In this context, the trend in eastern Colorado toward special mortuary sites and away from habitation sites for burial suggests that the burial site itself became sacra and as such had a very different place in the ideology of the community than did the habitation sites, even those also used for burial.

What was the basis for these seemingly fundamental changes in burial ritual? Others have posited economic and environmentally based explanations for the sorts of changes observed in eastern Colorado (Charles and Buikstra 1983; Goldstein 1976, 1980; Saxe 1970). These explanations tied the "development of specialized, permanent and bounded areas for exclusive disposal of the dead to ritual affirmation of corporate group control of crucial restricted resources" (Buikstra and Charles 1999:203). Although this perspective has been subject to criticism (e.g., Hodder 1980, 1982; Shanks and Tilley 1982), it still has explanatory utility in some situations as long as human agency is also taken into account (Buikstra and Charles 1999:204; Morris 1991). I believe this theoretical perspective does have some explanatory utility for the Archaic/Late Prehistoric transition in eastern Colorado.

Taken as a whole, the data here suggest that perceptions on the landscape changed during the transition from the Archaic to the Late Prehistoric. The shift from what appears to be a site-based perception of landscape in the Archaic stage to a larger, territorial perception of landscape that was seemingly part of the transition to the Late Prehistoric, as well as the context in which these changes occurred, suggests that at least indirect functional reasons existed for this shift. Relatively low population densities make control of a specific territory somewhat irrelevant—a sufficient quantity and variety of resources are distributed throughout the landscape, and no one group can exhaust or otherwise diminish any of the critical resources. The shift to a territorial sense of place during the transition to the Early Ceramic period has its origins in increasing population pressure and decreased residential mobility, as well as the resulting need to exercise greater control over access to critical resources.

Decreased residential mobility may have been the consequence as population increased and mobile hunter-gatherer groups divided into smaller, possibly mutually antagonistic groups, some of which moved into other areas within the original group territory. This would have effectively reduced the size of the territory that could be utilized by both groups, resulting in less space between times when resource areas were revisited. That in turn would have hampered the full recovery of the resource prior to the next visit, ultimately resulting in decreased productivity. Populations continued to grow; as a result, overly large groups divided and subdivided, and these groups became spatially constrained in progressively smaller territories. Because of this increasing circumscription, people had less access to dispersed resources, which necessitated more efficient use of the available resources required to survive. In addition to using known resources with greater efficiency, this situation compelled people to use a greater variety of resources, both animal (including a greater variety of animals overall and in particular a greater number of small animals) and plant. Because they were more spatially concentrated, plant resources became proportionally much more important for subsistence, as access to large migratory mammals (such as bison) was increasingly restricted as a result of the decreasing size of territory and subsequent limitations of access to migration routes. As population continued to grow in an environment that offered no further group fission options, consumer demand increased within a now-constrained space, and some sort of production system (i.e., agriculture) became mandatory (Binford 1968, 1983). Within this scenario, greater control of a smaller territory was necessary to guarantee access to critical resources, and the importance of territory and group identity was reinforced through repetition of rituals (such as burial ritual) at special places on the landscape. These recurring rituals created and reinforced community cohesion. The choice of topographically prominent locations to perform these rituals communicated possession of this territory by all members of the community, both living and dead, to other communities.

The changes in mortuary practice that characterize the transition from the Archaic stage to the Late Prehistoric stage on the High Plains of eastern Colorado reflect fundamental changes in the complexity and importance of the rituals surrounding death. Although many of these changes relate to the increased material elaboration and postmortem manipulation of individual burials, the most significant changes have to do with the cultural contexts of the burial sites and their relationship to changing perceptions of the cultural landscape and territory. Unlike patterns of mortuary practice established during the Archaic stage, many of the Early Ceramic burial sites were reserved for the exclusive use of the dead, separated both spatially and functionally from other activities; as such, they represent sacred places whose growing importance was enhanced and reinforced by repeated use through time. This change in the social context of the burial site, coupled with the shift from a pattern dominated by single burials in less visible situations—such as rock shelters—to one of multiple burials in topographically prominent situations, suggests not only that these changes were important to the people participating in the rituals but also that it was more important than before to signal the location of these places to others. This growing importance of special places on the landscape and the need to communicate the location of these places suggest a change in the importance of territory and a concomitant need to control that territory. The fact that these changes were not universal suggests that not everyone felt compelled to follow the pattern, and situational contingencies cannot be ruled out as the source of these variations in mortuary ritual. However, changes in the overall pattern of burial ritual and the increased variation within this pattern suggest that something larger was affecting and reinforcing the changes.

In addition to changes in mortuary practice, the transition from the Archaic stage to the Late Prehistoric stage in eastern Colorado was characterized by changes in technology, economy, settlement patterns, and social structures. These changes are likely related to a significant increase in population that began at the end of the Late Archaic period and peaked in the middle of the Early Ceramic period. The sense of place based on a larger territorial scale instead of at the site level was in part an outgrowth of the need for greater control of territory when population pressures resulted in greater competition for critical resources within constrained territories, which in turn contributed to a redefinition of community identity and territorial ties. Many of the changes in mortuary practice correlate to similar changes in Plains Woodland burial rituals on the Central Plains, where they also created and reinforced a larger and more integrated sense of community. Likewise, similarities in the nature and use of burial accompaniments, the appearance of secondary burials, and the topographic positioning of burial sites suggest not only communication but also a shared ideology with communities to the east.

## ACKNOWLEDGMENTS

I thank Bonnie Clark and Laura Scheiber for their helpful comments on several drafts of this chapter and their almost bottomless well of patience. This chapter was greatly improved by the expert editing skills of Kathy Corbett. Todd McMahon and Mary Sullivan at the Colorado Historical Society, Office

of Archaeology and Historic Preservation, provided information on prehistoric burials. Michael Castellon also commented on an earlier version of this chapter.

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FIVE

# Landscapes and Peoples of the Llano Estacado

*Eileen Johnson*

In viewing the Llano Estacado (Figure 5.1) as a whole, a landscape approach is taken to provide the basis for further research. This current synthesis encompasses the physiography, biota, and cultural record of the Llano Estacado with the objective of integrating and placing that broader record within the framework of a landscape approach. The geology, flora, and fauna are not simply background material but instead are an integral part of the landscape and form many of that landscape's resources. The theoretical perspective sets the stage for a greater effort than is presented here but also provides an overall interpretive framework useful for both the synthesis and future research.

The landscape is viewed as layered, with each layer composed of various parts and elements interacting synergistically. The physiographic landscape consists of landforms and landscape elements, influenced by changes through time as well as transformations in the climate and environments. Superimposed

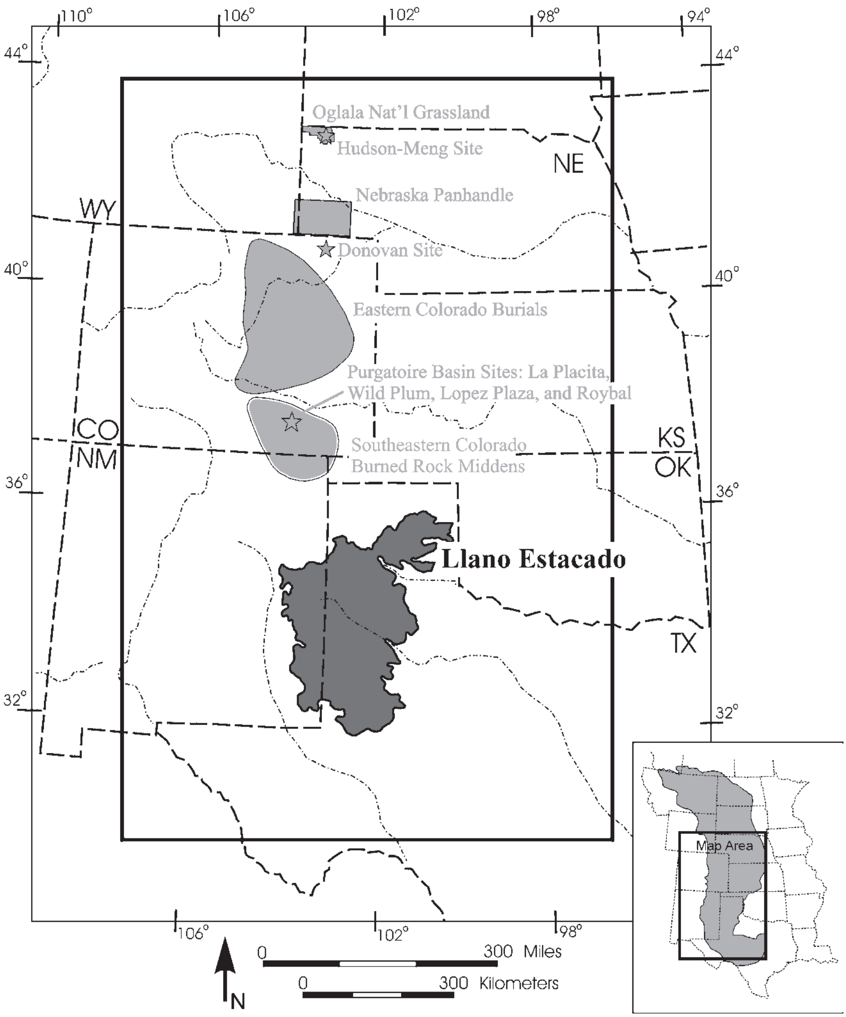


**FIGURE 5.1.**
*Map of the High Plains, highlighting the Llano Estacado (southern High Plains) of western Texas and eastern New Mexico. Illustration by Kevin Gilmore.*

over the physiographic landscape is the biotic landscape of plant and animal communities. Superimposed over these two landscapes is the cultural landscape, involving for this purpose activities, land use, and chronology. For the Llano Estacado, different levels of information are available for these landscape layers. The physiographic landscape is addressed, what is known about the natural and cultural landscapes regionally is outlined, and the relationship among the three layers is explored.

How one viewed and used the vast landscape of the Llano Estacado was a matter of cultural perspective. In 1839, an Anglo trader and explorer returning to the East from Santa Fe described the Llano Estacado as "an open plain . . . which was one of the most monotonous I have ever seen, there being not a break, not a valley, nor even a shrub to obstruct the view. The only thing which served to turn us from a direct course pursued by the compass, was the innumerable ponds which bespeckled the plain, and which kept us at least well supplied with water" (cited in Gregg 1954:252). Despite the acknowledgment of water, he also described the Llano Estacado as "that immense desert region" (Gregg 1954:357) and as "dry and lifeless" and "sterile" (Gregg 1954:362). In the 1850s, government-backed Anglo explorers reported that the area was "the Zahara of North America" (Marcy 1850:42), with "no inducements to cultivation" (Pope 1855:9). Yet twenty years later, in the 1870s, the *pastores* (Hispanic sheepherders from New Mexico) saw the territory as a vast, well-watered grassland ideal for expansion first through transhumance and then through year-round sedentary village pastoralism (Hicks and Johnson 2000). They called the western escarpment *la ceja de Dios,* or the eyebrow of God (Figure 5.2) (Cabeza de Baca 1954). This appellation imparted a much different sentiment than that of the Anglo statements.

The Llano Estacado has been occupied for the past 11,500 years (all ages in uncalibrated radiocarbon years). Despite climate changes and the mobile nature of some aspects of the landscape (dust storms, dune formation, water table), parts of the territory have always been good places to live. Early systematic research into the culture history, beginning in the late 1920s and 1930s, has focused on either the most recent records or the oldest periods. Sporadic investigation has focused on excavation. Although few large-scale systematic pedestrian surveys have taken place (e.g., Hester 1975a; Hughes and Speer 1981), some smaller-scale ones have occurred more recently, all with differing field methodologies (e.g., Hughes and Willey 1978; Johnson 2002; Litwinionek, Johnson, and Davis 1997; Schroeder and Rader 1995). Analysis of distributional data across the region has been limited and seemingly conflicting (Buchanan 1995a, 1995b, 1995c; Hester and Grady 1977). The application of a landscape approach to the archaeological record of the Llano Estacado is limited and just beginning (e.g., Litwinionek, Johnson, and Holliday 2003). This synthesis, then, provides a foundation and first approximation for using such an approach within the region.

**FIGURE 5.2.**
*Western escarpment of the Llano Estacado.*

## THEORETICAL PERSPECTIVE

This framework is neither a review nor a synthesis of the different theoretical perspectives available. It is rather the melding of a number of salient aspects from those various standpoints into a viewpoint that is useful as a regional guiding force. It is original only in taking pertinent concepts from these different perspectives and putting them together to create a functional framework, regardless of whether the overall theoretical schools are compatible or the most recent theoretical views.

Both evolutionary ecology and a landscape approach are incorporated to assess and interpret the late Quaternary record at different spatial scales on the Llano Estacado. The underlying goal is to understand the dynamics of the interface of culture, landscape, and climate reflected in adaptive responses. Cultural ecology, an early view of adaptive optimization, is based on the concept that culture is an adaptation to the environment with subsistence systems linked to that environment (Steward 1955; White 1959). More fully developed, the evolutionary ecology view of culture considers explanatory mechanisms of rational choice and natural selection to be causal factors (Smith and Winterhalder 1992:39; Winterhalder and Smith 1992:21). Primary condition factors for determining adaptations are the nature and distribution of resources (Kaplan and Hill 1992:167).

The approach to people-land relationships functions in the context of cultural continuity and change within hunter-gatherer and historical frontier economic systems in relationship to changing ecosystems. Useful to this approach are optimal foraging strategies (Bettinger 1980, 1991; Hayden 1981; Kelly 1995; Smith and Winterhalder 1992; Winterhalder and Smith 1981) and cultural change that occurs through actions of individuals within ecologically situated choices (Smith and Winterhalder 1992; Winterhalder and Goland 1997). This framework involves a set of methods with which to understand subsistence patterns in terms of a cost-benefit analysis in exploiting various resources. A cost-benefit analysis involves time, energy, and risk management. Risk management considers both the success and failure rates of procuring resources and the safety of individuals. It pertains to coping mechanisms and decision making in response to unpredictability in economic and environmental conditions and various levels of available information (Cashdan 1990).

Environmental variables include seasonality, potential hazards, and resources (size, distribution, and predictability). Seasonal movement of people is viewed as a mechanism for balancing maintenance and conservation of a resource with optimal exploitation (Hayden 1981:375). Decision making (rational choice) is viewed within a system of devising strategies for the most favorable resource procurement.

Such an analysis is also useful in examining the regional patterns of historical non-aboriginal peoples on the Llano Estacado. Frontier studies are couched in terms of core and peripheral societies, resource exploitation, habitat, and social process (Forbes 1968; Green and Perlman 1985; Hardesty 1980; Lewis 1984). The frontier as habitat poses a set of environmental and physiographic problems that must be coped with and managed if use or occupation is to be successful. The frontier as social process has two aspects. One is as a transitional zone of interaction where intrusive and indigenous societies compete (Forbes 1968; Waselkov and Paul 1981). Another is as an interface for the intrusive society between settled and unsettled territory, with the unsettled territory under the influence of, and interacting with, the settled area (Billington 1971; Lewis 1977, 1984; Ostrogorsky 1982). The homeland concept has the basic elements of people, place, identity with place, cultural landscape, and environment (Nostrand 1992). Regardless of where people go or live, they identify themselves with a homeland and return when they can.

A landscape approach facilitates examination of the interaction between people and their environments and land use patterns, as people are generally involved actively in a dynamic relationship with the landscape. This approach provides a framework with which to assess land use and regional patterns and to examine resource exploitation (Rossignol and Wandsnider 1992).

Landscape is defined as a heterogeneous land area consisting of interacting ecosystems repeated in similar form throughout (Forman and Godron 1986:11). The landscape is physically composed of landforms and landscape elements (Forman and Godron 1986:12; Stafford and Hajic 1992:139), dependent on scale. Landforms are the geomorphic features on the surface of the earth (Forman and Godron 1986:230). Two scales of immediate interest for landforms are the provincial section or region (overall) and the constituent part (local) (Hunt 1967:44). Factors controlling the shape of landforms are structure, process, and stage. Structure involves the resistance of rocks to erosion and deformation of the underlying bedrock of a province or section. Process involves erosional and depositional pathways and is the primary factor governing landforms at the regional to local scales. Stage involves the duration and intensity of a particular process, how long it has been occurring and the strength or force exerted. Stage acts as a modifying factor controlling the shape of landforms, whereas structure and process govern landform formation and development.

Landscape elements are located on landforms and are minimal spatial units that are locations with specific geomorphic and topographic characteristics that have different probabilities of being stopping points (Forman and Godron 1986; Stafford and Hajic 1992:139–140). Landscape elements possess physical and ecological characteristics at different scales (from regional to restricted). Different parts of the landscape are used for diverse functions that require different combinations of physical and ecological characteristics. Stopping points occur for various reasons depending on the function. Movement pattern and foraging pattern of life-forms are influenced by the spatial arrangement or distribution of landscape elements.

Movement of hunter-gatherers and agropastoralists across a region is in part a response to the distribution and organization of the landscape elements (Stafford and Hajic 1992:140). Landscape elements provide the potential for cultural activity and material deposition, and they influence where such places will be located. Depending on the mobility strategy and function, the use of a place or stopping point may vary from once to repeated occasions both synchronically and diachronically. Density of material deposition also will vary (Binford 1982, 1983; Chang 1992; Stafford and Hajic 1992).

Geomorphic processes also govern the spatial dimension of time and affect what is preserved in the record as well as the structure of that preservation

(Bettis and Mandel 2002; Waters and Kuehn 1996). Deposition and erosion control what is buried, not buried, or eroded away; while the resolution of the record (from single event to a palimpsest) is shaped by the rate of those processes. Rates and processes change through time and affect both the distribution of cultural material across the modern landscape and the landscape itself. Landforms and their associated landscape elements are affected by time and process. Landscape, therefore, has both a horizontal and a vertical dimension. Both dimensions are significant to land use and resource distributions. Geomorphic processes and the geologic filter created have affected both landscape development and the preservation of the various records contained within the deposits. This aspect has both regional and local effects that temper what is exposed on the surface and what is preserved in the ground. No landscape is unaffected by geomorphic processes, and the modern landscape is composed of elements of different ages as well as sites from various times and cultures. Neither excavation nor systematic regional survey alone counteracts the biases in the record created by these effects. But the combined efforts, coupled with an understanding of the processes, provide a more informed basis for interpreting land use and patterns.

Beyond landscape element and place is the concept of persistent place, a stopping point used repeatedly over the long-term occupation of a region (Schlanger 1992:92). The characteristics (i.e., landscape element) of these locations are such that the probability remains very high through time that they will be stopping points. Persistent places have unique qualities that make them well suited to certain endeavors, and they may have cultural features (e.g., site furniture) that anchor those places within mobility or subsistence strategies and draw people back (Binford 1979, 1980, 1982; Schlanger 1992:97). These locations are places where not just people representing the same culture reoccupied them but different cultures or groups through time also used them. This use involves both generational memory and information acquisition. Information is critical for a group coming into a new or unknown territory. Risk is involved in balancing the cost of acquiring information versus the value of increased knowledge. Uncertainty, however, is reduced through information acquisition, either through information sharing with people already in the region or reconnaissance forays (Cashdan 1990; Smith 1991; Smith and Winterhalder 1992).

On a broader scale, the region itself or its landscape is a persistent place. People traverse the area, and use of the landscape as a whole can be attested to through the distribution of persistent places, stopping points, and isolated finds. Isolated finds are not tied to cultural features and may only be broadly related to landscape elements (Schlanger 1992:101). They are, then, an independent variable too often underutilized in examining the settlement patterns of a region.

The concept of a remnant settlement pattern is based on the incompleteness of the archaeological record and is concerned with the spatial and temporal dynamics of the use of places and changes in those dynamics through time (Dewar and McBride 1992:227, 237). The record is affected by both taphonomic and geomorphic processes and by cultural processes shaping year-to-year variability in location and assemblage content. In terms of cultural processes, a cost-benefit analysis involves the comfort level or necessities for living juxtaposed with the landscape elements that make the location a favorable stopping point. Such comfort-level matters as availability of local resources (e.g., firewood, game, plants), rate of depletion and renewal of local resources, fleas and other pests, and sanitation are considerations in the length of occupation and reoccupation of a place. Cultural processes also may be operative in reoccupying a place in terms of the exact location of that reoccupation, inducing variation in the spatial equivalence of occupational sequences (Dewar and McBride 1992:234). While a place may be returned to repeatedly, the individual occupations may or may not parallel each other but rather may overlap or be adjacent to previous occupations. Boundaries, then, grow and shift horizontally and vertically through time.

## THE LLANO ESTACADO

### Physiography

The Llano Estacado (or southern High Plains) is a flat, expansive plateau in western Texas and eastern New Mexico covering 130,000 km$^2$ (Figure 5.3). Escarpments along three sides define the region. Bordering the eastern escarpment is the Osage Plains of the Central Lowland province. The northern escarpment overlooks the Canadian River Valley. That valley separates the southern High Plains from the rest of the High Plains section. The Pecos River Valley section, to the west and southwest, includes the Monahans Dunes and Mescalero Dunes that abut the southwestern escarpment and the Mescalero Plains. To the south, the region merges with the Edwards Plateau section without an obvious break.

Miocene through Pleistocene constructional and erosional events shaped the configuration of the Llano Estacado and produced its three archaeological bedrocks that contain regional rock sources. The Ogallala Formation (Miocene-Pliocene), a major unit of the late Tertiary Rocky Mountains alluvial and

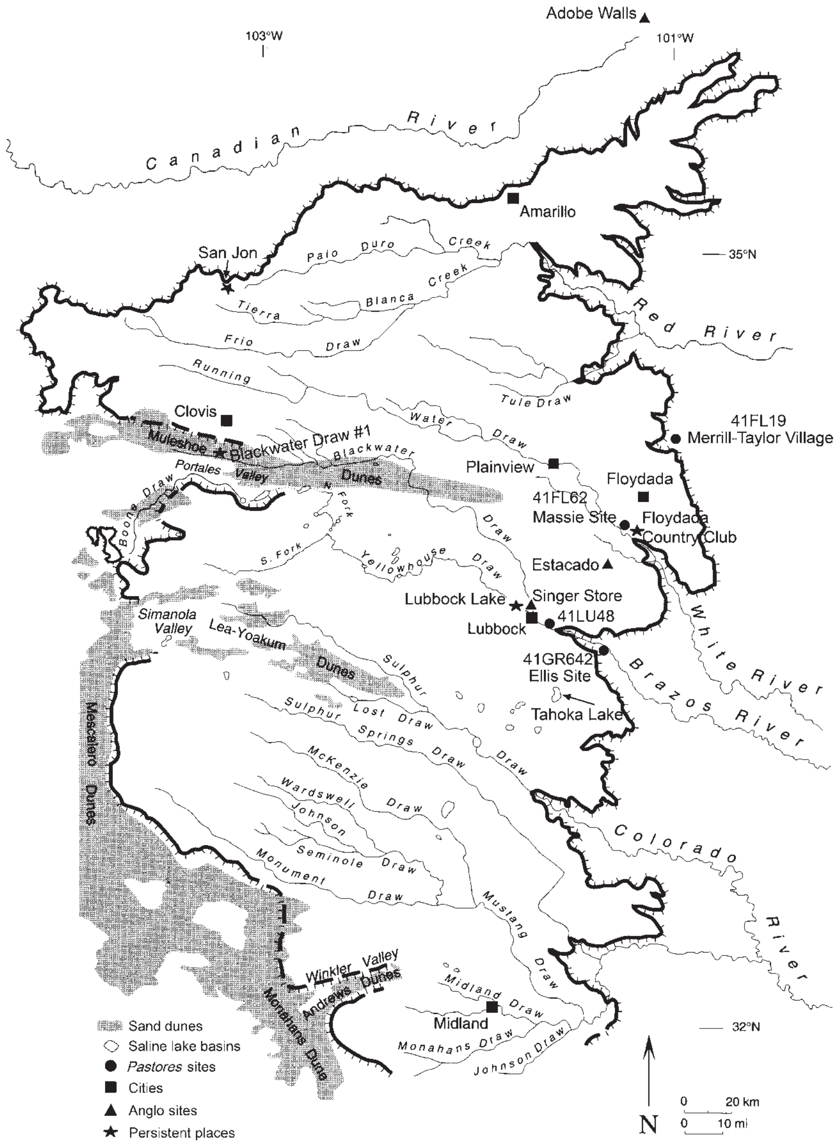


**FIGURE 5.3.**
*Drainage system, major dune fields, and selected sites of the Llano Estacado; sites denoted by a star are persistent places (second type).*

fluvial mantle, extends throughout most of the High Plains, from Nebraska to Texas. This formation produces the Ogallala aquifer, the major underlying water source for the High Plains (Fenneman 1931; Holliday et al. 2002; Hunt 1967). The Ogallala gravels are a regional rock resource available locally wherever a section of a paleovalley is exposed (Holliday and Welty 1981). The ca. 2-m-thick, highly resistant pedogenic calcrete at the top of the Ogallala Formation is primarily responsible for the configuration and size of the Llano Estacado and contributes to the topographic flatness. The calcrete is ledge forming, breaks off in blocky sections, and is a source for caliche (Gustavson 1990; Holliday et al. 2002), another regional rock resource available on a local basis.

Large lake basins along the eastern side of the Llano Estacado were inset into the Ogallala Formation and filled with lacustrine deposits (up to ca. 21 m) of the Blanco Formation (late Pliocene). A calcrete formed at the top of the deposits is another source for caliche and silica-enriched (silicified) caliche (Evans and Meade 1945; Holliday 1988, 1995a; Holliday and Welty 1981). The availability of these two varieties across the region is far more restricted than that of Ogallala Formation caliche.

The Blackwater Draw Formation (early Pleistocene to about 50,000 years ago [Holliday 1989; Reeves 1976]), composed of episodic, thick, widespread aeolian sediments, draped the region and blanketed all underlying units and geomorphic features. The sediments were altered by soil formation under dry and warm conditions, and their calcrete zones provide yet another source of caliche. This thick blanket of sediments is another reason for the region's flat surface.

Modern geomorphic features have cut through or are either inset into or rest upon the Blackwater Draw Formation (Figure 5.4). The northwest-to-southeast–trending, now-dry river valleys (locally known as draws) are tributaries of the Red, Brazos, and Colorado rivers, which flow through the Osage Plains and into the Gulf of Mexico (Figure 5.3). Final downcutting that resulted in the modern drainage system began sometime after 20,000 years ago, with aggrading and infilling of the valleys starting around 12,000 years ago (Holliday 1995a).

About 25,000 small lake basins (locally known as playas) and 40 saline depressions (locally known as salinas) cover the landscape, occurring primarily on the High Plains surface (Sabin and Holliday 1995). Playas are usually freshwater sources (Figure 5.5). Salinas are large, irregularly shaped basins (Figure 5.6). Although freshwater springs are associated with some salinas, the basins contain salt deposits and lake waters are brackish (Holliday et al. 2002;

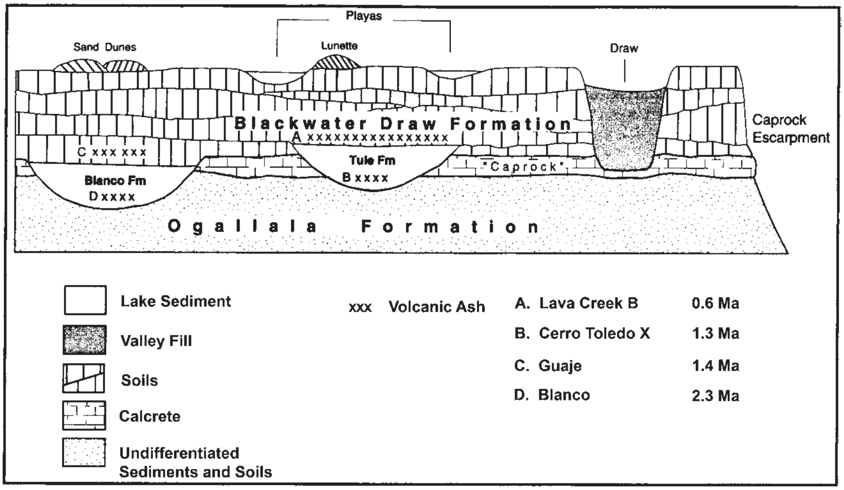


**FIGURE 5.4.**
*Modern geomorphic features in relation to the regional Blackwater Draw Formation.*

Reeves 1991). Lunettes and dune fields occur throughout the Llano Estacado. Lunettes (lee side dunes; Figure 5.4), associated with playas and salinas, have formed downwind of drying lake basins (Holliday 1997). Large reentrant valleys along the western side have acted as channels or ramps for sediments blowing off the Pecos River Valley in an incursion onto the Llano Estacado, forming several dune fields (Figure 5.3). Elsewhere along the western edge, large dune fields have built up against the escarpment (Holliday 1995b).

Numerous springs, active since at least the late Pleistocene (Holliday 1995a, 1995b), flowed in various reaches of the draws prior to the 1930s, with both ponds and free-flowing water available (Brune 1981). These springs were concentrated and confined to certain reaches of the draw system.

## Biota

The Llano Estacado was a vast grassland throughout the Quaternary (Frendlund, Holliday, and Johnson 2003; Hall and Valastro 1995; Holliday 1987, 1988, 1995a; Johnson 1986, 2007). Although early studies indicated forested periods for the late Pleistocene into the early Holocene (Wendorf 1961, 1970; Wendorf and Hester 1975), extensive research since has underscored an expansive grassland ecosystem whose composition and character

**FIGURE 5.5.**
*The Colston Playa near Floydada, Texas.*

Table 5.1. Native Trees and Shrubs of the Llano Estacado.

| *Taxon* | *Common Name* |
|---|---|
| *Pinus* cf. edulus | piñon pine |
| *Juniperus* spp. | juniper |
| *Populus* spp. | cottonwood |
| *Juglans* spp. | walnut |
| *Celtis reticulata* | net-leaf hackberry |
| *Prunus americana* | wild American plum |
| *Prosopis glandulosa* | honey mesquite |
| *Rhus* spp. | sumac |

changed through time yet remained a grassland. The rise of the short-grass ecosystem occurred around 8,000 B.P., with modulations in that ecosystem into modern times.

Native trees and shrubs (Table 5.1) formed a component of the vegetation community at various periods through time and always in a restricted pattern (Gregg 1954; Hall 1995; Holden 1962a; Johnson 2007; Marcy 1850, 1854; Pope 1854, 1855). These woody plants are found discontinuously primarily in the draws, reentrant canyons, and escarpment at different times and in the vicinity of water—seeps, springs, streams, ponds, marshes. Hackberry, black walnut, mesquite, and cottonwood are characteristic of the draws, whereas wild plum, piñon-pine, and juniper favor the protected, steep reentrant canyons (Table 5.1).

Bullrush (*Scirpus* spp.), the dominant plant throughout the late Quaternary, reflects the watercourse in the draws and was joined by spikerush (*Eleocharis* spp.) in the late Pleistocene and horsetail (*Equisetum* spp.) and chara (*Chara*


**FIGURE 5.6.**
*Tahoka Lake, a large salina near Tahoka, Texas; note the fringing lunettes along the eastern border and the playa basins to the east of the salina.*

spp.) in the early Holocene. These plants indicate emergent vegetation and sedge beds along the waterways in various reaches of the draws during this time. Devil's claw (*Proboscidea louisianica*) was present along the valley margins. In the middle Holocene, bullrush was joined by water lily (*Nymphaea* spp.) in those reaches of the draws that had surface water. In late Holocene times, bullrush along the draws was joined by devil's claw and prickly poppy (*Argemone* spp.) along the valley margins (Johnson 2007; Thompson 1987). R. B. Marcy (1850:62) noted a large playa with "rushes" growing in and around it. Historically, devil's claw has been found on the west side of playas, with scattered yucca (*Yucca* spp.) and prickly pear (*Opuntia phaeacantha*) on the uplands and "different kinds of small onions" in the canyons and marshy grounds. Wildflowers included Tahoka daisies (*Machaeranthera tanacetifolia*), buttercups, verbena (*Verbena* spp.), and Indian paintbrush (*Castilleja sessiliflora*) (Gregg 1954:363; Holden 1962a:7–8).

Most of the identified plants had economic value to aboriginal populations in general. The various trees and mesquite were a source of firewood. Mesquite in particular produces a hot, long-burning fire. The hackberry fruit is edible and can be ground into cakes and dried for future use. Mesquite beans are highly nutritious and can be ground into flour. Seeds from devil's claw are edible and high in oil, and the mature, dry seed pods have usable fiber. Water lily root stock can be dried and ground into flour, and the seed pods can be roasted. Bullrush can be a fiber source as well as a versatile food resource (Harrington 1972; Niethammer 1974; Thompson 1987).

Vertebrate biodiversity fluctuated through time over the late Quaternary. The fauna was a grassland one, although its composition changed through time. Woodland-dependent forms (e.g., wild turkey [*Meleagris* spp.]) were restricted in time or space, as were other forms dependent on flowing water, certain depth of water, or pH of water and forms dependent on certain temperature and humidity regimes (Johnson 1987). The greatest biodiversity of large vertebrates (both predator and prey) was in the late Pleistocene. Suggestions based on physiological needs (e.g., McDonald 2003) and isotope data (Matheus, Guthrie, and Kunz 2003a; Passey et al. 2002; Wang, Cerling, and MacFadden 1994) are emerging on how large-herd herbivores divided up the late Pleistocene grassland (i.e., the specific niches they filled). Anatomical and isotopic data now indicate which large carnivores were active predators and their prey and those that were scavengers and their preferred carcasses (Matheus 1995, 2003; Matheus, Guthrie, and Kunz 2003b).

A typical Rancholabrean fauna inhabited the Llano Estacado during the late Pleistocene (Johnson 1986; Table 5.2). Many of the small vertebrates and

Table 5.2. Late Pleistocene Large-Herd Herbivores and Carnivore Guild of the Llano Estacado.

| *Taxon* | *Common Name* |
|---|---|
| *Mammuthus columbi* | Columbian mammoth |
| *Equus mexicanus* | Mexican horse |
| *Equus francisci* | stilt-legged horse |
| *Camelops hesternus* | yesterday's camel |
| *Hemiauchenia macrocephala* | large-headed llama |
| *Odocoileus virginianus* | white-tailed deer |
| *Antilocapra americana* | pronghorn |
| *Bison antiquus* | ancient bison |
| *Canis dirus* | dire wolf |
| *Canis lupus* | gray wolf |
| *Canis latrans* | coyote |
| *Vulpes velox* | swift or kit fox |
| *Urocyon cinereoargenteus* | gray fox |
| *Arctodus simus* | short-faced bear |
| *Smilodon fatalis* | sabertooth cat |

herptile species reflected a prairie dog community and small grassland grazers (e.g., rabbits). Resident and migratory birds inhabited the region, with the playas and salinas a significant aspect of the migratory flyway. Streams in the draws were inhabited by a variety of fish, water turtles, and water snakes (Johnson 1986, 1987).

The time around 11,000 B.P. marks the biotic and ecosystemic end of Wisconsinian conditions on the Llano Estacado (Johnson 1986, 1987) and the Southern Plains in general (Baker 1983; Lundelius et al. 1983)—that is, the end of the Pleistocene. Most of the large-herd herbivores, along with their predators and scavengers, and smaller forms became extinct. Some forms were extirpated, and others continued in the region. Ancient bison emerged in the early Holocene fauna as the major grazing-herd herbivore, with deer and pronghorn continuing as large browsers. A variety of fish and water snakes inhabited the ponded waters in the draws; only catfish (*Ictalurus* spp.) were known from freshwater marshes in the draws at the end of the early Holocene. Prairie chickens (*Tympanuchus cupido*) and box turtles (*Terrapene ornata*) would have been found on the open grassland. While biodiversity overall was down from the late Pleistocene, the known early Holocene fauna for the Llano Estacado was still diversified (Johnson 1986, 1987).

The known middle Holocene faunas were depauperate and dominated by bison. Species richness was low, although the major habitats (waterways, riparian, valley margins, uplands) were reflected in the known species (Johnson 1987). The emergence of modern bison (*Bison bison*) by 7000 B.P. coincided with the rise of the short-grass ecosystem (Fredlund, Holliday, and Johnson 2003; Lewis 2003; Lewis, Buchanan, and Johnson 2001; Lewis et al. 2006).

The known late Holocene faunas again were depauperate, but species richness and biodiversity were higher than in the middle Holocene (Johnson 1987). Native bass (*Micropterus* spp.) returned to the stream-marsh complex of the lower reaches of the draws (MacEwan 2002), as did mud and pond turtles.

Puddle ducks and rails were once again found in the waterways and riparian areas, as were ruddy duck (*Oxyura jamaicensis*), garter snakes, and cotton rat (*Sigmodon hispidus*). Grassland birds were in the region, and bison and pronghorn continued as the large-herd herbivores.

Historical records note bison, large herds of pronghorn, and deer as the primary herd animals along with black bear (*Ursus americanus*), mountain lion (*Puma concolor*), wolf, and coyote (Gregg 1954; Holden 1962a). The most significant addition to the historical fauna (A.D. 1650 forward) was the modern horse (*Equus caballus*). Reintroduced into the Americas by the Spanish, the horse was acquired by aboriginal people on the Llano Estacado through trade and raid patterns and became an element of the historical fauna of the Llano Estacado as feral herds.

Many of the animals had economic value to aboriginal populations in general. Depending on the game animal, the variety of resources included meat, fat, tendons, marrow, hides, and feathers. Most of the herd herbivores were sought as game animals, with bison a major game animal—although not the sole resource—throughout time. Small game such as turkey, puddle ducks, and muskrat supplemented the diet and underscored a diverse subsistence base. Bone was a tool resource, and bones from various large and small animals were used in the creation of formal tools as well as decorative items.

## Cultures

Five broad cultural periods are generally recognized for the Llano Estacado: Paleoindian (11,500–8,500 B.P.), Archaic (8,500–2,000 B.P.), Ceramic (2,000 B.P.–ca. A.D. 1450), Protohistoric (ca. A.D. 1450–1650), and Historic (ca. A.D. 1650–1950s). Excavated sites within good contexts are few, particularly in the earlier periods, but they form the basis for the general patterns presented (Figure 5.3). The Paleoindian period is subdivided into the Clovis (11,500–11,000 B.P.), Folsom (10,800–10,300 B.P.), Plainview (ca. 10,000 B.P.), and Firstview (ca. 9000–8600 B.P.) times based on distinctive projectile point types.

Three sites on the Llano Estacado yielded evidence of Clovis-age occupations, two in the draws (Hester 1972; Johnson 1987) and one at a playa (Sellards 1938). Game animal diversity encompassed mammoth, horses, camel, ancient bison, short-faced bear, wild turkey, and box turtle (Hughes 1984; Johnson 1987, 1989, 1995a), involving both active hunting and scavenging activities (Holliday et al. 1994; Johnson 1989; Saunders and Daeschler 1994). Mammoth limb elements were quarried for core and tool production (Johnson

1985), and mammoth tusk was worked into tools (Saunders et al. 1990, 1991). Limb elements of other game animals were dynamically impacted, and suitable portions were used as expediency tools (Johnson 1987, 1989). Clovis points were resharpened and reused as butchering tools (Johnson 1991).

The Clovis-Folsom transition on the Llano Estacado was a time of significant climatic and environmental change that continued into late Paleoindian times. The hunting focus of Folsom peoples was on ancient bison, with additional game animals as supplements. Two draw sites yielded evidence of Folsom-age occupations (Hester 1972; Johnson 1987), with both sites expressing repeated kills. Small cow-calf herds were killed and butchered at the marshy edges of ponds using both expedient lithic and bone butchering tools (Hester 1972; Johnson 1987). Folsom points were refashioned for continued use as weapons and resharpened for use as butchering tools (Johnson 1987). A rim site where biface manufacturing and retooling took place overlooked the ponded waters at one of the valley sites (Boldurian 1990; Boldurian et al. 1987).

Excavated post-Folsom Paleoindian sites are equally limited, with only a few known in the draws and at playas (e.g., Hartwell 1995; Hester 1972; Johnson 1987; Roberts 1942; Sellards, Evans, and Meade 1947). The general pattern of hunting small cow-calf herds at the marshy edges of waterways continues, as do repeated kills, with occasional larger-scale kills. Plainview and Firstview points were refashioned for extended life and resharpened for use as butchering tools. The general butchering tool kit also consisted of expedient lithic and bone butchering tools (Hill, Holliday, and Stanford 1995; Honea 1980; Johnson 1987, 1989; Johnson and Holliday 2004; Wheat 1972). A group of large bifaces, large flakes, and finished points primarily from the same exotic material represents caching activity at a playa (Hartwell 1995).

The Paleoindian-Archaic transition was another time of climatic and environmental change. Little is known about Early Archaic peoples, with only two draw sites (Johnson 1987) and a playa site (Johnson, Litwinionek, and Holliday 2004) excavated that represent bison kills and a camp. Projectile points, stemmed but with basal grinding (Johnson, Litwinionek, and Holliday 2004), were refashioned for extended life and resharpened for use as butchering tools. A metate in the process of being manufactured is contemporaneous with the camp (Johnson and Holliday 2004; Johnson, Litwinionek, and Holliday 2004), reflecting the earliest visible sign of plant incorporation into the diet.

The Middle Archaic coincided with the Altithermal, with hot, dry, dusty conditions. Changes were occurring climatically, environmentally, and demographically. Excavated sites were in the draws. The water table dropped regionally, and people along the western and southern portions of the Llano Estacado were hand-digging wells to obtain water. By the middle of Middle Archaic times, the water table had dropped below the level obtainable by hand-digging, and people abandoned these parts of the Llano Estacado (Meltzer 1995, 1999). Bison may have decreased in abundance and probably herd size with less surface water available in the desert-Plains grassland setting. People continued to inhabit the eastern portion of the Llano Estacado, as surface water was available in restricted locations (groundwater seeps and springs in the lower reaches of the draws). While bison hunting continued, a greater reliance on plants (particularly desert succulents) is apparent with the presence of a large ash-filled pit capped by a layer of burned caliche cobbles, interpreted as a baking oven for vegetal processing (Johnson and Holliday 1986). Material culture was meager (Hester 1972; Johnson 1987; Johnson and Holliday 1986, 2004; Meltzer 1991).

The late Holocene was marked by a return to mesic conditions, a resurgence of springs that provided localized marshlands in the draws, and seasonal to year-round water in the upland playas and salinas. Few late Holocene sites have been excavated (Johnson and Holliday 2004). For Late Archaic times, excavated sites are along waterways (in the draws, on the rim, and at an upland playa) and reflect a small diversity of activities. Projectile points were used as weapons. Camping events associated with hearths and retooling were the most common activities (Backhouse et al. 2001; Johnson 1987; Lintz 1997). The only excavated bison kill is at the edge of a playa (Roberts 1942), involving a small cow-calf herd (Hill, Holliday, and Stanford 1995). A Late Archaic caching activity is in a draw setting (Buchanan 1995a).

A pattern of episodic drought began about 2,000 years ago and continues today, with the upper reaches of the draws lacking spring activity and the lower reaches with spring activity affected differently. Ceramic times were marked by the introduction of pottery and arrow points. The earlier part of the Ceramic was transitional, as indicated by the retention of Archaic dart point designs along with the use of pottery and arrow points. The earliest pottery was tradeware from the Jornada branch of the Mogollon in southeastern New Mexico (Willey and Hughes 1978). The few excavated sites on the Llano Estacado from this transitional period are primarily camps in the draws, including a rare rock-shelter occupation. Hearths were common, and activities included retooling and plant processing (Hughes and Willey 1978; Kelley 1974; Lintz 1997). A specialized site on the rim overlooking a draw focuses on probable vegetal processing in a series of rock-choked pits (filled with burned caliche cobbles) that may have used bison bone as a fuel source (Backhouse 2002; Buchanan 2002).

The later Ceramic times were marked by a variety of Puebloan tradewares as well as Mogollon pottery and sole use of arrow points. Of the few sites excavated, game animal–processing stations were in the draws, and use of the specialized rim site persisted. Camps were in the draws, on the rims, and around playas, and the most common activity was retooling (Baxevanis et al. 1997; Booker and Campbell 1978; Johnson 1987, 1995b; Johnson and Holliday 2004; Parker 1982; Word 1963, 1991).

The Protohistoric period on the Llano Estacado was another time of transition marked by the displacement of local people by the southward movement of Athabascan peoples out of Canada and down the western edge of the Plains and by the contact of Native peoples with Europeans (Flint and Flint 2003; Johnson 1987). The main pottery type was a thin, micaceous utilityware. Despite these changes, similar activities occurred in the same general locations. Game animal–processing stations were located in the draws (Bandy et al. 1981; Johnson 1987). Camps were on the valley margins of the draws and on rims, with associated hearths and retooling as a focus along with hide processing (Bandy et al. 1981; Hughes 1971; Johnson and Holliday 2004; Johnson et al. 1977; Katz and Katz 1976; Wheat 1955; Word 1965, 1991). A complex site in Blanco Canyon may have functioned as a trade center in the Plains-Pueblo interaction sphere (Baugh 1992; Parker 1982).

On the Llano Estacado, the Historic period was marked by the appearance of European trade goods in the material culture of the Native people, the modern horse, and the displacement of Apache by Comanche peoples and then of the Comanche by Anglo-Americans (Johnson 1987; Kenner 1969; Wallace and Hoebel 1952). During aboriginal Historic times, activities similar to those in the Protohistoric and Ceramic periods occurred. Game animal–processing stations were in the draws, distinctive in the inclusion of the modern horse as a game animal (Johnson 1987). Marrow processing of both bison and horse elements occurred. Upland rim and valley margin camps focused on retooling (Bandy et al. 1981; Hughes and Willey 1978; Johnson and Holliday 2004; Parker 1982).

European and Anglo-American occupation of the Llano Estacado began in the late 1800s prior to the displacement of the Comanche. The first of these groups were the Hispanic *ciboleros* (bison hunters) and *comancheros* (traders) from New Mexico, along with buffalo hunters and U.S. military units from the Texas side (see Clark, this volume). *Pastores* (Hispanic sheepherders) began moving people and flocks into the region by the mid-1870s, and settlements were in place by 1880 (Hicks and Johnson 2000). These settlements were off the Llano Estacado along the Canadian River and northeastern escarpment breaks. The draws and uplands along the eastern portion of the Llano Estacado were used for grazing (Figure 5.3).

Anglo-American cattle ranchers recognized the potential of the vast grassland of western Texas (the panhandle and Llano Estacado) and began moving in as the *pastores* were establishing their settlements. The first cattle ranch on the Llano Estacado was established in Blanco Canyon in 1877, also creating the first farmland (Jenkins 1986). *Pastores* settlements were abandoned by 1887, and flocks were moved back to New Mexico (Hicks and Johnson 2000). Anglo-American settlers began moving onto the Llano Estacado, with the first town site established in 1879. It was on the upland away from water. The surrounding land around the town site was the first upland used as farmland (Jenkins 1986). A trading post along the Canadian River brought European goods to regional occupants (primarily buffalo hunters) during the late 1860s to 1870s (Baker and Harrison 1986). The first trading post on the Llano Estacado was established in 1883 in Yellowhouse Draw at the crossroad of two military trails (Hicks 2002, 2005). Town sites continued to be established into the early twentieth century on the upland away from water and required drilled wells for a water supply.

## DISCUSSION

The foregoing are the pieces or building blocks needed to form an integrative landscape approach to understanding the late Quaternary history of the Llano Estacado. By putting those pieces together, along with available data from the few well-documented surveys and sites, we develop the primary level of infrastructure for a first approximation of a broad-brush model. That model, however, lacks the secondary level of infrastructure to strengthen and sustain it. That level is composed of intensive surveys that provide reasonable coverage of the region and numbers of well-excavated and documented sites.

The Llano Estacado itself is the major landscape landform at the regional level. The draws, playas, salinas, and dune fields are a second level of major regional landscape landforms. The major landscape elements are lunettes, springs, and potential toolstone outcrops. The landscape, however, is dynamic, and these landforms and elements are not all constant or of equal age. The modern draw drainage system is late Pleistocene in age (post–Last Glacial Maximum) and traverses the region in three major river systems that trend northwest to southeast across the Llano Estacado (Figure 5.3). The draws today range in depth, depending on location, from shallow swales to deep canyons (Figure 5.7). Salinas are early to middle Pleistocene in age, predating

**FIGURE 5.7.**
*Lower Yellowhouse Canyon ca. 15.2 km below the confluence of Yellowhouse Draw and Blackwater Draw.*

both playa formation in general and the modern drainage system, and they vary in size, shape, and depth. They occur in more concentrated areas than the playas. Playas are fairly well distributed across the Llano Estacado, although they are locally higher in number in some places than in others. Some playas are contemporaneous with the beginnings of the modern drainage system, but playas increased in number in the Holocene while some ceased to exist and became buried. Playas are of varying size and depth. The dune fields are the youngest landform, with their construction beginning in the early Holocene and intensifying through the middle Holocene.

Not all playas and salinas have associated lunettes. The oldest lunettes are late Pleistocene, while others formed in the Holocene. Springs are localized and distributed irregularly across the Llano Estacado and within the drainage system. Flow rates fluctuate through time, with some ceasing flow at particular time periods. The sizes of playa basins are different, and the amount of freshwater contained in playas in general, as well as in a particular playa, varies both seasonally and through time. Toolstone locations are limited, occurring primarily around the edges of the Llano Estacado and in fortuitous exposures of Ogallala gravels within the drainage system.

The distributions of plants and animals can be viewed as landscape elements. The character of the grassland has changed through time, but its associated species complex was distributed fairly uniformly across the upland of the region. Other plants were more restricted, occurring only in the draws and dune fields or around playas and salinas. Trees and hydrophytic plants were regional plants with restricted distributions. While such animals as herd herbivores and ground-dwelling birds ranged regionally, their distribution was not uniform and changed on a daily to seasonal basis. Animals with more restricted habitats or requirements, such as trees for roosting or nesting, were distributed locally in appropriate habitats across the region.

The intersection of the landforms and landscape elements provided potential stopping points for cultural groups in the region. The greatest biodiversity was found within the more restricted, irregularly distributed landforms and landscape elements across the Llano Estacado, and that diversity was keyed to water, whether in the draws, playas, or salinas. Water appears to have been the key resource and landscape element in terms of cultural interaction with the landscape, even in times of abundant surface water. Water would have been available in the draws, playas, and freshwater springs that fed the salinas. The reasons water was key may have changed through time, and sites shifted as water availability fluctuated. Nevertheless, wherever surface water was available, a greater diversity of resources would also have been available. For example, the playas and salinas are part of the great interior flyway for migrating birds. Puddle and diving ducks, rails, wading birds, and geese favor the playas, draw ponds, and marshlands, while salinas are the winter roosting grounds for sandhill cranes. Salt could also be obtained at the salinas.

While water was key, it was not the only important factor. Areas where landforms and landscape elements intersect to provide exposures of toolstone were both restricted and for some resources temporally limited. Toolstone, therefore, was a limited resource, and its procurement dictated activity at the few available outcrops.

Most of the recorded Llano Estacado sites appear to be occupations within a single time period, varying from a one-event overnight stay to return-event stays. The distribution of these places and their relationship to potential stopping points have not been determined on a regional basis. Based on an early study of Paleoindian site distribution within a 16,500-square-mile section of the central Llano Estacado, sites appear to be clustered (Hester and Grady 1977:82). These sites are located primarily along Blackwater Draw and around playas and salinas (Hester 1975b). Based on a site distribution analysis of three counties in the central Llano Estacado, however, Native peoples occupied the inter-playa upland, and a preference for topographic setting was not evident. These upland sites were generally located 1–4 km from currently known water sources (Buchanan 1995a, 1995b, 1995c).

From a different perspective, playas as a major landform are self-sustaining upland locations with set boundaries that offer a diversified, predictable concentration of resources. They form an extensive upland network across the region that was used by the various hunter-gatherer groups throughout the late Quaternary. Depending on the group and the time period, activities were varied and included game procurement, other resource exploitation, and domestic/camp endeavors. Occupation at a playa varied from a single occasion to multiple events and from one locus to encircling the basin. This pattern indicates that playas were sought after and likely played a significant role in the regional land use system through time (Litwinionek, Johnson, and Holliday 2003).

Two types of persistent places occur on the Llano Estacado. One type is a place occupied repeatedly by peoples from adjoining time periods (e.g., Late Archaic and Ceramic; Late Ceramic and Protohistoric) or disparate time periods (e.g., Folsom and Ceramic). The majority of persistent places are of this type, expressing a minimum of two occupations. Anecdotal information from early collectors in the region notes a large number of manos and metates around some playas, and regional museums contain large quantities of manos and metates donated to them, generally with minimal information. This type of difficult-to-transport and time-consuming-to-make material represents site furniture left by people who would be returning to use it. Both the resource and the availability of the heavy, cumbersome tools needed to exploit the resource are predictable and provide incentive to return to the same place.

The second type is a place occupied repeatedly by peoples from numerous time periods, expressing great time depth. Four persistent places of this type are known (Figure 5.3), and at least two of them indicate repeated visits by people within the same time period as well as through time. Of the four, three are located in the draws and one in a playa basin (Hester 1972; Hill, Holliday, and Stanford 1995; Johnson 1987; Word 1963). Active springs and ponded waters characterize the three places within the draws. The playa ceased being occupied when the basin was breached around 2,000 years ago by edge erosion of the caprock and the water drained (Figure 5.8). These persistent places are also characterized by the late Quaternary geomorphic processes that occurred there, causing continual deposition with minimal to limited erosion (Haynes 1975, 1995; Hill, Holliday, and Stanford 1995; Holliday 1985; Holliday and Allen 1987; Word 1963, 1991).

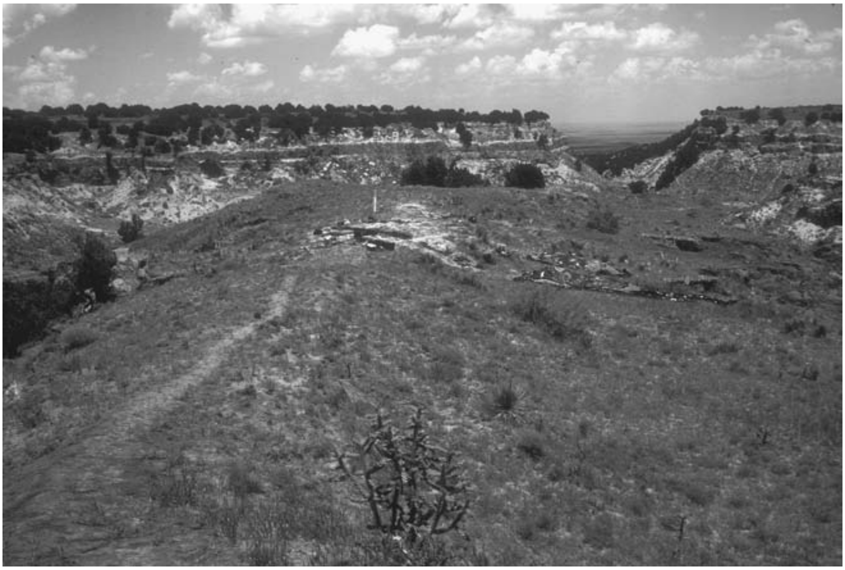

**FIGURE 5.8.**
*Breached playa basin of the San Jon site, a persistent place (second type); note the deep arroyos into the playa fill, edge of the caprock, and Tucumcari Basin in the background.*

The Llano Estacado itself is a persistent place, as people have used and occupied the region for thousands of years. Populations have fluctuated, and parts of the Llano Estacado appear to have been abandoned during the height of the Altithermal; but the region was never devoid of people from the time they first arrived on the Llano Estacado in the late Pleistocene to today. From that early time to the 1860s, hunter-gatherers dominated the landscape.

Non-Native encounters and use of the Llano Estacado began in the early 1500s and engendered rapid changes in land use and place locations. Forays into the region by non-Native peoples in the 1500s to the 1860s were primarily by Hispanic explorers who returned to their homeland, by traders servicing local populations, and by buffalo hunters obtaining a supply of meat and hides who then returned to New Mexico (Haley 1935; Kenner 1969). Wide-scale slaughter and diminishing of the bison herds began in the 1860s when Anglo buffalo hunters moved into the region (Gard 1959; Hagan 1993; Holden 1962b). This approach constituted a different treatment of the resource with different objectives than those of Native hunter-gatherers through time.

In the 1870s, the eastern movement of *pastores* began in the Canadian River Valley and then moved up the draws on the eastern edge of the Llano Estacado and finally to the upland, using the grasslands as pasturage in their transhumance lifestyle of sheepherding. Open pasturage, protected settings, water, and rock construction materials guided place locations (Hicks and Johnson 2000; Johnson 2003). By the late 1870s to the early 1880s, the western movement of Anglo cattle ranchers began along the eastern edge of the Llano Estacado. Pasturage and water appear to have guided ranch locations that were then solidified by exclusive rights (e.g., Hatcher 1944; Jenkins 1986; Pearce 1964). Several places may have existed within the boundaries of a ranch, the locations of which may have been determined for reasons other than the intersection of landforms and landscape elements.

The first drilled well on the Llano Estacado was sunk in 1879 for the first Anglo town site of Estacado (Jenkins 1986). This town site was on the upland in the inter-playa area away from the water sources of the draws and playas (Figure 5.3). Its placement was guided by the open, extensive grassland and social concerns about the distance to the nearest neighbor (Jenkins 1986:34). While the *pastores* and cattle ranchers saw this vast grassland as an economic resource critical for their flocks and herds, the settlers saw the unbroken ground itself as an economic resource, replacing the grassland with agricultural land. The first groundbreaking by plow took place in 1879 for crops and vegetables (Jenkins 1986). A pattern developed of placing town sites on the upland away from water, drilling wells, and using the grassland for cattle raising and agricultural land. Irrigated cropland was added to the pattern, with the first irrigated crops grown in 1909 on the western side of the Llano Estacado (Hixson 1940).

The slaughter of the bison herds not only depleted the main game animal of the Native peoples on the Llano Estacado but also removed the wildlife competition for the grassland itself, opening up the region to non-Native peoples, non-Native domestic animals, and different uses of the land and perspectives on the landscape. The draws and canyons were used for pasturage and recreation and as dumping grounds for household and commercial garbage (Brune 1981; Johnson 1987; O'Brien 1995). Playas were viewed as impediments to agricultural pursuits and urbanization; they were either drained and their basins modified or they were incorporated, drained, and managed as city parks. Inter-playa upland not used for agricultural purposes was subject to use as a dumping ground (Johnson 1994). The growth of towns, increasing number of drilled wells, and practice of irrigating crops had adversely affected the water table by the early 1930s. Many springs ceased flowing, even some that had remained active during the height of the Altithermal (Brune 1981; Johnson 1987). This situation was the visual signal of the beginning of the depletion of the Ogallala aquifer underlying the Llano Estacado, the region's primary water source.

Beyond this very generalized initial model of the use and occupation of the major landforms and use of the grassland through time, a closer-order exploration of settlement patterns across the Llano Estacado has not yet been accomplished. Impediments exist that hamper such an analysis. These obstacles include the lack of systematic surveys, leading to an uneven and arbitrary distribution of recorded sites (some counties have fewer than a dozen sites recorded, while others number in the hundreds); lack of excavation of sites from various time periods; intense collecting and vandalism that have occurred since at least the 1920s; site destruction that has occurred through urbanization and agricultural practices since the 1880s and erosional processes driven by drought and poor land management practices in the twentieth century; and the sheer size of the region. These obstacles are not unique to the Llano Estacado and undoubtedly are common across the country. They are accounted for in part by the concept of a remnant settlement pattern and acknowledgment of the incompleteness of the record. As a future step, this concept, coupled with a Geographic Information Systems (GIS) approach (e.g., Allen, Green, and Zubrow 1990; Zvelebil, Green, and Macklin 1992), will provide a basis for which to explore regional settlement patterns across time and space. Furthermore, it will provide a structure with which to examine in more detail the different land use patterns between Native and non-Native peoples that nonetheless still center on the key landscape resource: water.

## CONCLUDING STATEMENT

Historically, significant differences exist in spring activity and stream flow along the draws. Some have far greater amounts of surface water than others, and certain reaches of a draw may have more surface water than other stretches of that same draw (Brune 1981; Holliday 1995a). These differences are based in part on underlying geology, but other controlling factors are unknown (Holliday 1995a:26). However, climate played a key role in the past in terms of water table level and water availability in playas and salinas. Today, running water in the draws is rare or artificially induced, while unmodified playa basins hold seasonal water and modified basins have either no water or artificially induced year-round water. Water is piped to towns from well fields and reservoirs.

The Llano Estacado has engendered different feelings and attitudes based on the perspective of the people viewing the landscape. Early Anglo-American reports starting in the 1850s usually described the Llano Estacado as a flat, monotonous plain lacking water, part of the "Great American Desert." If wells could be drilled, the region could be "redeemed from unproductiveness" (Pope 1854:48). Later *pastores* and Anglo cattle ranchers saw a vast, lush grassland desirable for raising flocks and herds of domestic sheep and cattle, with water available in the draws and playas. By the 1880s, up to 10,000 head of cattle at one time were being watered at one of the springs in a draw (Holden 1932).

*Pastores*, in their descriptive name for the Llano Estacado, saw the region as akin to heavenly, while early Anglo explorers thought of it as stark and forbidding. While many settlers saw it as a lonely land, not all settlers were disparaging about the Llano Estacado, and some even found aesthetic qualities to admire. Upon seeing the upland for the first time, an early inhabitant of Estacado noted in 1881 that "the prairie grass [was] lush and green," and "the landscape dotted with little lakes gleaming in the morning sun, seemed a vast emerald shield embossed with gems of silver" (cited in Hunt 1933). On the other hand, Anglo settlers viewed the grassland as potential cropland and the upland as town sites. Playas holding water (those "gems of silver") were impediments to agricultural development. Wells were drilled to supply water for people, towns, and crops. Yet along the middle reach of one draw, stream flow was substantial enough so people could boat from town to town (Brune 1981).

For the Comanche, the last of the Native peoples inhabiting the Llano Estacado, the grassland provided crucial pasturage for their large herds of horses, bison as their main game animal, and, by the 1860s to 1870s, freedom from the reservation (Hagan 1993). For earlier peoples, the archaeological record serves as a proxy indication of feelings and attitudes. People have inhabited the Llano Estacado since the first arrivals in the late Pleistocene. Game, water, and other resources were abundant, and persistent places developed. Even under the harshest conditions during the Altithermal, people did not abandon the region as a whole. While abandonment of the southern and western portions is evident and populations moved elsewhere, other people remained in the eastern portion, where persistent places continued to be occupied. The region may have been marginalized because of the intensive drought conditions, but the remaining active springs probably served much like oases in a desert. Populations rebounded after the climate ameliorated. Persistent places along the western portion were inhabited again, while those in the eastern portion continued to be used. The Llano Estacado must have been a good place to live.

Persistent places have unique qualities provided through the intersection of landforms, landscape elements, and biotic diversity. Persistent places on the eastern portion of the Llano Estacado could only involve generational memory. However, reoccupation of those places on the western portion after hundreds of years indicates not only that the unique qualities were resurgent but that people entering this uninhabited area had acquired knowledge of those qualities. Water is the thread throughout. How critical the knowledge of water's availability, location, and predictability is to people inhabiting and traveling the Llano Estacado varies through time. How that knowledge is obtained, the uses of the water, and people's perception of the region also vary through time.

## ACKNOWLEDGMENTS

The regional foundation for this chapter is based on thirty-four years of research on the Llano Estacado supported largely by the Museum of Texas Tech University. Thanks to Laura Scheiber (Indiana University) for inviting me to contribute a chapter to this book on landscape perspectives, Vance Holliday (University of Arizona) and anonymous reviewers for comments that improved the manuscript, and Tara Backhouse and Patrick Kelly (Museum of Texas Tech University) for technical assistance with the figures. This chapter represents part of the ongoing efforts of the Lubbock Lake Landmark regional research program on late Quaternary adaptations to ecological, climatic, landscape, and cultural changes on the Southern Plains.

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SIX

# The Details of Home: Landscape Continuity in the High Plains

*Bonnie J. Clark*

> This is my home. This is the only sacred ground that I have ever known.
>
> —DAVE CARTER

ARCHAEOLOGY HAS ALWAYS BEEN ENGAGED WITH place and landscape. However, our intellectual heritage rests largely on the search for the "type site," the location that epitomizes life for a particular group at a particular time (Trigger 1989:96). Archaeologists often prize sites with a single occupation or ones with pristine stratigraphy where the evidence for each use is clearly separated from the ones above and below it. In reality, our sites are often palimpsests, with evidence of earlier and later occupations intermingled. Rather than ignore such sites, advocates of landscape archaeology highlight their information potential. These intermingled sites embody what Kurt Anschuetz and colleagues (2001:186) have called a "quality of simultaneity" that makes cultural landscapes resonate with "mythic, past, and present histories concurrently." Ideally, such resources allow the researcher to address how different individuals and communities conceptualize and modify the world around them in a specific locale that remains, in many ways, constant over time.

There are almost as many approaches to landscapes as there are landscapes to approach. Because I am interested in places on the landscape, this chapter presents the results of site-centered research rather than a broad regional approach (for a spatially extensive, rather than intensive, look at the archaeology of the High Plains, see Johnson and Peterson, this volume). Building on a regional culture history and extensive site database, its particular focus is on two Hispanic settlements occupied just on the eve of the twentieth century in southeastern Colorado (Figure 6.1). Data from excavations at these two sites suggest intriguing questions about long-term continuities of landscape use (Clark 2003). The residents of both sites—La Placita and Wild Plum—were not the first to occupy the sites. Their relationship to those who came before can be explored by looking closely at the way these residents inhabited the land.

My choice, to investigate landscape through a fine-grained analysis of specific locales, builds on decades of multidisciplinary discussion about the importance of place. Whether in the writings of historian Dolores Hayden (1995), phenomenologist geographer Yi-Fu Tuan (1977), or sociologist Henri Lefebvre (1991), the importance of the concept of place is that it describes not abstract spaces but concrete and, most important, lived places. It combines the physical requirements for living with cultural expectations and social needs. A place is both individual, as experienced and made meaningful by an embodied person, and communal, shared with those whose routines, rituals, or territories overlap with one's own. It helps form one's sense of proper living and behavior. Places also serve as loci for memory, often a culture's most resonant mnemonic devices (Hayden 1995).

Humans have a closeness with the world around them, whether one calls it a sense of place (Feld and Basso 1996) or being-in-the-world (Heidegger 1962). This relationship, many argue, is inherent in our humanity (Basso 1996). Our most intimate bonds are created by inhabiting a space. As Julian Thomas has argued, "[I]t is through inhabitation that a space becomes a place" (1996:86). Landscape as a whole is critical to human lifeways, but by peering closely at occupation sites, we investigate a central locus not only of activity but also of identity. The details of home tell us of both shared activities and shared ideals.

## REGIONAL OVERVIEW

The sites that are the focus of this chapter are located within the Pinon Canyon Maneuver Site, or PCMS, a parcel of land bordering the lower Purgatoire River

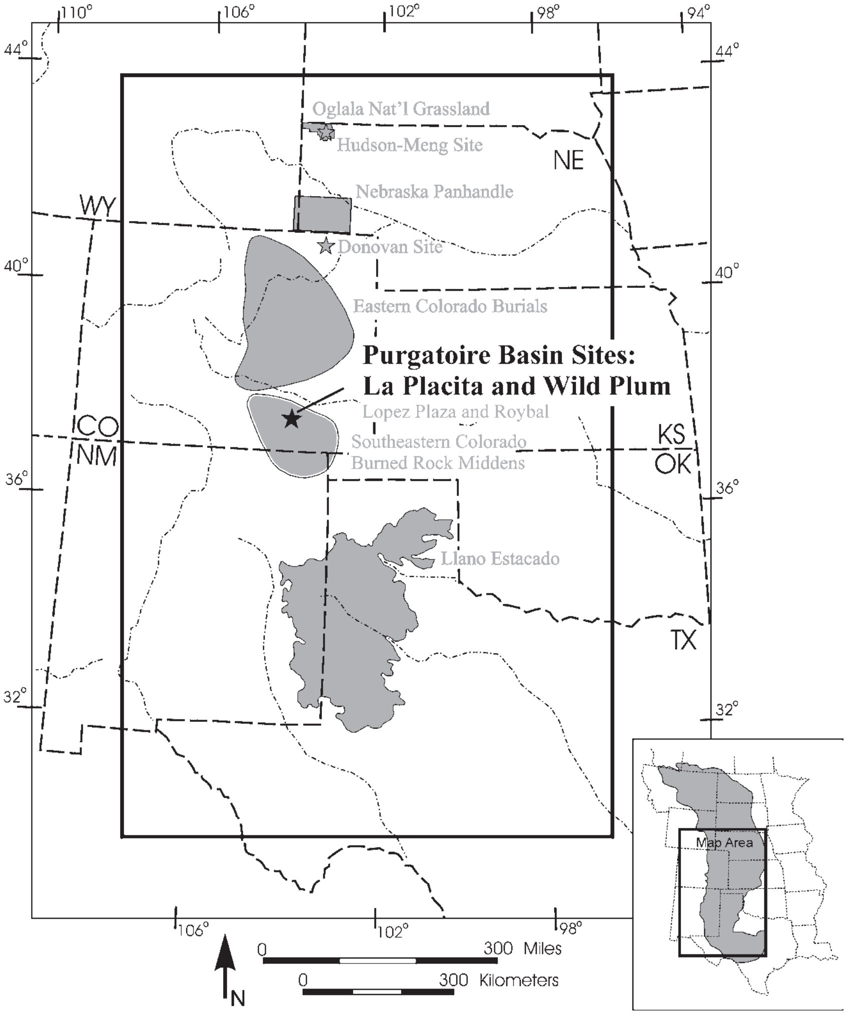


**FIGURE 6.1.**
*Map of the High Plains, highlighting sites discussed in this chapter. Illustration by Kevin Gilmore.*

in southeastern Colorado. When the U.S. Army purchased the land in the mid-1980s to create a training site for tank maneuvers, it acquired the nearly quarter-million-acre tract from only twelve landowners (Loendorf and Clise 1997). Much of the land in the area, which was largely used for grazing livestock, has never passed out of public domain. Thus the PCMS, which has been the site of archaeological and historical research since 1984, is a particularly

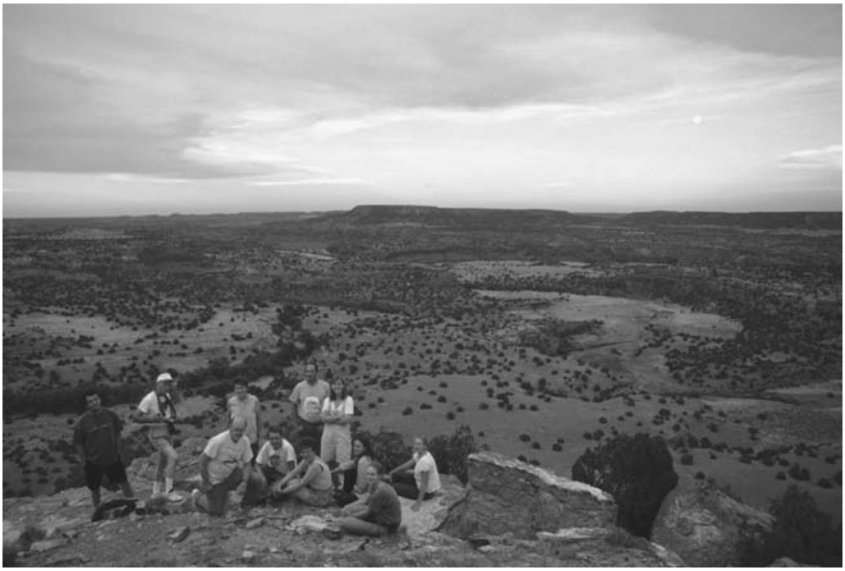

**FIGURE 6.2.**
*Archaeology field crew at overlook into the lower Purgatoire Canyon system. (*Left to right*): Steve Richards, Gil Kane, Bill Carr, Kathleen Corbett, Charles Bowyer, Bruce Duncan, Pamela Rasfeld, Bonnie Clark, Juliana Vivona, Julie Hoggarth, and Fiona Vasbinder. Photograph by Kathleen L. Corbett.*

apt location for applying landscape perspectives to the archaeology of the High Plains. The area has a cultural landscape that is remarkably legible.

The PCMS sits at the northern edge of the Raton Basin, a geological feature that abuts the foothills of the Rockies north and south of the Colorado/New Mexico state line. It is the far western element of the Raton section of the Great Plains physiographic province. The topography of the region is deceiving. In many areas it appears as if the rolling prairie continues unbroken to the horizon. But in fact, in many places the high plateaus of the Raton Basin are cut by river systems that create sometimes spectacular canyons (Figure 6.2). The possibilities presented by this diverse natural setting have attracted humans for millennia.

One of the most important sites for the establishment of an early human occupation of North America is located about forty miles south of the lower Purgatoire near Folsom, New Mexico. A Paleoindian site, Folsom provides evidence of big-game hunters on the Great Plains over 10,000 years ago (Meltzer

2006). These Paleoindians and the Early Archaic–period residents after them left few marks on the land, besides the occasional finely flaked stone tool. More visible occupations date from the Archaic period, when the aboriginal inhabitants of this area began inscribing local rocks with figures (Loendorf 1998). In the late 1980s, the PCMS was part of one of the biggest rock art research projects ever undertaken in North America (Loendorf 1998). The rock art tradition in this region, including petroglyphs and pictographs, is truly remarkable in both variety and scope.

The early rock art in the region coincides with what appears to be an increase in human use of the area. People returned to certain sites on the land over and over, especially sheltered sites near water (Zier and Kalasz 1999). After A.D. 1050, inhabitants called the Apishapa by archaeologists began building the first permanent architecture in the region (Cassells 1997). Although probably not occupied year-round, these circular, upright slab structures are still visible in many locations at the PCMS. Even at sites without architecture, occupations are often marked by large burned rock middens (Zier and Kalasz 1999:245), features that represent use and reuse of sites for food preparation (see Mitchell, this volume). The Apishapa, who had a well-developed rock art tradition of their own, left the area before literate explorers created the first written accounts of the region.

A corridor connecting the Southwest, the Rockies and the Plains, the southern High Plains was likely always a region of cultural intersection. The historical record, which reaches back into the 1500s with the arrival of the Spanish, tells of a succession of historical tribes that used the area—first the Apache, then the Comanche, and in the 1800s the Cheyenne and Arapaho. These groups used the Purgatoire as part of their seasonal round and left their mark, through either rock art or artifacts like iron arrow points. The first non-aboriginal users were Hispanics, aptly named *comancheros*, who traded with the Indians of the area, or *ciboleros*, bison hunters who took their name from the Zuni word for buffalo, *cibolo* (Johnson, this volume; Kenner 1969). They were joined by explorers from the many empires that eyed this area—Spanish, French, and American. The Arkansas River into which the Purgatoire flows was the international border between a changing cast of those empires (Wyckoff 1999).

Settlement of the Purgatoire by non-aboriginal groups started in the 1820s when the border between Mexico to the south and the United States to the north opened to trade. This swelled existing international business along the Santa Fe Trail, which ran through the region on its path between St. Louis, Missouri, and Mexico City. Still, it was not until the United States pushed the border south in the mid-nineteenth century that permanent settlement really took hold. Despite the new political regime, these settlers at first were overwhelmingly Hispanics from adjacent New Mexico, although through time more and more people of northern European stock—still colloquially called "Anglos"—joined them. At the turn of the twentieth century, census records indicate that the majority of the population in the Purgatoire was Hispanic. Although the demographic balance tipped toward Anglos into the twentieth century, the region remains part of the "Hispano homeland" (Nostrand 1992).

## CONTINUITY OF USE: NATIVE AMERICANS AND HISPANICS

The body of archaeological research in the Purgatoire region suggests significant continuity between the cultural landscapes of its Native Americans and Hispanics. In their study of sites in the Purgatoire Valley, Alan Reed and Jonathan Horn (1995) used data from the surface of sites to suggest that the region's Hispanics were much more likely to reinhabit prehistoric locales than their Anglo neighbors were. To subject this hypothesis to statistical study requires not just surface data but excavation data as well, for some prehistoric occupations are not visible on the surface. A complicating factor is that the region's ubiquitous prehistoric artifact, the stone tool, is a technology utilized by both historic Native Americans and Hispanic residents of the region (Carrillo 1994; Hardesty et al. 1995).

Excavated sites at the PCMS support the assertion that Hispanics were often drawn to the same places on the land that had attracted prehistoric inhabitants. La Placita (5LA6104) is a multi-household plaza settlement where occupants pursued a mixed strategy of gardening, hunting, sheep raising, and wage labor (Clark 2003). The site appears to have been occupied historically for about a decade centering on 1890. La Placita sits on top of a relatively substantial prehistoric site. Surface evidence for prehistoric occupation is composed of groundstone and lithics, including a Late Prehistoric side-notched projectile point. A burned rock midden, as well as other buried horizons exposed in excavations, bolsters the surface evidence of prehistoric occupation.

The Wild Plum site (5LA6101), like La Placita, is situated in a topographically protected location below the tableland and above an incised canyon. Located a mile north of La Placita, Wild Plum was composed of a single Hispanic household engaging in a subsistence economy based on raising sheep and hunting (Clark 2003). Like La Placita, Wild Plum also shares its location with an Apishapa site. A sandstone slab storage feature sits just meters upstream from the historic house, and in a downstream, historically utilized rock shelter sits a two-handed mano. The Roybal Homestead site (5LA4388), a Hispanic occupation on the PCMS excavated by Minette Church, also has a prehistoric component, including stone tools and ceramics (Church 2001).

The Anglo sites excavated at the PCMS are often not free from prehistoric artifacts, but they are not located on prehistoric occupation sites. For example, Church (2001) recovered seven lithics from subsurface contexts at the Riley site (5LA5310), but these are evidence of the diffuse lithic scatters often present around springs. Brown's Sheep Camp (5LA5824), another site originally settled by an Anglo family, has few prehistoric artifacts (Hunt, Schneck, and Roberts 1999). Finally, the sherds of a vessel type typically dated between A.D. 1500 and 1750 that were recovered from the Lockwood Stage Station (5LA5454) were attributed by excavators to Native Americans who visited the station historically (Hardesty et al. 1995:245–247). Such an assertion is bolstered by the presence of iron projectile points on the site.

The differences in choices about where to establish habitations illuminated by these sites cannot merely be ascribed to Anglos filling in the interstices of an established Hispanic settlement pattern. The Riley and Roybal sites were contemporaneous (Church 2001), and all of these excavated Anglo sites were settled prior to La Placita. This area is a prime example of what Sarah Deutsch has described as a pattern typical of southern Colorado and northern New Mexico. By 1880 the Anglo and Hispanic frontiers did not just meet, they "interlocked" (Deutsch 1987:13).

In addition to site location, landscape continuity between Hispanic and Native American sites is also expressed at the PCMS through attraction to the same types of natural resources. Especially during the Apishapa phase, prehistoric inhabitants of the region sought out rock shelters (Zier and Kalasz 1999). These same rock shelters appear prized by the Hispanic occupants of the region, who tend to use them either as temporary shelters (Louden 1998) or as sheltered animal pens (Clark 2003). The Hispanic use of these features is most clear at Wild Plum, where a substantial stone wall encloses a rock shelter to create a sheep pen (Figure 6.3). A less elaborated, but no less utilized, shelter can be found at La Placita, where a low wall and fence posts enclose a small rock shelter.

Evidence of foodways points to another conjunction in how these groups inhabited the land. Hispanics harvested many of the wild plants used prehistorically in the region. The tiny goosefoot (*Chenopodium* sp.), the wild plant most commonly recovered from Apishapa sites (Zier and Kalasz 1999:218), was called *quelites* by Spanish speakers and was used by them both in seed form

**FIGURE 6.3.**
*Modified rock shelter at Wild Plum (5LA6101). Photograph by Kathleen L. Corbett.*

and as a green. The outdoor oven at La Placita is surrounded by goosefoot seeds (Cane 2003). Hispanics at these sites and others consumed seedy fruits like golden currant (*Ribes aureum*) and elderberry (*Sambucus coerulea*). The piñon pine (*Pinus edulis*), which gave its name to the military facility here, provides nuts that were much used by both groups. The seep that provided water for the inhabitants of La Placita also supported an abnormally large and prolific piñon pine. It and other nearby piñon may have been one of the attractions to this site locale for both its prehistoric and historic occupants. Shells from piñon pine seeds were recovered from a number of contexts at both La Placita and Wild Plum.

Most accounts of Hispanic ethnomedical practices highlight the importance of herbal remedies learned from the region's Native Americans (Cabeza de Baca Gilbert 1982 [1949]; Moore 1990), and the remains from the PCMS are evidence of their continuation. Floral remains from the occupational structure at Wild Plum suggest that residents were preparing verbena (*Verbena* sp.), a local plant various Plains Indians (Kindscher 1992) and local Hispanics (Moore 1990) used to treat stomach maladies. A high concentration of buffalobur nightshade (*Solanum rostratum*) seeds was recovered from one of the garden terraces at La Placita. Although preparation must be carefully monitored because of a high alkaloid content, the Zuni used buffalobur nightshade tea to alleviate nausea (Kindscher 1992). The residents of La Placita may have done the same.

One of the most striking continuities of resource use represented at these sites is the utilization of wild game. At both La Placita and Wild Plum, the most prevalent animals in the faunal remains are cottontail rabbits (*Sylvilagus* spp.) (Smith 2002). Excavations of sites in Welsh Canyon, the drainage system in which Wild Plum is located, indicate that prehistoric inhabitants there also relied heavily on small game, especially cottontails. Indeed, analysis of those faunal remains indicates that the animal on which prehistoric occupants of the canyon primarily relied was the cottontail (Schiavetti, Loendorf, and Hill 2001:232). This is particularly interesting, given that our picture of prehistoric lives on the Plains has often been dominated by images of a strategy geared toward larger game, especially artiodactyls such as bison and deer. The Welsh Canyon researchers suggest that cottontails, with their nearly continuous breeding season, have a population considerably higher per unit of land than artiodactyls and one that can repopulate quickly (Schiavetti, Loendorf, and Hill 2001:230). Thus the subsistence strategy followed by prehistoric and Hispanic occupants of the region was particularly environmentally stable. By relying on smaller, more quickly reproducing species, inhabitants ensured that local game would be consistently available.

## THINKING THROUGH THE LANDSCAPE

To point to continuities in how groups inhabited the land 500 years or so after each other is to present a riddle. We cannot know exactly what motivates people to relate to the land the way they do. Yet the prehistoric and historic occupants of La Placita and Wild Plum were living in the same places, off the same game, using the same rock shelters, gathering the same wild seeds. These continuities stand in contrast to the land use practices of the region's Anglo occupants (Clark 2003).

Although the landscape approach is still a relatively new enterprise, a number of researchers have converged on the idea that the cultural landscape is composed of three main elements: the physical environment, the social uses of space, and the cultural meanings attached to and indeed embedded in that space (Sewell 2003; Thomas 1996). These three elements are always in a recursive relationship to each other. Meanings are brought to a place, but they are then reaffirmed or changed through the use of it. The physical environment, both the natural substrate and the built form, shapes the use of a space, but it itself is formed by the ideals of those who modify it, both subtly and radically. The interpretive act of placing people and their cultural imaginings into the land can begin, productively, with close attention to form and use.

This notion, then, moves us beyond what could be seen as merely an interesting convergence between temporally differentiated groups and their places. It suggests that by choosing to inhabit similar places in similar ways, aboriginal and Hispanic occupants were expressing similar attitudes toward the land and their place in it. These attitudes were not shared by Anglos, who chose not to live in the same locales or use the area's resources in the same way.

Why those attitudes are similar is a question with enough equifinality issues to make a scientist blush. The historical record points to several factors worth considering. Hispanics have a long tenure in the American Southwest. This means that, like aboriginal inhabitants, they had greater knowledge of the environment than relative newcomers such as Anglos. Still, there is no immediate feedback loop between environmental conditions and comprehension: we approach nature with cultural tools. It is clear that many of the "tools" in the Hispanic kit were either adapted or adopted from the region's Native groups, be they flintknapping, medicinal practices, or gathering techniques. Indeed, in terms of both material culture and genetics, there is less of a line between Indians and Hispanics in the Southwest than there is a gradation. David Weber (1992) has suggested that by the late 1700s, one-third of New Mexico's population were *genizaros*, detribalized Indians living an essentially "Hispanic" lifestyle.

*Genizaros* and *mestizos*, people of mixed Indian and Hispanic ancestry, were often considered Hispanic either in their own lifetimes or by their children (Weber 1992). Minette Church has pointed out that the eighteen individuals in the 1870 census of the lower Purgatoire enumerated as "Indian" were all members of Hispanic households. Children of Indian and Hispanic marriages in these census documents were enumerated as "white" (Church 2001:107–109). These households were likely to have had syncretic cultural practices, ones that informed the choices of their neighbors with less intimate or recent ties to Native communities. I would argue that these cultural practices included not just overt choices, such as exploiting rabbits, but also a general attitude toward the landscape, both natural and, as I suggest later, cultural.

A final issue to consider is the relationship of residents of the lower Purgatoire to the human history present in their landscape. The Apishapa residents of the Purgatoire were likely aware of those who had been on the land before them. Archaic-period occupations with rock art would have been

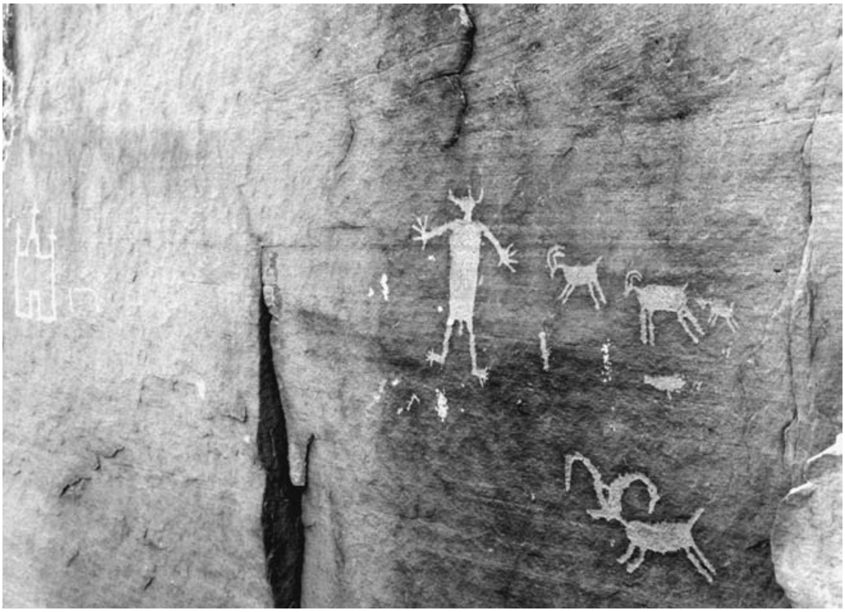

**FIGURE 6.4.**
*Historic and prehistoric rock art in the lower Purgatoire.*

particularly visible to the Apishapa. In places along the Purgatoire River, their rock art, and occasionally that of Hispanics, is in conversation with that which came earlier (Figure 6.4). Writings by Hispanic residents of the region indicate they knew they were occupying a landscape ripe with history. Julia Lopez Hudson grew up in the river bottoms of the Purgatoire about the same time La Placita was occupied. Julia wrote of the region, “We had much more which we took for granted, among them the ageless Indian caves, rich with petroglyphs” (Hudson 1987:61). Similarly, Fabiola Cabeza de Baca, who spent much of the 1910s on New Mexico’s High Plains, took note of its cultural landscape: “The country not only held in secret the lives of the Spanish colonists, but [those] of the Indians who thousands of years before had inhabited the land. There were the petroglyphs depicting human figures, animals, and other signs. . . . I lived in the past as I roamed the range and studied the petroglyphs” (Cabeza de Baca 1994 [1954]:139).

These Hispanic women took note of the signs of those who had come before, puzzling over what they meant, thinking about the lives of the earlier residents. Cabeza de Baca made an explicit connection to women in the past: "[I]n the rocks were deep grooves where the women ground the maize into meal" (Cabeza de Baca 1994 [1954]:139). The fact that these women, and doubtless other Hispanic residents of the region, were reading the cultural landscape implies that they were explicitly reaching out to the past. When reusing prehistoric places, Hispanics might in fact have searched for these locales, knowing that where there had been prehistoric occupations, there was likely to be game and water. Although I know of no written evidence documenting such behavior, it remains a compelling possibility. Certainly, landscape archaeology combined with historical research on the East Coast of the United States indicates that in many areas early colonists preferentially chose sites previously occupied by prehistoric groups (Potter and Waselkov 1994).

## COMING TO TERMS WITH PLACES

A landscape approach to these locales provides important insight. Even through times of enormous change—empire building, the collapsing of space and time with the railroad, the creation of new ethnic groups—the lives of the people who created and re-created these places were similar in critical ways. This fascinating convergence suggests that a landscape approach, especially one not rigidly divided between history and prehistory, has much to offer to a better understanding of both. Certainly, I am not the first to suggest that the walls between prehistory and history are in dire need of breaching (Kirch 1992; Lightfoot 1995). But because a landscape is always many documents at once, reading it requires that we not skip any chapters to get to what our disciplinary backgrounds tell us is the good part.

## ACKNOWLEDGMENTS

Much of this chapter took shape during a Kent Lightfoot seminar; without his influence it would likely never have come to fruition. I am indebted to Paul Groth for my thinking about landscape, and this chapter is no exception. Other authors in this book helped shape my thinking about the archaeological landscapes of the High Plains, in particular Minette Church, Kevin Gilmore, Mark Mitchell, and especially my coeditor, Laura Scheiber. I would like to thank the Department of Environmental Compliance at Fort Carson, which made the fieldwork possible and shared with me the results of many other investigations at the Pinon Canyon Maneuver Site. My field crews for the two seasons at La Placita were invaluable, especially my able crew chiefs, Dan Trout and Juliana Vivona, and my partner, Kathleen Corbett. A special thanks to

Cheryl Smith-Lintner, Rachel Cane, and Steve Archer for their analysis of the faunal and botanical remains at La Placita.

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SEVEN

# Purgatorio, Purgatoire, or Picketwire: Negotiating Local, National, and Transnational Identities along the Purgatoire River in Nineteenth-Century Colorado

*Minette C. Church*

In the introduction to their book *Archaeologies of Landscape*, A. Bernard Knapp and Wendy Ashmore (1999) divide the assembled authors' treatments of landscape into four themes: "landscape as memory, landscape as identity, landscape as social order, and landscape as transformation." These themes refer to the ways people conceptualize, perceive, and shape landscapes and how landscapes, in turn, shape human behavior. The themes are defined without reference to what some have considered in many cases false dichotomies of "natural" versus "cultural" landscapes or implicitly hierarchical core versus peripheral or frontier areas; the editors instead refer to heterarchically "nested" or linked spaces, the cultural meanings of which change, coexist, and overlap (Knapp and Ashmore 1999). In their examples, conceptual and spatial linkages connect architecture and land within specifically ritual places, but I contend here that such nested spaces can also be conceptualized in mundane spaces shaped by daily practice and in scalar terms ranging from nation and region to homestead, campsite, and field.

In the Anglo/Hispano borderlands of southern Colorado, national affiliations and boundaries as well as local use of space have long been, and still are, linked in processes of contestation and negotiation of identities and multiple senses of place. Choices and uses of material culture are linked in much the same way (Clark 2005; Deutsch 1987). The sites discussed here are located along a tributary of the Arkansas River, an area that was for generations a region of contested and changing international borders (Figure 7.1). The creation of homelands of memory, identity, social order, and transformation is ongoing in this area and arguably, given the abundance and variety of rock art, dates back to at least the Archaic period. I will focus here, however, on the nineteenth century. International rivalries in this era were very dynamic, and Michael Kearney has noted that people in such situations "create transnational spaces that may have the potential to liberate nationals within them," to a degree, from strong state controls (Kearney 1995:553). This contrasts strongly with older frontier and core/periphery models, where strong state controls were assumed, and is more in line with current models, which account for more variability (e.g., Hall 2000; Limerick 1987, 1996).

For purposes of this chapter, although I do refer to this region's status within larger structures of nationalism and power, I am more interested in examining particular case studies that show how these larger processes played out during this dynamic period among actors on the ground, along the Purgatoire River. Cristina Blanc and her colleagues noted that "individuals and groups renegotiate and contest their positions and identities within these transformed but still inherently hierarchical discourses of power. . . . [N]ewly created transnational spaces are sites at which new and multiple identities are fashioned and a variety of old and new forms of power or domination exercised" (Blanc, Basch, and Schiller 1995:684). Here I will present a regional case study of such processes using, primarily, two archaeological sites situated in southeastern Colorado, broader observations on archaeological settlement patterns, and documents generated by site occupants that allow us some access to their perspectives on these changes.

While I do not go into twenty-first-century local or national politics in any depth, the importance of understanding these processes in the nineteenth century has implications for current debates ranging from "English only" educational initiatives and immigration reform, to lawsuits over Mexican-period land grants (Stoller 1997), to a military proposal to displace local ranchers by means of sale and eminent domain. Understanding the past in this area

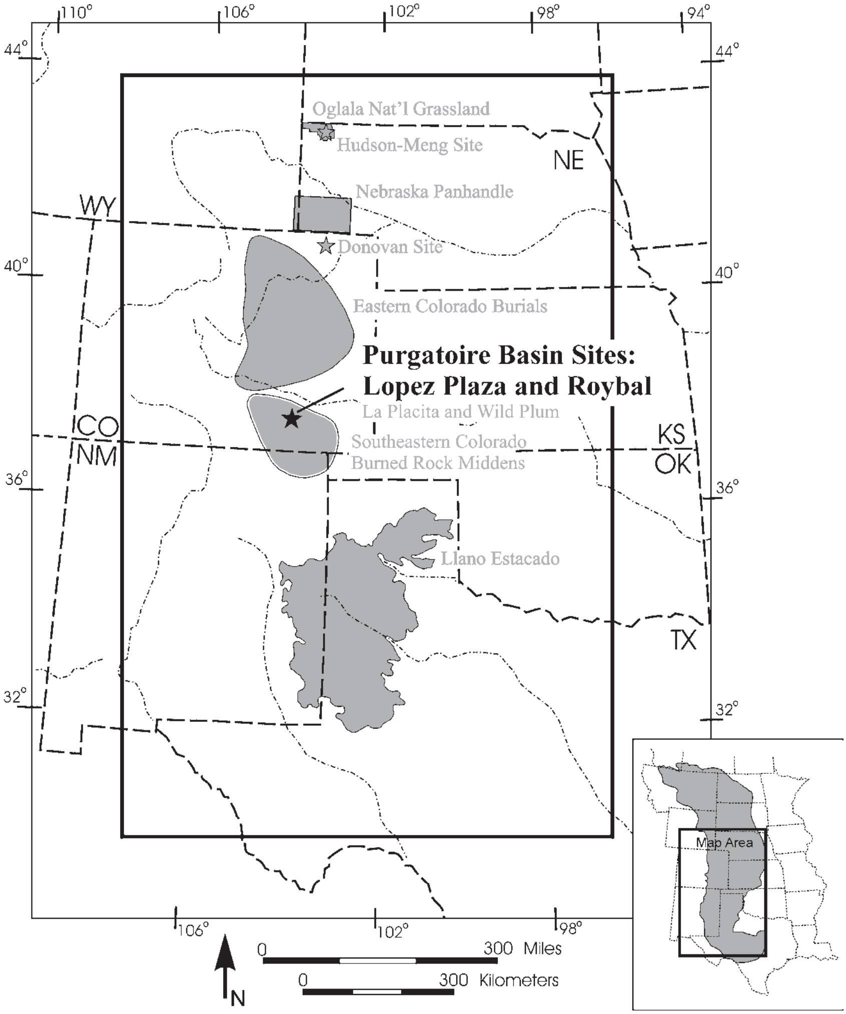



**FIGURE 7.1.**
*Map of the High Plains, highlighting sites discussed in this chapter. Illustration by Kevin Gilmore.*

has impacts on the present. Along the Purgatoire River in southern Colorado, negotiations of identity and corollary creation of spaces happened at scales ranging from international disputes over national borders to the way groups and individuals negotiated fluid individual identities within changing contexts. These political situations, both local and national, demonstrate that such negotiations are ongoing.

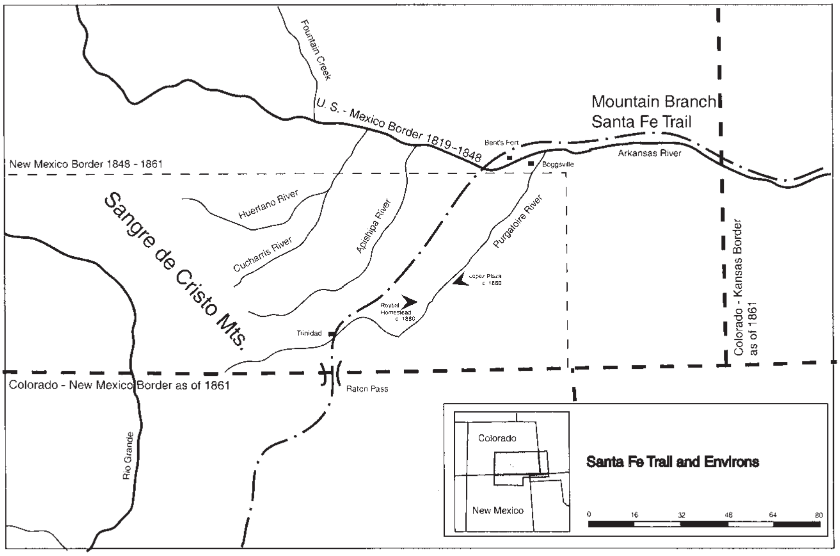



**FIGURE 7.2.**
*Map of internationally contested region of southeastern Colorado.*

For the most part, scholarly discussion of transnational strategies and processes has pertained primarily to the present or the very recent past and has applied to immigrant enclaves within modern nations. In this case study, analysis of the flexible strategies and fluid identities people use to cope within transnational settings begins long before the present, and this discussion focuses on the nineteenth century. Furthermore, the New Mexican settlers in the borderlands were not an immigrant enclave; they stayed on their lands along tributaries of the Arkansas River as national boundaries shifted around their settlements. The term "borderlands" has long referred to the U.S./Mexican region of mutual cultural influence in the Southwest, but it applies even more specifically to this area of southern Colorado where several nations contested boundaries, drawing and redrawing lines on maps throughout the nineteenth century (Figure 7.2). On the local scale, fluidity of identity and flexibility in economic and social strategies were as key to cultural survival in such a transnational borderland then as they are today.

Geographers have used toponyms to illustrate the complexity of how different groups seek to define such contested spaces (Wood and Fels 1992). All the areas discussed in this chapter lie along a river that was variously called El

Rio de las Animas Perdidas en Purgatorio by Spanish explorers, La Purgatoire by French traders, and the Picketwire by Anglo ranchers who could not wrap their tongues around the correct French pronunciation. By the early nineteenth century, the region was already an internationally claimed and contested nexus of international trade between Chihuahua and St. Louis. The area south of the Arkansas River was variously claimed by French Louisiana (by 1810), Spain (by 1820), Mexico (by 1830), and Texas (by 1840) before annexation by the United States in 1848 (Beck and Haase 1989). The Spanish-speaking settlers of New Mexico and southern Colorado did not have to move across a national border to leave Mexico and arrive in the United States in 1848, after the Mexican-American War. The United States came to them. Many of them had antecedents in the area reaching back hundreds of years. The periodic redrawing of international borders around these settlers must have been disconcerting and at times called for relatively swift renegotiations of personal and public identities, sometimes within the span of a single generation. Documentary, settlement, and material culture changes attest to these renegotiations in ways to which archaeologists have particular access, as they are not confined to only one or two of these data sets.

Given relatively stationary settlers in a landscape of shifting state sovereignty, a change in analytical structure from a "two-dimensional Euclidian space with its centers and peripheries and sharp boundaries, to a multidimensional global space with unbounded, often discontinuous and interpenetrating sub-spaces" (Kearney 1995:549) makes sense and answers Ashmore and Knapp's call for refiguring our analysis of landscape. It is not only how we as researchers need to approach these regions, it is also probably closer to the ways nineteenth-century occupants themselves saw these spaces: as shifting and contingent. This shift in our conceptualization of historical spaces is not congruent with either traditional "melting pot," assimilation-based histories or popular Anglo-American "western frontier" narratives, imbued as they are with imperialist notions of linear progress and clearly bounded, defined, and—when necessary—defended or expansionary nation-states. Nor does it adopt the overarching perspective of core/periphery models as the context for people's decision making on the ground and in the moment, focusing instead on local contingencies of identity building and cultural transformations, which often go unrecognized, yet are inextricably built into larger-scale political and economic processes (Comer 1996).

A look at interpenetrating national spaces and transnational identities has caused researchers to differentiate between legal citizenship—as a function of birth within a country—and what Blanc and her colleagues (1995:685) call "cultural citizenship." Locals living along the Purgatoire River in the late nineteenth century made this distinction as well, and it is still not uncommon for Spanish-speaking New Mexicans to refer to their Anglo neighbors as *Americanos* even though they and their ancestors have been American citizens since the Treaty of Guadalupe Hidalgo in 1848, and many have lived in the area much longer than that. Clearly, legal citizenship in the United States and cultural citizenship as a Spanish American in this transnational setting are not congruent in people's minds to this day. Currently, terms of identity such as Latino, Hispano, Hispanic, Chicano, *mestizo,* and Spanish American are all available to Spanish-speaking residents of southern Colorado. All of these terms refer to American citizens. All have implications for ethnicity, nationality, class, race, and cultural identity. All have made accommodations in terms of settlement and material culture, negative and positive, to the dominant Anglo-American economy and political system. Yet all are set in contrast to "Americano" or "Anglo," the latter an enormously broad term referring to anyone not of Native American or Spanish descent, or both.

Archaeologists often only have access to remnant cultural landscapes, unrepresentative artifact samples, and, if they are lucky, an incomplete selection of documents. Such is certainly the case for the sites I will use as examples here: the Lopez family Plaza settlement, the Roybal family homestead, and various structures of undocumented origin—some of which would have belonged to more transient groups that contemporaries termed squatters. Since the artifact analysis for the Lopez Plaza is incomplete and this is a volume emphasizing archaeological interpretations of landscape, I will focus more on geography, constructed spaces, and architecture than on excavation and artifacts. The challenge at such sites lies in finding ways to incorporate site occupants' cross-cutting and often fluid senses of identity into our understandings of landscape remnants and our interpretations of dynamic culture change in the past, including material culture when our analysis is complete.

In nineteenth-century southeastern Colorado, census records show that Hispano settlers with origins in New Mexico made up 90 percent of the people in the Purgatoire Valley, an area today located within the United States Forest Service's Comanche National Grassland and the United States Army's Pinon Canyon Maneuver Site (Colorado State Census 1885; Colorado Territorial Census 1870). Unfortunately, census data can be a relatively blunt tool when one hopes to dissect the nuanced ways class, race, and national identities were constructed and intertwined within a population of settlers who were often simply labeled white (Colorado Territorial Census 1870) or "Mexican" (Colorado State Census 1885) by nineteenth-century census takers. The changing terminology is in itself telling. The categories confuse nationality and "cultural citizenship" (as well as race) in just the ways Cristina Blanc and her colleagues suggest (1995).

To the descendants of many of these early settlers, the fact that Anglo census takers from the 1880s onward failed to make a distinction between "Spanish American" and "Mexican" indicated a clear failure to recognize what were to them clear differences of national heritage, race (as constructed in the nineteenth century), and class. Many families in southern Colorado and New Mexico still associate Spanish American identity with pure European bloodlines (including Spanish and in some cases French and Irish) and socioeconomic respectability. In contrast, other families and individuals embraced then and now the term "Mexican," an identity that acknowledges Indian heritage and *mestizo* bloodlines. Distinctions of nation, race, and class run to some degree in tandem; are fluid, flexible, and intersecting identities; and are tied to and inscribed upon the landscape in ways archaeologists can discern only if we take into account all of these factors in this particular transnational context.

## NATIONAL SCALE—LANDSCAPES OF MEMORY AND IDENTITY

The Lopez family Plaza in the Purgatoire Valley landscape is one site where such national and local conceptions of space intersected in the nineteenth century. In a letter to her sister, Manuela Lopez Merez (Mela for short), who grew up on this site, explained her version of the history of settlement in New Mexico and Colorado since Mexican independence in 1821: "Quite a number of Spaniards left Mexico and called themselves 'Los Dragones.' They had some trouble with Mexicans (mostly of Indian blood), and being on the losing side (when Mexico declared its independence from Spain) left those parts and came north to later New Mexico" (Hudson 1987b:98).

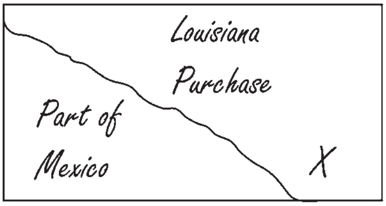
Bonnie Clark (2005:441) has noted that archaeologists have "slighted nationality and citizenship positions" in active constructions of ethnicity. In Mela's version of events, those who migrated north into New Mexico did so as an explicit rejection of Mexican national and also *mestizo* heritage. Mela illustrates the preference, common among some descendants of the region's early Hispano settlers, for "Spanish American" as an ethnic descriptor in explicit opposition to Mexican American or Chicano, the latter of which explicitly embraces both Mexican nationality and *mestizo* heritage. Several local Hispano historians from other parts of southern Colorado have made this distinction as well, for example, describing people as "descendents of conquistadores and seventeenth century Spanish Colonists" who participated in the "transplanting of old Spain into the San Luis Valley" (Lopez-Tushar 1992:1; see also Romero 1981). As Bonifacio Lopez (2002:36) stated in his memoirs: "For some of us, accepting the fact that we may have some Native American blood coursing through our veins is a problem that we typically cannot face. We can bring ourselves to say *Nosotros Mexicanos*. But, when speaking in English, many will still call ourselves Spanish-American."

Lopez notes people's willingness to use "Mexican" (in the sense of "cultural citizenship") among themselves but their desire to emphasize more of a European heritage to outsiders. This attitude is changing somewhat, but with a few exceptions such chroniclers do not address the long history of frequent and well-documented instances of intermarriage with, or capture by and of, Native Americans in Old Mexico or New, despite hundreds of years of coexistence (Brooks 2002). Although it is possible that those families who have lived in the U.S. borderlands for over 350 years, and before that in New Spain, are of pure European descent, odds are heavily against it.

Spanish Americans emphasize their European ancestry, including Spanish and French as well as occasionally Irish and English. Intermarriages between French traders and the daughters of trading families in New Mexico were common and were facilitated by their common Catholic faith (Craver 1982). The same would have been true in the case of many Irish suitors. In their memoirs, Mela's siblings Julia Lopez Hudson and Elfido Lopez take pains to note their mother's French roots, evidenced by her maiden name, which appears variously as "de Arce," "de Arcia," and "DeArce." Like Mela, Julia does not mention any Native American family ties (Hudson 1987a; Louden 1998 [1937]), although their brother Elfido, seventeen years Julia's senior, does. She does emphasize that their mother, Loretta, came from some wealth in the past, that their father, Damacio's, parents were Miguel Lopez and Antonia Lujan, and that "both were from respectable families living near Española and Santa Cruz [New Mexico]." Julia continued, "As mother told me many times: we should be proud of our ancestry: French and Spanish on our mother's side; Scotch and English on our father's side" (Hudson 1987a:36). The Scottish and English heritages were presumably at least one more generation removed, given the surnames of Damacio's parents, although it is also true that during the early nineteenth century it was customary to Hispanicize foreign surnames (Usner 1995).

Mela's preference for things French, Spanish, and British over things Mexican and Indian is illustrated in a more concrete manner in the letter quoted earlier. In fact, Mela writes her anti-Mexican sentiment onto the very landscape of her family homesite along the Purgatoire when she goes to some length to assert that the land her father, Damacio Lopez, settled was never

"...we were not born on any land that ever belonged to Mexico..."




Where the cross is located is about where we live, in southeastern Colorado. Includes San Luis Conejos. Grandfather's ranch was located in southeastern Colorado on the Purgatoire River.

**FIGURE 7.3.**
*Redrawn from map and accompanying text included in a letter from Manuela Lopez to Julia Lopez Hudson (Hudson 1987b:98).*

part of Mexico—claiming this despite the homestead's location south of the Arkansas River, which was generally acknowledged as the legal border between Mexico and the United States from 1821 until 1848. She claims instead that her parents homesteaded in what had been French Louisiana. The fact that the land had been part of Louisiana for a time is true. The fact that it was never part of Mexico is not. This territory had not been in the hands of French Louisiana since 1803 and was only Louisiana Territory for a short time between 1805 and 1819, at which time it became Mexico's by the terms of the Adams Onís Treaty (Beck and Haase 1989). One might argue that Mela's assertion is a matter of emphasis, given the competing and confusing national claims at various junctures by Texas, France, Spain, and the United States, as well as Mexico. But Mela chose to emphasize a vision of her family's land as part of Spain and French Louisiana, ignoring two and a half decades of actual Mexican sovereignty. She included in her letter her map of the Lopezes' Purgatoire Plaza homesite (marked with an X), which illustrates her particular vision of her heritage and family homeland (Hudson 1987b:98) (Figure 7.3).

Mela had reason to be familiar with the power that lines on maps have to transform landscapes and homelands from someplace legally belonging to long-term Hispano owners to someplace belonging to someone else. Such historical interpretations and designations on maps were then, and continue to be, important. Lawyers, legislators, surveyors, and cartographers could and did reallocate homelands with the stroke of a pen. Competing Colorado land claims based on such cartography are in the courts to this day (e.g., the Taylor Ranch lawsuit in Costilla County, settled in 2002). Many Hispanos had been in what is now New Mexico for hundreds of years before agents of the United States government redrew the boundaries around their land grants and villages into neater rectangular forms and, through legal maneuvering, transformed long-term and legal (under Spanish and Mexican law) Hispano settlers into squatters and poachers (Ebright 1987; Rosenbaum and Larson 1987). No doubt taking that lesson from the past, Mela chose to use the power of maps to emphasize her claims to the landscape, to emphasize her family's Spanish heritage (not coincidentally a heritage with higher status according to wider Anglo society), and to deny any family ties to the Mexican nation. As Bonifacio Lopez noted, Mela was by no means alone in such assertions. Olibama Lopez-Tushar, in her book on people of the high mountain valley to the west of the Purgatoire, across the Sangre de Cristo Mountains, characterized settlement there as a "transplanting of old Spain into the San Luis Valley" (Lopez-Tushar 1992:1).

While we can use archaeological settlement patterning and cultural geography to demonstrate the Hispanic presence in the borderlands with great time depth, what that settlement meant to the settlers and how it was reconceptualized by their descendants are archivally available. Such context helps us interpret the changing numbers and patterning of commercial goods along with locally produced ones at homesites like the Lopez Plaza and the Roybal Homestead. In turn, we will be able to compare material culture sites like these with both earlier sites and those occupied by people of less economic means.

However, high status was never determined exclusively through material wealth. Historian John R. Chávez (1984) has posited that the "Spanish American" identity common to families of substance in the Southwest borderlands was created in the twentieth century by longer-term residents to differentiate themselves from Mexicans who immigrated during the Bracero Program in the 1940s and were often portrayed in an unflattering light by contemporary Anglos. The Lopez family stories illustrate that the roots of this European-oriented identity and the attendant anti-Mexican feeling were important much earlier, even if the term "Spanish American" is more recent. A caste system emphasizing purity of bloodlines has a long history in Latin America, and claims of pure European descent were always somewhat flexible and roughly aligned with class ambitions. During the earliest years of New Spain, having noble Indian blood was also an avenue to elite status. But by the nineteenth century, romanticized notions of a noble Spanish aristocracy, explicitly contrasted with people of mixed heritage and therefore lesser virtue, were already common in popular literature and were exemplified by the characters in the widely popular novel *Ramona* (Jackson 1919 [1884]). In one of Julia Lopez's letters, she tells her son, "[Y]ou may be interested in one of my old books, *Ramona*, by Helen Hunt Jackson. . . . Those leading characters are very much like the Spanish of my parents [sic] time, except they had the friendship of the Indians. Ours didn't" (Hudson 1987b:75).

Individual flexibility when choosing to emphasize one part of cultural heritage over another is illustrated well by the eldest Lopez sibling, Elfido. Elfido presents an account of family ancestry different from that described by his younger sisters Mela and Julia, who were among the last born. Specifically, Elfido mentions that their maternal grandmother might have had "some Indian blood" (Louden 1998 [1937]:24). But clearly, there were times and places where blood ties to surrounding Native peoples could be perceived as more or less of a liability. During Elfido's childhood, while his parents were still struggling up the social ladder and one of his playmates was a Ute boy, perhaps it seemed less of one (Hudson 1987a; Louden 1998 [1937]). Fifteen years later, when his younger sisters were growing up, the Indian Wars were over, and their father, Damacio, had become "Don Damacio," it was more of one. Furthermore, Hispanos who had been listed as "white" by Anglo census takers in the 1870s were by the 1880s listed as "Mexican," so emphasizing European heritage and identity was a strategy to combat externally imposed and negatively perceived definitions of nationality and identity (Colorado State Census 1885; Colorado Territorial Census 1870).

While Elfido's memoirs focus on work, both income-generating and nonpaying, from age six, Julia Lopez Hudson remembers a more Victorian-influenced childhood, playing with her sister using dolls and more traditional and commercially available toys (Hudson 1987a). Some artifacts from the site analyzed to date relate directly and indirectly to children, most obviously including porcelain doll parts. A partial bisque figurine of an eighteenth-century gentleman in a frock coat demonstrates the kind of edifying Victorian knickknacks that adorned the house. There are also more ambiguous potential playthings, such as a number of pairs of spent cartridge casings hammered together with small bits of paper inside. It is well documented that children will play with whatever is available, and Julia's brothers may have had more access to these latter items, as she notes significant gendered segregation of space. Starting with childhood activities, such identity transformations clearly had concrete implications in terms of class-aligned behavior. In the history of New Mexico and Colorado, "Spanish Americans" were the descendants of those in New Mexican society who had let U.S. troops march into Santa Fe in 1848 with virtually no resistance; many upper-class or upwardly mobile families involved in the Santa Fe trade felt they would benefit from liberalization of that trade under U.S. rule. Uprisings such as that in Taos, where locals killed the U.S. territorial governor Charles Bent, were generally led by Native Americans and *mestizos* who were not direct beneficiaries of the trade and who felt they suffered from the change in jurisdiction.

## REGIONAL SCALE—LANDSCAPES OF TRANSFORMATION

Wealthy families in Bernalillo, Santa Fe, and Taos wanted the United States government to liberalize commerce along the Santa Fe Trail. This commerce, which stretched at various times from St. Louis to Chihuahua and beyond, forms the economic backdrop to the human history and transnational context of southeastern Colorado. Late-nineteenth-century politicians in the United States, influenced by captains of commerce and industry, were implementing laissez-faire economic policies beneficial to trader and merchant elites. Hispano merchant elites in Taos and Bernalillo wanted to take advantage of the new rules. Information on these regional connections is archaeologically accessible by looking at available goods through time, as well as settlement decisions.

Changing international boundaries, regional trade, and local strategic advantage within the trade system influenced settlers beginning to occupy plazas and ranchos along the Purgatoire River in southern Colorado in the late 1860s and 1870s. After Mexican independence and the subsequent Mexican-American War, the New Mexico commercial center of the Santa Fe trade shifted from the south around Bernalillo, New Mexico, where the Lopezes' maternal grandparents had lived, to the mountain route of the Santa Fe Trail along the Purgatoire River, where the Lopez family later came to settle in the 1870s. This shift of the nexus of international trade was accompanied by a shift of Hispano settlement in general to the north, the archaeological remains of which are still seen along the Purgatoire River.

Juan Córdova led the New Mexican settlements along the Purgatoire in the late 1860s, convincing families such as the Sandovals and the Lopezes to settle there as well. Many of the men had worked as freighters on the Santa Fe Trail. They were there under U.S. law, but the pattern of a Patrón leading communal extended-family settlements into northern valleys was hundreds of years old in both Old and New Mexico. One local historian who was along the Purgatoire in the early twentieth century observed twenty-eight such plaza settlements still occupied at that time by extended families, as well as a number of abandoned ones (Smith 1930). These plazas, many of which can still be seen today, are a patterned human response seen at a regional scale as people chose strategies of settlement to adapt to the shift from Mexican to U.S. rule and the shifting focus of trade from Chihuahua to St. Louis. In short, as commercial opportunity shifted north and east, so did Hispano settlement. Archaeologically speaking, their mode of settlement differed visibly from that of their Anglo neighbors and traders. There is no mistaking an extended-family plaza settlement for the typical single-occupancy Anglo homestead of that period. However, their move to this area illustrates in archaeologically available physical terms this transnational community's geographic adaptation to the new U.S. liberal economy.

## LOCAL SCALE—LANDSCAPES OF TRANSFORMATION AND SOCIAL ORDER

### Plazas and Patrones

In moving to the Purgatoire Valley, families like the Lopezes had to adapt to U.S. policies concerning land title and distribution under the Homestead Act of 1862. Yet the architectural and domestic spaces the Lopez family created on their homesite were similar to those in other Hispanic plaza settlements found in New Mexico and Colorado and settled under Spanish or Mexican land law (Church 2002; Clark 2003, 2005, and this volume). The settlers along the Purgatoire constructed and inhabited plazas that deviated greatly from the strict legal criteria set out by the Homestead Act, which was geared more toward individual family domiciles on formally patented acreage. Extended-family groups inhabited these plazas. The differences are observable archaeologically. The structures consist of adjoining adobe or stone-built rooms organized around a courtyard, sometimes incorporating an adobe house just off the courtyard group.

The archaeological site of the Lopez home consisted of several adobe buildings and livestock pens surrounding a defensible courtyard (Figure 7.4). Families like the Lopezes were using the flexibility of their position within the Hispano borderlands, at the faded edges of enforceable U.S. policy, to occupy land and build homes in a traditional New Mexican style that in some ways ran directly counter to the spirit of the Homestead Act (Church 2002). At the same time, they were taking advantage of economic opportunities made available by the liberalizing economy under U.S. law. We can see these negotiations in the archaeological record (Church 2002).

Even while rejecting U.S. land law in favor of familiar and comfortable spaces, the Lopez family did make compromises and changes at the intimate scale of domestic and work space to take advantage of opportunities for social

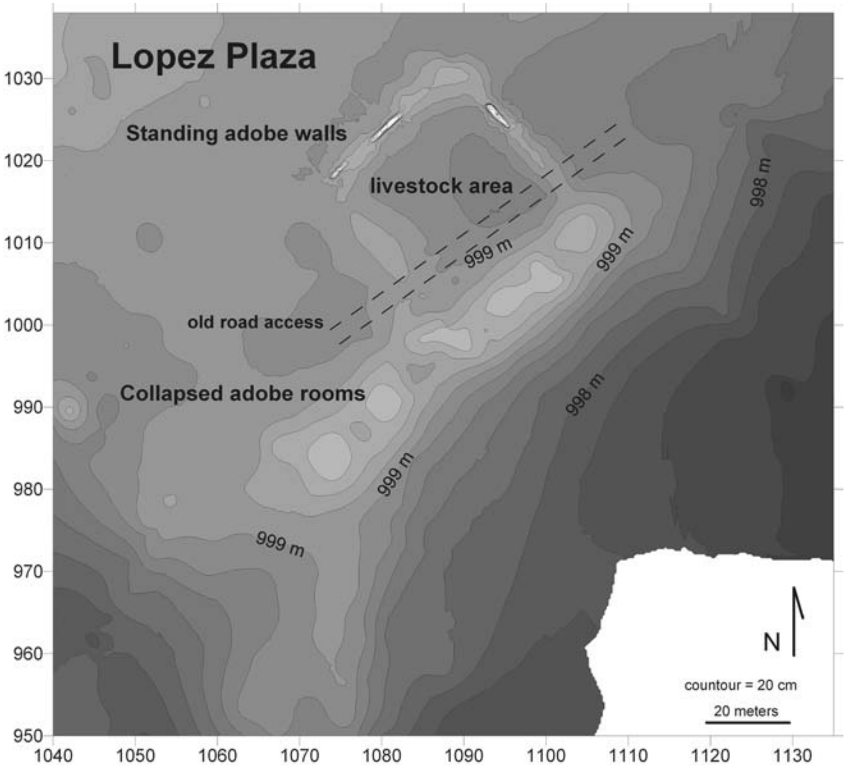



**FIGURE 7.4.**
*Topographic map of the Lopez Plaza site.*

and economic advances within the changing economic context. Around their traditional Hispano plaza they built a tidy cattle business, acquiring "large herds of cattle as well as fine horses for ranch and farm work" (Hudson 1987a:51). The growing business venture kept Damacio Lopez busy "constructing new stables and other outbuildings, repairing irrigation ditches, managing the ranch hands and two Indians [Taos Pueblo] who farmed [the Lopezes'] fields of grain and tended [their] vegetable garden and small orchard, making infrequent but long trips to Trinidad, and driving his well-fed cattle to railheads at La Junta and Las Animas" to be shipped "to Kansas City, Chicago, and other Midwestern Cities" (Hudson 1987a:51–52) (Figure 7.5). The majority of architectural space on the Lopez site was dedicated to livestock, and the largest proportion of metal artifacts analyzed so far comes from fencing, including fencing staples, fencing nails, and wire.

**FIGURE 7.5.**
*Enclosed corral area of Lopez Plaza.*

Damacio also took on the operation of a general store and post office and donated land and funds to build a school, church, and cemetery (Figures 7.6, 7.7). Damacio thus parlayed his economic success in the U.S. laissez-faire capitalist economy into an elevated social standing in Hispano cultural terms, becoming a Patrón, or "Don" in the traditional sense, and he was referred to by other settlers as Don Damacio at this stage in his life. He was also progressive in the Anglo-Victorian sense of the term. His patronage of the school provided his younger children with the kind of educational opportunities he and Loretta felt would be critical to their success in the increasingly economically liberal, capitalist-driven Anglo world into which they were born.

This was not the only choice available. Ninety percent of the Lopezes' neighbors were also Hispanic, and Hispanics elsewhere in the nineteenth- and early-twentieth-century New Mexico/Colorado borderlands debated the comparative value of traditional Catholic education, often conducted in Spanish, versus secular education, which was always conducted in English (Usner 1995). Don Damacio and Doña Loretta's decision to provide a schoolhouse on their land where both their children and those of neighboring Anglo and Hispanic ranchers could get a secular education in English as early as the 1880s is indicative of the Lopezes' upward social mobility, flexibility of tradition and identity, and concomitant ambitions for their children.

**FIGURE 7.6.**
*Church built by Don Damacio Lopez.*

Perhaps even more striking than their decision to abandon traditional Catholic education is that these ambitions were not confined to the Lopez sons. Unlike their unschooled mother, the Lopez daughters went to school alongside the boys, and all the books Julia remembers reading at home were within the Anglo-Victorian literary tradition, including *Ramona* (Hudson 1987a). Artifacts on the site include fifteen whole and fragmented slate pencils, and school census documents show all the Lopez children attending the school their father built, albeit Elfido only briefly (Las Animas County School Census 1880–1900). However, although the Lopez daughters may have been the first generation of girls educated in the family, upper-class Hispano gender norms and Anglo-Victorian ideals about separate domestic and work spheres were complementary and are reflected in the spatial layout of the Lopez Plaza. Corrals and agricultural work areas—venues for men's work—were set apart from the house where the girls spent most of their time, according to Julia's memoirs (Figures 7.8, 7.9). Virtually all the clearly gender-marked artifacts for women—including a Spanish-style decorative hair comb, glass beads, doll fragments, straight pins, a sewing machine leg, and a baby spoon—came from


**FIGURE 7.7.**
*Lopes [Lopez] headstone at the church.*

within the house foundation or the midden, created for post-flood cleanup. The Lopez parents wanted to prepare their children for life in the Anglo-American economy and social context, but in doing so they adhered to tradition wherever Anglo and Hispano ideals ran parallel.

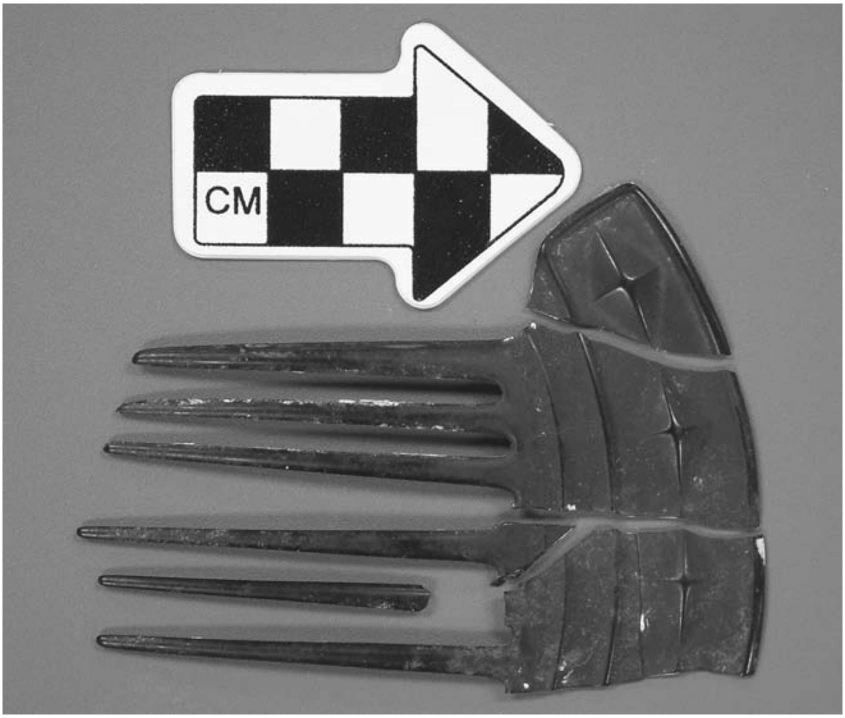



**FIGURE 7.8.**
*Woman's hair comb from domestic area of Lopez Plaza excavation.*

When all the children had grown and left home, Damacio and Loretta left their ranch but retained the land. The landscape comes up over and over in primary documents by Hispanos describing their attachment to place and to the past even after they have moved elsewhere. Rafael Chacón, a settler in southeastern Colorado in the 1890s, described the land thus: "The work was hard, the results uncertain, but men are no more uncertain or less hard, for the land at least is thankful like a common mother of all of us" (quoted in Meketa 1986:333). According to the Lopezes' daughter Julia, her parents' 1902 move to Rocky Ford, Colorado, after over thirty years of ranching was timed concurrently with seeing their children independently set up in homes of their own (although she also mentioned the crises of repeated droughts). She wrote, "He and my mother had a sentimental feeling for the land where they started from scratch, and built a small empire" (Hudson 1987a:66). This sentiment is pure Victorian "Horatio Alger," but with a culturally Hispanic twist. Evidence of


**FIGURE 7.9.**
*Woman's makeup pencil from domestic area of Lopez Plaza excavation.*

their "small empire" remains in the assortment of foundations and walls on what was their land along the Purgatoire River. The specific buildings, as well as their spatial layout and material culture, are testament to Damacio's negotiation of traditional New Mexican–style and upper-class Patrón status within the increasingly dominant Anglo-American economic order.

## Settlers without Documented Title ("Squatters")

Not all New Mexican families who settled in southern Colorado had the same sense of place, class, and ethnic identities as the Lopez family did, however, and the landscape and archaeology along the Purgatoire and its tributaries reflect other modes of settlement and negotiation that were also choices available within the nineteenth-century transnational borderlands setting. On Lopez lands, besides the plaza proper, there are scattered isolated domestic structures in the valley and alongside drainages for which we have no records of patent, tax, or sale. The occupation dates of these structures suggested by recorded artifacts do not match dates of documented landownership (Carrillo et al. 2003). These sites may reflect Don Damacio's role as Patrón just as much as the foundations of his plaza and adobe house do, but they also represent the ways economically disadvantaged groups moved to better their lot. Damacio's great-grandson Paul wrote, "At infrequent intervals of time squatters would trespass on grandfather's land and 'settle' on it. Grandfather would notify them that they were trespassing but explained that they could stay, at least temporarily, provided they would help with the farm and garden work" (Hudson 1987a:65). His mother noted, "Papa was glad when the squatters moved in. They didn't pay rent, or taxes, but did build their one-room houses on the banks of the Purgatoire River—on Papa's land—and raised chickens, a cow or two, and found employment with the ranch owners. My parents were glad to get them to do the many chores in the fields, and help Mama with the numerous household duties" (Hudson 1987a:65). Thus Don Damacio and Doña Loretta, a couple who reportedly arrived in the valley with no more than a cartload of goods (much of which was lost in the river in transit), by the 1890s had servants of a sort, just as the trading households of Taos and Bernalillo did. The fact that these squatters did work in "the fields" is significant, in that Hudson also stated that her brothers considered themselves cattlemen and did not do crop and orchard work. The Purgatoire Valley in general is peppered with one-room stone structures with corner fireplaces or stoves typical of Hispanic construction, accompanied by few to no artifacts, which confirms the presence of these settlers.

Thus the arrangement of the Lopez homesite, church, school, and surrounding sites reflects a type of settlement diagnostic of the family's ethnic background, but these arrangements also attest to the Lopezes' sense of class identity. Pueblo Indian laborers on the ranch lived in the plaza proper, nearer the livestock. They were hired to do farming and orchard work that Julia noted several times her brothers considered too menial for them (Hudson 1987a:65). The Lopez boys were raised as *vaqueros* (cowboys), latter-day *caballeros* (mounted gentlemen). As they grew to adulthood, they were able to combine this *caballero* heritage with the complementary and equally romantic Anglo-American notion of the "cowboy" (which itself had Spanish origins). They engaged in cattle raising, and one son, Isidoro (Sid), rode in Buffalo Bill's Wild West show (see another example from northeastern Colorado in Scheiber, this volume). The less glamorous work of tending the crops and orchard at home was the domain of Pueblo Indians and squatters. In contrast to the details about cattle, the memoirs do not mention whether any crops or fruits were raised for the broader market. Nor do they mention goats, the butchered remains of which have been recovered in our excavations.

## Homesteads

Damacio and his wife came to the region with ties to important trading families farther south and therefore with local political and social influence.

According to their daughter's account, they lost all their worldly goods, contained in one cart, in the river on the way to their new home, but they retained the social ties. Unlike the situation in the Anglo-American world, such social capital did not necessarily correlate with material wealth for Hispanos in this era. Other Hispano settlers and their descendants differed from the Lopez family in terms of both ethnic identity and sense of place. The late Marcelino Durán, born in 1912, embraced both Indian and Hispano heritages, although this identity meant he could not ride the bus to school with the Anglo children because, in his words, "we weren't the right breed of people" (quoted in Loendorf and Clise 1997:11). In recorded interviews, he and some Hispanos of lesser means and sometimes Indian descent complained more about the way upper-class Hispano sheep ranchers treated them than they did about their treatment by Anglos: "An' you think these people would help one another you know. Baloney! . . . We're a contrary son of a bitching race of people" (quoted in Loendorf and Clise 1997:17).

Durán saw himself as having a shared heritage (and apparently "race") with families like the Lopezes, even if some of the Lopez children would perhaps not have agreed because he was *mestizo.* Families of lesser economic means did not leave as many personal accounts from the nineteenth century as families like the Lopezes did, but poorer families shared the same aspirations to realize financial gain in the larger market system. Durán related, "[E]ver since I was a little kid I wanted to start something, and I had about 40 head of cows, my brother had about 200 head of sheep . . . we had a pretty good start" (quoted in Loendorf and Clise 1997:15). However, they often attempted to do so while maintaining comfortably familiar spaces and activities at home and within a social matrix of community reciprocity. A very few, like the Duráns, who were successful remain in the area. The remains of the homesteads of others dot the landscape along the Purgatoire.

In 1876 (when the Lopez family had temporarily relocated to the town of Las Animas), José Roybal, his wife, and two young boys established one such homestead farther up one of the side drainages of the Purgatoire River and constructed their architectural and exterior spaces quite differently than did the Lopez family, who had better land along the valley bottom. We have no documents written by the Roybals, but we do know them through documents written about them and the archaeology of their homestead (Church 2001, 2002). The Roybals succeeded in establishing their patent on land where they were engaged in irrigated subsistence farming, a strategy with deep roots in the Hispano borderlands, until 1881. In that year, just as soon as José had fulfilled the Homestead Act requirements and could legally do so, he sold his

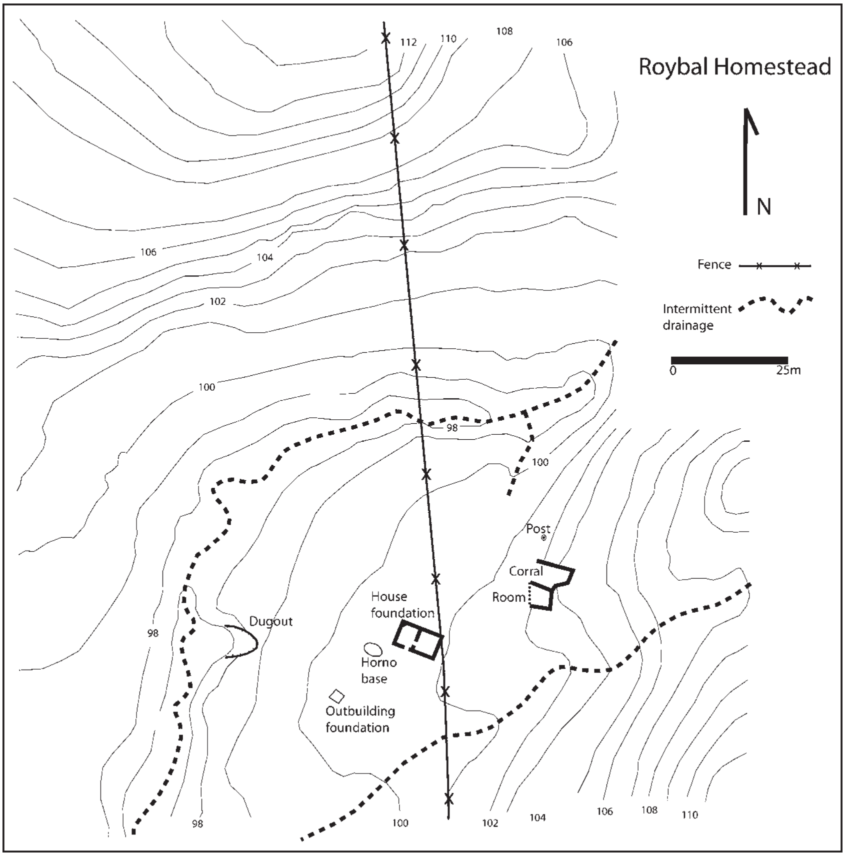



**FIGURE 7.10.**
*Topographic map of Roybal Homestead site.*

160 acres to Anglo sheep ranchers (Church 2001; Las Animas County Deeds and Records 1860–1996).

Roybal had invested five years of his and his young family's time in making architectural and agricultural improvements, but with only a minimum of cash. They built the house and outbuildings with local materials, materials they could salvage and move elsewhere upon leaving (Figure 7.10). For example, although the patent documents describe a log house, the absence of any evidence of logs—even in a decayed state—on the site suggests they were recycled, which is not surprising given that logs were in great demand on the increasingly denuded High Plains landscape of the 1880s (West 1995). Even discounting the material Roybal might have removed to his next house, his investment of time and material paid a relatively handsome dividend by the standards of the day; whereas the Roybals had made no cash investment in the land and the U.S. government valued it at $200, the Roybals sold it for $300.

Historians who have framed the homesteading experience in terms of "success" or "failure" have usually characterized such short-lived homestead occupations as failed ones (Friedman 1988). They judge these domestic sites that dot the landscape by the standards of congressional legislative intent and Jeffersonian agrarian ideals, not according to the intentions and goals of the homesteaders themselves. Archaeologists are too often led by historians to discount such sites. But they are part of a pattern of borderlands settlement. Families like the Roybals negotiated traditional Hispano home life in a setting increasingly dominated by commercial agriculture and larger landholdings. The remains of short-occupation homesteads can represent strategic choices made by Hispano families with less wealth than the Lopezes to accommodate the nineteenth-century market system and U.S. sovereignty, another strategic compromise between comfortable and familiar living and work spaces and the emerging market economy. They could settle and farm the land for a few years, growing familiar crops and livestock, then sell it to livestock ranchers for a 150 percent profit. Although this strategy was clearly informed by market forces, the Roybal family practiced mixed irrigation agriculture on their small farm, following a subsistence strategy with hundreds of years of history on Spanish land grants in New Mexico. The Roybal site demonstrated little evidence of reliance on imported canned goods, in contrast to Anglo-American neighbors of similar economic means, and a comparatively smaller proportion of artifacts related to ranching (and none to dairy) (Church 2001, 2002).

Along the Purgatoire, such isolated, single-occupation homesteads may reflect a different negotiation between traditional family and farm life and the late-nineteenth-century market system than the Lopez Plaza does. However, it is no less a way Hispanos tried to bend the free market system around, but not through, their domestic activities and spaces during this period of changing national and state sovereignty and law.

## CONCLUSIONS

Many archaeologists have explained patterning of artifact assemblages in reference to both local and national scales of consumption, such as Leslie Stewart-Abernathy's description of "industrial goods in the service of tradition" on farmsteads in the Ozarks (Stewart-Abernathy 1992). Fewer have taken a landscape approach to the nineteenth- or twentieth-century archaeological record (Horning 2000). I expect that when our artifact analysis is complete, the material culture will enrich the anthropogenic landscape-scale analyses I have presented here, as the preliminary materials touched on already suggest. Using examples ranging from northern New Mexican villages to the southern Colorado coalfields of the upper Purgatoire, social historian Sarah Deutsch has written, "[R]esisters [of the] onslaught [of Anglo westerners] from the 1870s to the 1890s did not necessarily resist progress but [rather] the form they saw progress taking. Many adopted, when they could, new technology and manufactured goods—iron bedsteads, cookstoves, guns, and plows began showing up in remote Hispanic villages—but for their own ends" (Deutsch 1987:38; see also Clark 2005; Kutsche and Van Ness 1981; Quintana 1991 [1974]).

It is important to realize that these "ends" were not some type of static traditionalism or uncomplicated resistance to change. Accommodation and resistance were not always entirely separable behaviors, as people made decisions on a day-to-day contingency basis, with no prescient idea of outcomes. The ends changed, and the means were negotiated within a context of increasing numbers of Victorian-period Anglo settlers and all attendant changes in trade and transportation technology. Hispanos resisted some aspects of change brought by Mexican and, later, U.S. political and economic hegemony, but they acquiesced and willingly participated in others or tweaked new practices to fit with the old. Some, like the Chávez family, ended up with a seat on the New York Stock Exchange (Milner, O'Connor, and Sandweiss 1994). They were defending some aspects of communal social networks while changing others in order to benefit from the new context, and they were doing so at many scales of site and region visible archaeologically if one adopts a multiscalar landscape approach.

Landscape approaches to archaeology have been with us for some time (e.g., Willey 1958), yet archaeologists still find themselves confined to site-level interpretations more often than not. Even when a landscape approach is part of the research design, it has often been confined to exploring questions of human ecology. However, just as dialogues among ethnic identity, class identity, national identity, and market opportunities structured consumer behavior, they also structured settlement behavior at the scale of ranches and homestead properties and choice of artifacts on such sites. Such variables affected not only the landscapes themselves but also the ways occupants and descendants remember and depict those landscapes and use them to create narratives of identity, past and present. To interpret patterns in the material remains at the site level, archaeologists must be aware of these narratives and interpret such patterns on the physical landscapes in terms of perception, facets of which include memory, identity, social order, and transformation. They must acknowledge that these contexts are as important as those with which archaeologists have tended to feel more comfortable: resources, subsistence, and economic interests.

Having observed such negotiations at scales ranging from homesites to regional homelands to national borderlands, it seems clear that these kinds of nineteenth-century sites and their patterning on the landscape, combined with documentary and material evidence, provide the historical and spatial and material perspectives on transnationalism explicitly proposed by cultural anthropologists (Blanc, Basch, and Schiller 1995; Kearney 1995) and should be useful to archaeologists working in such contexts. Yet archaeologists have not made much use of such contexts, nor have they conducted such research at multiple scales, often because of insufficient documentary context or because they cannot spend enough time researching a particular region to grasp the documentation that lies buried in courthouses or in people's attics. Often, cultural resource management work is by its nature constrained to rights-of-way and individual properties, leading to fragmented archaeological coverage of landscapes.

The people of the nineteenth-century borderlands clearly operated within the kind of liminal, interpenetrating, and nested conceptions of space, economy, and identity prescribed by transnational environments. In terms of personal identity, Elfido Lopez never anglicized his name, but his younger brothers Socorro (Sam) and Isidoro (Sid) certainly did. They maintained some traditional practices and modified others at different times and places as a result of larger contexts. As national and cultural borders shifted around them, their ability to remain economically and socially flexible through time was and still is fundamental to the culture history of Spanish American, Chicano, *mestizo,* and Hispano families living in the vicinity of the Purgatoire River or the Picketwire Valley.

## ACKNOWLEDGMENTS

First and foremost, I thank the editors of this volume for their patience and persistence in getting the volume together. This research could not have happened without the sustained interest of first Mark Mitchell and then Michelle Stevens at the United States Forest Service, Comanche National Grassland, and accompanying financial support. I thank the anonymous reviewers for their valuable comments. Kimberly Henderson, Ph.D. candidate at the University of Denver, has been my right-hand person in the field, without whom all would be chaos.

University of Colorado–Colorado Springs students past and present, too numerous to mention, have contributed many hours, paid and unpaid, toward the continuing research. And last but not at all least, I appreciate all the Lopez family members whom I have had the pleasure of meeting and interacting with so far, for their openness and generosity with family stories and pictures. They are without exception lovely people.

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EIGHT

# The Behavior of Surface Artifacts: Building a Landscape Taphonomy on the High Plains

*Oskar Burger, Lawrence C. Todd, and Paul Burnett*

> The material remains of past civilizations are like shells beached by the retreating sea. The functioning organisms and the milieu in which they lived have vanished, leaving the dead and empty form behind. An understanding of structure and function of ancient societies must be based upon these static molds which bear only the imprint of life.
>
> (WILLEY 1953:1)

MORE THAN A HALF-CENTURY AGO, Gordon Willey exhibited a thorough awareness of the nature of the relationship between archaeological materials and the people who discarded them. Just as a modern-day paleobiologist would not analyze Willey's "beach" as the home habitat for the "functioning organisms" that built the shells, archaeologists must consider artifact contexts as different from the "milieu in which they lived." Willey's opening paragraph to the Virú Valley settlement pattern survey represents a precocious recognition of the role of formation process studies, or taphonomic perspectives, applied to the study of landscapes. The wisdom in Willey's observations on the nature of archaeological context has not been fully appreciated by the traditions of settlement pattern analysis and archaeological survey he inspired. Here, we build on Willey's observations regarding the nature of artifact populations and apply them to the landscape of the northwest High Plains. We contend that

Willey's implied taphonomic orientation is as essential in landscape archaeology as it is in fine-grained analyses of individual sites. Just as paleobiological inferences regarding the context and histories of the "shells on a beach" would be incomplete without interpreting taphonomic processes such as wave action and shifts in ocean currents and temperatures, so too is it unwise to infer distributional patterns of artifacts on landscapes as yielding information on past human actions without assessing the taphonomy of those artifact-bearing landscapes. We refer to this perspective as *landscape taphonomy* and see it as an approach explicitly confronting Willey's shell/beach interpretive dilemma, a fundamental concern in archaeological survey and the study of landscape-level patterns (a more detailed definition is given later).

We discuss the landscape taphonomy perspective as it developed during our survey project on the Oglala National Grassland (ONG) of northwestern Nebraska (Figure 8.1). This survey project began as an attempt to extend the scale of traditional taphonomic studies of the Hudson-Meng (25SX115) bison bonebed (Todd and Rapson 1999) to interpretations of the surrounding grassland. The geologically complex nature of North America's High Plains provides an ideal setting to demonstrate the value of this perspective for large-scale archaeological investigation. Our surveys on the ONG began with basic experiments aimed at investigating the accuracy and experimental control of archaeological survey methods, a precursor to evaluating observed archaeological patterning in terms of prehistoric behaviors. Archaeological survey is defined as field investigation consisting of archaeologists walking systematically over a landscape looking for exposed cultural material and is here considered the primary field technique of landscape archaeology, as it was for Willey in Virú.

While some see taphonomic investigations as providing cautionary tales that restrain interpretation, we hope to illuminate exploratory research questions that build a more holistic and interdisciplinary field, ultimately providing archaeology with a richer interpretive palette. Of particular relevance is avoiding the common interpretive pitfall of an initial optimistic overemphasis on human causality while bringing an understanding of long-term human-landscape interaction to the forefront. This approach to archaeology is capable of contributing widely to researchers and planners who also study landscape change (e.g., Endter-Wada et al. 1998; Field et al. 2003; Forester and Machlis 1996; Holling and Gunderson 2002; Milne 1992; Naylor 2005; Norton 1998; Stohlgren et al. 1997; Swetnam, Allen, and Betancourt 1999; Turner 1989), many of whom explicitly seek collaboration with the social sciences.

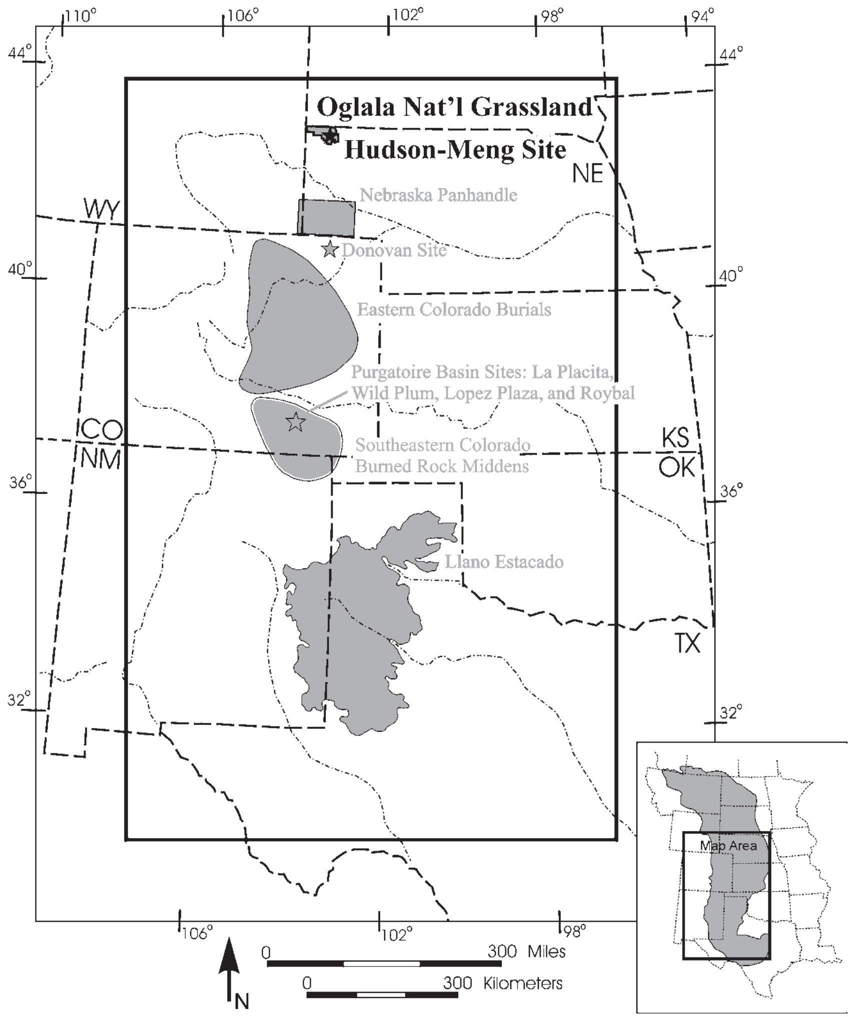


**FIGURE 8.1.**
*Map of the High Plains, highlighting the location of the Oglala National Grassland within the western United States. Illustration by Kevin Gilmore.*

## TAPHONOMY AND THE PROCESS OF ASSIGNING MEANING TO PATTERN

Any claim regarding the origin of patterning is relative to a given perspective, but one certainty is that most patterns can have many possible sources. Different processes can form similar patterns (equifinality), and elements of patterns can be the non-intuitive result of numerous interacting, scale-dependent processes (emergence). These observations suggest that caution should be exercised when assigning behavioral meaning to artifact patterning (whether intra-site or regional in scale) and that the more reliable inferences will be based on a dynamic understanding of multiple interacting agents of change.

Taphonomic studies have demonstrated the danger of making a priori assumptions about the nature of archaeological deposits (Behrensmeyer, Gordon, and Yanagi 1986; Brain 1981; Hill 1979, 1989; Marean and Cleghorn 2003; Oliver 1989; Todd and Rapson 1999; Yellen 1996). In spite of these realizations at the scale of the individual site, human action is often given interpretive primacy when studies are conducted at the landscape scale. An equally fundamental interpretive problem occurs when distributional patterns are consequences of methodological error, such as an inappropriate sampling frame, coarse screen size, or other systematic bias introduced by the archaeologist. Before interpreting the behavioral meaning of archaeological context, archaeologists need to evaluate (1) how methodological decisions determine the nature of the samples they wish to interpret, (2) which among several possible agents could have generated the pattern in question, and (3) the relative contribution of those multiple agents.

Any archaeological analysis could benefit from addressing the influence of method and taphonomic variables on archaeological interpretation, but these concepts are not generally explicit or sufficiently emphasized in landscape archaeology (but see Barton et al. 1999, 2002). A taphonomic perspective provides the needed means of critically evaluating the ways meaning is assigned to pattern. Landscape taphonomy is relevant both for experimental design and for developing more inclusive understandings of the various processes of landscape formation. The steps in building a landscape taphonomy are initially conceptual, but all have concrete implications for field methodology. The linkage between concept development and methodology is reflexive—one informs the other. Many archaeologists have tended to use human action as a default null model by assuming that human action is responsible for observed patterns until conclusive evidence to the contrary is demonstrated. A more sensible view places human action as one among many important landscape variables (Barton et al. 2002).

## THE PROBLEM OF ANTHROPOCENTRIC BIAS

Examples of assumptions overemphasizing human causality are common in archaeological definitions of the term "landscape." For instance, one view is that a landscape exists "by virtue of its being perceived, experienced, and contextualized by people" (Knapp and Ashmore 1999:1) and that "*landscape* is a conceptual and behavioral process" (Potter 2004:322, original emphasis). This view is phenomenological and emphasizes human consciousness and sources of cultural meaning that people may project upon landscapes. We agree with this perspective in so far as it highlights the need to include the role of culture in landscape formation and change, which should be one of archaeology's great strengths as *the* field positioned at the interface of the socio-natural sciences (van der Leeuw and Redman 2002). On the other hand, this perspective is also unnecessarily anthropocentric in viewing landscapes as solely the result of human perception and experience. It also implies that landscapes are static background templates that preserve only the complex social workings of one particular species: humans. Landscape elements contain historically contingent palimpsests of meaning in addition to being palimpsests of formational processes (Barton et al. 2002). To meet anthropological goals and to contribute to other fields, archaeology must incorporate the importance of culturally constructed meaning with an understanding of physical and biological processes that also shape landscape properties. To be fair, there is certainly more than one way to approach the study of landscapes, and the difference here (between ours and those cited earlier) is largely one of emphasis. However, defining a landscape in exclusively anthropocentric terms is ultimately short-sighted and incomplete, and it limits the potential for more holistic, transdisciplinary understanding.

Defining landscapes as the exclusive result of human perception and/or solely within the confines of human action makes at least three problematic assumptions: (1) that human actions are the only relevant archaeological processes on the landscape, (2) that anthropology is the only field that might study such landscapes, and (3) that archaeology cannot benefit from, or contribute to, other disciplines also investigating the human role in landscape change. A taphonomically oriented approach can alleviate these biases by seeking to understand multiple processes and their interactive effects on what archaeologists observe and interpret.

Human actions are significant components of landscapes, but they are not the sole component. All archaeologists should be comfortable with the notion that archaeological patterning is the result of numerous agents, only some of which derive from humans—this is the basic lesson of the growth of taphonomic and formational studies during the last quarter of the twentieth century. Landscape taphonomy promotes collaboration with researchers of the natural sciences. The inherently interdisciplinary nature of archaeology is one of its greatest strengths (Schiffer 1988; van der Leeuw and Redman 2002), and we should look to build bridges, not barriers, to outside perspectives.

## LANDSCAPE TAPHONOMY DEFINED

> Landscape structure must be identified and quantified in meaningful ways before the interactions between landscape patterns and ecological processes can be understood. The spatial patterns observed in landscapes result from complex interactions between physical, biological, and social forces. Most landscapes have been influenced by human land use, and the resulting landscape mosaic is a mixture of natural and human-managed patches that vary in size, shape, and arrangement.
>
> (TURNER 1989:174)

Monica Turner is a landscape ecologist, yet her view encapsulates much of the basis for landscape taphonomy and is a strong tribute to the potential and necessity for interdisciplinary collaboration in the investigation of landscape structure and process. Our definition of landscape is a version of the definition of the fossil record in Anna Behrensmeyer and Susan Kidwell's (1985:105) discussion of taphonomy. Like the fossil record studied by paleobiologists, a landscape is the result of a "complex, evolving, integrated system of biological, [cultural, climatological,] and sedimentological processes" (1985:105). This definition emphasizes the dynamic nature of the records preserved within and upon landscapes. Landscape archaeologists usually focus on cultural aspects of this formation, but it is beneficial to research biological and physical processes that also contribute to landscape patterning (Figure 8.2). Taphonomy is the field that has traditionally investigated the complex interaction of such dynamics (physical, biological, and cultural) on the formation of records preserved within and upon landscapes. Taphonomy is "the study of processes of preservation and how they affect information in the fossil [and archaeological] record" (Behrensmeyer and Kidwell 1985:105). Sampling design influences the information returned from a surface or matrix. As it influences information loss, it needs to be included in our understanding of taphonomic processes (Burger and Todd 2006). Taphonomy provides an avenue for achieving more inclusive understandings of landscape-scale processes across temporal, spatial, and methodological arrays (Barton et al. 2002).

Landscape-scale records are always multi-authored, but the taphonomic perspective outlined here divides the contributors into three camps: biological, physical, and cultural (Figure 8.2). Physical elements of the landscape include climatic, geologic, geomorphic, and sedimentological variables (Naylor 2005).

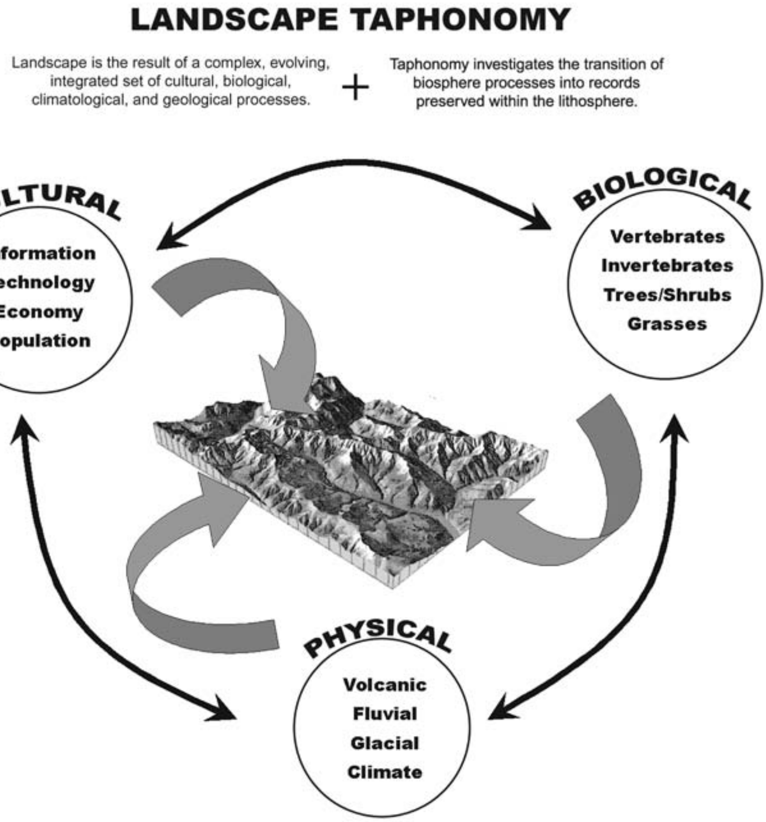


**FIGURE 8.2.**
*Landscape taphonomy, a conceptual model.*

The landscape elements in the biological compartment of Figure 8.2 include the complex network of living organisms from all phyla, which not only co-reside with humans, thus influencing their actions and beliefs, but also alter the form and content of the physical landscape. For example, soil development involves physical and biological processes, and landscape variability in pedogenesis results from interactions among climatic, biotic, topographic, and geological state factors as they change through time (Jenny 1941). A perusal of these state factors in soil development makes it all the more clear that archaeological patterns are influenced by physical and biological variables. Human actions of the past and present can influence and compound these processes in a variety of ways. Thus any investigation of the landscape must account for complex interacting variables, and considering a landscape solely as a stage for a prehistoric play or only as the product of human perception will not only fail to meet management concerns but is wholly inappropriate for the investigation of past human action.

In one sense, one could argue that the cultural compartment of Figure 8.2 should be placed among the biological elements because humans are necessarily part of the biological world, a point often missed by the more phenomenologically inclined. However, we separated cultural processes into their own compartment in the landscape taphonomy model because (1) understanding cultural processes is an important area of opportunity for anthropology to inform other fields and the general public, (2) the role of humans in landscape dynamics requires specific attention for anthropological interpretation and for broader issues of resource management and planning, and (3) cultural modifications of the landscape often tend to be of exceptional magnitude.

Cultural processes include traditional anthropological themes such as settlement patterns and place-use histories, but the elements of culture especially relevant for landscape taphonomy include the role of populations, their economic systems, and uses of technology and information in the human-landscape interaction (Figure 8.2). Couching investigations of the human past within this research strategy facilitates articulation with ecologists who are also studying the evolution of landscapes. This can improve the ability of archaeology to inform disciplines (and be informed by disciplines) that tend to underestimate the role of humans in landscape change. For example, ecologists have traditionally tended to seek "pristine" ecosystems for analysis, which are methodologically defined as those unaffected by humans. Some have asserted that any ecosystem that has changed as a function of human action cannot be considered "natural" in the first place (Jenkins 2003). Policy directives are often targeted at returning a modern ecosystem to some previous and static state. An unfortunate by-product of this tendency is that "pristine" is implicitly defined as unaffected by European cultures, implying that indigenous cultures either did not alter ecosystems or altered them in a "natural" way. Additionally, the notion that Native American groups did not influence ecosystems relates to a traditional view of hunter-gatherers as the original affluent society (Kelly 1995) and also carries a more deeply routed implication that non-Westerners were simply unwilling or unable to alter their ecosystems.

Humans often become an important ecosystem variable to ecologists only when their behaviors reach a scale that significantly influences other ecosystem variables (e.g., anthropogenic soil change, global warming, changes in the carbon cycle, and similar factors), but people tend to impact any ecosystem they inhabit (Redman 1999; Smith and Wishnie 2000). The subtleties of the assumptions regarding the pristine ecosystem bias in ecology will not be fully understood by ecologists without integration with social sciences (Field et al. 2003; Norton 1998). Likewise, anthropology can benefit from the ecological tools and perspectives for analyzing ecosystem change. Thus archaeology's interdisciplinary structure is ideal for correcting a number of historical biases that overlap with both the social and natural sciences (van der Leeuw and Redman 2002).

In sum, landscape taphonomy as depicted in Figure 8.2 is an alternative to traditional settlement pattern surveys by highlighting these concepts:

- Landscapes are complex formational mosaics that cannot be seen exclusively as cultural, biological, or physical entities.
- Nontrivial landscape research, regardless of its ultimate goals—whether archaeological, geological, or biological—must incorporate aspects of each of the major contributory realms.
- Landscape properties are constantly in flux at multiple spatial and temporal scales and require continuous monitoring.
- Methods to research landscapes must be collaboratively developed with significant inputs from disciplines based in the social, biological, and physical sciences.

The time has passed when archaeologists can focus solely on human activities as generators of archaeological patterns without considering the complex noncultural components of archaeological formational histories. The history of research and interpretation at the Hudson-Meng bison bonebed is presented in the next section as a case study that demonstrates how a taphonomic perspective can productively alter the meaning assigned to material patterns.

## BUILDING A LANDSCAPE TAPHONOMY

### Lessons from a Bonebed

Hudson-Meng is a research center encasing the largest documented Paleoindian-period bison bonebed in the Americas. At this site, over 600 bison of an extinct subspecies (*Bison antiquus*) are contained within loess deposits dating to nearly 10,000 radiocarbon years before present (Agenbroad 1978; Buenger 2001; Jahren, Todd, and Amundson 1998; Thomas and Kelly 2005:242–245; Todd and Rapson 1999). The research center is the hub of our landscape survey project on the surrounding grassland. The history of research at Hudson-Meng is used as a reference to demonstrate the value of taphonomically informed research strategies and high-resolution recording methods. This example will be used as a springboard from which to enter our discussion of the applicability of similar methodological and conceptual approaches to the study of landscapes.

The first published interpretation of Hudson-Meng's formational history emphasized an observed association between stone artifacts and bison bone (Agenbroad 1978). This led to the conclusion that the two classes of material were unambiguously behaviorally associated and that the humans who had made the artifacts were undoubtedly the same as those who had killed the bison as part of a single event (or a closely related series of events). This interpretation of the site, as a Paleoindian kill and processing location, emphasized the cultural elements of landscape change at the expense of biological and physical processes of decay, weathering, and sedimentation. Subsequent investigations of the bonebed, aided by developments of technology and taphonomic principles, led to a revised interpretation of the site's formational history (Todd and Rapson 1999). A more controlled documentation program and several observed archaeological patterns indicated that the accumulation of the main layer of bones was most likely not a result of human hunting and that the archaeological materials were a subsequent behavioral event (Todd and Rapson 1999).

Thankfully, the original excavators left most of the bones in place in the bonebed (they were not removed for further analysis but were identified in situ and reburied). Portions of the site were excavated in the 1990s to allow for an interpretation center to be constructed over the bonebed. During the later excavations, new discoveries played a role in the reinterpretation of Hudson-Meng. For example, it was found that the gradually sloping hill to the west of the site did not enclose the cliff assumed to be the kill location of the bison in the original interpretation (Agenbroad 1978). Some standard archaeological comparative analysis also implied that the site was very atypical for a kill location. Bruce Huckell's (1978) analysis of the chipped stone suggested the assemblage seemed like a camp rather than a kill in that it contains an abundance of bifacial thinning flakes and almost no unifacial retouch flakes (he also thought there might be multiple events at the site)—the opposite of the pattern typical of other Paleoindian kill sites on the northern High Plains. Hudson-Meng also has an anomalously low number of points per bison (Todd and Rapson 1999) compared with other kill sites. Such observations are important, and they emerged in part as a result of a more critical awareness of the process of assigning meaning to pattern that accompanied the advent of taphonomic investigations in archaeology but that are also a function of a larger sample of sites with which to make comparisons. Additional aspects of the reinterpretation are derived directly from taphonomic research on bonebed formation processes.

Taphonomic analysis of the materials from the 1990s excavations demonstrated that many nonhuman factors contributed to the site's formational history. As the site was first interpreted before the development of taphonomy, observing stone and bone in spatial proximity was a sufficient starting condition to assume that any subsequent patterning was caused by humans. For instance, skeletal element representation in processing locations is generally considered to reflect the concerns of transport and often consists of high-return elements and the lower-ranked parts attached to them (Binford 1978; Lupo 2001; Marean and Cleghorn 2003; Monahan 1998). At Hudson-Meng, the most underrepresented skeletal parts were third phalanges, complete crania, and caudal vertebrae—the lack of which was interpreted as resulting from human selection in the process of transporting the carcasses from the kill to the processing locality (Agenbroad 1978). This interpretation implied that after successfully killing several hundred bison, the Paleoindians who formed Hudson-Meng removed only the crania, toes, and tails to facilitate transport of the carcasses. This is especially anomalous for a kill site because the amount of effort required to separate a third from a second phalanx and to remove part, but not all, of the skull (tooth rows and occipital portions are common in the bonebed) would be considerable, and the remaining carcass would still be quite large and heavy. Furthermore, such a butchery strategy would be highly atypical given what has been observed among contemporary foragers and within other archaeological contexts.

It was later shown that the underrepresentation of these element classes could be parsimoniously accounted for by processes such as in situ weathering and deterioration (Todd and Rapson 1999). Crania have higher weathering profile heights than most skeletal elements (i.e., it takes much more sediment to bury a bison cranium than most other bones in the body) and are also composed of cavities and thin plates of bone. Thus an additional and fairly plausible explanation for the missing crania is that they were exposed for longer periods of time and were more susceptible to breakage from freeze-thaw cycles and the trampling that undoubtedly occurred because of the site's nearness to a major spring.

An additional taphonomic observation aided by developments in recording strategy was the high incidence of tibia-patella-femur articulations and of fully articulated carcasses in general. Taphonomic research has shown that if an animal is skinned or defleshed, it is extremely unlikely for the patella to remain in contact with the patellar groove of the femur (Hill 1979; Todd 1983). The fact that these articulations are common at Hudson-Meng suggests that many of the bison died and were buried without being butchered (Buenger 2001).

Taphonomically informed interpretations often require the use of high-resolution field documentation to account for the numerous distinct sources of information contained in an archaeological deposit. Many aspects of the reinterpretation of Hudson-Meng were made possible by the use of a total station and computer-processing ability that allowed efficient and accurate gathering of point provenience on all excavated material, deemed necessary by the growing awareness of the complexity of formational processes. For instance, these technological developments allowed identification of the decomposed crania as clusters of bone splinters surrounding the many preserved tooth rows (Todd and Rapson 1999). The fine-scale documentation of vertical spatial relationships also influenced the archaeological interpretation of the site's stratigraphy. Artifacts were definitely observed in close association with the bones in the bonebed. Some of these artifacts appear to be on the same ground surface as the bones, and a few bones bear evidence of human butchery. However, the cultural material recovered during excavations in the years 1991–2000 is an average of 12 cm above the bonebed level, and all of the bones that show signs of cultural modification recovered during this same period are in the upper elevations of the bonebed and are generally better preserved than the bones within the main bonebed (unfortunately, comparable data are not available from those portions of the site excavated in the 1970s). The dearth of evidence for human butchery, the lack of a cliff, and the absence of other lines of supporting evidence indicate that the bonebed cannot be unambiguously interpreted as the result of human actions. There is currently no analytical support for anything other than a natural mortality that occurred close to a spring where a group of Paleoindians camped some years later (Todd and Rapson 1999). The Paleoindians dispatched and butchered bison and other animals that contribute a small number of elements to the total observed at the site, but these elements are also stratigraphically above the bonebed level. Importantly, the taphonomic reinterpretation sees the site as two closely spaced events, whereas the original interpretation argued for a single episode. Human action is highly ambiguous in the level containing the bonebed but is clearly present in a level closely above it.

Any difficulty in applying the valuable lessons of taphonomy evident in the history of research at Hudson-Meng to the study of landscapes lies only in the larger spatial extents sampled. The changes in archaeology that have occurred since the 1970s led to changes in the process of assigning meaning to pattern. Since the time of Hudson-Meng's first excavations, methods of contextual analysis and the consideration of equifinality and formational processes have become more robust (e.g., Yellen 1996). Indeed, the interpretations of many sites are likely to undergo significant alterations in light of new concepts and technologies, through no necessary fault of the original investigators. The assumption that artifacts and association are the only requirements to infer human causality has become less common in all areas of archaeological investigation but is still often the primary interpretive guideline in archaeological survey. In the study of landscapes, the spatial extent and the added complexity of surface records being modified, buried, and re-exposed at variable rates and spatial scales add further challenges to adopting a taphonomic perspective and the detailed analysis it entails. This may be why the assumptions regarding artifacts, context, and human action have been less carefully examined in landscape archaeology than in other major subdivisions of archaeological fieldwork.

## From the Bonebed to the Landscape

The perspectives and lessons of Hudson-Meng were incorporated into a survey project of the surrounding grassland (Burger 2002). The first goals of the survey were to evaluate methodological accuracy and the effects of spatial scale on archaeological pattern recognition. As the survey developed, taphonomic processes relevant to the study of landscapes were specifically investigated (discussed later). Like much of the High Plains environment, northwestern Nebraska is an active, evolving landscape. The grasslands surrounding the bonebed were extensively modified by mid-Holocene erosion that culminated at around 5,500 B.P. (based on radiocarbon dates: e.g., LaGarry and LaGarry 2001; LaGarry, LaGarry, and Swinehart 2001; Richardson, LaGarry, and LaGarry 2001). Any archaeological materials contained within the eroding sediments would have been redeposited on Oligocene-age sediments of the region's badlands. In some cases, these deflated archaeological materials were subsequently reburied by later Holocene sediments. Thus archaeological materials that have undergone major rearrangement from erosional processes are now encased in a stratified sod table. Consequently, the assumption that buried artifacts are "better" or in primary context is problematic, as the artifacts on the surface in some locations may be closer to their original depositional setting than the artifacts buried below them.

On the ONG, archaeological visibility tends to be greatest in areas of deflation, slow deposition, and low vegetation cover. These areas often occur as eroding late Holocene sod tables, deflated Oligocene surfaces, or the windward side of stable ridges. Difficulties of deposition are compounded by biological agents such as the gophers that constantly cycle sediment both vertically and horizontally and by large herbivores whose hooves scatter and modify surface and near-surface materials. Thus any study of landscape patterning, just like bonebed patterning, must acknowledge a suite of contributing processes. A taphonomic perspective that focuses on the agents of change over time and on multiple accumulators of archaeological materials facilitates this integration.

Archaeological survey, as the method for studying landscape-level patterns, should be equipped to understand complex formational histories and not just to discover artifacts or sites (Barton et al. 1999, 2002; Burger et al. 2004; Foley 1981; Given et al. 1999; Thomas 1975). This involves conceptual and methodological challenges because virtually all patterns of archaeological interest occur at scales that are inconvenient for direct investigation. One of archaeology's great strengths is the ability to study change at scales larger than humans can directly perceive in their own life spans (Shennan 2002). Yet even at these large temporal scales, perceived landscape archaeological patterns may be more the product of sampling design or other taphonomic processes than the direct result of human land use.

## SURVEY AS SAMPLING

Methodological sampling decisions must be evaluated in a taphonomic study of landscapes. To understand the nature of archaeological samples, it is important to document where surveyors looked and how intensively. Archaeological survey is a multistage process (Given et al. 1999; Schiffer, Sullivan, and Klinger 1978), and one of these stages should ideally be aimed at high-resolution glimpses of the record. These observations at a finer scale can be used to augment the norm of coarser-grained samples that favor area at the expense of accuracy (extensive versus intensive survey coverage). In this sense, one requirement of archaeological survey is the discovery of material, while another is experimental investigations aimed at understanding the properties of the record (see Burger et al. 2004 for further discussion of property- vs. discovery-based investigation). Property-based methods include evaluating the influence of taphonomic agents on archaeological distributions and the effects of methodology on the accuracy of surface samples (Burger et al. 2004). While we favor detailed recording strategies in many settings (i.e., point proveniencing of surface artifacts and attribute-based artifact description), we are not arguing against the use of coarse-grained transect methods as the focal component of surveys. Many of the important patterns of archaeological interest could not be identified without an understanding of large spatial-scale, coarse-grained patterns (Willey 1953). Property-based methods are emphasized here because they are also important, are relatively underdeveloped in archaeology, and are fundamental to the building of a landscape taphonomy.

The most commonly manipulated element of archaeological survey is transect spacing, or the distance between pedestrian surveyors. However, there seems to be little consensus regarding the optimal transect spacing or, for that matter, the rate of movement of a survey team over the landscape (Banning, Hawkins, and Stewart 2004; Burger, Todd, and Burnett 2004). Artifacts pass between surveyors, but we lack the tools for assessing how many (Banning 2002; Burger et al. 2004). What is the significance of overlooked materials, and how does their elimination from the regional sample impact interpretations? To assess the extent to which past human behaviors (as opposed to contemporary "behaviors" of the archaeologists who select the survey design) contributed to the properties of artifact distributions, we require an understanding of how basic elements of survey design, such as transect spacing, influence attributes of the sample. Survey without a finer-grained examination of what the coverage design misses is akin to excavation without using a screen—no matter how much is recovered, you still have no idea what types of information have passed unnoticed.

During the archaeological survey on the Oglala National Grassland, we attempted to build on the tradition of "siteless" survey as pioneered by David Hurst Thomas (1975) and Robert Foley (1981) (see also Dunnell and Dancey 1983; Ebert 1992). Siteless or distributional survey tactics are much less assumption-bound regarding the nature of landscape distributions and are well suited for property-based investigation. Siteless survey naturally complements a taphonomic perspective on landscape archaeology:

> The material record will almost certainly be acted upon by a series of partially overlapping depositional and postdepositional processes of widely varying scales. These processes will combine the products of behavior episodes; blur or sharpen (and in fact probably create) their apparent boundaries; and differentially affect the placement of artifacts, depending on their sizes and shapes. These effects are all-important, for they determine where we see sites and what these sites look like. They also may be responsible for the fact that we think we see "sites" at all in many places. (Ebert and Kohler 1988:126)

Just as technological developments facilitated formational analysis of bonebeds, siteless survey tactics have become much more feasible to implement as a result of developments in GPS (Global Positioning System) technology.

Because artifacts, as opposed to sites, are the units of measure in siteless or distributional surveys, an accurate and efficient means of documenting provenience is needed. The system we used for the ONG survey (Locus® by Thales Navigation©) provides subcentimeter UTM coordinates (post-processed) on every documented artifact. Such resolution is valuable for addressing fine-grained patterns, investigating survey accuracy, and studying the formational histories of artifact accumulations. Additionally, the use of the UTM grid for regional documentation has the advantage of applying a single grid system to locate artifacts, thereby removing the numerous difficulties of cluster-specific grid coordinates (i.e., site-based provenience). However, the perspectives of landscape taphonomy can still be implemented with less precise and less expensive technology.

## SCALE

### Archaeological Scales

The study of landscapes generally requires inferences of large-scale processes based on small-scale observations. Scaling up, in this sense, requires explicit attention because a change in scale leads to changes in the properties of the pattern as well as in the processes responsible (Gardner 1998; Schneider 1998, 2001; Schneider et al. 1997; Wiens 1989, 2001). Additionally, both recognition and interpretation of archaeological patterns require the formulation of concepts and models well “outside the familiar spatiotemporal range” in which everyday experiences are “mechanically grounded” (Church 1996:150).

Scale is an important consideration for any interpretation of the archaeological record. Many fundamental properties of the patterns recorded in the field can be largely determined by the scale used for documentation and measurement (Burger and Todd 2006). Consequently, scale is initially an issue of sampling design because assemblage properties can change with the size of a sampling frame (Banning 2002; Hodder and Orton 1976; Wiens 1989). A distribution may seem homogeneous at one scale and more variable at another. Sites themselves are scale-dependent phenomena in that clustering of material can occur at any reasonable scale above that of the individual artifact, and the scale at which clustering is considered significant determines the nature of the relationship between clusters (Ebert 1992). The problem of assuming that we can attribute meaning to clusters of cultural material based on initial impression while field recording is compounded by a tradition of addressing patterns from a single scale of observation. Understanding properties of archaeological distributions requires multiple scales of observation and analysis.

### Using a Sampling Frame Designed for Plants

Plant ecologists have rigorously investigated the relationships between a sampling design and the properties of the sample. Because the spatial heterogeneity and small unit size of plants are analogous to artifact distributions, it follows that a method that is exceptionally good for sampling plant communities can be conceptualized as appropriate for property-based archaeological surveys (Foley 1981:174). For these reasons, the Modified-Whittaker multiscale sampling plot was used to investigate the properties of the ONG archaeological landscape (Figure 8.3). It has proved ideal for developing property-based archaeological investigation (Burger 2002). The nested subdivisions in the plot's framework are designed to gather observations at the spatial scales of 1, 10, 100, and 1,000 $m^2$ (Figure 8.3; Stohlgren, Falkner, and Schell 1995). This progression from smaller to larger subplot sizes facilitates evaluating the influence of spatial scale on pattern and accuracy (and other properties). Additionally, the spatial arrangement of the 1 $m^2$ subplots reduces the amount of spatial autocorrelation between samples (Stohlgren, Bull, and Otsuki 1998; Stohlgren et al. 1997). In plant ecology, the Modified-Whittaker plot has drastically improved vegetation surveys by finding more rare or exotic species than traditional survey methods uncover (Stohlgren, Bull, and Otsuki 1998; Stohlgren et al. 1997; Stohlgren, Falkner, and Schell 1995). The multiscale layout is valuable for analyzing community structure and for understanding the influence of spatial scale on the properties of the sample.

## SUMMARY OF THE OGLALA NATIONAL GRASSLAND SURVEY PROJECT

### Survey Strategies

During the summers of 1999–2002, fourteen Modified-Whittaker plots were placed in various locations on the grassland surrounding Hudson-Meng. A few were completed each summer as exercises for an archaeological field school through Colorado State University. These were the experimental units for investigating issues of sampling design and taphonomy. The major methodological points have been presented elsewhere (Burger et al. 2004), but a few need to be summarized here. We covered these plots with a "nested-intensity" survey design. That is, each plot was covered with a series of observational intensities to evaluate the effects of method on the accuracy of our documents (e.g., transect spacing, walking vs. crawling, screening of the taphonomically active zone to assess the "actual" artifact counts). These experiments demonstrated

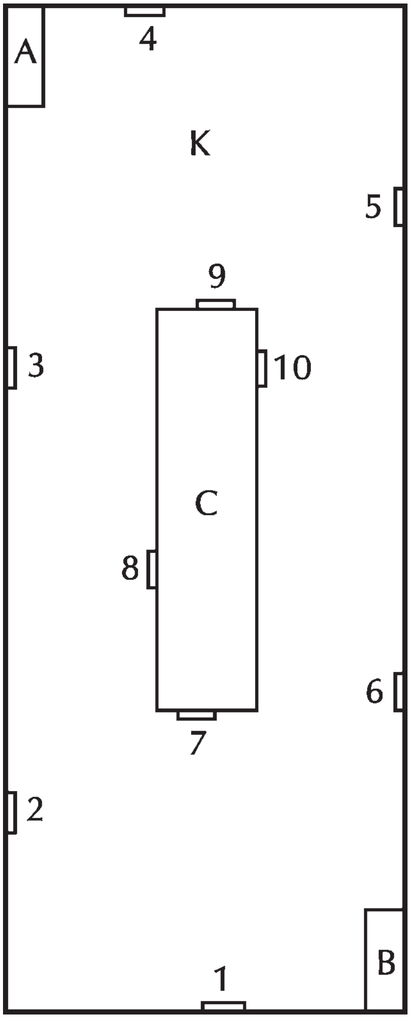


**FIGURE 8.3.**
*The Modified-Whittaker multiscale vegetation sampling plot. The numbered subplots (1–10) are 2 × 0.5 m, subplots A and B located in opposite corners are 2 × 5 m, the central C subplot is 5 × 20 m, and the outer K plot is 20 × 50 m. This allows the properties of samples to be evaluated at the spatial scales of 1, 10, 100, and 1,000 sq m. Subplots 1–10 are arranged to reduce the amount of spatial autocorrelation in the sample.*

that conventional transect surveys overlook major amounts of material and further support LuAnn Wandsnider and Eileen Camilli's (1992) observations that even very narrow transect widths systematically underrepresent low-density portions of the surface record. Our experiments involved comparing the results of a systematic walking survey with a spacing of 70 cm between crew members with those of a crawl survey that covered the same areas with a different crew. For the crawl survey, crew members covered the demarcated subplots (1–10, A, B, and C; Figure 8.3) on hands and knees with shoulders touching (i.e., 0 cm transect spacing). After each survey, additional artifact discoveries could be made while recording the systematically discovered items.

Because of our intensive recording strategy, similar to that used in the Hudson-Meng bonebed (in some instances recording over twenty attributes per item), the ground surface around the systematically discovered items was intensely resurveyed. The crawling surveys seemed to find all items on the surface in the first pass, whereas the walking survey missed considerable amounts of material (Burger et al. 2004). In fourteen trials, the crawl survey found between 170 and 1,000 percent more material, with a mean increase of about 350 percent. This comparison is for the combined artifact counts from the systematic and nonsystematic discoveries (i.e., those found during the documentation phase rather than during the survey phase). If only the systematic coverage is included, the percentage increase in recovery rate is much larger for the crawling survey. This provides a starting point for analyzing the effects of transect width on the recorded artifact population.

Additionally, we wanted to address the question: What do we "miss" during a survey? This requires a high-resolution sample (Cowgill 1990; Dunnell and Dancey 1983). We are not arguing that all surveys should be conducted at a crawl but rather that one phase of a sampling design that assesses the rate of "failure to discover" needs to be incorporated into archaeological survey. With such variance in small-scale artifact recovery and the magnitude of materials that pass between surveyors, parameters as basic as mean or median surface artifact density are wholly unknown with conventional methods. It may be that survey intensity influences patterning as much as spatial scale and taphonomy do (Burger et al. 2004; Burger and Todd 2006). Property-based methods are essential to landscape taphonomy surveys because they aid in identifying the many complex factors that influence properties of samples that become the basis of anthropological interpretation, but survey in any context can benefit from a property-based approach.

## Two Experiments with Taphonomic Agents: Ants and Cattle

Thus far, we have shown how scale is a methodological and conceptual problem that is better dealt with by adopting the appropriate tools. We need to blend this with actual applications that help identify the multiplicity of sources contributing to landscape-level patterning from a taphonomic perspective. Specifically, we are interested in cumulative effects that compound with time to influence the landscape of the ONG and the effects of different agents that accumulate and modify cultural materials. Because nonhuman agents are generally underestimated in interpretations of landscape patterns but are essential to realize the model of landscape taphonomy outlined earlier (Figure 8.2), we focus on two important behaviors that leave distinctive signatures: harvester ant foraging and cattle grazing (or other large herbivores in the past). These two modest studies are small parts of a much bigger puzzle, and neither on its own answers the interpretive and managerial challenges archaeologists face; but the role of such processes is important for any study of artifact patterning on landscapes or within excavations.

*Ants.* Harvester ants (*Pogonomyrmex occidentalis*) are excellent teachers for lessons of scale. For instance, when one looks at the distribution of mounds at a neighborhood scale (neighborhood from the ant's perspective), the spatial distribution is nonrandom in that the mounds repel one another through competitive exclusion (Taber 1998). However, if one increases the scale, ant mounds across a larger area will seem to cluster together because they have similar niche preferences. The key point here is that as one's perspective shifts scale, it is not just the pattern that changes but also the processes responsible (Allen 1998).

A study of ants is also particularly relevant to the landscape taphonomy approach because of their tendency to collect and accumulate cultural debris during their foraging rounds (Burris 2004). Consequently, many archaeologists have been taught to look at ant mounds for small flakes or beads, often with the idea that the artifacts represent windows into subsurface materials. Part of the ONG survey project involved evaluating this conventional archaeological wisdom from a landscape taphonomic perspective by investigating how ants forage for such materials. From how far away do ants bring artifacts, what do they bring, how quickly do they accumulate, and are they collecting from the surface or are the mounds only backdirt from the subterranean burrows?

An initial test with colored beads placed in concentric circles around an ant mound demonstrated that ants will go far beyond the vegetation-cleared patch surrounding the mound (this area is known as the disc, Figure 8.4). This preliminary test placed beads to a total distance of 80 cm from the center of the mound, and all the beads were gathered within just three days. A second experiment was then devised to investigate how ant foraging impacts chipped stone movement. In this second experiment, beads were placed in concentric circles around an ant mound at 50 cm for every interval out to 5 m. The beads from each ring were a different color, which identified each bead's minimum transport distance upon arrival on the mound. Ant foragers were returning home with colored beads before we had finished placing them on the ground.

**FIGURE 8.4.**
*Example of a harvester ant (*Pogonomyrmex occidentalis*) mound.*

At the end of a week, the majority of beads from all the circles out to 5 m were on the mound, and all the beads had been collected within a month. This is an area of 80 $m^2$ that the ants had thoroughly cleaned of appropriate building materials brought to the mound's surface. One of our beads showed up at a neighboring mound and had a total transport distance of about 18 m. These preliminary studies have been expanded upon and are reported by Lucy Burris (2004), who found that the collection radius tended to be about 12 m but could be as far as 20 m. In another part of this study, we investigated the chipped stone contained within ant mounds and found an average flake length of about 6 mm, but a few flakes in ant-gathered assemblage were over 1 cm. A particularly dense mound contained over 100 pieces of chipped stone. Thus ant foraging is a small-scale process with significant long-term effects on archaeological distributions (Burris 2004; Schoville and Todd 2001). Over archaeologically relevant timescales, the operation of multiple generations of mound colonies has the potential to significantly redistribute many of the smaller pieces of debitage across a landscape. This potential for size sorting can eliminate smaller flakes from some artifact scatters and accumulate them in very dense clusters at others.

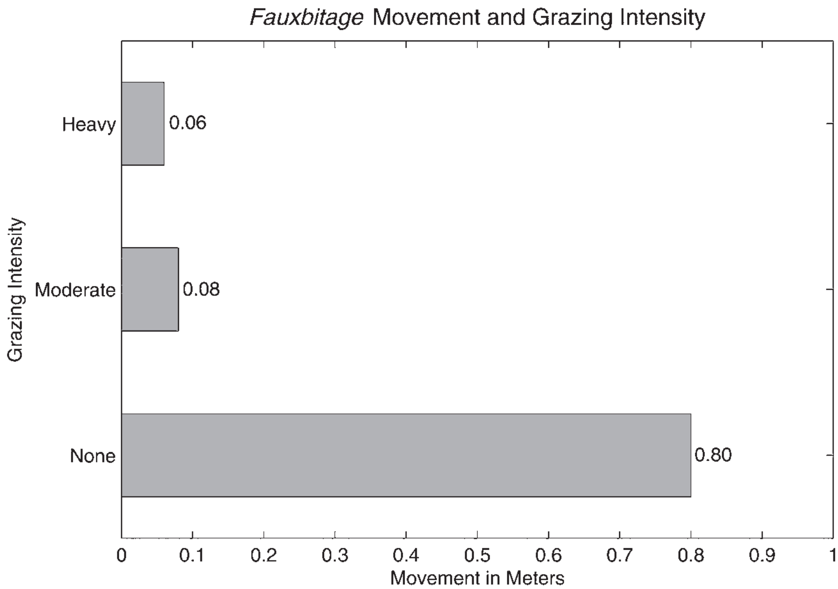


**FIGURE 8.5.**
*Influence of grazing intensity on artifact displacement during the study period.*

*Cattle.* A second study investigated the influence of large-bodied herbivore grazing on the properties of artifact distributions. As with the ant study, conventional archaeological wisdom (and common sense) tells us that cattle (*Bos taurus*) can influence artifact distributions. Cows kick things around, can influence erosional patterns, and have a variety of effects on surface visibility. With regard to artifact displacement, we began our study with the aim of answering questions such as: How much, and how far? Three Modified-Whittaker plots were placed in locations designed to answer these questions. One of the plots was ungrazed (within a fenced enclosure), the second was moderately grazed (in a pasture away from water tanks and fences), and the third was placed in an intensively grazed setting (adjacent to a water tank). The plots were surveyed early in the summer and then resurveyed after a single season of grazing.

In the intensively grazed plot, the average movement of our artificially introduced and individually numbered aluminum *fauxbitage* (fake debitage) was over 60 cm, and one in particular moved over 2.5 m (Figure 8.5). Moreover, thirteen of twenty-four of the *fauxbitage* could not be relocated. This is likely a result of the effects of scattering from trampling and from the high rate of cow

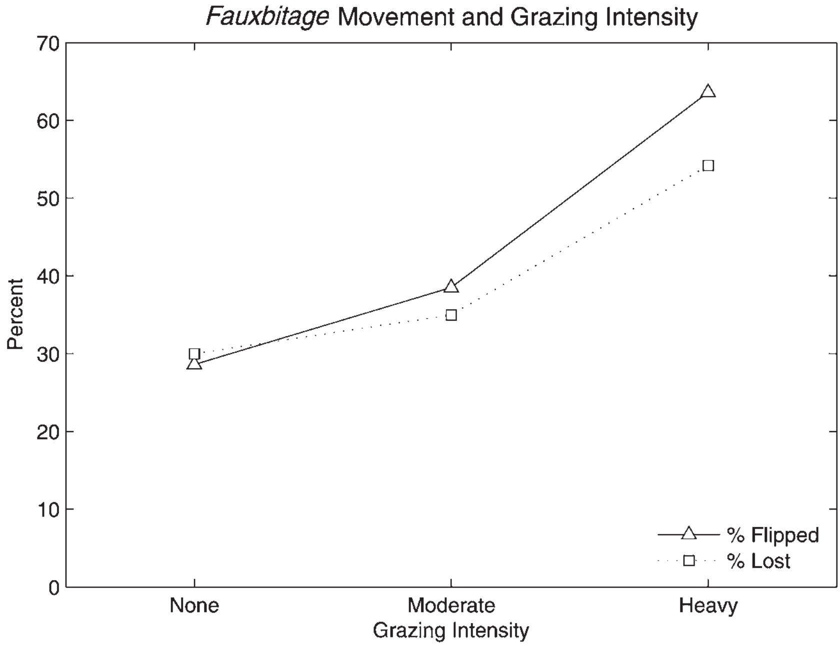


**FIGURE 8.6.**
*Grazing intensity also influenced artifact recovery. As intensity increased, the number of* fauxbitage *that were not relocated increased. We did not use a metal detector and assume that the* fauxbitage *are covered by sediment, excrement, or both. More of the subset of artifacts recovered were flipped side-up as grazing intensity increased.*

pie deposition in the plot (cow pies were mapped in each plot and served both as a measure of how much surface area was obscured and as a proxy measure of grazing intensity). In the moderately grazed and ungrazed plots, a few of the *fauxbitage* were not found during the second year's survey, but the number lost increased with grazing intensity (Figure 8.6). However, *fauxbitage* movement and loss in the moderately grazed plot were only slightly greater than in the ungrazed plot (6 of 20 lost in the ungrazed plot and 7 of 20 in the moderately grazed plot).

Part of the experimental investigation of multiple landscape-modifying agents is an evaluation of the experiment itself, as there is always a strong possibility that unaccounted-for intrusive effects have influenced the results (Hurlbert 1984). Figure 8.7 suggests that the plots were actually grazed at the intensities suggested in the design of the experiment. Cow pie density plots are

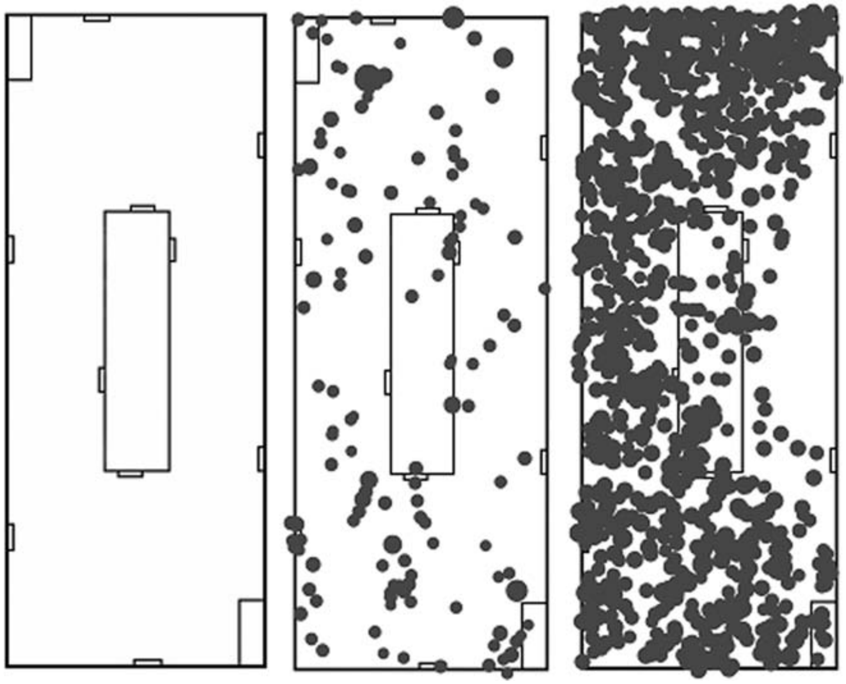

**FIGURE 8.7.**
*Cow pie density plots. The ungrazed plot (left), moderately grazed (middle), and heavily grazed (right). The density of cow pies on each plot suggests that the experimental effects met the needs of the design. The empty area in the right of the heavily grazed plot is the location of the water tank.*

an accurate measure of where cattle spend time. While they serve to evaluate the control of the experiment, they also could have a more practical application for future grazing-intensity studies. Perhaps a threshold level of grazing impact could be determined, and grazing intensities above that value should not be allowed on the surface of cultural properties. A relatively quick means of assessing grazer impact is provided by the readily identifiable telltale signs of their presence (Figure 8.7).

Because the *fauxbitage* were numbered on one surface, we could also record the minimum number that had been flipped over during the grazing episode (of course, it is possible that some were flipped and subsequently flipped back to the numbered surface upward position). Again, the moderately grazed plot exhibited slightly greater flipping than the ungrazed plot, and the heavily grazed plot was the most severely altered (Figure 8.6). Future studies could assess the possibility that sites located away from cattle trails or sources of water or food are not significantly impacted by grazing. On the other hand, this brief study demonstrates that sites located in heavily grazed settings will be heavily impacted. As in other property-based evaluations of landscape properties, these results need to be scaled up to assess the long-term influence of grazing. Would the moderately grazed setting become as altered as the heavily grazed setting over a number of years? Hoofed grazers have been a part of the Plains landscape for longer than there have been chipped stone artifacts; hence, evaluating their impacts is of fundamental importance, especially with regard to potentially compounding effects over time.

## SUMMARY AND CONCLUSIONS

We have outlined five basic steps for building a landscape taphonomy. The first of these is the need to embrace distributional archaeology and the realization that sites represent archaeological decisions rather than observations of the surface record (Dunnell and Dancey 1983). The early practitioners of these approaches made valuable strides toward investigating what the record is really like, a necessary first step for an inclusive landscape perspective. The second step is a critical evaluation of the process of attributing meaning to pattern, which is accomplished by adopting a taphonomic perspective that places biological, physical, and cultural processes on equal ground in terms of their ability to influence material patterning on the landscape. The third step is the investigation and experimental exploration of the formational properties of landscape samples. The properties of the sample confine the range and types of pattern that will be identified, and methodological decisions can create situations where these patterns are products of observational inaccuracies. The fourth step is to evaluate the influence of scale on the nature of pattern with property-based investigations and to adopt techniques for bridging across scales. The fifth step is to investigate the specific ways various agents influence archaeological patterns. These steps are by no means exhaustive, but they touch on the highlights of our approaches to these issues.

Documented patterning in archaeological materials can have many possible causes. Among these are scale, taphonomic agents, sample size, and survey intensity. All of these are part of understanding the archaeological record, its nuanced structure, and the behavioral information it contains. Interdisciplinary research should continue to be one of archaeology's hallmark traits (van der Leeuw and Redman 2002). None of the research presented here would have been possible without some degree of interdisciplinary collaboration. The concept of taphonomy itself comes from another field. Many models, perspectives, and methodologies will be discarded in the process of evaluating methodological accuracy and aspects of equifinality. As anthropological archaeologists, we often have humans in mind when we record field information and when we interpret the acquired data, but we should attribute cultural meaning to elements of pattern only after appropriate consideration of the complexity of the record (e.g., Yellen 1996). "It is rarely, if ever, the case that the appropriate notion of pattern is extracted from the phenomenon itself using minimally biased procedures. Briefly stated, in the realm of pattern formation 'patterns' are guessed and then verified" (Crutchfield 1994:3).

While the models, ethnographic data, and preconceived visions of the past exist at one set of spatial and temporal scales, the archaeological data relevant to past human action generally represent very large scales (Figure 8.8). Yet the use of the appropriate set of conceptual and methodological techniques can aid in bridging the gap between behavioral models confined to the range of scales relevant to everyday human perception and the large-scale behavioral patterning in the archaeological record. While the spatial and temporal variability represented by all of taphonomy is far greater than the actions of individual human behaviors, the variability of both can be investigated and understood. We need to see taphonomy as a domain of investigation that enhances our ability to decipher complex landscapes composed of interacting cultural, biological, and physical processes rather than as a laundry list of things obscuring a portrait cultural landscape.

## ACKNOWLEDGMENTS

We are extremely grateful to the many Colorado State University field school students who have made this research possible. We received valuable commentary on drafts of this manuscript from Laura Scheiber, Bonnie Clark, David Rapson, Judson Finley, Greg Zaro, and Charles Egeland. The final version was improved by comments from two anonymous reviewers. We thank Tom Stohlgren for his advice and contributions throughout the project.

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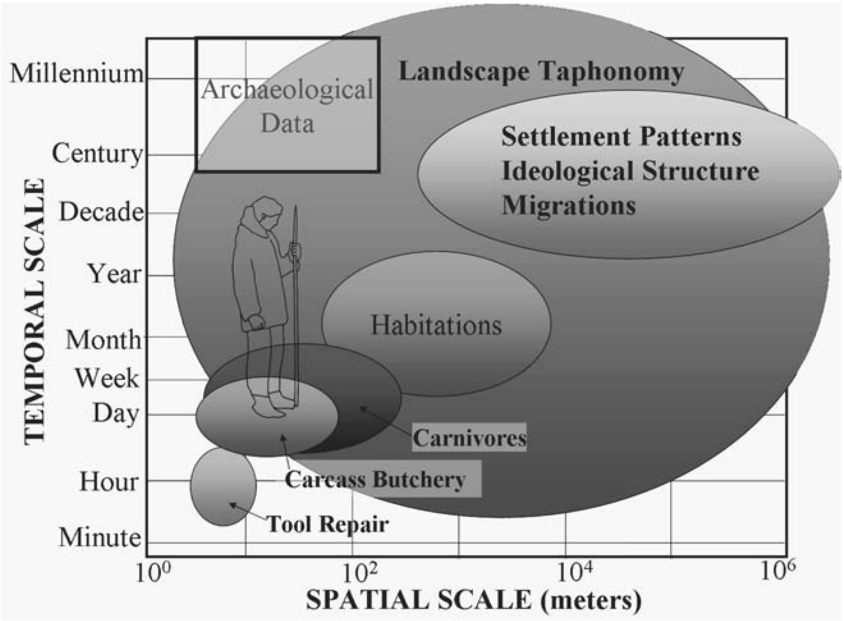


**FIGURE 8.8.**
*Human behavior and archaeological data in space and time. (Note: the axes are logarithmic, so incremental increases on each axis represent an order of magnitude increase in scale.) Many of archaeology's behavioral models are designed for small-scale explanation and recognition of behavioral variation that would be confined to the lower left portion of the figure, but the archaeological record consists of patterns represented at very large scales. Day-to-day human behavioral events obscure the variation in other processes. The human figure is scaled to represent the approximate extent of the space and time a human might generally influence during a lifetime.*

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NINE

# Prehistoric Settlement Patterns on the High Plains of Western Nebraska and the Use of Geographic Information Systems for Landscape Analyses

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THE AIM OF THIS CHAPTER is to explore variability in prehistoric settlement patterns in the southern panhandle region of western Nebraska (Figures 9.1, 9.2). This area, which borders Wyoming and Colorado, is often referred to as the tri-state region. The unique landscape contributes to a broad diversity of environmental resources, which enabled one of the highest concentrations of archaeological sites on the High Plains. Environmental resources and prehistoric settlement patterns across this region are assessed using Geographic Information Systems (GIS) and predictive modeling techniques. New archaeological site and settlement data also yield important information for interpreting site location patterning across a unique environmental and cultural landscape.

In this chapter I first describe the physiographic region and summarize past archaeological investigations and findings in and near the southern panhandle.

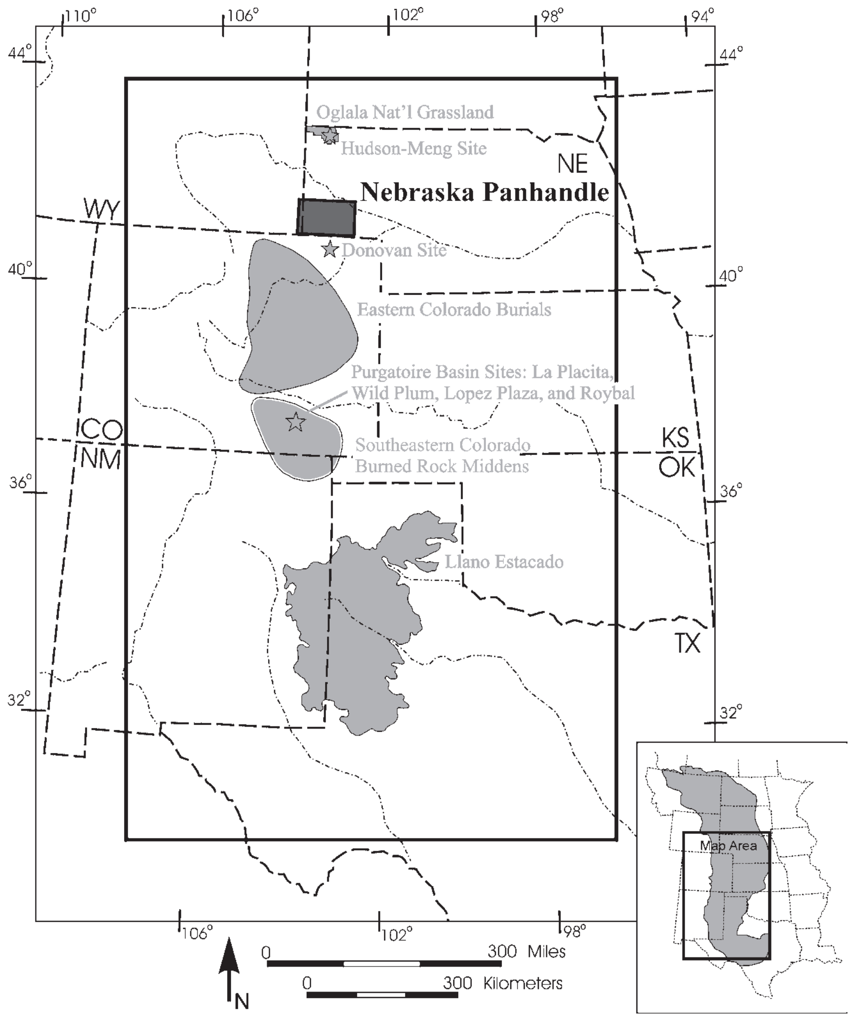


**FIGURE 9.1.**
*Map of the High Plains, highlighting the study area in this chapter. Illustration by Kevin Gilmore.*

Next, I present methods for constructing environmental predictor variables, or the GIS layers used to analyze settlement patterns, along with new and established GIS predictive modeling techniques. Last, I examine settlement patterns of Paleoindian, Archaic, Late Prehistoric, and Late Plains Indian cultures across three physiographic zones in the western Nebraska study area (Figure 9.3),

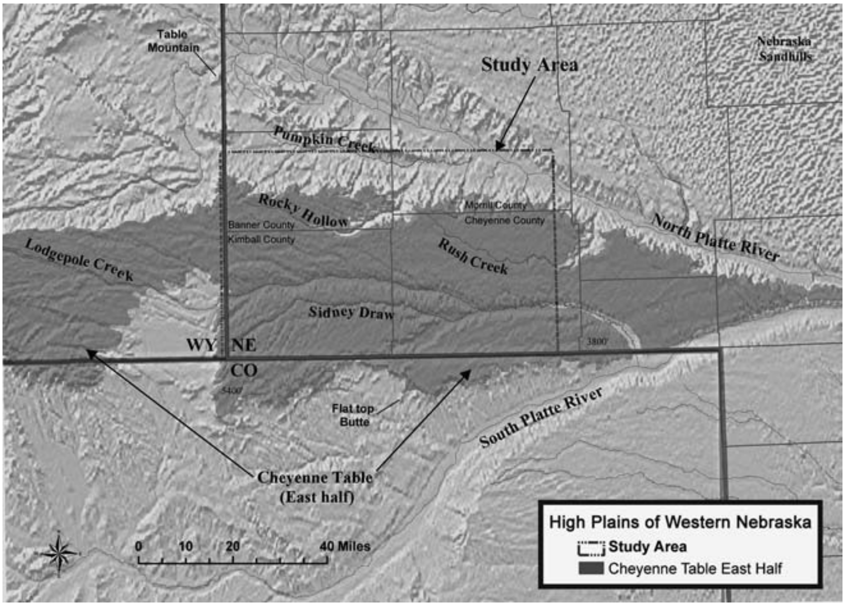


**FIGURE 9.2.**
*High Plains of western Nebraska general study area and Cheyenne Table.*

emphasizing the use of upland butte zones (one of three physiographic regions of interest).

## HIGH PLAINS OF WESTERN NEBRASKA

The study area is located in western Nebraska, approximately 113 km (70 miles) east of the Rocky Mountains in the central United States (Figure 9.1). It is centered on Lodgepole Creek, an east-west–extending drainage system situated between two major hydrographic systems (the North Platte and South Platte River systems) (Figure 9.2). The main geologic landform in western Nebraska, northern Colorado, and eastern Wyoming is the Cheyenne Table (McMillan, Angevine, and Heller 2002).

The Cheyenne Table is mainly a Tertiary landform predominantly composed of limestone and sandstone, overlain by Quaternary sands, gravels, and other sediments. It is highest at its westernmost extent near the base of the eastern slopes of the Laramie Range. Its lowest elevation is near the confluence of the South Platte and North Platte rivers. The eastern portion of the Cheyenne

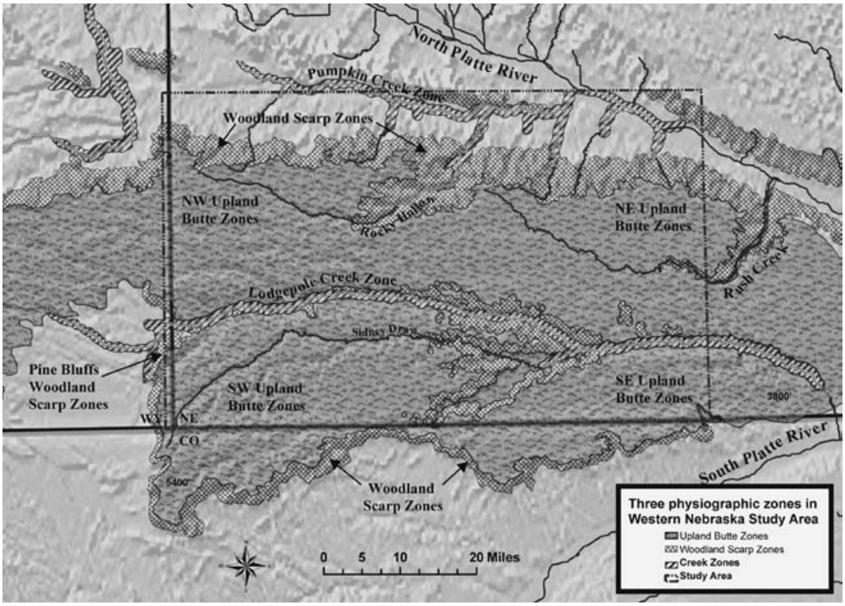


**FIGURE 9.3.**
*Three physiographic zones in the study area.*

Table is primarily bounded by steep slopes, exposed limestone cliffs, and in some areas woodland-covered scarps. The eastern portion of the Cheyenne Table represents about 70 percent of the approximately 2 million acres in the study area.

The study area is characterized by a high frequency of previously undocumented archaeological sites distributed across a landscape that contains unique topographic, geologic, hydrologic, and ecological features. Distinct features of this landscape include prominent buttes, limestone scarps, Quaternary gravel beds, and hundreds of playas distributed across the Tablelands. This landscape is also important because of its position along a major North American waterfowl migration route (Skagen and Knopf 1993), facilitated in part by one of the highest concentrations of playas in the United States—second only to the southern Great Plains (L. Smith 2003).

## Physiographic Zones

The Cheyenne Table contains three important and environmentally distinct physiographic zones: (1) an upland butte zone, (2) a woodland scarp

**FIGURE 9.4.**
*Playas in upland zone utilized in August after late July thunderstorms.*

**FIGURE 9.5.**
*View of woodland zone in the Rocky Hollow.*

**FIGURE 9.6.**
*View of creek zone, with Point of Rocks woodland zone in background.*

zone, and (3) a creek zone. Figures 9.4, 9.5, and 9.6 illustrate these physiographic provinces. Each zone has considerable differences in geology, hydrology, and ecological features, which in turn affected the settlement, subsistence, mobility, and technological organization of prehistoric people.

The first major physiographic zone includes the upland buttes. The upland butte zone is dominated by isolated limestone buttes, hills, ridges, and sinks that collect water, creating seasonal lakes or playas. These remnant Miocene geologic features were created in part by deposition and erosion during the Pliocene and Pleistocene periods. The buttes, hills, and ridges distributed across the Cheyenne Table (Figure 9.7) provide excellent promontories for observing animals traveling along drainage corridors and for viewing faunal resources attracted to playas (Figure 9.4).

During certain climatic periods, these elevated geologic landscape features may have functioned as loci for secondary base camps (Bender and Wright 1988:632) or short-term field camps (Binford 1980:10) for logistical forays into the surrounding regions. Sites on prominent ridges along major drainages and buttes at margins of playa basins may have been seasonally reoccupied, allow-

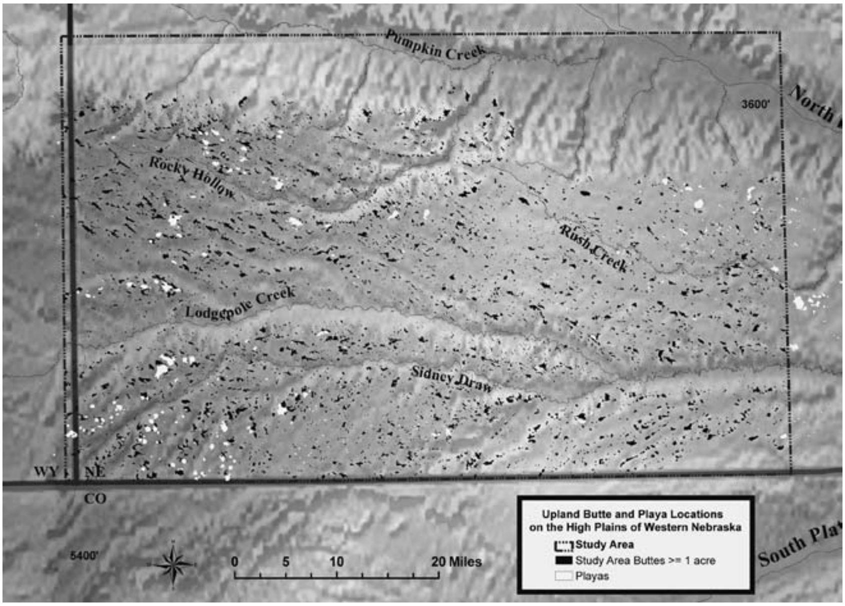


**FIGURE 9.7.**
*Map showing combined butte and playa locations throughout the study area.*

ing inhabitants to forage along productive hydrological corridors or within hydrologic basins during certain times of the year. This landscape use pattern is expected because many of the prominent features across the Cheyenne Table, such as high buttes near playas, are associated with resources that are seasonally predictable. Craig S. Smith (2003) has discussed similar prehistoric settlement patterns and seasonal landscape use patterns in Wyoming.

The seasonal lakes or playas located within the numerous sinks distributed across the upland butte zone are extremely important hydrologic features on the Cheyenne Table (Figures 9.4, 9.7). According to Loren M. Smith (2003:16), "[P]layas are a keystone ecosystem, central to the ecological integrity of the entire Great Plains." Waterfowl, ungulates, and a number of other fauna have utilized the playas on the Great Plains for thousands of years. The western Nebraska playas are seasonal lakes predominantly filled during midsummer and times of heavy snowmelt, and they provide water and habitats for many semi-predictable resources. James Judge (1973) recognized the importance of playas to the Paleoindian hunter-gatherers of the central Rio Grande Valley in the southern High Plains. In his analysis, wetland features shown on aerial photographs and topographic maps were key variables for predicting associated prehistoric site locations (Judge 1973).

Nebraska has four geographic areas with playa concentrations, and the playas in the Nebraska panhandle are known as the Southwest Playas (LaGrange 1997). The number of wetland basins or playas in the Southwest Playa complex is unknown (L. Smith 2003:15). In my analysis I identified more than 1,000 playas, ranging from about 30 to 1,000 m in diameter, in the study area. Rivers and colleagues' (2001) study of seasonal avian use of farmed playa and floodplain wetlands in Kansas demonstrated that large playa wetlands containing water have a higher mean species richness than floodplain wetlands (i.e., wetlands along the creek zone) do. Although playa wetlands contain an increased number of species, predictability of these food resources for many of the panhandle playas is variable and highly dependent on snowfall and summer rains.

In general, floral resources in the upland butte zone are less diverse and plentiful than in the woodland scarp and creek zones, although resources are more plentiful around upland playas. The abundance of short-grass plant species made up this difference, providing ample supplies of nutritious grass and other plants for ungulates and other species inhabiting the High Plains upland butte zone.

The second major physiographic zone in the study area is the woodland scarp zone (Figures 9.3, 9.6), an ecotone between the upland and creek zones. Slopes within the woodland scarp zone range from 33 to 90 degrees and are formed by eroding limestone and sandstone formations, which generally bound, yet channel, throughout the interior of the Cheyenne Table. In certain areas, pine, juniper, and brushy species prosper, especially near springs and seeps or in areas with high subsurface water. Plants such as yucca, cactus, minor amounts of brushy plant species, and an occasional juniper tree are found in areas with limited subsurface water.

The woodland scarp zone has a wide range of available resources, and it provides immediate access to the other adjacent physiographic zones. Not only are food resources plentiful and diverse in the woodland scarp zone, but wood resources and rocks for securing lodges and multiple other uses are abundant. The woodland scarp zone also offers defensive positions, winter and summer shelters or campsites, and locations with extensive views overlooking the valleys and creeks and back toward the upland butte zone.

The third major physiographic area addressed in this study is the creek zone (Figures 9.3, 9.6). The creek zone consists of riparian areas along stream banks and terraces directly above the creek—an area approximately 1,000 m wide on each side of Lodgepole Creek, Pumpkin Creek, and other tributaries of the North Platte River (Figure 9.2). The creek zone is usually dominated by meandering stream channels, bounded by two or three terraces approximately 1 to 6 m high. A diversity of aquatic life as well as fauna and flora flourish, and the main resource (permanent water) makes this setting uniquely different from the other two environmental zones. Within the creek zone, a continual supply of water ensures predictability of fauna and other food resources throughout the entire season.

## Climate

The modern-day climate of the study area is characterized as semiarid, with varying amounts of moisture from one season to the next and from year to year. Annual precipitation averages from 42 to 47 cm (Clocker et al. 1962; Stevenson, Lloyd, and Joseph 1983). Approximately two-thirds of the precipitation usually occurs from March through the end of August. During the months of June, July, and August, large thunderstorms develop, which if heavy may create flash flooding and if localized can fill playas within several hours.

## Geology

The major geologic formations found in all three physiographic zones are the Miocene-age Ogallala and Arikaree formations (Blackstone 1996; Minick 1951). Pliocene- and Pleistocene-age gravel deposits are also located in the study area, mainly situated along the major stream and river channels (Bjorklund, Kreiger, and Jochens 1959; Diffendal 1982, 1984). Limestone and sandstone from the Ogallala and Arikaree formations, respectively, are primarily exposed along the woodland scarp zones but also tend to form upland buttes that are interspersed with and occasionally surround playas.

Soils in the tri-state area are mainly Aridisols and Mollisols, the latter among the most fertile soils in the world (McDaniel 2005). These soils contribute in part to the composition of the short-grass prairie, which is about 65 percent blue grama grass and buffalo grass (Hazlett 1998; Laurenroth and Milchunas 1992; Sims and Risser 2000; Weaver 1965). The short-grass species are not only of high forage value, but they also withstand the heavy grazing pressures of herbivores such as bison (Larsen 1940; Milchunas et al. 1989).

Silica deposits are occasionally associated with the scarps and limestone buttes. Two main chert sources used prehistorically are located near the northern and southern edges of the Cheyenne Table. The primary and most common chert source is the well-known Flattop quarry located 20 km (12 miles)

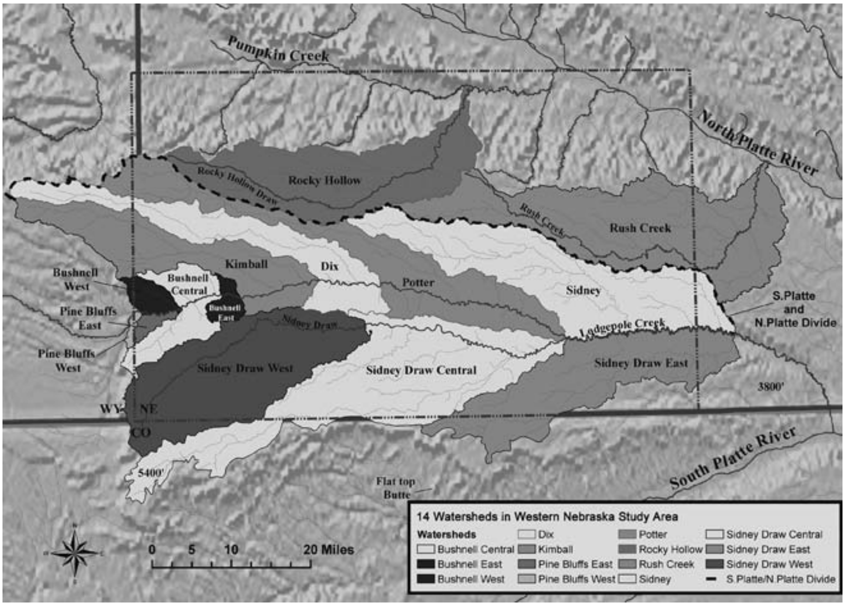


**FIGURE 9.8.**
*Map of fourteen watersheds in the study area.*

south of the study area in northern Colorado (Figure 9.2) (Greiser 1985; Miller 1991). Often confused with Flattop chert but in fact geologically distinctive is the Table Mountain quarry, located less than 30 km (18 miles) northwest of the study area (Hoard et al. 1993). Secondary sources of toolstone (i.e., small pieces of chert, quartz, quartzite, orthoquartzite, and rhyolite) are contained in Pliocene and Pleistocene gravels. Limestone nodules with chert inclusions are also found in the upland butte areas, especially south of Sidney Draw.

## Hydrology

Approximately fourteen major watersheds are located in the study area (Figure 9.8), and all but two flow into Lodgepole Creek, which ultimately flows into the South Platte River. The other two watersheds, Rocky Hollow and Rush Creek, drain into the North Platte River. The Rocky Hollow watershed is a significant landscape feature, since its southern edge creates the boundary or the divide between the South Platte and North Platte watersheds.

The key branches of Lodgepole Creek are the Sidney, Potter, Dix, and Kimball watersheds. These are all located in the northern portions of the study

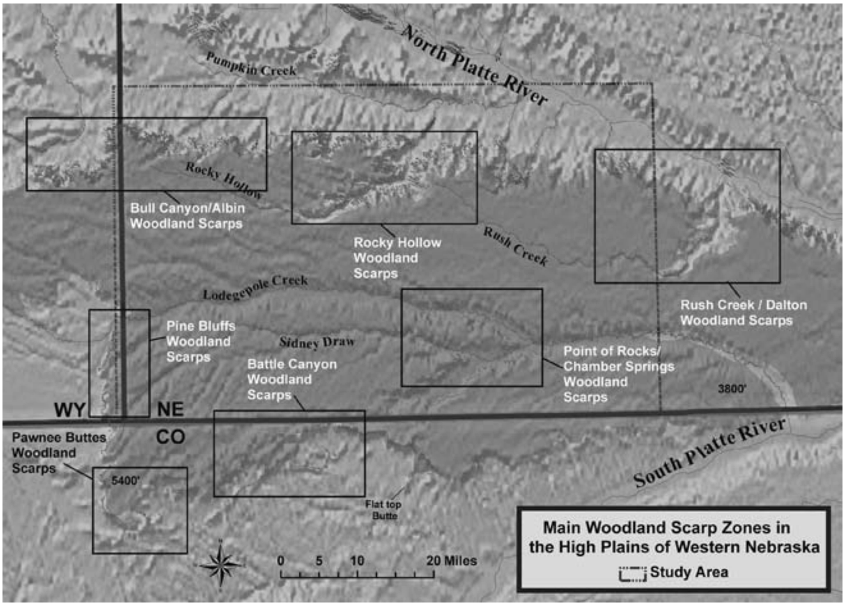


**FIGURE 9.9.**
*Map showing localized areas in woodland scarp zones with abundant juniper and pine.*

region and drain vast areas interspersed with playas. These branches form natural travel corridors that connect the central portions of the study area to northern localities and destinations farther into Wyoming and northwestern Nebraska. Key watersheds on the south side of Lodgepole Creek are the Sidney Draws (east, central, and west), Bushnell, and Pine Bluffs. The southern drainage systems are similar to watersheds north of Lodgepole Creek, acting as corridors linking adjacent regions (the South Platte Valley and areas in northeastern Colorado) to central portions of the Cheyenne Table.

Permanent water sources in the region include Rush Creek, Pumpkin Creek, and Lodgepole Creek (Figure 9.2). Lodgepole Creek drains into the South Platte River, and Rush and Pumpkin creeks flow north to the North Platte River. Of these permanent water sources, Lodgepole Creek is the paramount drainage because it is the main artery for secondary branches connecting nearly the entire Cheyenne Table landscape, and it greatly influenced prehistoric settlement and mobility patterns.

Numerous springs in the Albin/Bull Canyon and Rocky Hollow woodland scarp zones (Figure 9.9) provided prehistoric inhabitants with sources of water in the northern portion of the Cheyenne Table. Springs along the southern edge of the Cheyenne Table also supplied semi-permanent sources of water. Only three known springs in the upland butte zone do not flow directly into a creek. These springs are located in the north-central and southwestern portions of the western Nebraska study area.

Seasonal water sources located in the upland butte zones consist of playas filled mostly by significant rains during summer months. Some of the playas in the southwestern and eastern upland areas used to contain water year-round, according to local residents of Kimball, Nebraska. One informant described a playa that was home to seasonally abundant waterfowl. Prior to farming, cattails and other aquatic flora were plentiful.

## PREVIOUS ARCHAEOLOGICAL RESEARCH IN THE STUDY AREA AND SURROUNDING REGIONS

One of the earliest inventories of archaeological sites near the study area was conducted in 1931 when William Duncan Strong (1933, 1935) investigated the site of Signal Butte. Erwin Barbour and C. Bertrand Schultz (1932) located a Paleoindian bison kill in an arroyo a short distance away while visiting the Signal Butte excavations. In the same year, Robert Cape with the University of Nebraska excavated several Upper Republican–phase rock shelters in a woodland scarp zone in northern Cheyenne and southern Morrill counties (Bell and Cape 1936; see also Scheiber, this volume). In 1933, Etienne B. Renaud of the University of Denver recorded numerous sites during archaeological surveys and excavations along the Pumpkin Creek drainage (Renaud 1934). Merrill Mattes and A. Lynn Coffin (1941) recorded the Bisterfeldt Potato Cellar site, a Woodland-period ossuary located along the North Platte River drainage, during the early 1940s (see Gilmore, this volume). In 1955, E. Mott Davis tested a site on a butte in the Wild Cat Hills 16 km (10 miles) north of the study area within a woodland scarp zone (Holen and Watson 2000:12).

From 1955 to 1972, there was a lull in western Nebraska archaeology. Research resumed in 1973 when the Nebraska State Historical Society funded several archaeological inventories along Lodgepole Creek (Carlson 1973; Carlson and Jensen 1973). These surveys were conducted in anticipation of the construction of the west-bound lane of Interstate 80 and include distinctive areas such as the Point of Rocks, shown in Figure 9.6. During these surveys, approximately eighty historic and prehistoric sites were located. The 1980s saw an increase in the number of archaeological inventories, especially near Sidney, Nebraska (in Cheyenne County), and in southern Kimball County. These inventories identified only two new sites. Both are upland butte zone sites of unknown age or context (Hunt 1982). Since the late 1980s, Charles Reher with the University of Wyoming's High Plains Archaeology Project (HPA) has conducted ongoing archaeological investigations along a woodland scarp near Pine Bluffs, Wyoming, on the western edge of the study area. These investigations have led to the documentation of over 2,500 stone circles, hundreds of prehistoric campsites, and numerous bonebeds within the HPA project area (Reher 1973, 1986, 1987, 1988, 1989, 1990, 1996, 2005; see also Scheiber, this volume). The cornerstone of the project is the Pine Bluffs site, a stratified archaeological site with evidence of over 10,000 years of past human occupation of this localized area. This project represents the most sustained archaeological research in the vicinity and provides numerous comparable chronological examples.

Sixty-eight prehistoric sites, nine historic sites, three prehistoric and historic sites, and fifty-five sites of unknown age were listed in the Nebraska State Historic Preservation Office (NSHPO) records prior to 1990 for the entire study area. During the 1990s and until 2003, over sixty archaeological surveys were conducted and approximately 4,800 acres were inventoried (Koch 1999; Ludwickson 1995; Ludwickson and Bozell 1990; Neidhardt 1997; Tratebas 2003; and numerous others). As a result, approximately seventeen historic, thirty-four prehistoric, and two prehistoric and historic sites from the study area were added to the NSHPO archaeological database.

According to NSHPO's 2004 records, a total of 5,010 acres of the 1,996,886 acres in the entire study area have been systematically surveyed (0.25%), with a total of fifty prehistoric and historic sites recorded directly within the inventory areas (Table 9.1). Some reconnaissance survey took place during systematic surveys, which increased the number of sites found during a project undertaking. Table 9.1 shows additional sites found and or previously located within 100 m of a survey boundary. The numbers of sites recorded outside this 100-m buffer during reconnaissance are not reported here.

The majority of the systematic survey and reconnaissance has occurred in the upland butte and woodland scarp zones, the latter containing the highest site densities per acre surveyed. Site densities average one site per 66 acres of systematically surveyed land in the woodland scarp. Site densities in the creek and upland areas are lower, according to NSHPO records. The creek zone is slightly more likely to produce sites (one site per every 80 acres) than the upland butte (one site in 200 acres). Only nine prehistoric sites in the upland buttes in the NSHPO database are chronologically dated. Based on personal judgmental surveys of the upland buttes, I think the lower site densities in the

Table 9.1. Site Densities per Physiographic Zone within the Study Area.

| *Physiographic Zone* | *Total Acres Systematically Surveyed* | *Sites A* | *Sites B* | *Sites C* | *Sites D* | *Sites E* | *Site Density* |
|---|---|---|---|---|---|---|---|
| Upland butte | 2,195 | 36 | 9 | 11 | 14 | 15 | 200 |
| Woodland scarp | 2,099 | 100 | 31 | 32 | 35 | 36 | 66 |
| Creek | 716 | 52 | 10 | 9 | 9 | 10 | 80 |
| Total | 5,010 | 188 | 50 | 52 | 58 | 61 | 96 |

Sites A = Number of Recorded Sites
Sites B = Number of Sites Recorded during a Systematic Survey
Sites C = Number of Sites within a Systematic Survey Area (no matter when recorded)
Sites D = Number of Sites Recorded during a Systematic Survey within a 100-m buffer
Sites E = Number of Sites within a Systematic Survey Area within a 100-m buffer (no matter when recorded)
Site Density = Total Acres Systematically Surveyed Divided by Sites C
*Source:* Compiled from the NSHPO GIS archaeology database.

upland zones represent a sampling issue and result in part from the nature of typical transect spacing (see Burger, Todd, and Burnett, this volume).

In 1970 I began my own surveys of the study area, first as a seven-year-old boy residing in Kimball County, Nebraska. I have personally surveyed approximately 4,000 acres between 1970 and the present. These surveys have consisted of small sample blocks (5 acres) in areas of potential site locations. Over the past twenty years, I documented approximately 312 prehistoric archaeological sites ranging in age from Clovis to Late Plains Indian. Approximately half of these (n=155) are of unknown temporal age.

## KEY ARCHAEOLOGICAL SITES AND PREHISTORIC SITE CHRONOLOGIES IN THE STUDY AREA

Clovis sites near the study area include the Dent site (Brunswig and Fisher 1993; Hoppe 2004) and the Drake Clovis Cache (Frison 1991:40; Stanford and Jodry 1988). The Dent site dates to about 11,200 to 10,700 years ago[1] and is located approximately 145 km (90 miles) southwest of the study area; the Drake Clovis Cache was found 45 km (30 miles) south of the study area. Documented Folsom and Midland sites associated with the study area are also limited. The Folsom-age Lindenmeier site dates to about 10,780 B.P. and is located 97 km (60 miles) southwest of the Nebraska panhandle (Wilmsen and Roberts 1978). A potential Folsom projectile point fragment was found at the Pine Bluffs site, a multi-component site located near Pine Bluffs, Wyoming, which borders the western edge of the study area along Lodgepole Creek. Renaud (1934) found post-Clovis Paleoindian evidence along the Pumpkin

Creek drainage on the northern edge of the study area. Jack Hofman and Russell Graham (1998:100, figure 4.4.q) affirmed a Midland point from Banner County, Nebraska, north of Rocky Hollow in the middle of the study area.

Evidence for Hell Gap cultural materials, dating to approximately 10,000 to 9500 B.P., was documented at the Hell Gap site 130 km (80 miles) northwest of the study area (Irwin-Williams et al. 1973). A Hell Gap point was also found at the Pine Bluffs site in the 1980s. A Cody complex site (9400 to 8500 B.P.) known as the Scottsbluff Bison Quarry was documented near the northern edge of the study area (Barbour and Schultz 1932). Parallel flaked points from the James Allen complex have been recorded at the Clary Ranch site 97 km (60 miles) northeast of the study area, with dates ranging from about 9040 to 7900 B.P. (Hill 2005; Hill et al. 2001).

Only a few Early Plains Archaic sites have been formally documented in the study area. Steve Holen and Dan Watson (2000:14) identified Early Archaic sites in the Pumpkin Creek drainage near the mouth of the Rocky Hollow watershed. Renaud (1934) also noted Early Archaic points in collections from the Pumpkin Creek drainage. Early Archaic components at the Pine Bluffs site date from about 6300 to 4780 B.P., although several sites in Wyoming have associated dates that extend back to about 7600 B.P. (Frison 1991:29).

Middle Plains Archaic occupations within and near the study area are more plentiful than those from previous cultural periods. Numerous Middle Archaic artifacts documented at Signal Butte (Strong 1933, 1935), rock shelters excavated by Earl Bell and Robert Cape (1936), sites recorded around the Pine Bluffs area, and sites described by Holen and Watson (2000) demonstrate an influx of Middle Archaic material culture and possible people into the area about 5,000 years ago. A 4,220- to 4,500-year-old Middle Archaic burial was also uncovered within the study area, near Sidney, Nebraska (Lovvorn et al. 1999).

High frequencies of Late Plains Archaic sites (2500 to 2000 B.P.) have also been documented in and near the study area. For example, the Smoke Rock site is located on a high hill centered on a ridge in northern Kimball County (Peterson 1990). Two other examples of Late Archaic sites on prominent buttes include the Signal Butte site and the Barn Butte site (Renaud 1934), located approximately 32 km (20 miles) north and east of the study area, respectively. Late Archaic sites were documented by Holen and Watson (2000) near the mouth of the Rocky Hollow drainage and also by Gayle Carlson and Richard Jensen (1973) along the Lodgepole Creek Valley. The Kaplan-Hoover site is a Late Archaic bison kill located approximately 113 km (70 miles) south of the tri-state region (Todd et al. 2001). The Mill Creek site is another Late Archaic bison kill located near the western edge of the upland butte zone in eastern Wyoming (Peterson 1994a; Scheiber, Reher, and Peterson 1991).

Woodland cultures (also associated with the Early Ceramic period) are represented in the North Platte River Valley, 48 km (30 miles) north of Kimball County, as evidenced by two large Woodland ossuaries (Gilmore, this volume; Mattes 1965; Oothoudt 1976). Woodland occupations along the Lodgepole and Pumpkin Creek corridors and other areas near the study region have been reported (Carlson 1973; Carlson and Jensen 1973; Holen and Watson 2000; Kivett 1952; Meyer 1992; Reher 1973). Dates from Woodland sites in the Pine Bluffs area of southeastern Wyoming range from approximately 2000 to 1600 B.P.

Late Plains Woodland sites dating from about 1500 to 1000 B.P. are prevalent in the region and have been extensively documented (Butler 1988; Connor 1993; Gill and Lewis 1977; Irwin and Irwin 1957; Meyer 1992; Steege 1967; Wood 1967). Ash Hollow Cave is a hallmark site containing Late Woodland components and is located about 64 km (40 miles) east-northeast of Sidney, Nebraska (Champe 1946). Late Woodland cultural deposits are also found at Signal Butte, Barn Butte, the Pine Bluffs site, and near the northeastern edge of the analysis area in the Dalton rock shelters (Bell and Cape 1936).

By approximately 1000 B.P., Late Plains Woodland cultures were replaced in the study region by semi-sedentary groups associated with the Central Plains tradition (Wedel 1986) (also known as the Middle Ceramic period). High Plains Upper Republican–phase and possibly Itskari-phase sites of the Central Plains tradition are present but not moderately abundant in the region. The best documented is the Donovan site, an Upper Republican animal-processing camp situated in a secluded canyon approximately 64 km (40 miles) southeast of Dix, Nebraska (Scheiber, this volume; Scheiber and Reher 2007). The tops of steep-sided isolated buttes in and near the study area were also often used by Late Prehistoric groups. These landforms constituted defensive fortresses and were potentially used for other reasons (cf. Peterson 1994b). Several examples of these landforms include Seven Mile Point south of Pine Bluffs, Wyoming (Reher 1973); Gurney Peak north of Albin, Wyoming (Reher 1973); and Signal Butte and Barn Butte along the northern edges of the Cheyenne Table.

Evidence for the Dismal River aspect (or Late Ceramic period/possible Protohistoric Apache) in the region, dating at least to A.D 1675–1725 and possibly earlier (Scheiber 2006), is meager; nevertheless, isolated artifacts and sites have been recorded. One isolated point found during the Holen and

Watson (2000:100) survey was postulated as an unnotched Dismal River point. Reher (1973) documented Dismal River ceramics at several sites in the Pine Bluffs, Wyoming, area. Dismal River artifacts have also been reported from Ash Hollow Cave (Champe 1946) and from the Donovan area (Scheiber, this volume; Scheiber and Reher 2007).

The final indigenous occupants of the High Plains within the study area were historically recognized Plains Indians (ca. A.D. 1700 to the late 1800s), known as the Pawnee, Kiowa, Arapaho, Cheyenne, and Lakota (Gunnerson 1987). Samuel Bassett (1922), Grant Shumway (1921), and Mari Sandoz (1964) have discussed some of the last vestiges of Plains Indian traditional lifestyles in western Nebraska. The Red Cloud Agency, one of the first Lakota agencies and the site of the famous Oglala chief Crazy Horse's murder, is located 162 km (100 miles) north of the study area outside of Fort Robinson, Nebraska.

## METHODOLOGY

An examination of prehistoric settlement patterns across the three physiographic zones required several steps (see Peterson 2004 for a more thorough description of the methodology employed in this study). First, cultural data (i.e., archaeological site information) were accumulated through years of personal surveys, acquisition of data from the NSHPO, discussions with friends and colleagues working in the area, and recording site locations through interviews with local residents. From this information, a GIS cultural data layer was produced that defined boundaries for the digital evaluation model (DEM) used for this study.

A 10-m DEM was used in this analysis to produce an accurate hydrology layer and locate landscape features such as stream confluences, playas, butte tops, and small hills greater than 10 m above or below the surrounding landscape. The 10-m DEM also facilitated the accuracy of the slope and aspect maps when predicting preferences of slope and aspect for prehistoric campsites. The boundaries of the DEM were extended beyond the existing site location data to reduce edge effects and improve statistical results in unsampled areas. A large geographic area ensured inclusion of all available cultural data so that global versus local patterning could be considered.

The next stage in building the GIS and an eventual predictive model was to construct eight significant environmental data layers for delineating the upland butte zone from the other two physiographic zones. The upland butte zone was ultimately selected for further consideration because it contained the most comprehensive data set and the largest number of documented archaeological sites. The eight environmental data layers also allowed for exploration and statistical testing of the potential associations between archaeological site placement and environmental variables. The eight layers or predictive variables used in this study include: (1) aspect, (2) slope, (3) buffered confluences for major streams, (4) buffered playas, (5) buttes and isolated hills, (6) size of buttes relative to surrounding topography, (7) buffered main watershed boundaries, and (8) buffered subsidiary watershed boundaries across the region.

### Slope and Aspect Layers

The slope and aspect layers of the upland zone were used to test prehistoric preferences for site placement on certain degrees of slope and directional or aspect preferences. Kenneth Kvamme (1990:375) used slope as a predictor variable to model prehistoric settlement patterns and found that the mean slope of thirty habitation sites in an east-central Arizona study region was 2.33 degrees, suggesting that level ground was preferred for most site placements. James Ebert (2004:77) discovered that site locations in Manitoba tended toward surfaces that are nearly flat (0–5 degrees). He also determined that southeast-facing aspects were preferred by prehistoric hunter-gatherers in the Boreal Forests of Canada.

### Stream Confluence Layer

A stream confluence layer was developed using open-source GIS GRASS5 and an algorithm that calculated stream confluences from a raster map of stream order data (see Conolly and Lake 2006:261; Peterson 2004). The algorithm calculated confluence locations positioned only at major streams and intermittent drainages, since cultural sites frequently occur at major confluences of rivers or intermittent streams (Anderson 1996; Bushnell 1927; Peterson 1994b; Yarrow 1881). After the map containing only raster cells representing confluence positions was created, the raster cells were buffered with a 500-m ring, allowing for statistical calculation of sites within this buffer zone.

### Playa and Butte Layers

A layer for buttes (hills, ridges, or polygonal landscape features) and one for playas were constructed from the 10-m DEM in conjunction with 7.5-minute USGS maps (Figure 9.7). After the map was developed, playa features were buffered for statistical purposes with four concentric rings (250 m each) that extended 1,000 m from the playa edge. The buffer distances around the playas were based on archaeological site data previously reported (Ballenger 1999; Judge 1973; LaBelle, Holliday, and Meltzer 2003; Mandel and Hofman 2003; Peterson 2001, 2004; Peterson, Kornfeld, and Frison 1998; Winchell and Largent 1994). James Judge (1973:194) noted that 80 percent of all Folsom sites in the Central Rio Grande Valley had a mean distance of 1,180 m from hunting areas (areas around playas and other features), with a maximum distance of 3,219 m and a minimum distance of 402 m. Michael Peterson and colleagues (1998) described a Wyoming Folsom campsite (the Krmpotich site) located directly at the edge of a playa. Michael Jochim (1976:55) noted that water was central for campsite location. Frank Winchell and Floyd Largent (1994) conducted an archaeological survey in Texas and found twenty-three Late Archaic and Late Prehistoric sites near playas.

## Upland Butte Layer

A map defining buttes and isolated hills and a map of the size of these features relative to surrounding topography were also developed for modeling site locations in the upland areas. I postulated that high hills in relation to surrounding topography were more attractive to prehistoric hunter-gatherers because of the increased visibility. Since each ring represented a higher elevation, a hill with an increased number of rings would generally have a better vantage point. In this study a large number of the upland zone sites are located on buttes, high hills, and ridges. Strong (1935) and Holen and Watson (2000) recognized a similar pattern in western Nebraska, and a study by Kvamme (1983:28) determined that some sites in western Colorado tended toward locations on hilltops or near ridge crests that offered good vantages. Mark Lake and colleagues (1998) studied viewsheds associated with Mesolithic sites and concluded that in specific cases, sites were deliberately located for their vistas. Reher (1973) noted that High Plains Late Prehistoric people moved some of their campsites to high butte tops for defensive purposes.

## Watershed Boundary Layers

A buffered watershed boundary layer was used as an environmental layer for the analysis. This watershed data layer is critical for the analysis because I hypothesized that a greater number of sites would be located along watershed boundaries represented by the crests of hills, ridges, or other landforms. A majority (66%) of the Central Rio Grande Valley Folsom sites studied by Judge (1973:195) were located on the side of a ridge, and nearly half (44%) were on the top of the ridge.

The use of buffered watershed boundaries rather than buffered stream channels is very useful for analyzing or predicting sites located on hills and ridges that may vary in distance from a specific stream channel. Buffered watershed boundaries were used in this analysis because ridgetops and watershed boundaries tend not to fluctuate and are less variable over time. Globally, buffered watershed boundaries also represent ridges or hills adjacent to the overall hydrologic corridor generally associated with sites.

Buffered stream channels were employed in this analysis only for defining environmental-zone boundaries and associated site locations. Care was taken in creating the buffered stream data, since, if not developed correctly, narrow or wide areas in a hydrological corridor created by lateral stream channel fluctuation over time would not be compensated. Buffered stream channel data should be used primarily for predicting localized site patterning at a specific distance from an exact stream channel for a specific time period.

Main watershed boundaries for the fourteen watersheds, as well as subsidiary watershed boundaries, were developed from stream order data as exemplified in the Rocky Hollow watershed map (Figure 9.10). After the stream order map was built, main and subsidiary watershed layers were calculated. The main watershed boundaries were buffered by a 30-m boundary, and the subsidiary watersheds were buffered by a 60-m boundary. The 30- and 60-m buffers were designed to capture potential micro-topography adjacent to minor ridgetops or hillcrests situated along watershed boundaries.

## Defining Physiographic Zones

The three physiographic zones discussed earlier (uplands, woodlands, creeks) were defined because the reliability of a model and the ability to predict site locations are strengthened when environmental factors are defined on a local scale (Earle and Christenson 1980; Kvamme 1979). Differences in environmental factors between zones also influenced past human settlement, subsistence, and mobility patterns (Binford 1980, 1983; Kelly 1983, 1995). Daniel Amick (1996, 2002) found that foraging patterns of small prehistoric hunter-gatherers were affected by differences in resource structures in the basins and ranges of New Mexico. Patricia Woodman (2000:446) suggested that constructing independent models for each unique environmental zone is preferable, as differences between environmental zones might be apparent.

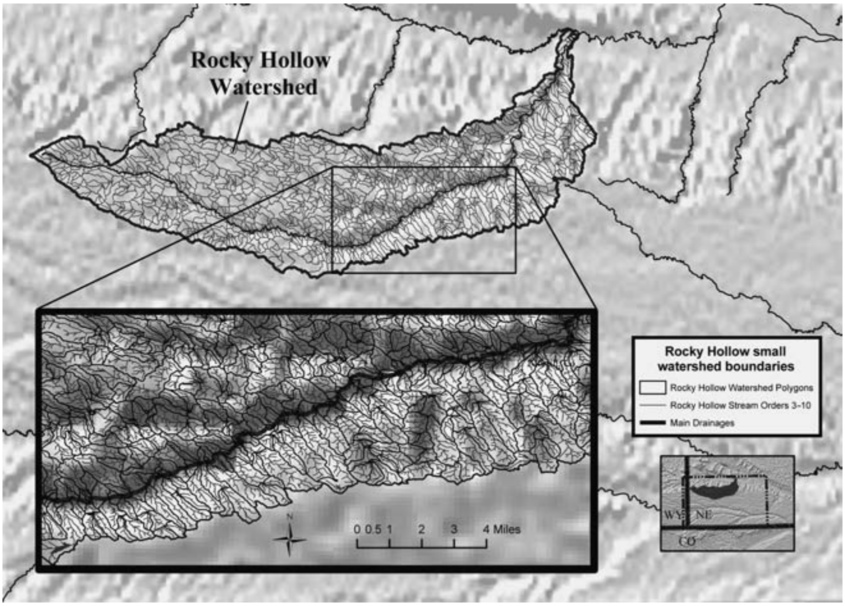


**FIGURE 9.10.**
*Map showing location of the Rocky Hollow watershed and associated small watershed boundaries and stream orders.*

Kvamme (1992:23) noted that "sites representing different functional classes may be located according to different environmental criteria."

## Cultural Data

Cultural data were acquired from several sources. The first source was my own data set, consisting of approximately 312 prehistoric site locations documented over past years as a result of ethnographic interviews and field inventories conducted since 1970. These locations were digitized into polygons. The second important source of prehistoric site location data came from the NSHPO in digital form. However, about 32 of the 107 prehistoric sites in the NSHPO database were not included in the cultural data layer for a final predictive model because of imprecise site locations (i.e., only reported to within a quarter-section). Both sources were then incorporated into one cultural layer. Cultural information was also obtained from the Wyoming State Historic Preservation Office.

## Statistical Tests and Results

A series of univariate statistical tests was conducted on the eight environmental GIS layers discussed earlier to determine which layers showed significant patterning with the presence or absence of sites in the upland butte zones. These tests allowed for a better understanding of settlement patterns across the upland landscape and provided insight as to the predictive capability of each environmental variable. Cumulative frequencies, chi-square significance, a fitted linear regression model, and Kolmogorov-Smirnov tests were used to compare known upland zone sites with the same number of non-sites or randomly computer-generated sites (see Peterson 2004). These tests also explored relationships among the eight environmental variables (slope, aspect, main watershed boundaries, subsidiary watershed boundaries, buttes, butte type, buffered playas, and buffered confluences) and sites/non-sites. The statistical results of each variable follow.

*Slope.* The results of the statistical tests on the slope variable were significant, and the null hypothesis was rejected, as the two samples used (sites and non-sites) were different. Slope averages calculated for upland sites had a mean value of 8 degrees with a standard deviation of 3.94.

*Aspect.* Statistical results for the aspect variable were also significant, and it appears that aspect can be used in conjunction with slope as a predictor variable for campsites in the upland butte zone. A majority of upland sites were located on south-southeast–facing landforms, as the mean aspect value for upland sites was 162 degrees.

*Watershed Boundaries.* Main and subsidiary watershed boundaries demonstrated moderate statistical significance. Of a total of 210 sites in the upland areas, 54 (27%) are located within 500 m of a main watershed boundary, and 19 of those are directly on or within the 30-m buffer of the main watershed boundary line. Statistical results for sites located on small watershed boundaries indicated that 167 (80%) of upland butte sites are located within a 60-m-wide boundary of a small watershed.

*Buttes.* A chi-square test for the butte variable indicated a positive correlation between sites and buttes. A linear regression model was fitted to the data, and again a positive correlation was observed. Further testing of the butte-type variable in conjunction with other variables could assist in determining whether higher hills (relative to the surrounding area) with superior views were preferred in some cases.

*Buffered Playas.* The results of the chi-square conducted on buffered playas were poor. Recalculating the statistics on a localized region within the analysis area rather than on a global one may solve this problem, since a majority of the upland sites are located in Kimball County. Sites within localized areas in the study region do show a tendency to correlate with playas. Upon further inspection of the site and playa data, I found that 84 of 210 (40%) upland sites are located within 1,000 m of a playa, and 46 (22%) are located within 500 m of a playa.

*Buffered Confluence.* Upland butte sites did not statistically correlate with buffered confluences. This indicates that a confluence may not be a good indicator of site location. However, poor statistics may have been the result of the way the confluence was selected from the stream order data or of the configuration of the stream order data near junctures of drainages.

## RESULTS OF THE GIS PREDICTIVE MODEL

### Environmental Variables

The descriptive process identified six environmental variables that have moderate to high statistical significance in relation to site location: slope, aspect, main watershed boundaries, subsidiary watershed boundaries, buttes or hilltop features, and butte types. The results for each variable are presented next.

*Slope.* Slope is a good indicator of site presence. However, since so many flat regions exist across the study area, slope by itself is limited for predicting site locations. Slope, in concert with other variables such as watershed boundaries or buttes, has the potential to enhance a model for site prediction.

*Aspect.* Aspect used as a predictor variable encounters pitfalls similar to slope in that its predictive capabilities alone are limited to large general areas. Statistics did show that a majority of the sites were located on south-facing slopes. Considering the harsh winter weather conditions in western Nebraska, site placement on south-facing aspects may be a result of past efforts to enhance early-morning solar heat and reduce the effects of wind. Again, when added to other predictor variables, aspect assists in predicting site locations and by itself could help in differentiating seasonal occupations.

*Buttes and Watersheds.* Buttes, main watershed boundaries, and subsidiary watershed boundaries have high statistical significance, although collectors' bias for targeting plowed butte tops located along watershed boundaries may have artificially increased the statistical significance. These three variables combined to predict the majority of campsite locations in upland butte zones.

*Other Variables.* Playas and confluences did not show a statistical difference between sites and non-sites. Playas and confluences do not appear to be viable predictor variables according to the data. The problem with using playas as a predictor variable in this study is that areas within 500 m of playas in the region have not been fully inspected, and global and local analysis areas should be further considered. The locations around playas that were surveyed nearly always had sites located immediately adjacent to them. Playas and confluences may still assist in predicting site locations if each variable is further developed, if intensive surveys are conducted around the playas, and if the areas at confluences of drainage systems are delineated differently or a combination of variables including viewsheds is used. Ranking each playa by volume of water and potential pond duration may also improve statistical results.

Collector bias (the tendency to collect mainly from plowed hilltops) may also contribute to limited usefulness of the playa variable. Accepting the null hypothesis that playas do not share a relationship with site location would be contrary to the magnetic effect such high-biodiversity areas have on numerous organisms. Playas were and still are an extremely essential part of the upland zone ecosystem, and with further survey more sites across the study area will be found. Coupling, or creating a "hybrid" variable (playa-buttes), would substantially increase the capability of predicting site location and analysis of settlement patterning. The same method could additionally be used with confluences and buttes. In summary, both the playa and confluence variables suffer from a dearth of field surveys in their radii of prediction, which points to a need for additional fieldwork within their buffered areas.

## Prehistoric Sites by Physiographic Zones

Although I ultimately chose to analyze the distribution of sites within the upland buttes for the predictive model, GIS was also critical for assessing the location of sites within physiographic provinces. Without building the physiographic layer, I was unable to subdivide sites into the three zones, which allowed me to assess temporal changes in site distribution across these physiographic areas. By combining my data and the NSHPO data, I examined

Table 9.2. Prehistoric Archaeological Sites per Physiographic Zone in Western Nebraska.

| | *M. R. Peterson Sites* | *NSHPO* | *Total* |
|---|---|---|---|
| Upland butte | 190 | 20 | 210 |
| Woodland scarp | 76 | 62 | 138 |
| Creek zone | 46 | 25 | 71 |
| TOTAL | 312 | 107 | 419 |

the distribution and variability of 210 prehistoric sites in the upland buttes, 138 sites in the woodland scarp, and 71 sites in the creek or riparian zone, for a total number of 419 sites (Table 9.2).

This preliminary study of prehistoric settlement patterns in western Nebraska indicates that the upland butte zones, especially the inner areas far from permanent water, were cyclically occupied for at least the past 12,000 years. Paleoindian and Late Prehistoric sites were represented with the highest frequency in upland butte zones, especially inner areas around playas and buttes (Table 9.3).

Early Archaic site data show the lowest utilization of the extreme inner areas of the upland butte zone. Only one in five of these Early Archaic sites is more than two miles from the creek zone. The outlying site is located downstream from a concentration of playas and near gravel sources that have the potential for springs. A primary reason for limited numbers of Early Archaic sites and limited utilization of the inner areas of the upland butte zone by these people may be the onset of the Altithermal climatic period (approximately 8100–7900 B.P.) (Antevs 1955; Bryson, Baerreis, and Wendland 1970; Wendland and Bryson 1974). During the Altithermal, relatively warmer and drier climatic conditions were observed on the High Plains. These desolate conditions climaxed by the mid-Holocene (6700 B.P.) (Viau et al. 2002), in part creating active dune fields directly north of the study area in the Nebraska Sand Hills during this time (Miao et al. 2007).

Following the Altithermal, temperatures began to cool, and by the beginning of the Sub-Boreal period (4030 B.P.) a trend toward increased precipitation may be indicated by a marked influx of Middle Archaic occupation of the upland butte zones (Viau et al. 2002; Wendland and Bryson 1974). An increase in Middle Archaic occupation of these zones is shown by the fact that 58 percent of all Middle Archaic sites are located in this delineated butte zone. About one-third of these sites are located near the ecotones of the three physiographic areas or near interior springs of the upland areas. Only two of the total Middle Archaic sites are located 1,000 m from, and with a good view of, a playa. Two other Middle Archaic sites are located within 1,500 m of a playa. Five Middle Archaic sites are in unexpected locations (away from permanent water sources), perhaps because of informant error regarding the site age, or

Table 9.3. Site Time Period by Physiographic Zone.

| | | *Upland Buttes* | | *Woodland Scarp* | | *Creek Zone* | |
|---|---|---|---|---|---|---|---|
| | | *M. R. Peterson Data* | *NSHPO Data* | *M. R. Peterson Data* | *NSHPO Data* | *M. R. Peterson Data* | *NSHPO Data* |
| Total General Paleoindian | | 30 | 1 | 0 | 1 | 11 | 2 |
| *Paleoindian* | Clovis | 1 | 0 | 0 | 0 | 0 | 0 |
| | Folsom/Midland | 11 | 0 | 0 | 0 | 3 | 0 |
| | Dalton/Meserve | 0 | 0 | 0 | 0 | 1 | 0 |
| | Agate Basin | 2 | 0 | 0 | 0 | 1 | 1 |
| | Cody complex | 6 | 0 | 0 | 0 | 3 | 0 |
| | Hell Gap | 5 | 0 | 0 | 0 | 1 | 0 |
| | James Allen | 2 | 0 | 0 | 0 | 1 | 0 |
| | Late Paleo lanceolate | 6 | 0 | 0 | 0 | 2 | 0 |
| Total General Archaic | | 41 | 4 | 33 | 8 | 12 | 8 |
| *Archaic* | Early Archaic | 6 | 1 | 1 | 0 | 0 | 0 |
| | Middle Archaic | 18 | 1 | 5 | 0 | 9 | 1 |
| | Late Archaic / Early Woodland | 22 | 1 | 8 | 2 | 5 | 2 |
| | Besant | 0 | 0 | 0 | 0 | 1 | 0 |
| Total General Late Prehistoric | | 39 | 3 | 34 | 21 | 13 | 10 |
| *Late* | Avonlea | 2 | 0 | 0 | 0 | 0 | 0 |
| *Prehistoric* | Late Woodland | 14 | 0 | 2 | 7 | 8 | 2 |
| | Central Plains tradition | 10 | 1 | 5 | 10 | 4 | 5 |
| | Dismal River | 1 | 0 | 1 | 6 | 0 | 2 |
| Protohistoric / Plains Indian | | 9 | 1 | 1 | 2 | 2 | 0 |
| Stone Circle sites (Late Archaic–Late Plains Indian) | | 8 | 1 | 24 | 2 | 0 | 0 |
| Unknown Prehistoric | | 99 | 12 | 35 | 36 | 21 | 6 |
| Total sites in each zone | | 190 | 20 | 76 | 62 | 46 | 25 |
| Total sites in each zone (M. R. Peterson and NSHPO data combined) | | 210 | | 138 | | 71 | |

they may actually have been near a water source in the upland area that was flowing at the time but is not present today.

The cooler and wetter Sub-Boreal period allowed Late Archaic prehistoric settlement in the upland butte interiors because of overall resource productivity, water availability, and decreased variability in the quantity and quality of flora and faunal resources. Increased utilization of interior regions of the Cheyenne Table by Late Archaic populations is demonstrated by the presence of nineteen Late Archaic sites near playas or in playa basins. Approximately 80 percent of these sites are well into the upland butte zone, or over three miles from the creek zone. Fourteen of the nineteen are within 1,000 m of a playa. The other five show no strong correlation to the environmental parameters used for this study.

Around 2000 B.P., exploitation of the inner areas of the upland butte zone increased substantially. Twenty-nine Late Prehistoric sites are located across the upland butte zone, and roughly two-thirds of these sites are within view of a playa. The remaining sites are not located in places that would have been predicted by the parameters used in this study, but two of the Late Prehistoric localities overlap with Middle Archaic sites that also fell outside the predictable range. This, coupled with the fact that Paleoindian artifacts have also been found at these two locations, leads to the suspicion that an undiscovered spring is located within the interior of the upland butte zone.

What appears to be increased and intensive use during the Late Prehistoric of ridgetops and high hills near the edges of major drainage systems, areas bordering the woodland scarps and creek zones, as well as increased settlement around playas may provide evidence for a climatic optimum in western Nebraska during the Neo-Atlantic climatic period of the late Holocene. If playas during the Late Prehistoric period were filled more often by increased precipitation, the inner areas of the butte zone would be habitable for longer periods as a result of more predictable faunal and floral resources and water supplies. This same landscape use pattern may hold true during the late Pleistocene when Folsom, Cody complex, and Hell Gap hunter-gatherers inhabited the inner areas of the Cheyenne Table and surrounding areas.

## CONCLUSIONS

Determining the locations of prehistoric sites is vital to explain settlement and land use adaptation strategies. Shifts in settlement patterns through time may provide evidence of changing climatic conditions, which may have implications for study outside of archaeology. This study relied heavily on the use of

GIS combined with accurate data layers as a tool for both accumulating and analyzing data, and as a result, a number of prehistoric settlement patterns within the western Nebraska study area on the High Plains were identified.

Of the eight potential variables tested in the GIS model, six showed promise for identifying and predicting site locations across time periods. These environmental data layers include slope, aspect, main watershed boundaries, subsidiary watershed boundaries, buttes, and butte types. Although the presence of playas in the upland buttes was clearly important to past peoples, the results of the statistical analysis correlating playas and archaeological sites were inclusive. However, fewer surveys have been conducted directly around the playas, which skews the applicability of the model on a more global scale. In more localized analyses of smaller areas at which playas have been more adequately surveyed, sites are statistically correlated with playas. In further analyses, I will work to address this issue of scale.

The model also demonstrated temporal differences in site locations. Late Prehistoric sites tend to be located in upland butte and woodland zone areas, with some site dispersal along creek zones as well. Paleoindian occupations are also represented in all three zones, with a majority of the sites near permanent or semi-permanent water sources (springs and playas) along major drainages and within the upland butte zone.

Archaic groups in western Nebraska were also attracted to the upland butte, less during the early period and increasingly into the late Holocene. Archaic people were more likely to situate campsites in ecotones between physiographic zones and near permanent springs, especially during the Early and Middle Archaic periods. Marcel Kornfeld (2003) noted a similar pattern for the Archaic in the Black Hills, a region located approximately 177 km (110 miles) directly north of the study area. David Meltzer (1999) also discussed shifts in human settlement patterning across landscapes of the southern High Plains in response to climatic changes during the mid-Holocene.

I also observed other potential patterns that should be explored further through additional research. For instance, sites along creek zones correspond with stream channel fluctuations over time. Additionally, subsequent inspection of orthophoto aerial photographs and Landsat satellite images, corroborated by discussions with local residents, has revealed the previous existence of high-moisture areas or springs that have since disappeared in the upland butte and adjacent areas. These data, in conjunction with my current research on water levels of the Ogallala aquifer in western Nebraska, may substantiate archaeological site settlement patterns and provide evidence for the use of old springs within the upland butte landscape of the Cheyenne Table.

Further analysis of soil, geologic, hydrologic, and other data within the three physiographic zones will help define zone boundaries, slope and creek buffers, and hydrologic occurrences with more accuracy. Considering spring sources, geomorphology in conjunction with site identification, and differences between sod-cover versus plow-zone areas for site identification could also improve the accuracy of site prediction and settlement pattern analyses (see Burger, Todd, and Burnett, this volume).

Finally, future research on NSHPO records may reveal additional data specifying site boundaries for recorded sites along Lodgepole Creek and other physiographic zones in the study area. The use of high-resolution satellite and aerial imagery will likely provide increased data accuracy for playa boundaries and may increase the number of identified playa locations.

## FINAL IMPLICATIONS

Analyzing settlement data and predicting site locations across a landscape are difficult if environmental variables are not fitted properly to the site type or when global and local analyses are inadequately considered (Conolly and Lake 2006:177). One large model for the determination of all site type locations may not be entirely accurate. Rather, smaller models that look at specific site types for specific time periods should be considered.

Using traditional methods for measuring distance, like the buffering of modern features that vary over time (i.e., river systems), may skew the predictive capability of final models. Using stable environmental features or features that were present during the time period under consideration should ensure that a truer representation of the original landscape is incorporated into the model, thus increasing its accuracy.

Information obtained from this GIS-based study is important because it has brought to light archaeological and environmental data that heretofore have not been extensively researched or documented. It also establishes a foundation for the understanding of settlement patterns of hunter-gatherer groups that utilized the High Plains in southwestern Nebraska and portions of northern Colorado and southeastern Wyoming.

The cultural data comprise the basis of future models for the study of prehistoric patterns in this area. The results obtained from this analysis, in conjunction with previous research, will help substantiate the existing cultural chronologies of the area and should allow the dating of unknown sites. Artifacts from the sites firmly documented in the area can now be systematically compared, and typologies and chronologies can be developed for prehistoric populations of western Nebraska specifically and the High Plains more broadly. Finally, environmental features and cultural data in this landscape study provide valuable information for understanding climatic variability and response to changing conditions by prehistoric High Plains occupants.

## NOTE

1. All dates in this chapter are presented as radiocarbon years before present (B.P.).

## ACKNOWLEDGMENTS

This chapter formed the basis for my 2004 master's thesis in GIS and spatial analysis from University College London. I thank Laura Scheiber and Bonnie Clark for their assistance and support and for this opportunity to summarize my thesis research for a broader audience. Next, I thank Mark Lake for sharing his extensive knowledge of GIS and archaeological theoretical notions and for his assistance with map algebra equations. I thank James Conolly for his GIS and archaeological opinions regarding landscape analyses. Suggestions from William Gribb and Charles Reher of the University of Wyoming were also appreciated. Charles Reher graciously provided all of the unpublished information about the Pine Bluffs area and the High Plains Archaeology Project discussed in the text. Gratitude goes to Rob Bozell and the NSHPO for providing me with archaeological site information and to Steve Soberski at the Nebraska Department of Natural Resources, who assisted with satellite imagery. I extend my gratitude to my good friends Mack and Scott Vowers of Kimball, Nebraska, for their assistance with my research. I also thank the various informants who helped identify site locations. Finally, I am grateful to Linda A. Siegele for her comments and suggestions and for the opportunities she provided.

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TEN

# Places in the Heartland: Landscape Archaeology on the Plains

*Philip Duke*

SEVENTY OR SO YEARS AGO, a Plains archaeologist could feel he or she was on the cutting edge of archaeological theory. William Duncan Strong (1935) and Waldo Wedel (1938) were developing the direct historical approach, and the latter (e.g., Wedel 1941) was trying to convince the rest of North America of the importance of the natural environment in explaining human behavior. Even in an overtly nontheoretical arena, finds of early human sites put the western Plains on the world's archaeological map. However, after World War II, things seemed to change. Plains archaeology settled into a comfortable mode of drawing its interpretive models from elsewhere and conducting detailed culture-historical studies of specific sites and regions. Perhaps, as Alice Kehoe (1995:19) and Patricia O'Brien (cited in Duke and Wilson 1995:3) have noted, the pragmatic and practical upbringing of many Plains archaeologists made it more likely that they would be attracted to the pragmatic nature of archaeological survey and investigation. That surely is part of the reason, but Mark Mitchell (2006) has also convincingly argued that the importance of the Missouri Basin Project and its emphasis on inductive culture-historical investigations in a sense sucked the air out of other attempts to advocate alternative paradigms. James Deetz's (1965) groundbreaking work on Arikara ceramics was never followed through in any systematic paradigm shift, and it was only with processual and ecologically oriented work that began in the 1970s (Duke and Wilson 1995:4) that a viable alternative to culture history was offered. Mitchell (2006:383) makes a good case that Plains archaeologists over the past thirty years have tended to consume rather than produce theory.

So where do we stand today? This volume provides a positive and energizing answer to that question. For even if the theoretical scene has shifted elsewhere, something important is going on in Plains archaeology. Theoretical innovations have a two-wave effect. The first wave comprises works by scholars more concerned with theory for its own sake. Case studies are chosen seemingly because they conveniently fit the proposition the scholar is trying to make (*vide* the numerous Historic-period and ethnographic case studies in some of Ian Hodder's earliest edited volumes on the postprocessual project). The second wave is as important because it takes the theoretical musings of the first wave and implants them into the real world of archaeological data, where one does not have the luxury of cherry picking one's examples, a world where one is forced to stick with the data and let the analysis fall where it may. This, I believe, is the great contribution of this volume, and it is a contribution not just to Plains archaeology but to archaeology in general. Of the eight chapters after the Introduction, six concern themselves primarily with prehistoric cultures and apply a number of interpretive approaches to their particular data. Two chapters—Clark's and Church's—are primarily historical in nature and integrate ethnographic, archaeological, historical, and sociological data into their particular interpretations. I wish to place the chapters within the overall tradition of landscape archaeology and then to isolate seven themes that run through this volume, themes that are of value not only to landscape studies in general but to Plains archaeology in particular.

## LANDSCAPE STUDIES

Landscape archaeology has been a flavor of the month for the last decade or so, although attempts to try to understand why humans did what they did where they did have been around almost as long as archaeology itself. A number of different approaches that fall under this general rubric are used by the authors of this volume. We can identify two major sets of approaches, each one identified by a particular set of goals and a particular set of methods for attaining those goals. The first is broadly ecological-functionalist in scope. Its lineage can be traced through O.G.S. Crawford (Trigger 1989:249) and Cyril Fox (1932) and in South America to Gordon Willey's (1953) work in the Virú Valley of Peru and then to the work of Lewis Binford (1978). The fact that this approach broadly sees the environment and the economy as prime movers and lends itself more readily to attempts at quantification and at least to the potential of predictability made it a favorite of the processual school. In this volume, chapters by Gilmore, Johnson, Burger and colleagues, and Peterson fall solidly into this category. The second category, which concerns itself more with landscape as a culturally constructed entity that embodies cognition and memory, has a less hallowed lineage in archaeology. Certainly, the work of Fox cited earlier argued for the culture of a region being partially influenced by the degree to which its geography allowed contact with other cultures. Nevertheless, a more pertinent influence can be traced to the work of various French scholars who questioned the validity of a positivist approach to knowledge. This approach has received its most recent airing in the work of such scholars as Christopher Tilley (2004). The other chapters in this volume, by Scheiber, Mitchell, Clark, and Church, sit more comfortably in this second category. This division is not just didactic in nature, for it exposes a fundamental rift in archaeology that has not yet been adequately bridged: viz, should archaeology *explain*, à la a natural science, or should it only try to *understand*, à la a social science, an issue that goes back in the debates on the philosophy of science at least to Johann Gustav Droysen (Johnsen and Olsen 1992:421), Wilhelm Dilthey, and Edmund Husserl (Erickson and Murphy 2003:136) in the late nineteenth and early twentieth centuries?

## CONCEPTUAL THEMES

### Sensitivity to the Nature of the Archaeological Record

All the contributors to this volume demonstrate a sensitivity to and awareness of the limitations of the archaeological record to a degree not seen in many theoretically oriented archaeological studies. By this I mean that the contributors do not go beyond the material constraints of the record. This sensitivity is best exemplified in the chapter by Burger, Todd, and Burnett, who, in a detailed micro-scalar analysis of surface data, show how and why we must understand what ancient landscapes looked like before we can hope to understand what they meant. A similar point is made by Peterson in his large-scale predictive modeling of settlement patterns and his insistence that predictive models rely on stable landforms rather than on those that could vary over time. Clark and Scheiber, and Burger, Todd, and Burnett recognize archaeological sites as palimpsests, so we can see sites as overlays of discrete events that sometimes blur into one another but sometimes retain their stratigraphic discreteness.

There is much to the notion, however, that despite our best efforts, a full understanding of the hunter-gatherer record will continue to elude us. Jonathan Driver (1978:125) argued that the hunter-gatherer archaeological record is a record of "average behavior" in that rather than isolating discrete events, we are more likely to identify the accretion of those events over perhaps decades of repetition. In the same light, Eric Higgs and Michael Jarman (1975:5) noted the difference between precise and archaeological contemporaneity. So for this reason, those of us who are happiest in pushing the envelopes of interpretation need to make sure we are not overstepping our bounds. The chapter by Mitchell does a good job in this. He proposes that burned rock middens in the upper Arkansas Basin of southeastern Colorado, which date to the Late Archaic period (3000–1850 B.P.), were significant not for their economic potential but for their social or cosmological potential. Communal feasting was an important element in establishing and maintaining group solidarity. Although it relies on what Binford (1989:17) disparagingly called "accommodative arguments," Mitchell's argument is convincing. Interestingly, as Mitchell himself notes, archaeologists in other parts are using the social event of feasting as an important factor in social reproduction. It may be that the hunter-gatherer record lends itself more to the types of ecologically based explanations advocated by the processual school. In this volume, Gilmore, for example, ties changes in mortuary practice during the transition from the Late Archaic to the Early Ceramic periods to increases in population, sedentism, and greater territoriality. Burials in this model serve as sacred symbols of group cohesion.

A number of the authors in this volume (e.g., Scheiber, Mitchell, Johnson, Church, Burger and colleagues, and Peterson) emphasize the importance of scale in trying to understand the different levels at which landscapes should properly be studied. The choice of what scale to examine on a landscape is influenced by a number of factors the authors isolate. One factor is simply the type of data available. Burger, Todd, and Burnett's chapter starts at the micro-scale of the impact of ants and cow hoofs on cultural landscapes recognized in lithic scatters, an appropriate scale given the amount of data on the Plains recovered from surface surveys. Macro-scale is seen in Johnson's chapter, a product of a long-term research program on the Llano Estacado of the Southern Plains. Similarly, Peterson's GIS modeling is allowed by improvements in the level of technology that fifteen years ago would not have been possible. Others are allowed a micro-scale because of the fine-grained historical evidence with which they work. However, choice of scale is also influenced by the decision of what is a priori important in the landscape for the individual analyst. Is it the individual in the past, named or unnamed (the British tradition of landscape painting), or is it the surrounding environment (Japanese tradition)? Is an individual analyst more comfortable with the sweep of a large region or the microcosm of an individual site?

## Pragmatism over Paradigmatic Purity

A truism is that processualists only feel comfortable saying something with a good chance of it being proven correct; postprocessualists probably feel comfortable saying something so long as it is not palpably incorrect. The debate over the most appropriate form of knowledge production in Plains archaeology will be with us for some time to come. Yet the willingness of nearly all the contributors to take on questions that twenty years ago would have been left squarely to postprocessualists speaks well, I think, of the increasing maturity of the discipline in general and its practitioners' unwillingness to ignore potential avenues of exploration in the interests of ideological or paradigmatic purity. So it bodes well for Plains archaeology when scholars with the academic pedigrees of Burger, Todd, and Burnett can write, "Landscape elements contain *historically contingent palimpsests of meanings*" (emphasis added). I cannot imagine that sentence in a chapter on Plains taphonomy even ten years ago.

## Exposing Artificial Boundaries and the Potential of the *Longe Durée*

Clark and Scheiber, and Mitchell argue that landscape studies provide a means of collapsing the artificial boundary between nature and culture in that there is nothing "natural" in nature. Nature itself is a cultural construction. Clark's and Church's chapters also argue for continuity between history and prehistory. Of course, we can never fully erase these boundaries because perceptually what is on either side must continue to exist, if only for the items between them to be collapsed in the first place and then to stay collapsed. However, these chapters offer exciting possibilities for wholly new ways of looking at Plains archaeology. I will form my discussion around the concept of the *longe durée*, Fernand Braudel's (1972, 1973) notion of the vast time depth of environmental strictures on human culture and the consequent notion of structures of *mentalité*. As Clark and Scheiber note, "[O]ccupied for at least 12,000 years, the High

Plains geography is inscribed by human history." Clark notes the similarity between Native American and Hispanic attitudes toward the landscape, which were rather different from the Anglos'; in Braudelian terms, they possessed a similar structure of *mentalité*. Of interest in Clark's chapter is the possibility that landscape studies can provide empirical evidence of meaning- versus content-driven traditions. The latter is the traditional form of tradition in which "morphological homogeneity defines membership" (Duke and Wilson 1995:11). The former is based on homogeneity of meaning (although that itself is a problematic suggestion given the contingency of meaning). Nevertheless, structures of *mentalité* can possibly form a basis for identifying such traditions, and landscape studies provide one potential avenue to realizing this.

## Landscape as Reflector and Mediator of Ethnicity and Class

Ethnicity has been one of the vexing problems of archaeological investigation since the 1970s (cf. Sackett 1982; Weissner 1983; Wobst 1977, for example). The problem is that certainly on the Plains, the individual items of material culture that have shown functional variation are not the type one would typically see as actively symbolizing ethnicity. We are also confounded by sociological and ethnological confusion over what ethnicity and an ethnic group might actually constitute in terms of social identity. However, the chapters by Clark and Church suggest that landscape and the culturally constituted definition and exploitation of landscapes might have some basis in ethnic variation. For example, Clark sees continuity between Native Americans and Hispanics in terms of their cultural landscapes, which are different from those of Anglos. Church emphasizes the importance of class. This undervalued concept in contemporary archaeology (cf. Duke and Saitta 1998) finds identity in particular patterns of landscape use. A cautionary tale is spun by Church, who exposes the complexity of identifying ethnicity, which is also wrapped up in class and socioeconomic circumstances. Church also identifies the landscape as a medium of social negotiation among local, national, and transnational identities. Both chapters suggest a medium of cultural expression in the past that could be recognized in data gained from the large-scale surveys that increasingly characterize North American archaeology and provide novel ways of identifying these media of social identity.

## The Importance of "Place"

The participants in this volume define place as a discrete and bounded locus of human behavior. The contributors ask why inhabitants come back to a particular locus when from an environmental point of view other places would serve just as well. Johnson retains a firmly ecological approach and defines "persistent place" as a locale occupied either during two adjacent time periods or at disparate time periods on a repeated basis. Gilmore sees the repeated use of burials as a means of anchoring a community's territoriality. Other contributors look at the cultural meaning of a place. For Scheiber, a place is full of "memories" and "meaning": "People at the Donovan site repeatedly returned to the fire hearths the first residents constructed." These and other features on the landscape are "embodied landscapes in these occupants' memories." Place involves an appropriation of the past and of past landscapes. Mitchell sees a place as a focal point for communal feasting. For Clark, place and landscape are two sides of the same coin. Place is both individual and communal—places serve as "loci for memory." However, place is, of course, a Western notion, based on particular culturally constructed notions of spatial boundedness, even territoriality. Who defines a place? Is it them or is it us?

## CONCLUSIONS

As noted at the beginning of this chapter, this volume represents an intense application of different landscape approaches to a single region: the Great Plains of North America. The contributors, in true Plains archaeology fashion, have not placed paradigmatic purity over the pragmatic needs of understanding what was going on in their particular area of interest. The composite picture this volume offers us is the Plains as both a natural and a cultural landscape. The natural landscape imposes limitations as to what its prehistoric and historic inhabitants could do, but within these limits, individuals and the societies to which they belonged created a culturally mediated landscape through which they expressed group identity and contextualized their own existence with individual, social, and cultural memories.

In closing, I suggest that this volume itself is a metaphor for landscape. This volume identifies particular entities—a feature, a site, a region—and endows them with meanings drawn from the individual contributors' own individual, social, cultural, class, ethnic, and academic memories.

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## About the Contributors

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**MINETTE C. CHURCH** is associate professor of anthropology at the University of Colorado, Colorado Springs. Her research focus has been on the historical anthropology of the nineteenth- and early-twentieth-century U.S. West and the southwest borderlands, particularly southern Colorado and northern New Mexico. She is particularly interested in archaeological expressions of gender, class, and ethnicity at several scales, from that of individual sites to anthropogenic landscapes. She pursues similar interests in western Belize, where she joins researchers from the University of Wisconsin and the University of Pennsylvania to codirect the San Pedro Maya Project, working on sites of nineteenth- and early-twentieth-century villages inhabited by Maya Caste War–era migrants from Mexico.

**BONNIE J. CLARK** is an assistant professor of anthropology at the University of Denver, where she is also the curator of archaeology for the Museum of Anthropology. In 1992 Clark moved to the High Plains of Colorado, and she has been investigating the archaeology and cultural landscapes of the region ever since. She received her Ph.D. in anthropology from the University of California, Berkeley. It was in California, while they were both graduate students, that Clark met her coeditor. She is very interested in what the material record of daily life—especially as situated in specific locales—can tell us about the way people live their ethnic, gender, and class identities. Clark is actively involved in the study and preservation of cultural resources and believes places should be mobilized to tell their complex histories.

**PHILIP DUKE** received his Ph.D. from the University of Calgary in 1982. He is a professor of anthropology at Fort Lewis College, Durango, Colorado, where he has taught since 1980. He is the author or coeditor of numerous articles, monographs, and books on Plains archaeology, including *Points in Time: Structure and Event in a Late Northern Plains Hunting Society* (University Press of Colorado, 1991) and *Beyond Subsistence: Plains Archaeology and the Postprocessual Critique* (coedited with Michael Wilson, University of Alabama Press, 1995). His most recent books are *The Tourists Gaze, the Cretans Glance: Archaeology and Tourism on a Greek Island* (Left Coast Press, 2007) and

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**MICHAEL R. PETERSON** dreamed of becoming an archaeologist at age seven while growing up on his family farm and ranch in Kimball County, Nebraska. He received a B.A. in anthropology from the University of Nebraska, an M.A. in anthropology from the University of Wyoming, and an M.S. in GIS and spatial analysis in archaeology from University College London. He has worked as an archaeologist for the United States Forest Service in Wyoming and for the Bureau of Land Management in the Great Basin. He is currently an archaeologist for Redwood National Park in California. Peterson is also a world-class flintknapper and lithic technologist. He remains enthusiastic about archaeology and GIS, devoting his spare time to documenting and analyzing High Plains hunter-gatherer settlement patterns and artifact assemblages in western Nebraska.

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