Thomas E. Emerson, Dale L. McElrath, Andrew C. Fortier, editors

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edited by

Thomas E. Emerson, Dale L. McElrath, and Andrew C. Fortier

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Preface

The 2004 Urbana Archaic Working Conference

Archaic societies have come into much sharper focus over the last several decades, due in no small part to the efforts of researchers associated with cultural resource management investigations. The broad evolutionary and environmental sequences available from the rockshelter work of the mid-twentieth century have been fleshed out and refined by data gathered from significant excavations at open-air villages, campsites and cemeteries. One result of this effort has been to demonstrate that there are serious problems with the cultural framework in many areas, even in fairly recent sequences such as the American Bottom chronology established only twenty years ago. In particular, the unsystematic application of an ecological and evolutionary framework envisioning a regionally identifiable group with steadily growing population sizes, gradual improvements in technological proficiency and increasingly complex levels of social interaction leading to later agricultural economies has come in question in American Bottom research. Instead, we see wholesale population replacements, shifting cultural alliances, periods of depopulation, and shifting levels of social complexity throughout the archaeological record of the American Bottom, including the Archaic period. A review of papers at several recent Midwestern conferences suggests that regional scholars are developing new regional chronologies, as well as revaluating existing subsistence and social models of Archaic lifeways. The Archaic Working Conference that was held in Urbana in December, 2004 sought to foster a greater level of interaction and understanding among regional scholars.

The conference format was similar to several that have been hosted by the organizers and other regional scholars in the past (e.g., Late Woodland—Emerson, McElrath and Fortier; Early Woodland—Farnsworth and Emerson; French Colonial—Walthall and Emerson; Mississippian—Emerson and Lewis, and several others). Each of these conferences involved a select group of scholars delivering papers on their area of regional expertise, and each conference resulted in one or more published volumes. Combined with the paper presentations and discussion was the opportunity to examine large artifact assemblages made available by participating regional specialists. This informal small meeting format provides a favorable environment for the free exchange of ideas and examination of relevant diagnostic material, a situation that can no longer be achieved, even at regional conferences.

We asked participants to come with a prepared manuscript. It has been our experience that presentations and discussion are far more productive if presenters have written drafts at the time of the conference, although presentation time (approximately 30 minutes) may only allow a summary to be delivered; extemporaneous talks from outlines, although stimulating, do not provide the level of detail that is necessary for a productive conference.

We viewed this conference as an opportunity to capture the disparate "gray literature" on Archaic materials. Much of this information is known only to a few researchers or has been published in reports that are poorly circulated. Presenters are limited only by the requirement that it is necessary to present the baseline information on the cultural chronology, artifact assemblages and lifestyles of the Archaic societies in their region; beyond the mandate of a solid grounding in material culture and context, their theoretical bend, be it selectionist, processualist, post-processualist, or historical processualist was up to them—it was an opportunity to move beyond the "rocks" and "environment" explanations of Archaic societies. In anticipation that we all faced similar definitional and interpretational conundrums in the Midcontinental Archaic, we provided a series of topics that had proven to be of concern to regional archaeologists. We believed that a coordinated discussion of these issues might provide new insights into this, the longest, recognized period of human history in the Eastern Woodlands.

One of the concerns of all conference organizers is bringing together a diverse yet representational body of regional researchers. We have found in past instance that a working group of about twenty to thirty is large enough to provide a broad spectrum of theoretical and evidential perspectives. Larger groups of individuals become unwieldy and there is a loss of intimacy and informality. We took our usual approach to organizing such a working conference by selecting a key set of individuals who had regional expertise and a demonstrated record of publication. We asked them to serve as coordinators for a specific region or topic. In this capacity we suggested that they identify and contact colleagues that they felt could contribute to their effort. In some cases they invited these individuals to participate as co-authors but that was a decision we left up to the coordinators.

With these considerations in mind, we assembled a group of individuals who had demonstrated a commanding research interest in Archaic studies for their respective regions or states; or, who were currently working with large Archaic data sets from specific sites or localities, or specific topics. The volume and participants might be thought of as "Illinois centric" because of our heavy reliance on data from our own state. We unashamedly point to the importance of the major rivers that both define and traverse this state, along with the level of research activities and funding that have been invested in the Illinois River Valley, American Bottom, and Southern Illinois, along with the number of published site reports and availability of synthesized data. In fact, we suggest that Illinois can be seen as the birthplace of the modern Archaic site report with the publication of Howard Winter's Riverton Culture in 1968. Illinois also came to the forefront of Archaic research with the systematic radiocarbon dating studies of Modoc in the 1950s, and the ground-breaking efforts at the stratified open air site at Koster in the 1970s. With these efforts in mind, we eagerly accepted the offer by Ahler and Koldehoff (this volume) to summarize the results of a return to Modoc in the 1980s, and a re-examination of the Koster work by Wiant and his co-authors (this volume). Before leaving Illinois we would call attention to the effort by Nolan and Fishel to deal with the Archaic of western Illinois. There are no comparable regional studies that we are aware of that approach the level of detail accomplished by these researchers in examining over 3500 Archaic sites to establish a fine-grained, temporally sensitive distribution as study of Archaic phases, complexes, horizons and point types. It has provided information at the regional level that is the "horizontal" equivalent of the best examples of "vertical" analyses of deeply stratified sites anywhere in North America.

In choosing individuals from adjoining states we were fortunate enough to entice individuals who were in a position to deal with datasets at a comprehensive state level (i.e., Wisconsin, Michigan, Ohio, Kentucky) or appropriate sub-state regional level (i.e., eastern Iowa, southern and eastern Missouri). We were unable to find equivalent researchers who were willing to deal comprehensively with either Missouri or Indiana; but we were fortunate in attracting researchers who were currently involved in major site locality projects for both southern Indiana (Stafford and Cantin, this volume), and the Ozark region of Missouri (Ray et al., this volume).

We also thought it appropriate to bracket the major Midwestern study area with overviews that served to provide a Midcontinental backdrop perspective on our understanding of Archaic period research. In this effort we were successful in enlisting the aid of researchers in the southeast (Kidder and Sassaman, this volume) and our colleagues from Canada (Ellis et al., this volume). Their contributions are effective in highlighting the level and scope of interaction and possible boundary maintenance by populations during the Archaic period.

Also valuable in placing the midcontinental Archaic in context are the insightful overviews provided on fauna (Styles and McMillan, this volume), flora (Simon, this volume), mortuary patterns (Milner et al. this volume), and theory (Emerson and McElrath, this volume). These reviews help put the individual regional and site contributions in a broad context.

We envisioned several broad themes that we asked all authors to discuss in their papers. These included a) the appropriateness of the correlation in your region between archaic cultural change and climatic/environmental change, b) the validity of existing Archaic taxonomies in your region (e.g., is there really a Middle Archaic), c) the actual (rather than extrapolated) archaeological evidence for an Archaic sequence in your region, and d) the soundness of the standard hunting and gathering, seasonal-round models when compared to the actual archaeological record in your region (or do such models actually prejudice our interpretations of the data).

Presenters were encouraged to utilize regional survey and excavation material to touch on some of the following issues:

- What constitutes the earliest recognizable Early Archaic manifestation in your area, and how is it technologically distinct from the late Paleoindian occupation?
- Do you recognize formally defined Early Archaic phases or view these manifestations (Theban, Kirk, Bifurcate etc.) more generally as traditions or horizons?
- What marks the Early-Middle Archaic transition? Are there regionally specific radiocarbon dates and archaeological data that support this transition?
- Do you view the Hypsithermal as a relevant backdrop for explaining the Early/Middle Archaic transition? Do you have regional data that allows a fine-grained reconstruction of the effects of this climatic episode on native vegetation, animal life and human society in your area?
- Do you recognize a Middle and Late Archaic break? When did this occur and what are the criteria used for recognizing this break? Also, what are the social and technological diagnostics that signal this switch.
- What constitutes sedentism, and when does it occur in your area? Was sedentism an ongoing trend or does it vary from locality to locality or even fluctuate within your locality? Do you equate this with the postulated switch from foraging to collecting?
- Do you equate specific diagnostic projectile points with identifiable groups, thereby recognizing regional boundaries between "societies" in the Middle or Late Archaic?
- Do you have representative dated assemblages/contexts for cultural events within your study region or must you extrapolate from other regions?
- Do you believe that the lack of specific diagnostic projectile point types that may be recognized in neighboring areas, but not your own, is based on real divisions or is related to differences in nomenclature?
- Are there diagnostics other than projectile points (scrapers, drills, bifaces, groundstone implements) that are temporally sensitive in your area?
- Are there recognizably distinct, temporally sensitive methods of biface manufacture in your area?
- Is the appearance of Early Woodland in your area simply the addition of ceramics to a Late Archaic material

assemblage, or does it represent actual population as well as technological replacement?

- We have recently seen the appearance of spectacular Archaic complexity in the Southeast and the Lower Mississippi River valley. Is the Archaic of the Western Great Lakes more complex than we have previously admitted?
- Think about the social, religious and political ramifications of your data. What are the implications of the formalized Archaic mortuary complexes, especially those that are associated with the Late Archaic societies?

With these suggestions in mind three-dozen researchers and a number of guests gathered at the University of Illinois on December 2, 2004 for an intense two-day session in which nineteen oral presentations were given. The conference concluded with an afternoon workshop session in which hundreds of artifacts from various Archaic contexts were displayed and discussed. Saturated, and in some cases inundated, with this deluge of new information authors were sent off with the admonition to revisit their preliminary draft presentations and to consider and, as appropriate, incorporate the new ideas, new data, and divergent theories into a final draft manuscript by early summer 2005. The majority of contributors were able to meet this deadline some, however, were as much as a year late. Fortunately this did not interfere with the editorial and production aspects of the volume and while we waited we were able to edit the chapters in hand. Consequently, over the last two years, with the dedicated work of the editors, copy editor, graphic designer, production manager, and authors this massive, nearly 900-page volume, has moved towards final completion. We thank everyone involved in this process but we are especially grateful to Dr. Gary Dunham, Director of SUNY Press, for making this great effort finally come to fruition.

Thomas E. Emerson, Dale L. McElrath, Andrew C. Fortier

Organized by the Illinois Transportation Archaeological Research Program (ITARP), Department of Anthropology, University of Illinois at Urbana-Champaign.

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To host a conference of this magnitude and complexity and to turn that effort into a published volume is an immense undertaking that can only be accomplished with the support, cooperation, and enthusiasm of many parties, in this case, the conference participants and contributors, the staffs of the Illinois Transportation Archaeological Research Program (ITARP), the Levis Faculty Center at the University of Illinois at Urbana–Champaign (UIUC), the Illinois Department of Transportation (IDOT) Cultural Resources Section, and the State University of New York (SUNY) Press. The assembly, formatting, and production of a 23-chapter volume, an impressive final compendium covering more than 8,000 years of prehistory, is not an easy undertaking. Fortunately, in this project, the task was seamlessly executed by Michael Lewis, ITARP Production Manager, and copyeditor and indexing assistant Linda Forman. We, the organizers and editors, owe much to those many people who contributed to make this effort a success, and we thank them all. We also would also like to acknowledge the financial and logistical support of the UIUC and ITARP that made this project possible.

2004 Archaic Conference Participants, Urbana, Illinois: *Bottom to Top, L to R:* Andrew C. Fortier, Dale L. McElrath, Rochelle Lurie, Bonnie W. Styles, Thomas E. Emerson, John A. Walthall, Mary L. Simon, Jane E. Buikstra, Larry Conrad, R. Bruce McMillan, Jack H. Ray, Matthew P. Purtill, Richard L. Fishel, Kenneth E. Sassaman, George R. Milner, Tristram R. Kidder, Richard W. Jefferies, William A. Lovis, Joe B. Thompson, David J. Nolan, Scott J. Demel, Douglas Kullen, David W. Benn, Thomas C. Pleger, C. Russell Stafford, Neal H. Lopinot, Mark Cantin, Christopher Ellis, Kenneth B. Farnsworth, James B. Stoltman, Brad Koldehoff, Brian M. Butler, Michael D. Wiant

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Part 1

An Archaic Overview

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An Introduction to the Archaic Societies of the Midcontinent

Dale L. McElrath, Andrew C. Fortier, and Thomas E. Emerson

Archaic Themes

In our position as editors, we sometimes felt, as the various authors submitted their chapters, that we were privileged recipients of pieces of an intricate mail-order puzzle. From this vantage point, we were able to see commonalities that would have been far less obvious to the volume's individual contributors. Although the individual authors are of differing opinions and scholarly persuasions concerning major factual and many theoretical issues confronting Archaic studies, they are surprisingly evenhanded in presenting and summarizing the available regional data. Most have gone to extraordinary efforts to integrate gray literature and unpublished site reports and to use available site records to develop a comprehensive, if not always temporally representative, framework. In this introduction, we examine some of the issues that dominate the discussions and explore both the truisms and conundrums that have fettered attempts to reconstruct Archaic lifestyles. We have developed opinions that are sometimes at odds with those of our colleagues. We are especially concerned in this chapter with identifying positions that may have questionable foundations—positions that obscure rather than elucidate patterns that are essential for reconstructing the history of Archaic societies.

Ideally, our call for contributions to this conference and volume would have resulted in regionally balanced summaries of Archaic-period developments based on the natural physiographic regions within which related groups might have been expected to develop. Such an approach would have enabled construction of an overarching chronological framework for relating Archaic social and technological developments, as has been attempted, for example, for the Woodland and Mississippian periods (e.g., Emerson and Lewis 1991; Emerson et al. 2000; Farnsworth and Emerson 1986). The nature of the available archaeological data and the configuration of researchers' study areas, however, are somewhat at odds with this aim. Although the arbitrary political boundaries of midwestern states were of no relevance for the coming and going of Archaic peoples, they are of paramount relevance for shaping the research scope of institutionally affiliated archaeologists. The quantity and quality of Archaic research, therefore, for multiple historical reasons, have varied considerably from state to state.

As we assembled these many contributions on the Archaic period in the Midcontinent, it became clear to us that three themes dominate, either implicitly or explicitly, all of the chapters and that they are fundamental to interpreting or, we should perhaps say, reinterpreting Archaic societies. First and foremost among these issues is the establishment of basic relative and absolute chronologies; the second is the essential question of the meaning of material culture, often summarized as the "points equal people" debate; and the third is the relationship of culture, climate, and landscape. These are hardly new issues and we are not the first to discuss them, but we highlight them here because of their central importance for Archaic research, interpretation, and theorizing. In the following sections of this introduction, we explore in some detail the implications of these issues for interpreting the past.

Dating the Archaic

There can be no doubt that the development of radiocarbon dating has revolutionized, and continues to revolutionize, understanding of the archaeological record, no more so than in the case of the Archaic. The picture changed dramatically from the late 1940s, when the Archaic was formally recognized and thought to comprise a few thousand years of prehistory, to the late 1950s, when its antiquity was appreciated for the first time. The large number of radiocarbon dates (exceeding 1,000) gathered in this volume testifies to the value placed on this tool by researchers. However, given the extensive time span and expansive area of Archaic manifestations, even this number must be viewed as inadequate to properly document the sequence of cultural developments and events that unfolded. Also, researchers are realizing that radiocarbon dating has limitations that prevent achieving the tight chronological controls that are necessary to answer many of the questions they pose.

Although advances in radiocarbon dating have overcome initial concerns with, for example, dating bone and shell or C_4 plants such as corn, the process is still plagued by contamination of samples, issues of context, and variation between labs and, surprisingly, in results between specific techniques (i.e., conventional vs. AMS dating; see Fortier et al. 2006). In addition, variations in atmospheric carbon have generated problems that were not apparent at first glance. So, archaeologists not only are faced with issues of sampling and instrument limitations in the accuracy of sample measurement but also with the fact that samples of substantially differing ages can each have multiple "intercepts." Whereas archaeologists once operated under the (mistaken) assumption that dates could be reliably compared with one another within the latitude offered by statistically measurable confidence limits, they must now contend with the reality that dates can be easily "flipped" depending on which intercepts one "accepts." The dilemma has been compounded by the most recent version of a standard calibration scheme used by researchers in the Midwest (CALIB 5.0). While this version is, no doubt, more realistic and accurate in its results than previous versions, the system generates differing probabilities for assigning a date to specific time frames, thereby precluding convenient presentation in text form and complicating any attempt to summarize information from multiple dates. These difficulties explain the reluctance of contributors to this volume to adopt CALIB 5.0, even though they were offered the opportunity to do so prior to final submission of their chapters. The calibration dilemma has caused some (e.g., Ahler and Koldehoff, this volume; Ray et al., this volume) to prefer the original uncalibrated dates as simpler and offering greater clarity (with relative accuracy), at the expense of obfuscating precision.

Whatever the shortcomings of the radiocarbon dating method, it is clear that this method still provides the main vehicle for establishing and comparing the timing of cultural developments between and within regions. It is also clear that researchers are only beginning to determine the ages of the various Archaic manifestations that typify the Midcontinent. Using the American Bottom in the Mississippi River valley of western Illinois as a test case, we note that, while the 9,000-year-long Archaic period is estimated to represent approximately 75 percent of the post-Paleoindian archaeological record, less than 20 percent of the radiocarbon date assays are for this time span. While other regions and states may present more balanced results, the number of authors in this volume who indicate that their regions of study lack basic chronological frameworks suggests that the American Bottom region is, in fact, at least marginally ahead of the curve in terms of Archaic radiometric documentation.

We suspect that, in large part, this is due to the scholarly focus on later time periods and ceramic-producing groups. In this case, the cultural-evolutionary paradigm acts as a two-edged sword; not only are the later time periods viewed as the pinnacle of cultural development and complexity but the earlier periods are also conceived of as simpler, more uniform, and therefore easier to characterize. Because the Archaic period is viewed monolithically, that is, in terms of "homogeneous long-term trends," more attention has been given to dating later periods, characterized in terms of cultural dynamics or emergences and collapses. As long as this perspective prevails, there is little incentive to create detailed histories of Archaic people. Because of this, researchers find it acceptable to extrapolate dates and interpretations from neighboring, or even distant, regions to "fill in" local sequences of cultural expressions; given such practices, one should not be surprised to find broad homogeneity characterizing interpretations of the archaeological record of the Archaic period.

To some degree, such generalizations result from the paucity of Archaic archaeological manifestations. The factors of time and preservation have taken their toll on Archaic remains. Archaic sites often yield substantially fewer features containing diagnostics and datable charcoal than do their later counterparts. This accounts for the large number of Archaic dates that have been generated for features (e.g., Lovis, this volume) and stratigraphic levels (e.g., Ahler and Koldehoff, this volume) without associated diagnostic material. Much of the Archaic chronology is built on the radiocarbon dating of geomorphological rather than cultural units, with all of the uncertainties such contexts engender. This testifies to the need to excavate larger samples from Archaic-period sites to generate sufficient cultural material for dating. In our experience, only one out of 10 or 20 (or in some cases one out of 100 or 200) pit features at open-air Archaic sites yields diagnostics. Furthermore, Archaic pits are usually shallow, small processing features that seldom served as trash repositories, and they contain little charcoal. Given these factors, then, greater effort must be made to collect datable material from the few features that are capable of providing reliable and contextually secure diagnostic material.

Regardless of the reason, there can be little doubt that many Archaic-period material expressions remain poorly dated at the regional level. Examples in Illinois that come to mind involve well-recognized point traditions or horizons (e.g., Kirk, Table Rock, Hardin Barbed, Smith Basal Notched, Fox Valley Barbed, and Merkle side-barbed, among others), for which there are no known dates from single-component sites or stratigraphic levels in which these point types dominate. If culture-historical reconstructions and histories rest on constructing chronologies, establishing spatially delineated social boundaries, and, most importantly, identifying regional population stability and movements, then the vagaries of the dating methods employed thus far have left considerable latitude for interpretation of the archaeological record.

Dividing the Archaic

When it became available in the early 1950s, the radiocarbon dating method provided a major boost to understanding Archaic culture history. It confirmed archaeologists' suspicions that aceramic sites represented groups that existed prior to the ceramic-using Woodland lifestyle. More importantly, no longer were interregional comparisons completely dependent on the vagaries of trait distribution analysis to establish cultural associations and contemporaneity. For the first time, small sites with modest assemblages could be reasonably dated. This resulted in a major reappraisal of the age of and variability present among Archaic cultures. Although Ritchie proposed a comprehensive division of the Archaic period, it was Fowler (1959a, 1959b) who struggled with subdividing materials spanning the entire Archaic period from a single site (Modoc Rock Shelter). In the end, he did so arbitrarily by dividing a 6,000-year period of occupation (i.e., 8000–2000 B.C. uncalibrated) into three subperiods of equal 2,000-year units. This division suited his research focus since he was primarily interested in identifying subsistence trends through time (on the basis of artifacts and faunal and floral data) for the various periods of rockshelter use. Although Fowler (1959a, 1959b) created his divisions arbitrarily for intrasite comparative purposes, his ability to recognize substantive differences between them led him to propose three periods of Archaic use of the Modoc site area: (1) a period of initial occupation, (2) a period of localization, and (3) a period of specialization. Once he had identified these subdivisions, he sought to refine the dating involved, incorporating available Archaic dates from throughout the Midwest. He suggested that the initial occupation dated prior to 8000 B.C. and that the period of specialization began about 3500 B.C.

Because he published extensive comparisons between Modoc and sites in eastern Missouri (Graham Cave and Logan), southern Illinois (Faulkner and Ferry), and Kentucky (Green River sites), these divisions represented, for the Midwest at least, the beginnings of the Early, Middle, and Late tripartite division of the Archaic (even though Fowler did not use these designations). Researchers have struggled ever since with the chronological boundaries assigned to these divisions and the associated lifestyles. For example, Cook (1976), using the established date of 3500 B.C. for the beginning of the Late Archaic in the lower Illinois River valley, defined and characterized two sequential phases, Helton and Titterington, at the famous Koster site. However, presumably because major differences were observed between these two phases in subsistence and settlement patterning, later researchers used the end of the Helton phase to denote the conclusion of the Middle Archaic and the beginning of the Titterington phase (ca. 2500 B.C.) to signal the beginning of the Late Archaic. The problem researchers encounter outside the valley in using this criterion is that the Titterington phase has a very limited distribution in Illinois (many argue that it represents an intrusion from the west; e.g., see McElrath et al. ch. 11, this volume), and they have struggled to find equivalent-age materials. The issue is further complicated by the appearance of the Matanzas point (the hallmark of the Helton phase) much later in Indiana and its use there well into the Late Archaic period (Stafford and Cantin, this volume).

Subsequent Archaic studies in Illinois provided further impetus to the concept that the Early, Middle, and Late subdivisions represented logical divisions of directional trends, especially after Brown and Vierra (1983) published their Middle Archaic model (themes that Brown [1985, 1986] further explored and that we discuss below). This provided the basis for a seemingly perfect marriage of data and theory by taking the Koster site stratigraphic data and wedding it to a hypothesized switch from residential mobility to logistical mobility. This built on Binford's (1980) influential article on the relationship between resource distribution and hunter-gatherer settlement patterning. An indication of the impact of Brown and Vierra's and Binford's articles on midcontinental Archaic research is that they are both cited by many of the contributors to this volume.

Brown used the schema suggested by Binford of a continuum of hunter-gatherer subsistence-settlement strategies that related consumers to available resources, and he transmogrified this concept into a cultural-evolutionary model. Thus, whereas Fowler (1959a, 1959b) had assumed, at least for purposes of discussion, that the environment between 8000 and 2000 B.C. was essentially stable, Brown (1985; Brown and Vierra 1983), using more recent data developed at Koster (e.g., Butzer 1977, 1978; Hajic 1981) and elsewhere in the Midwest (King 1981), attempted to relate the archaeological record in the lower Illinois Valley to rather dramatic changes in riverine geomorphology combined with vegetational changes purportedly associated with the Hypsithermal climatic episode. In the resultant reconstruction, populations were both forced off the upland prairie regions by deteriorating climatic conditions associated with a drying episode and attracted to enhanced aquatic resources in the floodplain associated with the development of meandering river channels. This "pushpull" reorientation of populations has assumed the dominant role in explaining population distribution in the Midwest, just as the switch from residential mobility to logistical mobility (à la Binford) has become a dominant explanation for significant changes in the archaeological record throughout the Midcontinent (although the timing of this event is viewed as regionally variable).

One might expect that the broad perspective gained by incorporating data at the midcontinental level in this volume would provide a comprehensive regional basis on which to divide the Archaic into consistent, comparable, yet regionally sensitive diachronic units. In our judgment this is not feasible at this juncture because every region has a historically rooted rationale for its own temporal divisions, and, at least in some cases, rationality has less to do with it than does the force of tradition. It seems reasonable to divide such a lengthy period (which is now seen as extending for at least eight millennia) into manageable subdivisions, and virtually all contributors to this volume make use of a tripartite schema of some sort. This triple division has become the de facto temporal framework and will no doubt continue to be, despite its problems, for the foreseeable future.

It seems reasonable, therefore, to retain the tripartite system as an arbitrary division of the Archaic for purposes of identifying the time frame with which one is dealing; but, at the same time, it seems unwise to link temporal boundaries to perceived technological "progress," adaptational "advances," or changing climatic episodes for the simple reason that, to the extent that any of these factors influenced human actions, they were, by definition, regionally experienced and highly variable. Virtually all of the technological innovations that have been enlisted to define the Archaic either by inclusion or exclusion (e.g., the inception of the bow and arrow, agriculture, pottery, sedentism, political complexity, mound building, etc.) have proven to be, if not outright inapplicable, at least equivocal. It is no longer feasible to view the Archaic at any supraregional level as exhibiting broad trends that can be used to characterize temporal subdivisions representing isomorphic units, even if one allows for the time-transgressive expression of effects associated with south-to-north vegetational shifts resulting from glacial retreats, and west-to-east changes triggered by an advancing prairie. Indeed, the Archaic seems to have been far more complex than either its name or the previous attempts at overviews have intimated.

Projectile Point Style, Form, and Function

Archaic-period research begs the question, how do scholars establish local or regional sequences and determine historic trajectories for Archaic-period societies? The answer is, of course, that they use "diagnostics" (usually projectile point types) from surface sites to establish the relative intensity of local and regional occupations and the settlement systems employed; the presumed dates of the various diagnostics are usually assigned in the Midwest on the basis of relative dates and radiocarbon determinations generated from other areas, particularly the Midsouth and Southeast. This dependence on surface diagnostics raises a host of inevitable and very thorny issues concerning the nature and reliability of projectile point typologies and the validity of types as chronological markers. In fact, the "hafted biface," as researchers now prefer to call the projectile point, has been viewed with mixed feelings and today has a problematic place in archaeological research.

The use of projectile point types by midwestern cultural resource management (CRM) archaeologists has persisted because types have proven valuable for recognizing chronological and cultural units and because they facilitate communication among researchers. The idea of types may also prove useful in new analytical approaches involving the concepts of communities of practice and the *chaîne opératoire*. While we do not wish to relive or, worse, rekindle the typology debates of the mid-twentieth century, we briefly explore the historical development of the point-type debate and new perspectives that may serve to resolve some of the more contentious issues that were once considered irresolvable.

One philosophical aspect of the typology issue that was hotly debated in the 1950s concerned the nature of types. Some theoreticians argued that types existed in the real world and simply awaited discovery (Spaulding 1953), whereas others argued that they were arbitrarily imposed (Rouse 1960). Perhaps because a new generation of scientists has turned its attention to phenomena, such as certain life-forms and subatomic particles, that defy conventional classification, increasingly, researchers in many fields have accepted that all categories are humanly constructed and, therefore, by definition, are arbitrarily imposed on the unsuspecting "real" world (Tschauner 1994). If one accepts this premise, then the only measure of the validity of a defined type or classification system is how useful the categories prove for advancing understanding of the subject matter. It also means that the essentialism that purportedly undercuts the usefulness of artifact types (Lyman et al. 1997) is of equal concern for all organizing schema used by archaeologists (be they artifact types, political types, settlement types, subsistence types, ethnic types, or selectionist traits).

Whereas previous conceptualizations of artifact typologies analogized them as "mental templates" representing ideals that were shared by social groups and that producers strove to replicate, practice theory recognizes that they are the products of communities of practice, that is, interacting individuals who are involved in their production. Although the two concepts appear superficially similar, the latter is more flexible and less abstract because it explicitly acknowledges the method (human agency) by which the knowledge of tool production was transmitted between generations. In terms of our discussion, it recognizes that a teacher-student (i.e., master-novitiate) relationship provided the context for training successive generations of flintknappers in the "correct" way to perform a task (in this case, producing hafted bifaces). Correct performance involved not only the basic mechanical aspects and the chaîne opératoire of tool production but also the religious and symbolic implications that imbued the process with meaning. Many idiosyncratic elements of point production were also transmitted, involving the appropriate blade shape, stem treatment, hafting method, refurbishing sequence, and so on. Obviously, the subject of training was not limited to the production of hafted bifaces but, rather, included a multifaceted catechism of lithic tool manufacture; raw material acquisition; weapon production; techniques of tracking, trapping, killing, and processing game; and the general wisdom and special lore necessary for defending and supplying the individual, family, or corporate group with food.

Much attention has been focused on how hafted bifaces inform archaeologists about activities undertaken (i.e., function) or group interaction (form or style). The neutral term *hafted biface* became popular after Stanley Ahler convincingly argued, on the basis of his examination of a sample of 114 projectile points from a single level (Stratum 2) at Rodgers shelter in Missouri, that the belief that points served as tips for projectiles is not always consistent with evidence from use-wear analysis. He further addressed the issue of whether the morphological variability in the Rodgers assemblage was due to "mental templates" derived from ethnic preferences or, as he surmised, from functional distinctions. Ahler (1970:118–121) arrived at a series of conclusions that have typically been characterized as supporting functional categories as opposed to "formal" or cultural categories, although Ahler himself was more cautious in describing his results. Among other things, he discovered functional categories that crosscut some formal categories and formal categories that fulfilled more than one function, suggesting they contained more than one tool "type." Ahler was also able to replicate many of the wear patterns evident in the sample assemblage and provide insight into some of the activities undertaken by the tool users. Among other things, he suggested that heavy serration was correlated with sawing or slicing and that, by contrast, beveling was not related to function (i.e., tool use) but, rather, was the result of resharpening. Eastern Woodland specialists have largely accepted these conclusions, while often ignoring other of Ahler's insights, for example, that "gross morphological" formal categories were better supported by factor analysis than the refined formal categories based on "objective" criteria (Ahler 1970:119).

Weapon Systems

Ahler may have been one of the first of the New Archaeologists to address point typology and function, but he and contemporary lithic researchers were not the first to confront the problem of discerning the uses of stone projectile points; nor are today's researchers the first to struggle over the form versus function dilemma. The great artist and anthropologist William Henry Holmes, who documented many of the lithic quarry sites and flintknapping techniques used in North America, observed in a symposium on "Arrows and Arrow-Makers" that "it is not possible, in all cases to distinguish points made for the arrow from those made and employed for projectiles thrown by the hand, or throwing stick, or from those intended to be hafted and used as knives, daggers, drills, and the like. It is not unlikely that many points were alternately used for a number of purposes as necessity demanded" (1891:49). In the same symposium, Thomas Wilson, another important student of the stone projectile point, reinforced this observation with his own. "The arrow-heads, spear-heads, and knives of the prehistoric races have such likeness of form, style, and size that a line of division between the three is practically impossible" (Wilson 1891:58). The problem was expressed even earlier by Haldeman in a consideration of "unsymmetric arrow-heads." He observed that, "while irregularities would interfere with the function of arrows, all these objects are not to be regarded as arrow-heads, some of the larger kinds being for spears, while others are probably borers, … scrapers … and knives" (Haldeman 1879:292).

The fundamental question concerning the weapon system represented by projectile points from archaeological contexts persisted into the twentieth century, when systematic excavations began to yield stratigraphic results that could be used to separate and relatively date artifact assemblages. Turn-of the-century attempts to solve the problem, as they are today, were based on observations made on ethnographic and archaeological collections and on experimentation and replication. Willoughby (1902) scoured the literature and museum collections to identify prehistoric knives that were still hafted onto handles. He discovered several from California, Colorado, Oregon, and Ohio as well as examples from dry caves in northern Mexico (state of Coahuila). He noted that the stone blades were "of the common typical forms (leaf-shaped, triangular, stemmed and notched) usually found in a collection of chipped implements" (Willoughby 1902:3). He further observed that the blades were affixed to wooden handles sometimes using only gum, sometimes only cords (either plant cordage or animal sinew), and sometimes both. He concluded by enumerating the various uses that researchers today ascribe to projectile points and observed that "the greater number of the implements of the common types, of lengths varying from about two inches to seven inches, were probably used as knife blades" (Willoughby 1902:6). Despite these early observations, which continued to be upheld by the recovery of additional specimens from dry cave sites in the Southwest (e.g., Guernsey and Kidder 1921), archaeologists to this day hold out hope that the geometry of the hafting element will eventually be proven to vary according to the specific weapon system in use. To further pour cold water on this idea, we offer the example of late prehistoric arrowpoints (e.g., Justice 1987), which display all of the hafting-element shapes that are present among earlier hafted bifaces, with the possible exception of fluting.

Aside from the function of projectile points, early researchers speculated on the rationale for such attributes as beveling, serration, and barbs. By the late nineteenth century, the process of stone tool production had been demystified through direct observation of tool production by native flintknappers (Redding 1879; Wilson 1899) and by some researchers' mastery of stone tool production techniques (e.g., Cushing 1895). Researchers began to examine the individual elements of stone tools, in particular, hafted bifaces, to debate the functional merit of individual characteristics. For example, Haldeman (1879) suggested that barbs, especially the single barbs associated with "unsymmetric points" might be related to fish gigging. Fox addressed the issue of serration, noting that, although characteristic of tools from North America, Europe, and Japan, its widespread occurrence was probably not the result of diffusion or migration, and he observed that

> the mode of working flint and other materials which flake off with conchoidal fracture, by taking off flakes and leaving facets from the edge alternately on opposite sides, naturally produces a more or less serrated edge, in consequence of the projection of the edges between the facets. A perfectly serrated edge, therefore, appears to me to be a refinement of workmanship produced by deepening the facets, which might or might not have been produced independently in different countries. [1875:319]

Similar arguments were presented for the "spiraling" or beveling that was noted on points. Beveling was popularly thought to impart a spinning or "rifling" motion to the dart or arrow in flight (Fairbank 1864; Hough 1891; Wilson 1899). This notion was disputed by accomplished practitioners to the degree that, by the mid-twentieth century, reference to "rotary points" brought derision from one flintknapper: "The fable that beveled points were made in that manner to spin an arrow in flight is in the same category as that fable about the Mound Builders tempered copper, and the one about chipping arrow heads from red-hot flint with an icicle. Let us forget them or leave them to the writers of filler pieces for the Sunday Supplement" (Smith 1953:270). The assertion that beveling imparts important flight characteristics, however, continues to be asserted by some researchers today (i.e., O'Brien and Wood 1998:96).

Like modern researchers, these early pioneers were also fascinated by the relationship between the spear-thrower and the bow and arrow. Otis Mason (1885) published a study of North American spear-throwers in the collections of the National Museum, and in 1891, Zelia Nuttall published her influential study of the atlatl, based on an analysis of Mexican codices. Interest increased considerably when several ethnographic spear-throwers, collected along the western coast of North America during the Vancouver expedition in the late eighteenth century (1790–1795), came to light when the expedition collection was donated to the British Museum almost a hundred years later (Read 1892). The discovery of ethnographic specimens was followed quickly by reports of archaeological specimens from Colorado (Mason 1893) and Florida (Cushing 1897). Like their modern counterparts (e.g., Vanderhook 1998), early researchers also experimented with the efficiency and accuracy of the atlatl weapon system.

These discoveries spurred debates over the antiquity and possible multiple inventions of the bow and arrow, which was clearly the weapon of choice in subarctic and temperate North America at the time of European expansion. Sporadic discoveries of archaeological atlatls were made throughout the early twentieth century, leaving little doubt as to the ubiquity (cf. Kellar 1955) and, to some extent, the antiquity of the spear-thrower. By 1940, when Fenenga and Wheat (1940:222) reported on one specimen recovered from the Baylor Rock Shelter in Texas, they were able to list multiple southwestern examples, from Arizona, Oklahoma, New Mexico, Mexico (Chihuahua), and Texas. Once the spear-thrower was shown to have been widespread and important in North America, the discussion eventually shifted to practical considerations involving the identification of archaeological correlates of this weapon system, since few regions outside the Southwest enjoyed favorable preservation conditions.

Fenenga (1953) was the first to formally employ weight to distinguish between atlatl and arrow points. In fact, size had already been recognized as a potential criterion for sorting atlatl points from arrowheads, and archaeologists had been informally using it for years to classify specimens. Baker and Kidder (1937) dated the transition from spear-thrower to bow and arrow in the Southwest to Basket Maker II times and noted the absence, in general, of arrow-sized points from "respectably ancient deposits." This prompted a response from Browne (1938, 1940), an avid archer and hunter, concerning the optimal size of arrow points. Browne had experimented extensively with stone points and had concluded that there was considerable overlap between atlatl and arrow points, in terms of both overall size and haft-element size. He used stone points exceeding 5 cm in length, including archaeological specimens from the Signal Butte I, Sheep Mountain, and Pictograph Cave sites, and was able to shoot arrows tipped with these points to distances of 175–200 yds (Browne 1938). He lamented that he was not able to test a Folsom point from the Lindenmeier site, suggesting that, "if ever there was a point that was made for efficient bow and arrow shooting, it is the Folsom point" (Browne 1938:359).

Elements of this long debate have been resolved to some degree in recent times; Thomas (1978) did what researchers had done almost a century earlier and examined museum specimens in an attempt to distinguish spear from arrow points. He developed a statistical method of separating them that proved accurate 86 percent of the time. His method was based on his examination of over 100 archaeological hafted arrowheads but only 10 dart points attached to foreshafts. Shott (1997) extended the hafted-dart sample size to 39 by visiting several more North American museums. On the basis of his larger dart population, he was able to demonstrate that simply measuring shoulder width was as effective as the more complex statistical methods employed by Thomas (1978) to distinguish between arrow and dart points. Researchers quickly realized, however, that, while shoulder width might be a reasonably accurate guide for distinguishing between isolated dart and arrow points from surface survey, it would not serve to resolve the issue of the antiquity of the bow and arrow if both systems operated contemporaneously (Corliss 1980; Shott 1997).

In addition to the stone tips of darts, researchers have also attempted to identify "adjuncts" to the spear-thrower that might be considered *cartes de visites* in the absence of preserved specimens of the spear-thrower itself. Occasionally, bone spurs have been recovered that are interpreted as the hooks that were attached to the distal end of the throwing stick and that served as the point of contact with the base of the dart shaft during launch (Goslin 1944). While bone is only slightly more likely to be preserved than wood, the recovery of such hooks in linear association with ground bannerstones and stone points in Late Archaic burials in the Midsouth (Webb 1946; Webb and Haag 1939) led most researchers to conclude that the exotically shaped bannerstones served as spear-thrower weights. Atlatl weights of copper, galena, and stone were soon identified in archaeological context (sometimes associated with burials) throughout North America (e.g., Butler and Osborne 1959; Neuman 1967). Other archaeological atlatl adjuncts that were recognized included shell or stone "spurs" from California (Riddell and McGeein 1969) and U-shaped shell "fingerhooks" from northern Mexico (Ekholm 1962). In the Eastern Woodlands, the bannerstone (e.g., Winters 1961) and, eventually, the "boatstone" and "birdstone" of the Northeast (Griffin 1967) became synonymous with the atlatl. The earliest occurrence of the bannerstone (i.e., Middle Archaic) was thought by some (e.g., Griffin 1967, 1968) to date the invention of the spear-thrower.

These circumstantial associations seemed to generate confidence among Eastern Woodlands scholars that the artifacts involved were functional parts of an atlatl weapon assembly. However attempts to prove the functional advantage of attaching a weight to a spear-thrower were considerably less supportive; for example, Hill (1948) suggested only "some" improvement using a weight with lightweight darts; Peets (1960) was unable to demonstrate any advantage; Mau (1963) suggested improved distance throws; Howard (1974) suggested no improvement; Palter (1976) suggested diminished throwing capacity; and Raymond (1986) suggested no improvement in distance but potentially improved accuracy. Although the jury is still out on the subject, the one thing that is beyond doubt is that weights are not necessary for competent and reliable use of the spear-thrower as a hunting and warring device. Notably, none of the ethnohistoric or ethnographic atlatl examples on record involved use of a weight (Palter 1976); however, small "fetish" stones (often turquoise or hematite) and related symbolically charged paraphernalia (usually animal teeth) were sometimes attached near the proximal end presumably to confer a spiritual, if not a functional, advantage to the operator (Palter 1976). In any event, the presence or absence of atlatl weights, if, indeed, the artifacts so identified operated as such, cannot be argued as proof of the antiquity of this weapon.

The past couple of decades have seen a renewed emphasis on the study of projectile technology on a worldwide basis (e.g., contributors to Knecht 1997), one aspect of which has been an attempt to identify archaeological correlates of specific weapon systems. Christenson (1986) has provided a comprehensive review of attempts at relating hafted-biface attributes to appropriate weapon systems, noting that several ethnographic, archaeological, and experimental studies support a relationship between stem width and haft diameter that may have implications for distinguishing different weapon systems. In an impressive, commanding grasp of both the physical principles governing projectile flight and the knowledge gained through experimentation with artifacts, he assessed how information about projectile accuracy, killing power, range, and durability can be used to functionally decode archaeological hafted bifaces. He used a surface-collected sample from the Sangamon Valley of Illinois to explore these issues and examined technological developments in the context of a generalized temporal framework. Although Christenson found that hafted bifaces dating to certain periods seem to conform to predicted trends, he encountered problems in recognizing long-term technological trends; in particular, the larger hafted bifaces associated with the Early and Middle Woodland periods counter an expected trend of decreasing point size through time. We would add to this the observation that, in the American Bottom, the average sizes of points from dated context are erratic through time, sometimes oscillating wildly, as exemplified by the hypertrophic Titterington points and the diminutive Riverton point types, the latter only a few hundred years later than the former (contra Shott 1996; cf. McElrath et al. ch. 11, this volume).

We have embarked on this history of the study of Archaic weapon technology and the functional and typological aspects of hafted bifaces to highlight several issues that we consider to be of paramount importance, especially in a volume dedicated to Archaic societies. First, after almost a century and a half of directed research by some of the best minds, past and present, in the discipline, the categorization of hafted bifaces either by form or by function remains problematic. Disciplinary consensus has emerged on occasion. For instance, archaeologists seem to have concluded that projectile points are better viewed as hafted bifaces, because they were often used as knives (e.g., Ahler 1970; Finkelstein 1937; Haldeman 1879; Holmes 1891; Nance 1971; Odell 1994; Willoughby 1902; Wilson 1899). Points of consensus, however, are few.

Archaeologists are unable to convincingly distinguish between the tips of arrows and the tips of atlatl darts or to determine whether the bow and arrow or the spear-thrower is a technologically or functionally superior weapon system, whether groups used multiple weapon systems contemporaneously, or whether hafted-biface morphological form was generated by ethnic practices or simple functionality or both. Inability to answer these simple real-world questions has a dramatic impact on interpretations of the past.

Take, for example, the inability to identify the morphological characteristics of arrow versus dart points. This precludes archaeologists from determining the individual histories of these two weapon systems in the New World. It leads to a lack of consensus on such topics as the date of the introduction of the bow and arrow in North American prehistory. If, for example, one were to poll current views on when the bow and arrow was introduced or reinvented in North America, one would find the following opinions: Paleoindian (Amick 1994; Patterson 1994), Early Archaic (Byers 1959; Shott 1997), Late Archaic (Bradbury 1997; Nassaney and Pyle 1999), Middle Woodland (Justice 1987), and Late Woodland (Hall 1977, 1980; McElrath et al. 2000). The best that can be said from written historic accounts is that both systems existed at contact in the Western Hemisphere. An equally diverse set of archaeologists could be called on to dispute related topics, such as whether there were single versus multiple inventions of the bow and arrow or whether it was technologically superior to the spear-thrower.

It would appear that well over a century of functional analysis has resolved little about the relationship between stone points and their counterpart weapon systems. In reviewing the current literature, we note that researchers are of two opinions. The optimistic scenario is perhaps best expressed by Christenson, who passionately argues that the pursuit of several lines of research "will ultimately lead to the development of numerous general and specific models of projectile design" (1986:123–124). In seeming contradiction, Shott concludes that, "leaving aside other possible uses of chipped-stone bifaces, we cannot with certainty classify archaeological unknowns as dart or arrow points, and we will never attain such an impossible goal" (1997:99). Although these views may seem an unusual segue into the next topic, which concerns the use of hafted bifaces as spatially and temporally sensitive group-identity markers, we argue that it is the reconciliation of these two seemingly contradictory statements that will provide the foundation for building a more productive and realistic understanding of the place of Archaic people and the social role of technology, in the history of the Eastern Woodlands.

We begin by pointing out that we have presented the two quotes in the previous paragraph out of context. Christenson is referring to interpreting a sequence of points from a specific region (the Sangamon River valley of Illinois), whereas Shott is referring to the overlap in archaeological hafted dart and arrow point metrics that reduces to 85 percent the reliability that unhafted projectile points can be correctly assigned to either class, thereby leaving considerable room for doubt about the assignment of any given specimen. This is relevant because researchers interested in identifying early (indeed, the earliest) use of the bow and arrow will find this objective difficult to achieve if the bow and arrow was used in tandem with the atlatl system. Still, one can view this state of affairs from the perspective of the glass half full rather than half empty. After all, Shott points out, regarding the 85 percent level of accuracy, "Considering the problematics of archaeological inference, this is not a bad average." It goes to the core, however, of what questions archaeology and archaeologists may be capable of addressing.

Of course, a large part of the uncertainty in hafted-biface studies comes from applying modern engineering concepts of specialization and optimal efficiency to prehistoric systems of technology that were, in fact, extremely flexible and technologically forgiving, especially when used in combination with a variety of hunting techniques (e.g., communal drives, netting, and perhaps even poisoning). The minimal requirement of a stone point hafted on a shaft is that it allow the shaft to be propelled a "reasonable" distance, with sufficient force, accuracy, and penetrating power to kill or cripple the target, whether a person or an animal. Despite impressions to the contrary presented by modern researchers, this minimum requirement is met by a wide array of shapes and sizes of "points" (witness the multitude of shapes and sizes of stone, bone, wood, teeth, antler, and other materials that bedeck the business end of historic arrow and spear shafts). The "significant" engineering parameters of projectile points may, in fact, be limited to broad principles; for example, beyond a certain threshold, a point may simply be too large or heavy to be propelled by a bow. Clearly almost no point is too small to be placed on the piercing end of an atlatl or spear shaft. This suggests that studies based on the principle of functional optimization may, again, be misdirected when applied to ancient tradition-bound technologies.

Are Points People?

Moving beyond the concept of functional optimization, we consider the demonstrable relevance of projectile point types as group-identity markers and their importance in documenting group interaction across space and through time. The early pioneers involved in relating projectile points with their counterpart weapon systems were also concerned about classifying projectile points into logical categories. To some extent, this was no doubt a reflection of the museum mentality that favors classification as an organizational device, but it is also clear that early researchers entertained the idea that similarities in form indicated historical and social relationships. For example, Fox (1875) argued that stone point styles from sites in Patagonia were more similar to North American forms than Old World types, suggesting historical relationships within the New World. The issue of classificatory types was such a common concern in the nineteenth century that

Wilson complained about the complexity of the classification systems that had been employed by his contemporaries, suggesting that they were "too complex, the divisions have been too close, and the distinctions not sufficiently broad to be popular. A classification of infinitesimal divisions, with slight differences, difficult to distinguish and still more difficult to remember, will never be satisfactory or acceptable" (1891:58). He went on to propose a simplified system that included three shape categories: leaf shaped, triangular, and stemmed, with each shape type including up to three subclasses. He further identified a "peculiar" category made up of beveled, serrated, and bifurcated specimens and examples with "extremely long barbs usually squared at the ends." Obviously, "lumpers" and "splitters" have a long tradition in archaeological studies.

We credit a fellow American Bottom researcher, Robert McCormick Adams, with popularizing the term *diagnostic* to refer to point types that were spatially or temporally restrictive or both. He noted that "several valuable classifications of flint points have been formulated but few of these have attempted to distinguish between those points having diagnostic value, and the numerous forms which are found rather indiscriminately over a large series of cultures and which may or may not have value as cultural determinants" (Adams 1940:72). Adams may have been the first to explicitly lay out criteria to be considered in developing point types. He suggested that a classification system might "include a description of form, technique of chipping, type of chipping scars, and the nature of flint or chert used in its manufacture" (Adams 1940:72). The examples he chose as diagnostic for the Eastern Woodlands were all Woodland or late prehistoric forms; no Archaic examples were considered illustrative. This highlights a problem that persists today, that is, that many Archaic projectile point types cannot confidently be associated with other "cultural traits" that could be used to establish their diagnostic value. So, many Archaic point "types" were created simply on the basis of morphological similarity rather than on cultural and chronological contextual associations. Is it a surprise, then, that many of these types are suspect as valid cultural indicators or even as morphological units?

By the 1930s, researchers were beginning to promote "taxonomic systems" of classes and types of projectile points (e.g., Finkelstein 1937). As with other artifact categories, many researchers believed that projectile point types existed and awaited discovery (Smith 1954). By the 1960s, the analytical power of computers was seen as the key to sorting out the myriad of metric and nonmetric data necessary to scientifically describe and objectively categorize stone tools (Krieger 1964; Weyer 1964), an unfortunate trend that continues to this day. The classification of projectile point types very quickly became caught up in the debate over artifact types, in general (see Lyman et al. 1997). An even more unfortunate fate was in store for types when they were equated with "norms" (Binford 1965) and were swept up in the normative-substantivist debates (cf. Lyman and O'Brien 2004). Ironically, although Binford equated "type" with "norm" and treated both as four-letter words not to be used in social discourse, it was the New Archaeologists who undeniably incorporated norms into their methodological approach to model building (cf. Lyman and O'Brien 2004).

One outcome of the processualist approach to artifact analysis was the famous "style or form versus function" or "tale of two caves" debates between Binford and Bordes (Bordes 1972) in the 1970s; in the Old World, the argument centered on the implications of variability among Mousterian lithic assemblages, but in North America it signaled the start of a major reassessment of how archaeology should be conducted. The scholarly free-for-all that resulted directly and indirectly affected midcontinental Archaic studies, partly because Binford learned (and taught) much of his archaeology in the Midwest but also because the debate thrust hunter-gatherers into the limelight. The North American Archaic became the darling of the Americanist New Archaeologists. Efforts to persuade archaeologists that the miscreant type concept was so heavily laden with flaws that it could not be usefully applied largely succeeded. This only served to drive the use of types underground; while researchers in the Midwest openly talked about and used types for purposes of communication, in published reports they tried to objectify their analyses by using arbitrary biface categories (e.g., Class Ia, Ib, II, etc.). This attempt at sidestepping the issue actually made it worse for those attempting to compare reported assemblages, because of the confusing overabundance of artificially labeled categories to be considered. Meanwhile, CRM archaeology was steadily amassing evidence that supported the affiliation of specific point types with specific regions, periods, and even societies. The premature announcement of the death of point types was eerily similar to the conclusion reached by engineering studies that bumblebees, by virtue of their poor body weight-to-wing ratio, were not actually capable of flight. During the 1970s and 1980s, the chronological and cultural validity of projectile point types was being demonstrated as was the value of culture history (e.g., Bareis and Porter 1984).

We might point out that recognizing "communities of practice" as the underlying rationale for the existence of types should clarify one aspect of the archaeological record, but it will do so at the expense of the traditional functionalist approaches cited above. At issue is the central role accorded to the master-novice relationship and the impact this relationship has on shaping material culture. This holds major significance for the debate concerning the antiquity of the bow and arrow. Typically, in ethnographic hunting and gathering societies, the teacher charged with the training of a student in the necessary lore of hunting will gift the student with a "toy" set of weapons (or perhaps several sets throughout his childhood and early adolescence) to allow him to develop the complex motor skills required to skillfully operate weapons as an adult. Archaeologically, this would be reflected in "undersized" stone tools, appropriate to the size of the person being trained. In the case of spears or darts, the small hafted bifaces would easily fall into the size range of arrowpoints. Most midwestern archaeologists have encountered diminutive examples of all of the commonly recognized Archaic forms and have privately speculated that they served as teaching toys. Such points would only account for a small number of the points used by the average hunter throughout his lifetime, but this scenario certainly highlights the concerns that some researchers have expressed (Corliss 1980; Shott 1997) concerning the reliability of distinguishing between arrow and dart points.

As proof of the validity of types, we offer the success that has been achieved in the recognition of contextually and chronologically based projectile point types or styles. In fact, time and the accumulation of data tend to favor resolution of issues surrounding the viability of point types. Few archaeologists now dispute the priority of fluted points in the Eastern Woodlands sequence and North America, in general. The 14 point types Scully (1951) identified for the central Mississippi Valley are still recognized as valid today, even if researchers have modified their associations on the basis of new information; for example, several types originally identified as Late Archaic or Early Woodland are now recognized as indisputably Early Archaic (i.e., Hardin Barbed, St. Charles, Graham Cave Notched). Points that had been assigned to a broad Late Archaic–Early Woodland time span have recently proven to be restricted, on the basis of good contextual data, to one or the other period, at least in some regions (e.g., Emerson and Fortier 1986). Other examples abound. Dalton points were once chronologically grouped with side-notched varieties because of their co-occurrence in mixed deposits in cave and rockshelter sites, but their unique occurrence on open-air sites in the Southeast led to their recognition as an earlier horizon marker (Goodyear 1982). Kramer points, which were thought to bridge the Terminal Archaic–Early Woodland transition, are now definitively associated exclusively with Early Woodland times (in fact, with one specific Early Woodland culture—Marion), at least in the Midwest. The straight- and expanding-stemmed, barbed varieties (e.g., Dyroff, Springly, Mo-Pac) that were thought to persist from Archaic times into the Early Woodland in Illinois (Linder 1974) are now recognized as restricted to the terminal Late Archaic (McElrath et al. 1984). Contracting-stemmed points have been historically difficult to employ as cultural identifiers because they seem to reappear often in the archaeological record, having been found in the Eastern Woodlands and on the Plains in contexts dating from about 6000 B.C. to A.D. 500. In specific localities, however, they seem to be restricted in their affiliation to narrow periods or specific cultural associations. For example, in the American Bottom Archaic sequence, they are largely restricted to a single Late Archaic phase (i.e., Mule Road). They reappear in Early Woodland contexts, in which they are associated with Black Sand and Florence-phase sites, but not with Marion-phase sites (Emerson and Fortier 1986; Farnsworth 1986), and they are common in Middle Woodland contexts but may be more temporally and regionally sensitive than previously thought (Fortier 2001).

Archaeologists are also beginning to recognize significant boundaries in the distribution of particular point types; for example, the classic Dalton variety is arguably restricted to the central Mississippi Valley (Koldehoff and Walthall, this volume). We are even beginning to recognize contemporary (ethnic?) boundaries or interface zones between point types, as in the case of the McLean point type of the Falling Springs phase of the American Bottom and the side-notched Hemphill and Godar types in the central Illinois Valley (McElrath et al. ch. 11, this volume; Nolan and Fishel, this volume). Stafford and Cantin (this volume) suggest a possible boundary between the Brewerton Eared variety of the Ohio River valley and the Matanzas types of the southern Indiana hill country.

This is not to imply that the pursuit of types has not been without missteps, setbacks, or failures, many of which have involved grouping points by a single apparent morphological trait, usually centering on the haft element. The failure to conduct careful typological examinations and to rely on secure collections from chronologically and contextually secure deposits has led to much confusion. For example, in the Midwest, the common assumption that side-notched points can be reliably assigned to the Middle Archaic period (O'Brien and Warren 1983) has largely been disproved (Nolan and Fishel, this volume). Contracting-stemmed points are a perennial focus of examination in the effort to develop explicit criteria to formularize a method of objectively sorting surface-collected materials into various named Archaic and Woodland types. Such studies seldom yield publishable results; as is the case for side notching, the tendency is to resort to a functional explanation for the contracting base shape (Boszhardt 2002; Musil 1988).

It is important to recognize that projectile point types do not form a classification scheme that can be invalidated or undermined because a given point type proves not to be a useful indicator of age or cultural affiliation. We recognize that each type must stand on its own and that some are more useful and restrictive, either temporally or spatially, than others are. Also, we reject any attempt to mathematically define or recognize point types on the basis of a uniform set of criteria. A single trait, such as a distinctive haft element (e.g., Turkey-tail), shoulder element (e.g., Table Rock), blade shape (e.g., Wadlow), barb shape (e.g., Calf Creek), or unusual composite shape (e.g., Fox River Valley), may be sufficient to define a category; more often, multiple factors, such as frequency of heat treatment, method of resharpening, degree and placement of grinding, and material preference play significant roles in contributing to the recognition of distinct types. Again, the criteria for accepting a type (or variety) as useful rests solely on the degree to which the point can be reliably associated with a group or time period on the basis of excavated, contextually secure materials.

The suggestion that projectile point types are subjective is absolutely correct; all attempts at lithic categorization are subjective. Researchers have recently recognized that debitage types are not easily replicated or necessarily logically bounded

(Shott 1994). Degree of thermal alteration of chert has always been difficult to define, and even assignment of chert to bedrock formations is not without difficulty (McElrath and Emerson 2000). Still, experienced regional practitioners who are accustomed to identifying the projectile point types that occur in their region will achieve and share a consistency rate of identification that matches the success rate that lithic use-wear analysts have demonstrated with blind testing (Odell and Odell-Vereecken 1980).

Whatever misgivings researchers may have had in the past concerning the concept of projectile point types, it is clear that the universality and heuristic value of types as cultural markers outweighs the shortcomings accruing to small pointed stones with few distinguishing comparative traits. Many contributors to this volume have endorsed hafted bifaces as ethnic or cultural markers to varying degrees (e.g., McElrath et al.; Ray et al.; Stafford and Cantin; Nolan and Fishel; cf. Ahler and Koldehoff; Butler; Purtill; and Wiant et al.). In fact, the projectile point has assumed a preeminent role in assigning time and cultural affiliation, to judge by the contributions. For example, in their summary of western Illinois Archaic prehistory, Nolan and Fishel (this volume) list 62 radiocarbon dates from 29 sites, but the database they draw from of sites with chronological parameters exceeds 4,000 locations (Dave Nolan, pers. comm. 2005), indicating that over 99 percent of the sites are given a temporal assignment on the basis of diagnostic projectile point type present.

Most researchers now recognize the falsity of the form-versus-function dichotomy that developed during the twentieth century and accept the two aspects as complementary sides of the same "biface" (Christenson 1986; Odell 1994, 1996; Shott 1997). The cultural-evolutionary paradigm that artificially postulates a trend of continually increasing efficiency precludes the independent study of point styles and forms since those who endorse that paradigm seek answers that are, to a large extent, predetermined by the model. We see the projectile point form as a very forgiving, functionally diverse, and variable tool that was documented in the ethnohistoric record as having served, at a minimum, as a piercing weapon for hunting and war, as a butchering and cutting tool, and as a scraping implement. Functionalist studies that impose modern standards of tool specificity onto the past establish false parameters by which to measure tool selection. Point shape was more likely dictated by hafting needs and cultural preferences than by standards of physics and functionality. We further argue that only by adopting a theoretical stance that allows for the stereoscopic perspective necessary to integrate form and function will archaeologists contribute to a meaningful, three-dimensional reconstruction of the history of Archaic societies. The basic documentation of the growth, spread, and interaction of Archaic social groups in a culture-historical framework (homology) is the fundamental and necessary precondition for any contextually meaningful discussion of the role of environment and technology (analogy) among the apparently diverse trajectories undertaken by those societies.

The incomplete and sometimes contradictory nature of the evidence surrounding formal stone tool uses and associated weapon systems precludes data-based conclusions that lead to a grand narrative theme. The narrative themes that have been employed in the literature were in place prior to the collection of the data that are marshaled to dispute the issues. So, for example, the argument that the bow and arrow system is technologically superior to and, therefore, replaced the atlatl and dart as a preferred weapon system exists in the absence of conclusive data from the prehistoric record; instead, the evidence cited in support of the argument is selected on the basis of its conformity to the paradigm. We believe that most researchers quickly overlook this in the heat of debate. Even more problematic are the subtle, unexpressed biases inherent in the Western outlook. In particular, we argue that the concepts or, more accurately, the assumptions of the inevitability of technological progress and innovation and the accepted importance of "newer, better" devices are so ingrained in the Western world view that they have become the accepted scientific explanation for whatever archaeological phenomenon is thought to require illumination.

Earth, Wind, Fire, and Water and the Archaic Landscape

The study of climate change and culture-climate relationships has been an integral part of Holocene research for at least a century and was especially emphasized in the New Archaeology. Climates change because of natural forcing mechanisms such as variations in solar output, increases in carbon dioxide and methane gases, volcanic aerosols, and rapid deglaciation, which creates changes in oceanic water temperatures (Webb et al. 2004). The relationship between climate change and fluvial response is unpredictable and variable (Knox 1985; Van Nest 1997). Understanding the episodic nature of rainfall, erosion, and flooding, especially in regard to human habitation in river valleys, is, however, an important aspect of Archaic research as is documenting the relationship between landscape evolution and climatic change at the local level during the Holocene. In fact, large-magnitude flooding in river valleys likely had more direct impact on landscape modification and human environments than broader regional changes in climate (e.g., Kidder 2006; Kidder and Sassaman, this volume).

Biotic communities, which form the sources for human subsistence, are directly shaped by the inherent characteristics of prevailing air masses, wind patterns, and resulting weather conditions. Evidence of regional climate change based on reconstructions of vegetation patterns comes largely from pollen cores (King 1981; Webb et al. 2004; Wright 1968). In the Midcontinent, the advance and contraction of the Prairie Peninsula has been a major area of research (Transeau 1935). Early characterizations of this movement (King 1981; Wright 1968) were based primarily on pollen sequences derived from the northern periphery of the prairie. However, recent research has broadened perspectives through additional sequences from virtually all of the states bordering the Prairie Peninsula (cf. Styles and McMillan, this volume). The scenario recorded by pollen has been corroborated by additional data sets, including macrofossil remains (Baker et al. 1992), and by stable isotope analysis of speleothem calcite from cave sites (Denniston et al. 1999; Dorale et al. 1992). Faunal (Styles and McMillan, this volume) and floral (Simon, this volume) data from cultural contexts have also provided information on species availability useful for local environmental reconstruction. The emerging picture of Holocene climate change in the Midwest is assuming a much sharper focus, and we refer the reader to the excellent summary of this data by Styles and McMillan (this volume).

Despite the considerable strides being made, local environmental conditions usually still must be extrapolated from regional data. For example, the Illinois River valley, which has generated climate and culture-change models, has not been sampled by pollen cores (Van Nest 1997). As a result, there is little direct evidence for vegetation or climate change in this area during the Archaic. Botanical evidence from the Koster site is derived from carbonized wood fragments, and it is through these remains that researchers have argued for minimal direct climatic effect on floral communities in this locality during the Hypsithermal. The general absence of pollen data in the southern portion of the Midwest is striking, leading researchers to rely more heavily on faunal remains to reconstruct ancient environments for specific locales (Klippel 1971; McMillan and Klippel 1981; Styles and McMillan, this volume). Lower Illinois River valley geomorphologists have also often utilized landscape deposition and alluviation rates to model landform changes and, by extension, changes in vegetation and climate (Hajic 1990). The data from which researchers reconstruct climate and vegetation during the Holocene are, at best, indicators of broad regional patterns. Debates continue about the specific effects of climate change on vegetation in many localities because of the uneven nature of the data. Geomorphic data are usually modeled on such an expansive scale that they are of limited use in understanding and interpreting local conditions that would have had significant impacts on human populations. It is apparent that when this very incomplete environmental record is considered in conjunction with the very limited archaeological evidence, researchers need to proceed with some caution when proposing human-climate relationships in the Midwest.

Rather than attempt a comprehensive review of the posited climatic shifts that potentially impacted midcontinental Archaic populations, we highlight several aspects of the climate-landscape connection that not only may have affected the life histories of prehistoric native groups but also may have altered or structured the appearance of the archaeological record. There has been a trend in recent years, largely in response to the perceived trend toward environmental determinism, to discount the environment as a relevant factor influencing the historical trajectories of human groups. While it is true that some researchers have accorded the environment unwarranted preeminence and treated it as a prime mover in shaping human behavior, there is little doubt it is a relevant factor in human decision making.

A distinction must be drawn, however, between long-term meteorological shifts that operated over millennia (e.g., the Hypsithermal) versus short-term calamitous events (flooding, volcanoes, earthquakes, mudslides, natural dam breaches, tsunamis, regional droughts, etc.). For the most part, longer-term climatic shifts had little perceptible year-to-year impact on the lifestyles of groups who occupied and exploited the environmental niches that were gradually impacted. Life-threatening catastrophic events involving days, months, several years, or decades, however, would have focused the attention of indigenous populations in ways that were direct and immediate, perhaps instilling patterns in the corporate memory that lasted for generations. It is important to note that both of these categories of events affected the ultimate disposition of the archaeological record, but only the latter impacted the real-life histories of native groups at the individual or transgenerational level.

Researchers also need to be cognizant that in many cases human practices in conjunction with specific environmental settings become key factors in long-term landscape modification. Perhaps the most profound impact on the landscape initiated by nonindustrial human practice is through the use of fire. The maintenance of prairie-forest ecotonal zones through the use of fire has been proposed in the past (Abrams 1992; Grimm 1984; Guyette and Cutter 1991; Nelson et al. 2004; Sauer 1950; Van Nest 1997). Palynologists generally view the effect of fire on the landscape as the result of natural causes; from their standpoint, fire was not utilized by Native Americans until after they became slash-and-burn corn agriculturalists (McAndrews 1988). However, the ethnographic record in North America indicates that the use of fire was not restricted to agriculturalists (Barrett and Arno 1982; Sauer 1950; Van Nest 1997:352; Wright 1973), and recent research has largely tipped the scale in favor of human burning practices having characterized the earliest periods of occupation in the Midcontinent (Styles and McMillan, this volume).

There is little doubt that the Hypsithermal episode initiated a drying effect resulting in the expansion of the Prairie Peninsula; at the same time, however, the drying impact favored xeric forest expansion at the expense of mesic forested areas and would have made midwestern woodlands even more susceptible to impact by anthropogenic burning. The prevailing westerly winds and the general lack of relief over much of the Midwest ensured the rapid spread of fires from west to east. Not only did human intervention hasten prairie expansion but it also prolonged the episode of expansion and slowed what would have been the natural reversal of this process when a wetter climatic regime returned. More important, however, was the net effect on resources of economic value to human groups. As Styles and McMillan (this volume) point out, the expansion of the Prairie Peninsula opened up and expanded the woodland-prairie interface, making it a more suitable habitat for animals (rabbit, squirrel, deer, turkey, etc.) that were of interest to humans. So, not only were the quantity and variety of floodplain resources improved as a result of climatic change associated with the Hypsithermal, but upland resources surrounding the advancing prairie also were enriched. We believe that the growth and economic enhancement of a large area of the prairie-woodland ecotone during mid-Holocene times have been ignored by those suggesting a net deterioration of the resources of the greater Prairie Peninsula. While some areas would, no doubt, have become economically less productive (e.g., tallgrass prairie), other areas would have been substantially enhanced. Importantly, this would have unfolded at such a "glacial" pace that it would not have been perceptible to indigenous populations (Simon, this volume); it would have had little impact on the real-life histories of individual native groups.

Nevertheless, such a time-transgressive phenomenon would have contributed to the ultimate shape of the archaeological record. For example, if Early Archaic groups regularly hunted animals that preferred the open savannas associated with timber-grass ecotones, their collective multigenerational campsites and hunting losses would have accumulated in the archaeological record in such a way as to mimic the movement of the forest edge as it retreated (e.g., Conrad 1981). Moreover, the advance and retreat of the prairie edge would have triggered several landscape-altering events that would, in turn, have reconfigured the archaeological record. The episodic erosion and infilling of stream valleys routinely erases or buries traces of human occupation, and to the extent that such phenomena are temporally restricted at the regional level, the net effect is to erase evidence of specific periods of occupation or specialized components of settlement systems. Geomorphologists in Iowa (Bettis and Hajic 1995) have demonstrated the role that geomorphic and soil processes have played in the Midwest to disguise the nature of the archaeological record.

Archaeologists are just beginning to appreciate the importance of water-level history on the modern disposition of the Archaic portion of the archaeological record. Griffin (1967), in his classic summary of Eastern Woodlands prehistory, recognized that many coastal Middle Archaic sites are now underwater. Kidder and Sassaman (this volume) indicate that mid-Holocene rising sea levels drowned many coastal Early Archaic sites and occluded the entire chapter on subsistence and settlement for this period along the coast. The drowning of Archaic sites is not limited to the seacoast. If anything, because of their association with glacial events, the interior Great Lakes have experienced significant and complex water-level histories. Lovis (this volume) paints a vivid picture of alternating higher and lower lake levels for the Michigan-Huron and Superior basins (by comparison with today). Such reconstructions are complicated by the distinctive histories of each lake basin, one often experiencing high water levels at the same time that the other underwent low-water episodes. Lovis notes that at the inception of the Early Archaic, the Michigan-Huron basin was at its lowest and that all of the initial Early Archaic settlements that were within several miles of the coast are now submerged. This picture is further complicated by water levels that were, at times, higher than those prevailing today, resulting in "coastal" sites occurring at locations deep in the interior of Michigan, not to mention that the alternately submerged and exposed sites have undergone complex geomorphic histories often resulting in burial by deposition of sediments.

In addition to the drowning of many Early Archaic sites, the fluvial activities associated with river valleys have buried many sites from later periods beneath often-thick layers of sediment. Kidder and Sassaman cite the example of the Nolan site, a Middle Archaic mound complex on the modern floodplain of the Mississippi River that is buried by up to 5 m of alluvium. The only Early and Middle Archaic open-air sites in the American Bottom floodplain that have been investigated were buried by a meter or more of alluvium. In the lower Illinois River valley, Archaic deposits at the Koster site exceed 10 m in depth, and remains of all three subperiods have been buried by a combination of alluvial and colluvial processes (Brown and Vierra 1983). More recently, archaeologists have come to appreciate that many sites in upland settings may have been buried by a combination of wind-borne loess and other soil processes (Abbott 1987; Benn and Thompson, this volume; Bettis and Hajic 1995; Van Nest 1997), and Lurie et al. (this volume) identify a series of factors that have caused the burial of sites in the glaciated topography typifying northeastern Illinois.

It is important to distinguish between those gradual, time-transgressive climatic events that may have resulted in a gradual shift in the location of settlements through time (rising or falling sea levels) or the location where hunting activities took place (expanding prairie-woodland ecotones) from events with a certain urgency, like the unexpected onset of a period of catastrophic floods, that would have immediately affected the locations of villages and fishing stations, if not associated lifestyles. Even the latter events may not have affected the overall lifestyle of native groups unless the resources they depended on were seriously degraded by such catastrophes. An example of the latter involves the episode of increased flooding and overall cooling of the temperatures in eastern North America at the end of the Archaic (see Kidder 2006; Kidder and Sassaman, this volume). The degree to which such events disrupted established social networks and the extent to which they can, in turn, be deciphered from the existing archaeological record vary considerably; but the occurrence of such history-altering episodes cannot be ignored by cultural evolutionists who seek to explain every perceived social development as a step toward social integration and complexity. It is important to disentangle the *historical trajectories* of specific native groups from the background of *reconfigured archaeological records* that are the inevitable result of landscape evolution. This is the peculiar task of the archaeologist, who, by undertaking it, will shed light on issues of concern to social scientists, such as anthropology, economics, social interaction, technology, and the growth of complex societies.

Concluding Remarks

In this chapter, we have discussed three domains of Archaic research—chronology and taxonomy; projectile technology, function, and style; and climate and landscapes—and the many-layered issues embedded in their interpretation. These topics, in various forms and guises, have dictated the course of Archaic research for generations. The impressive growth of Archaic databases resulting from CRM research has only served to highlight the commanding role that these themes play in attempts to understand the nature of early indigenous societies in North America. The contributors to this volume, each to a differing degree, have been forced to confront these themes in the course of their research. Climate change, landscape evolution, and their subsistence implications, for instance, have been central to much Archaic research. For topical specialists, changes in climate form the organizational frame (Styles and McMillan), or at least the backdrop, for population studies (Milner et al.) or establishing the context of diet choices (Simon). For those examining culture change, as interpreted from deep stratigraphic sequences (Ahler and Koldehoff; Ray et al.; Stafford and Cantin; Wiant et al.), reconstructing environmental conditions is key to understanding not only the geomorphological determinants of site contexts but also the habitats encountered by the human occupants of sites and those occupants' lifeways. For those attempting regional summaries, the environment is of concern for understanding broad-scale populations movements, local and regional adaptations, and habitat preferences of successive populations.

Problems associated with dating artifacts, recognizing contemporary assemblages, and taxonomic organization of material remains have proven more difficult to resolve than one might have imagined, despite the advent of radiocarbon dating. In addition to the limitations of ^{14}C dating (which were magnified with the advent of calibration programs), the problems inherent in determining secure archaeological context and meaningful associations (especially in deep sites such as Modoc [Ahler and Koldehoff, this volume] and Koster [Wiant et al., this volume]) still plague archaeologists. These concerns are increased when one considers that most artifacts are dated only by association. Because of these constraints, archaeologists have made only erratic progress in transforming diagnostic artifact markers into reliable regional chronologies. These problems are exacerbated by the sad state of artifact typologies, especially hafted-biface categories—which are all too often indiscriminately correlated, dated, identified, and modified to the extent that they become unusable for defining cultural and chronological contexts. The use of artifact typologies to identify technological or cultural traditions is further hampered by researchers' inability to understand the relationship of points and people. As we discussed above at length, archaeology as a discipline has yet to come to terms with issues as seemingly straightforward as hafted-biface function, chronological associations, styles, delivery systems, and so forth. The lack of detailed chronologies and cultural associations is most critically felt by researchers reconstructing social landscape use on the basis of distribution patterns of surface-collected diagnostics (e.g., Nolan and Fishel, this volume).

All of the above factors and more play into the essential taxonomic divisions of the Archaic period promoted by various archaeologists. These divisions, in turn, recursively dominate the interpretation of what the Archaic "means." It has become increasingly popular to use perceived climatic and landscape changes to demark changes in Archaic cultures. Whether they are intended to or not, these climatic shifts all too often become the primary variables in creating cultural (i.e., material and subsistence) change. In a broad sense, such scenarios provide a reassuring picture of cultural adaptations marching through time in lockstep with climatic shifts. Yet, as is apparent from the evidence we have presented above (as well as from the chapters in this volume by Kidder and Sassaman; Lovis; and Styles and McMillan), while there have been significant, indeed, almost catastrophic landscape changes in some regions, many landscapes remained almost unchanged in terms of their habitability through the Archaic. There is no doubt that environmental conditions do create boundary conditions for human subsistence and habitation, but we contend, and many of the authors in this volume illustrate, these parameters are extremely broad and more often serve as enabling rather than delimiting factors.

The specialists invited to participate in this volume have had to cope with and, to some extent, overcome the problems just enumerated to impart as complete a picture as possible of Archaic developments in their specific regions or topics of interest. Despite the often-unstated misgivings researchers may have about their respective data sets, it seems midwestern archaeologists are collectively on the threshold of a breakthrough in the construction of a new baseline for Archaic research. We believe that the careful reader will discern in the following chapters a somewhat inchoate framework of the early history of native social developments and interaction in the Midcontinent. We also believe that this beginning will serve to encourage future researchers to break out of the neo-evolutionary straightjacket within which Archaic studies have all too often been confined.

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2

The Eastern Woodlands Archaic and the Tyranny of Theory

Thomas E. Emerson and Dale L. McElrath

The Archaic of . . . the Great Lakes area represents a rather monotonous cultural pattern through time. Current data do not permit close-knit arguments as to culture change and specific activities dictated by local environmental circumstances or cultural predilections. While, obviously, it would be nice to establish some empathetic relationship with actual people involved in the Archaic, this is impossible, because dead men tell no tales. What we are left with is an essentially boring situation in which, as far as I can tell, only those devoted to the investigation of minutiae could be interested.

—Olaf Prufer

This is an exciting time to be studying Archaic societies in eastern North America. A wealth of new data provides evidence that this was a time of unprecedented social, political, economic, and technological variability.

—Tristram R. Kidder and Kenneth E. Sassaman

Theories, and those who craft them, prosper best with ambiguous and limited data sets.

—Thomas E. Emerson

Introduction

The first of these three epigraphs concerning Archaic studies embodies a common perspective in the North American Midcontinent. Indeed, archaeologists, as well as the public, in general, have seldom shown the passion for the lengthy Archaic period that they demonstrate for either the Paleoindian period or the later ceramic-bearing periods. To paraphrase the cliché about the Late Woodland period, one might characterize the Archaic period as incorporating the "other good gray cultures" of the Eastern Woodlands. This disinterest seems counterintuitive since the Archaic period has yielded prolific assemblages, spectacular artifacts, and, as any knowledgeable collector can attest, the most commonly recovered artifacts on the landscape. The third epigraph focuses on one of the major problems facing Archaic-period studies—the domination of theorizing and the paucity of data.

Is it the ubiquity of Archaic material remains that contributes to the period's neglect, or is a more fundamental scholarly bias at play? To be sure, both archaeologists and the public often succumb to the hyperbole that can be attached to artifacts, styles, and sites touted as the "earliest," "largest," "most complex," "most sophisticated," and so on, superlatives that are seldom applied to Archaic sites or artifacts. In fact, Prufer suggests that, "if the human element involved in the study of real, live people is removed, the material remains of such 'Archaic-style' folk as the Australian aborigines or the Bushmen of the Kalahari Desert would be just as uninteresting as the study of the Archaic of northeastern Ohio" (2001:195). Indeed, we believe that it is this conception of the Archaic peoples of the Eastern Woodlands as the social equivalents of modern hunter-gatherers that has contributed to declining interest in the Archaic period in the Midcontinent. If so, this is, indeed, ironic because it was scholars' confidence that North American Archaic societies constituted a laboratory for hunter-gatherer studies that put those societies in the spotlight several decades ago.

From the earliest times in North American archaeology, interest focused on large sites with obvious or elaborately constructed earthworks or mound centers and spectacular artifacts. In areas where these archaeological sites had not been destroyed by urban, industrial, or agricultural development, they were investigated during the Depression-era Works Progress Administration (WPA) program. In the Midsouth, WPA excavations explored spectacular Archaic sites such as the Green River shell middens (e.g., Webb 1946; see also Jefferies, this volume; Milner et al., this volume). During the 1970s and 1980s, when the foundation was laid for the long-term public financial support of what had been largely "salvage" archaeology up to that time, a fundamental shift occurred in archaeologists' understanding of what constituted "significant" information from prehistoric sites. The emphasis placed on the study of hunter-gatherers and their settlement patterns correlated with a new cultural resource management (CRM) appreciation of the small site as an essential element of the archaeological record. In the name of cultural ecology and processualism, New Archaeologists scoured the landscape for the spoor of hunter-gatherers no less diligently than the latter had searched for evidence of game movement, good locations for plant gathering, or productive fishing stations. The New Archaeologists were armed with more advanced weapons than their WPA predecessors, among which were an absolute dating method, a soil flotation technique, and a mandate to scientifically sample the landscape. Carbon dating could relate sites of similar age across the landscape, flotation could provide evidence for reconstructing the relative importance of plant and animal foods in the diet, and the sampled landscape could reveal whole settlement patterns and systems—or so researchers thought.

Like most scholarly movements (not to be confused with fads), the processualism of the 1970s and 1980s has been followed by a counterreformation, and archaeological interest has shifted away from the sterile scientism that typified some processualist thought. Contributors to this volume span the spectrum of archaeological theory, some eschewing processualism while others continue to embrace it. However, we suggest the Archaic record, as currently known, is largely resistant to many processualist modes of analysis. All too often Archaic societies have been abandoned to the neo-evolutionists, who have adopted them as the necessary basic building blocks in ancient North Americans' advance to social complexity. Thus, to rephrase the situation and to address Prufer's concerns, we believe that, after cultural ecologists breathed life into the Archaic, it was left conceptually adrift until it was embraced by neo-evolutionists and transmogrified into a taxon to do the heavy lifting for the complex societies that necessarily followed. In this overview, we endeavor to historicize the Archaic so that it can fulfill the panegyric offered by Kidder and Sassaman and assume its rightful place in the history of midcontinental North America's native peoples.

Perhaps because of the breadth and depth of Archaic occupation in the Midcontinent, the presentation of data has often been implicitly centered on a neo-evolutionary model of cultural change that has served to frame the research and shape the results. The outcome of our research in Illinois has caused us to question the validity of this model as well as others for later periods, and our colleagues' presentations in this volume have reinforced our suspicions about the tyrannical nature of the neo-evolutionary paradigm. Because models have been so inextricably woven into discussions of the Archaic, we think it useful to untangle and examine their individual threads prior to suggesting what the data gathered thus far might indicate about the early history of native groups in the midcontinental United States.

Defining the Archaic

Since its formal conception and introduction by William Ritchie (1932a, 1932b, 1936, 1944:235–309) in the 1930s, the *Archaic pattern* has presented a persistent and apparently irresolvable conundrum to North America's Eastern Woodland archaeologists. Early reactions reveal a less than enthusiastic reception to the concept by key figures in regional archaeology, such as William S. Webb (Webb and Haag 1939, 1940), William Haag (1942:214), James Griffin (1946:42), William Sears (1948), and Richard MacNeish (1948:243). However, histories of early archaeological practice (Byers 1959b; Stoltman 1992) illustrate that, by the late 1940s and early 1950s, the identification of "Archaic" components had become widespread in the professional literature. It was clear that the utility of the term in giving conceptual form and structure to prepottery or nonpottery assemblages overcame any perceived typological and taxonomic weaknesses.

Why is it that the Woodland and Mississippian patterns (Deuel 1935; McKern 1939) quickly established themselves as bulwarks of Eastern Woodland taxonomy while the intrinsic validity of the Archaic pattern continues to be debated nearly three-quarters of a century after its introduction? The answer to that question may lie in its retention of those inherent weaknesses that were apparent to early critics. The failure to address those flaws still haunts current archaeological conceptions of the Archaic. With this in mind, it is useful to revisit the original definitions and usage of the Archaic pattern and the contemporaneous critiques of early commentators.

In defining an Archaic pattern, William Ritchie codified and expanded on what earlier excavators had already begun to recognize in the field—that assemblages of stone and bone tools were being recovered that were apparently preceramic. Such preceramic assemblages were tentatively assigned to a period preceding the newly recognized Woodland pattern. Without the advantage of radiocarbon dating or sealed stratigraphic sequences, early twentieth-century investigators could do little more than guess at the real age of such materials. What these early assemblages seemed to share, however, was a *lack* of ceramics and an *absence* of agricultural products (Ritchie 1932a). Such assemblages were, therefore, defined as "Archaic" more by default than by design. Increasingly, as archaeologists excavated and analyzed preceramic assemblages, they concluded that the remains represented traces of semisedentary peoples who lived by hunting, fishing, gathering, and collecting (e.g., Webb and DeJarnette 1942). By the time Sears negatively commented on the validity of the Archaic pattern, he was able to summarize it in terms that generally still characterize it today—"a complex which is non-ceramic, non-horticultural, old, and has a hunter-fisher-collector culture pattern" (1948:123).

Of the early criticisms expressed by opponents of the Archaic pattern, some have stood the test of time, while others have faded with additional research. For example, Griffin (1946:42–43) declined to use the term *Archaic* because he believed the Lamoka type assemblages represented a culture that was insufficiently primitive and too late chronologically to be "archaic." It seems evident from his discussion that he equated the term *archaic* with the pre-Neolithic period of Eurasia. Perhaps this is why he ultimately subsumed the known Archaic components into his Paleoindian cultures (Griffin 1946:42–43, Figure 3). Sears (1948:123) objected on the same grounds to the use of *Archaic* for cultures that he saw as too recent to deserve that appellation (assumed to be about A.D. 500 at the time he wrote). Obviously, in some sense these writers conceptualized "archaic" very much in the term's dictionary definition as "out of use, obsolete, having characteristics of an earlier more primitive time." The advent of radiocarbon dating eliminated the chronological objection and revealed the long span of preceramic occupation of the eastern United States.

More telling has been the objection that the Archaic pattern was defined in the negative, that is, by the absence of certain cultural traits (e.g., Sears 1948:123–124). At a practical level, these negative traits could be so broadly applied as to be meaningless for recognizing true Archaic assemblages. Scholars were cognizant that functional variation among sites could account for the absence of traits such as pottery or evidence of horticulture. They raised the concern that the remains of, for example, non-ceramic-using or highly mobile groups might be miscategorized as Archaic when they actually were associated with one of the later cultural patterns. Sears (1948:123–124) further stressed that, in the Midwest Taxonomic System classification, except for the presence of pottery, the Archaic and Woodland patterns were indistinguishable, suggesting the Archaic classification had questionable utility and, in fact, might be deceptive. The problem of classification was exacerbated by the tendency of researchers in the West and Southeast to appropriate the Archaic terminology and apply it to inappropriate assemblages (Byers 1959b:231–232). Running through these early discussions was an undertone questioning the actual taxonomic status of the Archaic—was it a time framework, a technological or evolutionary stage, or something altogether different? By 1955, research on Archaic-pattern assemblages seemed to be in such a state of confusion that there was an attempt to bring order to the issue by holding the first Archaic Conference in conjunction with the Society for American Archaeology (SAA) meeting in Bloomington, Indiana. From this conference emerged the initial attempt at a synthesis of the Archaic of North America (Baerreis 1959; Byers 1959a, 1959b; Fowler 1959; Kelley 1959; Meighan 1959).

For midcontinental archaeologists, one of the most important outcomes of the 1955 conference was the publication of Melvin Fowler's (1959) Modoc Rock Shelter sequence and his initial discussion of the Archaic stage in this region. Expanding on Willey and Phillips's (1955:740–747) technological definition, Fowler (1959:257) conceived of an Archaic "stage" that involved progressive technological development, adaptation to and utilization of local fauna and flora, subsistence practices based on collecting, and a community patterning best described as "Restricted Wandering" or even "Central-Based Wandering" settlement. The Modoc excavations also added an important dimension of great time depth to the regional Archaic stage through the demonstrable presence of deeply stratified deposits and very early radiocarbon dates. Modoc Rock Shelter appeared to support many of the early assumptions about Archaic lifestyles and continues, in many respects for some scholars, to represent the quintessential definition of the Archaic in the Midcontinent (e.g., Ahler and Koldehoff, this volume).

In the last half-century, the Archaic has become a well-worn and integral part of the Eastern Woodlands cultural chronology—although many of the criticisms of early detractors remain unresolved. Some of the early questions have become even more pertinent now that archaeologists recognize that horticulture and ceramics occurred within some Archaic cultures and that some societies were socially and politically complex and perhaps even sedentary. While the cultural and economic criteria for defining Archaic societies have become less clear, the parameter of time has been clarified and the long span validated by the multiple absolute dating technologies that are now widely available.

James Stoltman (e.g., 1978, 1992) has evaluated the continuing ambiguity of the Archaic concept as a taxonomic unit in his review of Eastern Woodland Archaic archaeological literature. His discussion underscores the generally casual attitude of midcontinental archaeologists toward taxonomic issues. He notes that, while the majority of practitioners appear to conceive of the Archaic as a fixed *period* of time, following James Griffin's (1952, 1967) early presentation of the concept, in reality its specific chronological boundaries shift from geographical region to region (e.g., see the various chapters in this volume). Given that shifting chronological boundaries are incompatible with the taxonomic definition of a period, Stoltman concludes that, despite what many researchers say, "*in practice*, the Archaic concept functions as a stage, not a period" (1992:109). Adding to the taxonomic uncertainty, in the late 1960s Gordon Willey (1966:247ff.) introduced the concept of a geographically circumscribed Eastern Woodlands Archaic *tradition* with implied historical and cultural group continuity. In contradistinction to Willey's tradition, it is not uncommon in the Eastern Woodlands to find references to a widespread Archaic *horizon*, both within and across regions. In this volume, all of these terms (*period, stage, tradition*, and *horizon*) appear in discussions of the regional Archaic cultures in the Midcontinent.

Whatever shape the concept of the Archaic assumes, whether a specific chronological period, a technological or social stage of development, a subsistence economy, or a long-term cultural-historical pattern of evolutionary development, archaeologists must be able to define its unique characteristics if it is to be a useful tool for understanding the past, a point Sears made (1948) nearly 60 years ago. It is this ability to define "difference" that was originally called into question by Sears and that still resonates today—perhaps even more strongly than it did in the early twentieth century.

In his assessment of the Archaic tradition as a meaningful formal taxon in the Eastern Woodlands, Stoltman (1992:111–114) characterizes its distinctive properties as consisting of the appearance of stemmed and notched spear points, generalized hunting and gathering subsistence practices, and the lack of ceramic containers. He contends that Archaic-tradition stone technology is recognizably distinct from that of Paleoindian times and that a distinctive shift took place in subsistence practices from the early big-game hunters to the later generalized Archaic foragers. While recognizing the presence of horticulture in Late Archaic times, he accepts Willey and Phillips's (1958:108) argument that plant cultivation only became a critical factor in the cultural-neo-evolutionary sequence when populations became dependent on its produce.

This effectively removes horticulture (or the lack thereof) as a defining Archaic criterion. The absence of pottery, which was a crucial variable in the original definition, seems to have become less important with the documented occurrence of stone vessels and early-fiber tempered wares in Late Archaic societies. Such a shift seems to us to seriously impinge on the utility of a definition that depended on the Archaic being "prepottery."

Stoltman concludes by offering a new conception of the Archaic that he believes represents a general consensus of current archaeological practitioners. He defines the Eastern Woodland Archaic as including those "cultures with Foraging or Cultivating ecosystem types (see Stoltman and Baerreis 1983) whose technological inventories are characterized by the presence of post-Paleoindian projectile point styles and the absence of true Woodland pottery" (Stoltman 1992:114). Little remains of Ritchie's *Archaic pattern* in this modern retelling.

We contend that, even 70-plus years after the *Archaic pattern* first emerged as a formal taxon in Eastern Woodlands prehistory, its definition continues to elude researchers. In fact, one could easily say that, in terms of definitional clarity, the Archaic has regressed rather than progressed. In the 1930s, archaeologists "knew" that Archaic societies did not make pottery, did not practice horticulture, and were hunting and gathering folk and that they preceded the Woodland pattern and were of some antiquity. Intervening years of research have demonstrated that, in contradistinction to earlier beliefs, the transition between big-game-hunting and Archaic foraging lifestyles is less clear than once thought. Some "archaic" groups did make and use pottery, did practice horticulture, and were likely socially and politically complex, even to the extent of engaging in monumental construction. Only the relative age of Archaic societies has been preserved intact (although greatly modified in absolute time and span).

One implicit conceptualization that has been transmitted through time virtually unaffected by the vagaries of research and theorizing is that the Archaic pattern is a reflection of a primitive stage in a cultural-neo-evolutionary sequence. As noted above, the common meaning of the *archaic* label itself was inherent in the archaeological definition—to be archaic was to be technologically and socially primitive. In fact, some of the objections to the term by Griffin and Sears related to the fact that the then-representative assemblages (e.g., Late Archaic Lamoka) were not "archaic" or "primitive" enough to fit into their evolutionary schema. More than anything else, the Archaic concept reflects the persistence of a neo-evolutionary stage framework that underlies and is tightly interwoven with much of eastern North American archaeology. This genre of thinking typically correlates attributes such as progressive technological improvements and subsistence efficiency with increasing social, economic, and political complexity, beginning with the earliest and simplest big-game hunters and ending with the late prehistoric chiefdoms or, in some scenarios, historic-period native confederacies (Muller 1997). Despite the profession's long inability to satisfactorily "define" the Archaic, it persists as a taxon because it fills a necessary developmental niche in the neo-evolutionary perspective of North American native societies. One might conclude that the Archaic theme is sustained more by theory than by data—a perspective that is supported by many of the chapters in this volume, which repeatedly demonstrate just how sparse the factual base is for many current theoretical constructions.

Archaic Theory and Truisms

To state, as we have above, that the Archaic taxon is definitionally ambiguous is not to say that no conceptual consensus exists among researchers as to what is appropriately "archaic." We believe that many points of consensus, so-called Archaic truisms, may be of doubtful validity or, at the very least, should be seriously questioned rather than simply accepted. The challenge to Archaic-period researchers is to recognize and confront unproven assumptions. Most archaeologists would probably not characterize Archaic-period research as being dominated by theoreticians. It is more likely to be thought of as the exclusive realm of paleoecologists, geomorphologists, archaeozoologists, archaeobotanists, lithic specialists, and their like. It is usually associated with "real science" and seen as a fieldwork endeavor enmeshed in site-formation processes and geomorphological deep trenches with complex stratigraphies interpreted against a backdrop of geoarchaeological and paleoclimatological issues.

Yet we contend that Archaic-period research involves some of the most theory-dependent archaeology being practiced in North America. The reasons seem clear to us. Because of preservation difficulties, sheer age, and the often-limited material signature of the small societies involved, Archaic assemblages tend to be restricted in diversity and are often contextually ambiguous. Theories, and those who craft them, prosper best with ambiguous and limited data sets. Large data sets from many sites with good cultural and chronological context limit the creative abilities and flexibility of theorists. The relative scarcity of data-rich assemblages makes the Archaic period a prime location for theoretical endeavors. Nowhere is this better or more completely expressed than in such issues as sedentism, mobility, cultural evolution, technological progressivism, adaptationism, environmental determinism, and the like. Not only are Archaic studies dominated by theory but that theory is also restricted almost entirely to a single paradigm—adaptation (i.e., Emerson and McElrath 2001).

Modern archaeological field investigations seem overburdened with theoretical baggage and often collect relatively few substantive data. We propose that some of the blame for this must rest squarely on the predominance in such research of behaviorist assumptions combined with an overriding neo-evolutionary paradigm. A behaviorist approach diminishes the importance of variation, categorizing it as idiosyncratic, and assumes that virtually any "sample" is representative of the behavior of the studied group as a whole. These typically inadequate samples can only confirm what is already known—they are seldom of sufficient vigor to actually challenge models. Such approaches are an unfortunate legacy of the New Archaeology, in which methodology took precedence over data. When this research approach is incorporated into a neo-evolutionary paradigm with its adaptationist assumptions about the relationship among key cultural variables, it is difficult for the research results to ever be at variance with the model. Such research agendas are more about filling in the details than about challenging the paradigm.

Theorizing the Archaic

From its earliest conception, the Archaic pattern was believed to represent the material vestiges of societies with hunter-gatherer lifestyles. Such people were presumed to have lived in small groups and have possessed a technologically unpretentious material culture. For archaeologists, the question was one of recognizing such prehistoric communities from the nominal material deposits. Beardsley et al. (1956) first systematically explored the connection between social, political, and economic variables and what they called "community mobility and patterning" in a seminal theoretical initiative sponsored by the SAA. Defining a "community" essentially as a group of people representing an "economically self-sufficient corporate unit" that is "politically independent and self-conscious," Beardsley and his colleagues (1956:133) were convinced that community mobility should be differentially reflected in archaeological residues. They believed a comprehensive examination of these residues would reveal the distinctive *community pattern* of a society and provide insights into its (to them) clearly interrelated economic, sociopolitical, and religious features. A series of these community patterns was identified that reflected, in a stage-like progression, an increase in economic, social, and political complexity.

On the bottom rung of the community-pattern stages envisioned by the SAA symposium participants (Beardsley et al. 1956) were Free Wandering folk hypothesized to have followed a lifestyle linked to the hunting of large mammals and foraging for locally abundant resources. Earlier Paleoindian societies were thought to have been Free Wandering. Lifestyles in the newly recognized Archaic pattern were generally thought to resemble a pattern either of Restricted Wandering or Central-Based Wandering. Archaeologists postulated that with the advent of the Restricted Wandering pattern, groups settled into distinct and perhaps defended territories. They might have followed a seasonal round or a less regimented schedule depending on the distribution and form of the exploited resources. This adaptation was usually attributed to later Paleoindian and the earliest Archaic groups. In the subsequent stage of Central-Based Wandering, people began to spend at least part of the year at a central settlement to which they may or may not have annually returned. The realization of such a pattern required storable wild foods, a locally abundant food source such as fish, and incipient agriculture. The succeeding Semi-Permanent Sedentary community pattern, in which participants lived in a sedentary village that moved in its entirety every several years, represented the advent of fully agricultural economies (although with some exceptions; see below).

For the first several decades after their conception, Archaic-pattern societies were primarily recognized as being *nonceramic* and *nonagricultural*; however, these societies were not necessarily characterized as being either socially or technologically simple. Beardsley et al. (1956) recognized such groups as the Australian Aborigines, the Kalahari Bushmen, the subarctic Athabascans, and the Shoshone as examples of Restricted Wanderers. Other groups such as the northern and central California natives, the Interior Salish, and many Siberian maritime groups were categorized as Central-Based Wanderers. Importantly, the researchers further acknowledged (Beardsley et al. 1956:150–151) that some hunter-gatherer societies with access to a rich and steady resource base (such as the classic exceptions to nearly every rule, the Northwest Coast societies) might have possessed a Semi-Permanent Sedentary community pattern. From their published discussions, it is apparent that Beardsley and his colleagues recognized that hunter-gatherer societies possessed diverse subsistence economies, participated in a wide range of social and political systems, and practiced diverse forms of community mobility.

Modern Hunter and Gatherer Analogs and Simple Societies

Initially, researchers did not envision hunter and gatherer societies as especially simple and certainly not as a one-dimensional social type. Yet by the 1970s, such economies had become pigeonholed, at least in the archaeological literature, as those of small, egalitarian, highly mobile groups living in marginal environments. So one might with some justification ask, what changed? What happened to that earlier rich, multilayered view such that it was replaced by what many think of today as stereotypic hunters and gatherers—those small bands of highly mobile folks idealized in the Bushman societies of Africa? Within a decade of the early attempts to correlate archaeological residues and hunter-gatherers, the character of such research was transformed by a burst of anthropological interest in modern hunting and gathering groups. The benchmark publication relating to this transformation was Lee and DeVore's *Man the Hunter* (1968). Peter Rowley-Conwy (2001) suggests that *Man the Hunter*, in combination with the conceptualization of "the original affluent society" in *Stone Age Economics* (Sahlins 1972), revolutionized the way anthropology, and ultimately archaeology, thought about hunters and gatherers. These works tapped into dominant social themes of the 1960s, including the multifaceted environmental movement that accentuated humans living at one with nature and the ever-continuing Romantic theme of the "noble savage." These influential works and the many similar studies that followed served to create a public image of hunters and gatherers as living a generally peaceful and tranquil existence, in relative ease and plenty, in tune with their environment. They also presented such hunters and gatherers as timeless, living virtually fossilized lifestyles from time immemorial, perpetually uninfluenced by surrounding complex societies.

What emerged from Lee and DeVore's research agenda (1968b:11–12, cited in Rowley-Conwy 2001:39–40) was a powerful image of small, highly mobile groups characterized as possessing an egalitarian social system and minimal personal property, living in bands that sporadically aggregated and between which individuals might move at will, and lacking territorial rights or claims, food-storage capabilities, and an attachment to any particular landscape. Lee and DeVore's work generated a revival in hunter and gatherer studies in anthropology as well as in ecology and human biology. The initial reaction was a flourishing research agenda that focused passionately on environmentally and ecologically related variables. Given the new field studies, it seemed self-evident that hunting and gathering societies were tightly integrated with their host environments and were best studied in that context. This new focus effectively disenfranchised the vast majority of historic hunting and gathering societies in the world and focused attention on very specialized adaptations to marginal environments as representing *all* such societies. This tendency to accept a particularly narrow spectrum of hunting and gathering practices as representative of the whole was widely adopted in archaeological studies and was unquestionably the predominant view until very recently.

Binford's New Archaeology paradigm, his concentration on the principal role of the environment in influencing human actions, and his fieldwork with Arctic Eskimos typified these trends. An effective expression of this perspective emerged in 1980 in his "Willow Smoke and Dogs' Tails" article—a work that continues to provide an important model for archaeological studies of hunters and gatherers. On the face of it, Binford's premise was straightforward—different patterns of human mobility were linked to different patterns of resource distribution and utilization, and these could be recognized in the material patterning in the archaeological record. Groups he labeled "foragers" moved their residences to the location of the resources. They made daily foraging trips from their mobile residential bases to obtain needed food resources. Populations who possessed a stable residential base and made long-range logistical trips to collect and process resources for transport back to the settlement he referred to as "collectors." They traditionally practiced food storage. Although he stressed that these dichotomized types simply represent two extremes of a virtually continuous array of mobility variations, they are most often employed by analysts as oppositions.

For Binford, hunting and gathering is all about high mobility, environmental constraints, and differential resource distribution. In his memorable "Garden of Eden" quote, Binford (1980:19) contends that human societies do not remain in a fixed location unless *compelled to do so by extraneous forces*—such as differential resource distribution or increasing population density. From this perspective, the world of hunters and gatherers is a world in constant movement. Yet Binford's own data suggest the universality of his assumption is questionable.

In a less often cited section of "Willow Smoke and Dogs' Tails," Binford elaborates on his environment–resource distribution–mobility correlation by looking at the big picture. He presents data that suggest his Garden of Eden "rejection" scenario may be somewhat overstated. His examination of a north-to-south transect of hunting and gathering societies in the Northern Hemisphere of the New World strongly reinforces his point that tropical-forest peoples are among the most resource deprived, resulting in small populations and high group mobility. What his data also coincidentally show is that more than three-quarters of historically documented hunting and gathering groups in temperate zones lived in fixed settlements for some part of the year. His analysis makes it apparent that in areas that are *not* characterized by highly differentiated resource distributions, populations are inclined to be less mobile. In cases in which rich, dependable resources such as large volumes of nuts or fish are available or where food storage is possible, long-term residential villages are possible and are perhaps even the dominant form of settlement. As Binford (1980:17) himself notes, any factor that restricts residential mobility (e.g., hostile neighbors or the attraction of stable resources) will produce a responsive increase in logistically organized production, that is, residential stability or sedentism. Binford stresses the mobility side of this equation, namely, that people must be forced to be less mobile. We suggest that an equally valid view is that people must be forced to be mobile and that Binford's assumption of universal mobility and his rejection of the Garden of Eden premise might not fully apply to the temperate zones of North America that midcontinental archaeologists study.

The seven plus decades since the recognition of preceramic archaic hunting, gathering, and collecting economies in the North American archaeological record have seen a tremendous expansion in understanding of the basic subsistence economy that was the primary lifestyle for most of human prehistory. As is the case in most instances of expanding research frontiers, much of the recent work has raised questions about earlier assumptions. However, in some cases, ongoing work has verified earlier suppositions. For example, the famous "Kalahari" debates in the 1980s justifiably questioned the validity of Lee and DeVore's model of timeless hunters and gatherers (e.g., Barnard 2004). From that revisionist debate came a more balanced picture of modern hunter and gatherer groups as marginalized societies existing in a complex web of interactions based on dominance by and resistance to surrounding agriculturalists and state-level societies. With the decline of the universalist vision of hunters and gatherers as economically simple, socially and politically egalitarian peoples, archaeologists were encouraged to refocus on issues of complexity and diversity that had been acknowledged decades earlier (i.e., Beardsley et al. 1956).

Adaptationism and Cultural Evolution

The interpretative assumptions in cultural neo-evolutionary and adaptationist theories that are associated with modern hunter-gatherer analogs promote a belief in a directional, progressive, and irreversible movement from simple to complex societies. In fact, as Rowley-Conwy quips, such perspectives presume that "there was a time *before* complexity emerged: a time, therefore, of *universal simplicity*" (2001:44, emphasis added). Several maxims can generally be correlated with what one might call the "original simplicity" model. These include (1) a view that there is a universal directional neo-evolutionary trend from simple to complex, (2) that the transition between social states of organization occurs gradually, (3) that the path to complexity is irreversible, and (4) that these trends are (often) linked within a framework that sees society as a "system" in stasis that can only be affected by an external force, typically, environmental change. Such maxims should not be accepted at face value.

The presumption of potential hunter-gatherer complexity has yet to make significant inroads in neo-evolutionary thinking. Of course, that evolutionary change is progressive, directed toward greater complexity, and irreversible is, on the face of it, refutable. In fact, the acceptance of such preconceptions would likely be denied by most of the scholars who implicitly incorporate them into their archaeological reconstructions and analyses. Yet it remains a dominant theorem in hunter-gatherer archaeological studies (e.g., see the lower Illinois River valley studies cited below; see other commentary by Ames 1991; Emerson and McElrath 2001; Pluciennik 2001; Rowley-Conwy 2001; Trigger 1989; Willey and Sabloff 1973, 1980). This is unfortunate, for, as Ames points out, these notions are detrimental to understanding the past because they "obscure the very dynamic of culture change that archaeologists seek to understand" (1991:109).

Also pervasive in hunter and gatherer research is an approach that weaves human society into the ecology of the past and investigates it as simply one more species in the biota on the landscape. In its most recent incarnation, such a view can be linked to White's (1959) conflation of culture with environmental adaptation. This attitude was influential in the New Archaeology, which identified environmental factors as the prime movers in human culture change. The traditional characterization of environmental change as inherently gradual promotes a view of cultural change as equally gradual, as people react to the incremental shifts in environmental stimuli.

The adaptationist paradigm is becoming increasingly questionable given the mounting evidence from field archaeology for the discontinuous nature of past patterns of sedentism and mobility, the clear demonstration of early complexity sometimes followed by episodes of simpler lifestyles, the lack of convincing verification for the synchronization of cultural and environmental change, the perceived importance of human culture as a variable in understanding even Archaic societies, and the new focus on studying the historical trajectories of these societies and, to some extent, eschewing the broad behavioral and universal explanations so important to the adaptationist approach. It is time for archaeologists to return to the actual material remains of Archaic societies and to make the practices reflected in those remains the focus of study. This will be a difficult task for an area of study in which theory has taken pride of place for so long that archaeological evidence has become almost secondary. It is critical that Archaic research shift from creating elegant models based on ecological and economic principles, modern hunter and gatherer studies, and neo-evolutionary agendas to a detailed study of the actual remains of early North American hunter-gather societies. Perhaps they have something to say.

Settlement and Mobility

Many of the suppositions concerning Archaic societies, especially regarding social organization and subsistence, spring directly from conceptualizations of mobility and settlement. The implicit correlations between mobility, sedentism, complexity, and progressive evolutionary change are so interwoven and all pervasive as to be all but impossible to disentangle in adaptationist theory. The typical characterizations of Archaic settlement patterns are replete with inherent assumptions of high residential mobility. The validity of these characterizations depends greatly on how one defines a sedentary or mobile way of life (Emerson 1999:189–191).

Archaic studies are not alone in suffering from a lack of precision regarding the definition of residence and mobility, and these concepts are subjects of ongoing debate in the literature (e.g., Ames 1991; Bocek 1991; Eder 1984; Gregg 1988; Kelly 1995; Rafferty 1985). Beardsley and his colleagues (1956) provided one of the earliest categorizations of settlement permanence by creating a model of group mobility that ran the gamut from sedentary to nomadic (with various degrees of each) lifeways. These broadly defined stages of community patterning, however, were hard to identify in the archaeological record. When the distinction between residential and logistical mobility was recognized (e.g., Binford 1980; Hitchcock 1982), it enabled archaeologists to correlate the material remains at sites with facets of human mobility. This critical differentiation involves identifying the movement of a group's residential base from an individual's or a task group's movements to and from the primary settlement. Binford describes this lifestyle continuum as ranging from residentially mobile groups of foragers to those living in fairly stable settlements of collectors.

Such conceptual differentiation contributes to Eder's (1984:838) penetrating observation that *sedentism* should be thought of as a threshold property of social groups, while *mobility* is best seen as a continuous variable that is an attribute of individuals. Such a distinction is crucial for comprehending modern observations that show sedentism and mobility do not covary (cf. Eder 1984; Kelly 1995). For example, one conceivably might have populations in which individual mobility actually increases at the same time residential mobility decreases. With the uncoupling of mobility and sedentism, it becomes possible to recognize the appearance of sedentism and, coincidentally, to independently observe variations in the frequency and constitution of mobility patterns (Eder 1984:848).

A fairly common definition of sedentism focuses on the idea of year-round occupation of a site (e.g., Eder 1984; Kelly 1995; Rafferty 1985; Rice 1975). A review of the literature makes it clear that most archaeologists simply sidestep the definitional issue by continuing to use *sedentism* in a relative sense as measuring one group's residential mobility against another's. It is the kind of considerations noted above that causes some scholars to categorize sedentism as a threshold event rather than as a gradualist continuum. Viewed as a threshold, sedentism takes on a very different meaning than it does when thought of as a continuum; for example, this perspective makes it impossible for a people to be "semisedentary." Part of the dispute is definitional. For Rafferty (1985), anything less than year-round use of a site by a social group is, by definition, nonsedentary. Brown and Vierra (1983:168) adhere to a similar definition. In this approach, sedentism is an absolute property of social groups rather than a continuous variable, as is individual mobility (i.e., Eder 1984:845). This type of rigid either-or approach is not of much utility in understanding the development or implications of sedentism in Archaic lifeways, or, in fact, in any society.

A simple "time of occupation" criterion does not adequately define the complex trajectory of changes inherent in sedentism, and those changes are what archaeologists seek to explain. The significant aspects of sedentism are the important economic, social, and political alterations it engenders within a previously residentially mobile society. Consequently, a less didactic but much more satisfying answer to the threshold question is one that highlights the dramatic social and political changes that accompany the long-term coresidence of numerous families. All too often, research on the viability of long-term residence focuses on the capacity of environmental resources to support sedentary populations. While, clearly, a minimum resource base is required for sedentism to be viable, a more serious impediment lies in the inability of band-level social and political mechanisms to provide ways that ensure the successful long-term interaction and stability of a sedentary group.

The consequences of adopting a sedentary way of life can be varied. Keeley (1988, in Kelly 1995:58) observes that multifamily populations living in stable residences for at least five months a year have an increased population density, depend more on stored food, and have greater wealth distinctions than more mobile populations. If these observations are valid, they mean that individuals who continue to coreside in a village that moves as a unit from place to place throughout the year develop the social and political characteristics of "sedentism." Other potential side effects of a sedentary lifestyle include increasing fecundity and shifting patterns of male and female interaction and offspring enculturation (i.e., Kelly 1995:58–59). Sedentism may even generate conceptualizations of the landscape that are different from those of mobile hunters and gatherers (Meillassoux 1973). Sedentary populations, even when absent from their place of residence, show a cultural attachment to it and treat the land differently than those who simply pass through it (Kelly 1995:45).

A review of current thinking on sedentism shows that the concept, as defined in its most rigid form, is difficult to implement in an archaeological study. It is misguided to focus on the spatial and chronological parameters of sedentism when one is actually interested in its social and political ramifications. Keeley's (1988) study indicates that human social groups experience the social, political, and economic effects of aggregation after a minimal period of five months. Thus, social groups who aggregate for at least half of each year on a consistent basis or who coreside in sufficiently large population clusters (*regardless of their degree of residential mobility*) will feel the political and social effects of sedentism. To identify such a pattern archaeologically is possible.

An Adaptationist Case Study—The Lower Illinois River Valley Model Examined

The lower Illinois River valley articles of Brown and Vierra (1983; Brown 1985, 1986) epitomize the "adaptationist" research trend in Archaic-period hunter and gatherer studies (Emerson and McElrath 2001). This approach remains central in many midcontinental studies of Archaic-period topics. Such models interpret the Archaic as a period of ahistorical, unbounded human societies that, as a result of economic rationalism and increasingly functionally efficient environmental adaptations, move through a framework of progressive, gradualistic evolutionary changes toward greater sedentism and increased complexity (Emerson and McElrath 2001:202–204). As is typical in the adaptationist school of culture change, humans play the role of "reactors" rather than actors.

Binford's forager-collector template has seen wide service as an explanatory device in Archaic studies in North America. While there is no evidence that Binford viewed his mobility model as in any way evolutionary, others clearly have. In the forefront of those who have are Brown and Vierra (1983), who weave together a blend of adaptationist factors to create a functionally satisfying explanation of shifting Archaic settlement patterns in the Illinois River valley. Brown and Vierra (1983:168–169) observe that, as settlement forms move from a highly mobile to a sedentary pattern, food acquisition logically depends less on residential mobility and increasingly on logistical mobility. Since they *know* earlier groups were more mobile than later groups, that is, that there was a trend toward sedentism, and since they assume population stability through time, their interpretations add a diachronic flavor to Binford's typology, producing a unidirectional neo-evolutionary shift from residential to logistical mobility. The product of these assumptions is a picture of an apparently inevitable and irreversible multithousand-year progression from mobile to sedentary lifeways in the lower Illinois Valley.

In an elaboration on the rise of sedentism in the lower Illinois River valley, Brown (1985) reconfirms his commitment to the premise that adaptationist factors are the key to understanding the rise of sedentism and complexity. In creating his model of the emergence of sedentism, Brown (1986) follows Binford in assuming that human societies must be forced out of a pattern of high residential mobility (their *natural* state) toward a more residentially stable pattern (their *unnatural* state). In these discussions, he acknowledges that in situ populations, following a risk-management strategy (another rationalist economic strategy) and reacting to external variations in environment and population density, might have a role in the development of sedentism and complexity.

The lower Illinois River valley model includes a perception of innate human aggressiveness (Byers 2004:163–167). Brown (1986) assumes that humans are forced into a restricted territorial mode by the pressure of increasing populations and their inability to peacefully interact. He contends that a capacity for nonviolent intersociety interaction developed only at the end of the Middle Archaic and was marked by the appearance and circulation of exotica (minerals, cherts, worked chert and bone, etc.). As Byers (2004:164–167), however, points out, Walthall and Koldehoff (1998) have demonstrated that Dalton people were circulating hypertrophic Sloan points, very probably to facilitate intergroup reciprocity, by cal 9000 B.C. Furthermore, the recent recovery of hypertrophic Paleoindian blades suggests such mechanisms may have been in place by the time the first immigrants entered the New World (Gramley 1993). Consequently, mechanisms of intergroup interaction and peaceful reciprocity can be presumed to have existed long before Middle Archaic times, and their lack cannot be used to explain the inability of peoples to peacefully interact or to demonstrate the "forced" nature of sedentism.

Paradoxically, the lower Illinois Valley model also envisions a world in which populations, while reacting to locally manifest environmental factors, were almost mythically stable during the course of many-millennia-long evolutionary processes. This concept of culture change stands in stark contradiction to the other classic adaptationist concept of small, highly mobile bands of hunters and gatherers who eschewed territories. One would expect such groups to have roamed widely across the Midcontinent, or at least to have frequently crossed the upland divides between river valleys and have moved freely up and down those valleys. How does a model that incorporates high rates of residential mobility articulate with the New Archaeology's assumptions of in situ evolution of stable populations over the long durée? We suspect that they are essentially incompatible. In fact, the evidence presented in this volume suggests the Archaic was a period typified by population movements, some possibly over great distances; by the abandonment of some environmental zones, perhaps some regions; by pioneering movements of populations into newly emerging landscapes; and probably by the first clashes of divergent cultures. The adaptationist image of stable Archaic populations who passively accepted technological and stylistic innovations does not fit well with the emerging picture provided by archaeology (see also Milner 2004).

When cultural change in adaptationist models does not respond in the proper manner to environmental change, this can lead to interpretive convolutions. The lower Illinois River valley model hypothesizes that the enrichment of the available floodplain resources during the Hypsithermal pulled local populations from the uplands to the floodplains, thus evoking a major shift in both resource utilization and settlement patterns (e.g., Brown 1985, 1986; Brown and Vierra 1983). Yet, as even the model's proponents note, the shift of local societies from residential mobility to residential stability, that is, to a situation in which they employed a logistical resource-collection strategy to take full advantage of the plentiful clustered resources, took millennia to come into its own (Brown 1985:220–221). In other words, in one of the prime examples of adaptationist modeling, neither human society nor environmental causation appears to be functioning properly. As Byers observes, the archaeological record has failed to produce what the theoretical approach predicted: "the rapid working out of the adaptive process to its optimal conclusion, this being fully domesticated subsistence integrated with fully tethered settlement, that is, sedentary farming regimes" (2004:161). The failure of the lower Illinois River valley people to fall into line with the model is explained away as the result of hunter-gatherer conservatism (Brown 1986:317–318). Employing risk-management and gaming strategies, these Archaic people determined it to be to their advantage to remain mobile until local population pressure began to make productive resource patches scarce. At that point, they picked a patch and reluctantly settled down, often only to later drop their sedentary mode and resume a pattern of residential mobility. The consequence of this pattern was a long, drawn-out trend toward sedentism (see Byers 2004:163). Between-group accommodation and negotiation are envisioned as impossible because Middle Archaic peoples are said to have lacked "tokens of intergroup exchange" (Brown 1985:223), a view that Byers (2004:165–166) demonstrated is untenable.

Byers (2004:166–167) further argues that the lower Illinois River valley model of long-term shifting from sedentism to mobility and back again seems unlikely. While some groups, after settling in on a resource patch, may have "remobilized," it is unlikely that all would have. This means that selected groups would rather quickly have become entrenched in prime locations on the floodplain, thereby eliminating the viable options for other undecided residentially mobile groups. This process would rapidly have excluded those still-mobile groups from the area. Consequently, while the establishment of territorial groups might have taken generations, it would hardly have taken millennia, making the explanation for the lag of social response to environmental change improbable.

Moving Hunter-Gatherers Toward Complexity

The last two decades have reawakened archaeologists to the broader multiplicity of social, political, and economic variables contained within the hunting and gathering spectrum. This increasing comprehension has expanded to form an entirely new direction of research conducted under the rubric of hunter-gatherer complexity (e.g., Price and Brown 1985). Archaeologists now know that hunter-gatherer societies can be extremely complex, may be hierarchically structured, and can inhabit settlements for long periods of time, engage in monumental constructions, organize significant efforts in the "production and management" of wild food sources and incipient domestication, and maintain large population clusters. This change has not only altered the picture of prehistoric hunting and gathering populations but it has also required an entirely new theoretical base to pursue their investigation. This new theorizing, most clearly articulated in historical processualism, places its emphasis on comprehending the historical trajectories of groups and on envisioning peoples as actors rather than reactors. It privileges the material record over idealist neo-evolutionary trends, accumulating large and rich data sets, and understanding power, gender relations, resistance, and accommodation (Sassaman 2001, 2005).

Nowhere have the remains of Archaic-pattern people been so "vocal" on the subject of complexity as on the south Atlantic coast and in the lower Mississippi River valley, with the discovery of Middle Archaic monumental mound constructions (Gibson and Carr 2004; Kidder and Sassaman, this volume; Russo 1994, 1996; Saunders et al. 1994; Saunders et al. 1997). Given the recognition that these mounds provide precedence for the previously anomalous Late Archaic Poverty Point complex (e.g., Gibson 1996, 2000), it is difficult to ignore a several-millennia-long tradition of Archaic mound building in the southeastern United States (Anderson 2004; Kidder and Sassaman, this volume). Not only did these societies "mound" dirt and shell in a systematic manner but there is also good reason to suspect that some Louisiana sites, such as Watson Brake, Caney, Frenchman's Bend, and Insley, represent planned complexes expressing "proportional and geometric" spatial regularities; this activity suggests relatively complex associated political and social organization (Sassaman and Heckenberger 2004:220–231). Contemporaneous ring shell mounds on the Atlantic coast, while not usually constructed in complex groupings, also suggest hierarchical social and political structure (Russo 2004).

Despite its now more than decade-old revelation, the evidence that Archaic people were "mound builders" seems to have had little impact on the conventional wisdom of traditional archaeology—early New World inhabitants continue to be perceived as essentially "simple folk." This is due in part to an inherent archaeological conservatism that categorizes incompatible data as "idiosyncratic exceptions to the rule" and ignores them or explains them away and to a not unhealthy skepticism that delays acceptance of new data and ideas until they are "proven." Initially, there was a reasonable hesitation on the part of many to accept the purposeful construction of mounds as dating to Middle Archaic times. The careful work of researchers such as Saunders et al. (1997), Russo (1994), and many others has now demonstrated beyond a doubt that the identification of some mounds as Archaic constructions is correct. No one can doubt that these early societies built mounds, so the issue for current skeptics becomes one of doubting the social or political significance of the monumental construction process. The debate over the material and behavioral correlates of political, social, and economic complexity far exceeds the space available to reprise it here (see discussions of various aspects of the debate in Anderson 2004; Crothers 2004; Milner 2004; Milner and Jefferies 1998; Sassaman and Heckenberger 2004; Saunders 2004). However, the systematic construction of monumental forms does require "formal" conceptions of planning and organization and perceptions of time and space that would seem at a premium among the ephemeral band-level societies that some scholars envision as populating the Middle Archaic period. Can it be possible that the Archaic peoples of the New World failed to understand and conform to the neo-evolutionary sociopolitical models that are so frequently applied to them? (Anderson 2004).

The movement of human societies into the New World, whether Clovis bands, coastal maritime hunters and fishers, or unknown pre-Clovis groups, occurred very late in terms of human history. Those initial pioneers carried with them long-standing social, political, and economic traditions. How well these cultural practices survived the lengthy movement by generations across and down the hemisphere is unknowable. But the first immigrants came from Eurasian backgrounds with well-established patterns of human social and economic interactions probably couched in terms of exchange and ritual. So why should archaeologists not expect to find evidence of Paleoindian ritual objects that were created specifically to facilitate intersocietal exchange, interaction, and marriage and to soothe intergroup tensions and hostilities? The first concrete evidence of such social signifiers in North America might be hypertrophic Clovis points such as the Rutz point or the magnificent points recovered from the East Wenatchee cache in Washington (Gramly 1993). It may not be simple coincidence that the hypertrophic point phenomenon is recognized by Walthall and Koldehoff (1998) in their slightly later Dalton-era "Cult of the Long Blade" and again by Brookes (1997) in his Middle Archaic "Benton" analogy.

Oversized stone blades appear in the archaeological records dating throughout Paleoindian and Archaic times, sometimes associated with items such as bone pins, bannerstones, beads, and other unusual items or materials. Most archaeologists think such items were involved in practices that facilitated social, economic, and political relationships between spatially disparate groups. Essentially they are interpreted as having served to make possible those large population agglomerations so necessary to keep these scattered societies viable, that is, simply to maintain a breeding population. How far are such large social, presumably non-kin gatherings from what social typologies hold to be loosely bound tribal clusterings? So even in a neo-evolutionary paradigm, one must accept the presence of social and perhaps even political complexity as a necessary aspect of very early population continuity.

The evidence for monumental constructions, large permanent-appearing settlements, and exploitation patterns suggesting a rich resource base is becoming increasingly common in Archaic contexts in the Eastern Woodlands (e.g., see Gibson and Carr 2004 and various chapters in this volume). However, only in the last few years have researchers begun to seriously question the generally pervasive conventional models of regional unilinear culture history, perhaps expressed most elegantly by Bruce Smith in his 1986 summary of Eastern Woodlands prehistory. The emergence of apparent "complexity" in the Archaic period, of course, raises serious concerns about the entire reconstruction of Eastern Woodlands social and political history. It also calls into question the comfortable correlations that the discipline has long promoted between such variables as hunting and gathering and mobile lifestyles, agriculture and complexity, monumental constructions and political control, and so forth. Archaeologists such as David Anderson (e.g., 2002, 2004) and Kenneth Sassaman (e.g., 2001, 2005; Sassaman and Heckenberger 2004) have recently questioned Archaic-period political and social reconstructions and found them wanting. They contend that it is not unreasonable to envision at least a moderate level of sociopolitical organization in parts of the region by the Middle Archaic period.

Why not Early or Middle Archaic political and social complexity that in neo-evolutionary terms is usually described as tribal?[1] What factors trigger tribal patterns of organization? Traditional explanations of tribal origins are generally tied to environmental causal factors such as resource shortages resulting from either uncertainty of access or general scarcity. In this sense, tribal alliances are thought of as "risk-minimization strategies" to circumvent scarcities (e.g., Braun and Plog 1982). As Anderson (2002:248) notes, most explanations rely on increased population pressure on resources or environmental stress as causing unreliability in resource availability and therefore view "complexity" as inevitable when that threshold point is reached. Traditionally, such a threshold is not conceived of as having come into existence until the Woodland period in the Eastern Woodlands (Bender 1985; Braun and Plog 1982).

Such tribalization models stress, to some degree, outmoded concepts of hunter-gatherer behavior patterned after modern marginalized groups such as the Kung Bushman (as discussed earlier). By implication, early human societies are seen as *naturally* existing in small band-level groups that essentially had to be forced into associating within larger macroband or tribal groups. However, other factors than food shortages can promote population clustering and increased levels of political organization, for example, intergroup violence (Anderson 2002:248; Milner 2004). Not only does such violence promote population clustering but it also encourages the creation of ethnic identities (e.g., Anderson 2002; Emerson 1999; Emerson and McElrath 2001; Sassaman 2001) that are supportive in the context of intergroup conflict as well as individual group survival. One would also assume that larger groups facilitate access to reproductive partners, economic success, and personal safety and longevity. In preindustrial societies, population size, to a large extent, equals power—the relative size of one's group directly empowers its members. Therefore, where resources allowed (we would argue in much of the temperate zone), there was arguably momentum to gather group members into sizable clusters of population—large enough to support loosely organized tribal forms.

As new archaeologically focused studies have demonstrated (e.g., the papers in Parkinson 2002a), tribal patterns of organization have much to offer social groups in terms of adaptive postures. Tribal forms are extremely fluid and flexible in regard to population size; political, social, and economic levels of integration; spatial bounding; mobility; and longevity (Anderson 2002, 2004; Fowles 2002; Parkinson 2002b). This plasticity is what makes them of prime value to their members as well as rather nebulous to scholars who seek to study them. It is reasonable to assume that tribal patterns of organization have an extremely long history in human societies, in the New World perhaps coming in as part and parcel of the original inhabitants' social and political repertoire.

Summary

Archaic studies suffer as much from the paucity of appropriate theorizing as from a paucity of large, contextually sound data sets. The dominance of the adaptationist paradigm has structured (and continues to structure) virtually all Archaic research. Through the decades, this has led considerable numbers of researchers into interpretive dead ends and has discouraged studies of Archaic social and political development. When joined with the precepts of the New Archaeology, for example, interpretations acknowledging even the potential of population movements fell into theoretical disfavor. Instead, archaeologists postulated a prehistoric landscape in which populations apparently were established in perpetuity. These populations were conceived of as evolving in situ, and there was little acknowledgment that population exchange, movement, interaction, or depopulation could play any role in altering the stability of local societies. Meaningful culture modification within this stultified social landscape could only be initiated by environmental change. This fit well within a perspective that saw technological change as an adaptationist mechanism geared to increasingly efficient human exploitation of the environment (à la White 1959).

This model of environmentally driven change also fit well with a tendency to conceive of "culture" as a monolithic, ahistorical analytical unit (Marcus and Fischer 1986). Such a perspective obscures individuals, factions, and communities from consideration, and, consequently, social interaction (except in the almost extraneous sense of exchange, etc.) cannot be considered a force of change. It eliminates the possibility of modeling social agency even of collectivities. This view of cultural unity, especially when coupled to perceptions of band-level hunter-gathering societies, did not encourage models of social or political diversity in Archaic societies. Only recently have archaeologists considered the possibility that more complex political forms such as tribes may have been present in the Archaic period (e.g., Anderson 2002).

Perhaps more than for any other cultural context, researchers have had to struggle with the dilemma of the relationship of Archaic material culture to social formations. To some extent, this is due to the limited artifact inventories of such groups—how does one link a cluster of points to ethnicity, political communities, or family groups? Do the stylistically similar stone tools recovered from Archaic sites represent the distinctive signatures of related social groups? Or are these simply functionally specific tools that owe their similar morphological form to the similar tasks being performed? And how much variety is there in Archaic tool assemblages? Did projectile points and large knife styles come and go like the length of women's skirts in the modern fashion world? Did a woman in Archaic society have a choice of formal knives and points to perform her daily tasks? Some stratified sites seem to suggest the contemporaneous use of multiple biface styles that had chronologically different use spans. But in open-air sites, where the probability of multiple occupations and component mixing is statistically much lower than in rockshelters (Walthall 1998), it seems that the old equation "points equal people" often holds true (e.g., Ray et al., this volume). We also note that Archaic caches recovered in the Midcontinent tend to be mostly limited to a single point style. How archaeologists determine contemporaneity of point styles is critical in determining how they interpret the past.

Archaeologists have begun to recognize the dangers of using modern and ethnohistoric hunter-gatherer data as direct analogs to model Archaic lifestyles. Significant disadvantages include the lifestyle modifications of such groups that resulted from their marginal positions vis-à-vis environmental resources and their political and social relations with complex societies. The emphasis by modern hunter-gatherer subsistence and settlement research in marginal environments has encouraged the development of a series of theoretical positions heavily influenced by the boundary conditions encountered. Such research has tended to incorporate assumptions of economic rationality, optimal foraging, technological progress and efficiency, functionalism, and behavioralism. When such models have been applied to the study of Archaic subsistence practices, they have carried the same theoretical assumptions with them. It is not clear that these are applicable to ancient prehistoric hunter-gatherers. Added to these concerns is the inappropriate application of subsistence and social models derived from such marginalized groups to the prehistoric inhabitants of temperate zones. The environmental richness of the temperate woodlands of the Midcontinent of North America minimized the necessity of significant seasonal movements to exploit widely spaced resource patches (Binford [1980] notwithstanding).

The conceptual issues in Archaic-period research outlined above suggest the wide range of challenges currently facing scholars of the period. It is perhaps fortunate that many of these challenges simply require all of us to be more intellectually open. One crucial change involves a basic adjustment of perspective: we need to be willing to accept and explore models of political and social complexity outside of the neo-evolutionary paradigm. We cannot simply accept the Archaic template of small bands of seasonally mobile hunters and gatherers as a given. This requires us, when interpreting our data, to decouple the traditional linkage of the environment, subsistence economy, and sociopolitical organization and to consider the impact of such factors as ethnicity, tribalism, incipient complexity, multiple populations, migrations, and historical process. An essential part of this consideration is the large-scale recovery and identification of the all-important material correlates of such factors that allow us to define them in an archaeological context.

Endnote

1. We do not participate here in the seemingly endless anthropological debates decrying the evils of social typologies. We see no reason not to use such long-standing terms as *bands*, *tribes*, or *chiefdoms* to communicate approximate levels of social organization. It seems to us the outcry against such terms is appropriate when they become explanations but is overdrawn when the terms are used as general descriptors.

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3

Archaic Faunal Exploitation in the Prairie Peninsula and Surrounding Regions of the Midcontinent

Bonnie W. Styles and R. Bruce McMillan

Introduction

In this chapter, we contrast Archaic-period faunal exploitation strategies in different ecological settings across the Prairie Peninsula and into the deciduous forests to the east. To facilitate this discussion, we have defined a series of biogeographic regions that include the tallgrass prairie of the Prairie-Plains border; the open forests, savannas, and prairie patches of the Ozark Highland; the riverine environments of the great river valleys—the Mississippi and Illinois rivers; the prairies and groves of the Grand Prairie of Illinois; the eastern deciduous forests of Indiana, Ohio, and Michigan; and the northern pine-hardwood forests and littoral environments of the western Great Lakes (e.g., Bailey et al. 1994; Kuchler 1975). Critical for understanding faunal exploitation in this region is the time-transgressive development of the Prairie Peninsula, including the mid-Holocene expansion of the prairie, the opening of the forest, and the development of productive aquatic ecosystems in some major river valleys.

Landscapes varied dramatically across geographic space and through time, affecting the availability of animal resources. North-to-south variation ranged from the northern mixed conifer-hardwood forests of southern Ontario to the cypress swamps of southern Illinois, the prairies of western Iowa, and the eastern deciduous forest in Indiana and Ohio. The diverse area considered here crosscuts numerous physiographic divisions and provinces: the Central Lowlands (the Wisconsin Driftless Area, Till Plains, Dissected Till Plains, and Eastern and Western Lake sections), and the Interior Highlands (Ozark Highland) (Fenneman 1946). These landforms contributed to differences within and between the major ecological regions. Faunal availability varied across these diverse regions (e.g., Semken 1983; Shelford 1963).

We quantitatively examined faunal data for 48 Archaic components from 19 archaeological sites with satisfactory faunal preservation (Figure 3.1). For this study, we used pre-

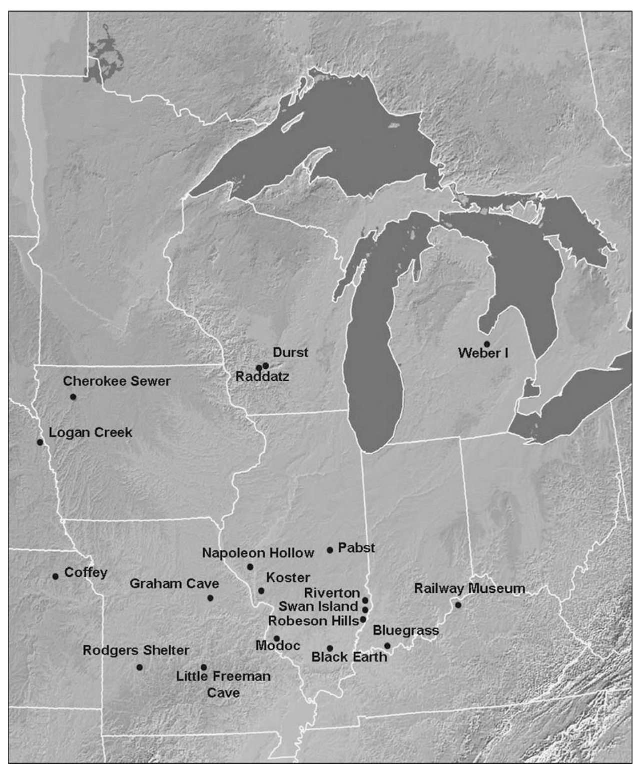

Figure 3.1. Study area and Archaic sites used in the quantitative analyses of faunal exploitation.

settlement vegetation as a baseline from which to assess how the vegetation may have differed from region to region. Our assessments of environmental change for the early and middle Holocene are also informed by recent studies of fossil pollen and charcoal from lakes and fens in the Midwest.

Throughout this chapter, all dates are given in calibrated years before present (cal yr B.P.). Radiocarbon (^{14}C) ages are converted to calibrated ages utilizing IntCal04 (Reimer et al. 2004), available at http://www.calib.org. Table 3.1 presents the calibrated ages for ^{14}C dates at 100-year intervals. For the purposes of this discussion, we divide the Holocene epoch into the early Holocene (12,500–8900 cal yr B.P.), the middle Holocene (8900–5700 cal yr B.P.), and the late Holocene (post-5700 cal yr B.P.).

Holocene Evolution of Midwestern Biomes

Climate and a Changing Biota

Post-Pleistocene environmental changes contributed to variation in the resources available to Archaic hunters and foragers. Issues related to ecosystem evolution identified as important for understanding human use of fauna are the development of grassland and forest habitats, the stabilization of river systems, and changes in Great Lakes water levels. Rapid warming at the

Table 3.1. Chart for Converting Radiocarbon Dates in Radiocarbon Years B.P. (^{14}C Yr B.P.) to Calendar Years B.P. (Cal Yr B.P.).

^{14}C Yr B.P.	Cal Yr B.P.	^{14}C Yr B.P.	Cal Yr B.P.	^{14}C Yr B.P.	Cal Yr B.P.
100	109	4000	4479	7900	8693
200	177	4100	4608	8000	8881
300	389	4200	4738	8100	9022
400	480	4300	4856	8200	9162
500	526	4400	4960	8300	9335
600	605	4500	5167	8400	9448
700	666	4600	5320	8500	9509
800	712	4700	5391	8600	9545
900	827	4800	5512	8700	9633
1000	927	4900	5627	8800	9822
1100	1005	5000	5723	8900	10,034
1200	1123	5100	5810	9000	10,200
1300	1245	5200	5951	9100	10,242
1400	1309	5300	6083	9200	10,347
1500	1379	5400	6235	9300	10,512
1600	1471	5500	6297	9400	10,631
1700	1603	5600	6364	9500	10,752
1800	1736	5700	6477	9600	10,926
1900	1849	5800	6605	9700	11,163
2000	1949	5900	6715	9800	11,221
2100	2072	6000	6839	9900	11,279
2200	2238	6100	6968	10,000	11,468
2300	2335	6200	7086	10,100	11,711
2400	2419	6300	7220	10,200	11,908
2500	2582	6400	7336	10,300	12,083
2600	2744	6500	7425	10,400	12,276
2700	2797	6600	7493	10,500	12,518
2800	2903	6700	7574	10,600	12,688
2900	3035	6800	7640	10,700	12,780
3000	3201	6900	7723	10,800	12,831
3100	3334	7000	7843	10,900	12,870
3200	3418	7100	7940	11,000	12,919
3300	3523	7200	8001	11,100	13,010
3400	3651	7300	8105	11,200	13,110
3500	3771	7400	8250	11,300	13,188
3600	3906	7500	8343	11,400	13,262
3700	4037	7600	8400	11,500	13,339
3800	4187	7700	8482	–	–
3900	4344	7800	8578	–	–

Note: Conversions made using IntCal04 (Reimer et al. 2004).

end of the Pleistocene contributed to establishment of biotic communities that differed with the geographic expression of each region. Vegetation changed in structure and composition as dictated by climate and local edaphic features and by the differential response of individual taxa to climate change (Webb et al. 2004:472). The position and seasonal variation in air masses played a major role in the distribution of vegetation (e.g., Bryson 1966). The interplay between the Arctic, Pacific, and Gulf air masses as well as the circulation of ocean currents affected temperature, precipitation, and vegetation.

Shifts in the ranges of certain vertebrate species or increases in the abundance of specific taxa have been used to interpret changing landscape conditions. Climatically induced expansion of the prairie during the early Holocene pushed the prairie-forest ecotone eastward and opened and changed the composition of the mesic deciduous forests. The early Holocene deciduous forest was ultimately transformed into a more xeric and open oak-hickory association interspersed with prairie outliers and smaller patches that covered the interfluves and south-facing slopes.

With the opening of the arboreal vegetation, anthropogenic fire undoubtedly became a significant factor in maintaining, if not expanding, the parklandlike environment within forested areas, eliminating woody undergrowth and replacing the understory with grasses and forbs. Fire-scar studies in the Ozarks demonstrate that frequent fires maintained this vegetational regime. The biota was transformed by climate during the early to mid-Holocene but was maintained and further changed through human agency for the next several millennia (Cutter and Guyette 1994; Guyette and Cutter 1991). How far back in time the landscape was truly transformed by human intervention is still speculative, but charcoal-influx studies of wetland basins with stratigraphic records spanning the Holocene suggest that the human burning of midwestern landscapes may be as ancient as the period of major prairie expansion itself (Nelson 2005:53–54; Nelson et al. 2004:54).

From eastern Kansas to central Illinois expansion of the prairie from west to east was time transgressive. When patches of upland prairie first became established is still a question, but this probably occurred by the end of the Younger Dryas (10,650 cal yr B.P.), if not earlier. On the basis of his work along the South Fork of the Big Nemaha River in southeastern Nebraska, Baker (2000) presents evidence that prairie was well established on the thinly timbered uplands by 9800 cal yr B.P. By 9500 cal yr B.P. the full-blown development of the prairie was well underway as upland forests disappeared and riparian trees became sparse. During this time, alluvial fans began to aggrade rapidly in the valleys (Baker et al. 2000). This period of maximum aridity lasted for about three millennia. After ca. 6500 cal yr B.P., droughts apparently became more intermittent, aggradation of fans slowed, and riparian forests returned to the valleys (Baker et al. 2000).

South of the Missouri River along the western margins of the Ozark Highland in southwest Missouri, the collective appearance of grassland animals (bison, pronghorn, jack rabbit, plains pocket mouse, and prairie chicken) in the deposits of Rodgers Shelter by 9500 cal yr. B.P. argues for a change from a more mesic forested environment to a drier landscape wherein uplands and valley interfluves supported prairie (McMillan 1976:229; McMillan and Klippel 1981:230). After their initial appearance, prairie taxa increased so that by 9000 cal yr B.P. the greatest numbers of prairie taxa were present. This faunal evidence suggests that maximal expansion of prairie into the western Ozarks occurred during the two millennia after 9000 cal yr B.P. (McMillan and Klippel 1981). This interpretation is supported by subsequent faunal studies from Ozark sites (Purdue 1982; Purdue and Styles 1987; Wolverton 2002, 2005) and by analysis of temporal clinal variation in small mammals—eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), and fox squirrel (*Sciurus niger*) (Purdue 1980). More recently, Denniston and colleagues (Denniston et al. 2000; Denniston et al. 1999) have reported the results of carbon isotopic research on speleothems from caves in the Ozark Highland, a record they then compared with pollen records from Cupola Pond (Smith 1984) and Oldfield Swamp (King and Allen 1977) and with the vertebrate biostratigraphic sequences at Rodgers Shelter and Modoc Rock Shelter. The speleothem data, which provide an independent proxy for vegetation, support the interpretation of steppelike conditions in the Ozark Highland between approximately 9000 and 1500 cal yr B.P. (Denniston et al. 1999:381).

Holocene pollen records from artesian spring deposits in western Missouri are discontinuous and incomplete (King 1982, 1988), even though some of the same springs yielded pollen records that aided in constructing vegetation models for the late Wisconsin (King 1973). Pollen and plant macrofossils from organic-rich alluvial sediments from along the lower Sac River in southwest Missouri provide some tentative results for comparison with the Rodgers Shelter faunal data (Baker et al. 2005). These data suggest that by 9000 cal yr B.P., percentages of nonarboreal pollen (NAP) were high and were increasing and that percentages of oak (*Quercus*) and maple (*Acer*) pollen were relatively low. Big bluestem (*Andropogon gerardii*) and Indian grass (*Sorghastrum nutans*) macrofossils were present (Baker et al. 2005:35–36). After 7300 cal yr B.P., Baker et al. (2005:34) suggest, there was a return to a higher percentage of deciduous trees, with more diversity in the riparian forest and recolonizaton of the more mesic habitats along valleys by sugar maple (*Acer saccharum*) and American elm (*Ulmus americana*). Macrofossils from prairie plants were still abundant, indicating that the uplands were a mosaic of forest and prairie. Historical records indicate that the presettlement vegetation of the uplands was primarily prairie and oak savannah, while the steeper valley slopes and floodplains were dominated by dense deciduous forest (Jacobson and Primm 1997:12). Although tree cover probably thinned and receded down ravines and valley slopes during the mid-Holocene, faunal evidence suggests that throughout this period arboreal vegetation continued to cover the valley floors.

On the northern border of the Prairie Peninsula in Minnesota, the late Wisconsin spruce forest was replaced with an elm-dominated mesic assemblage (Webb et al. 1983:161). This transition began around 11,400 cal yr B.P. and lasted until ca. 9000 cal yr B.P. This mesic vegetation assemblage indicates that the northern Midwest was slightly cooler and more moist than during later parts of the Holocene. Prairie advanced eastward following the early Holocene mesic phase and was fully developed in Minnesota by 9000 cal yr B.P., then retreated ca. 4500 cal yr B.P. with the onset of a cooler, wetter climate that favored arboreal vegetation (McAndrews 1966:67; Webb et al. 1983:162). Once prairie was established, fire became an important factor in maintaining the mosaic of prairie and forest along the prairie-forest ecotone (Grimm 1984).

Pollen, plant macrofossils, and carbon isotopic ($\delta^{13}C$) values for alluvial organic matter in samples collected along Roberts Creek in northeast Iowa, when compared with carbon isotopic values in speleothem calcite from Coldwater Cave 60 km northwest of Roberts Creek, provide a multiproxy record of Holocene environments that suggests a steep climatic gradient across Iowa. Prairie did not reach this area in northeastern Iowa until sometime between 6300 and 6000 cal yr B.P. (Baker et al. 1996; Baker et al. 1998; Chumbley et al. 1990; Dorale et al. 1992). A similar record obtained from Mud Creek indicates that deciduous forest was extant in east-central Iowa at 6300 cal yr B.P. (Baker et al. 1990). These records indicate that prairie existed for much of the next three millennia, until ca. 3500 cal yr B.P., when oak savanna returned. Baker et al. (1992:387) suggest that fires may have played an important role in maintaining savanna-like vegetation following the amelioration of climate after the peak dry conditions of the mid-Holocene.

In southern Wisconsin, Baker et al. (1992:386) suggest, a xeric oak (*Quercus*) forest replaced mesic deciduous forest by 6300 cal yr B.P. Grimm et al. (2001:339–340) propose that prairie began replacing the elm-oak forest slightly earlier, sometime between 6800 and 6300 cal yr B.P. Grimm and Jacobson (2004:392–393) stress that mesic forest prevailed in the driftless region of southeastern Minnesota and northeastern Iowa during the driest part of the prairie period in central Minnesota. They cite the stable-isotope data from cave speleothems and plant fossil data to support a model that fixes the position of the prairie-forest border along a sharp gradient between southeastern Minnesota and northeastern Iowa between 8000 and 6000 cal yr B.P. After 6000 cal yr B.P., the prairie expanded eastward, forested areas opened, and more xeric trees (oaks) replaced mesic-adapted vegetation. A mosaic of prairie, savanna, and open forest was created across this region, dictated in part by areas of relief and firebreaks.

Recent research has helped clarify the timing of the development and expansion of prairie into the glacially modified landscapes of Illinois. Since the 1960s, most researchers have followed the model proposed by H. E. Wright Jr. (1968), which posited gradual warming and desiccation beginning on the western edge of the tallgrass prairies in South Dakota and gradually spreading east, reaching its maximum extent between 9000 and 4500 cal yr B.P. During the late Holocene, cooler climate gradually returned to the Midwest, reversing the expansion of the Prairie Peninsula. King (1980, 1981), in his interpretation of stratigraphic pollen sequences from Volo and Chatsworth bogs in northeast and east-central Illinois, supported Wright's model and suggested that prairie vegetation was established in Illinois between ca. 9500 and 8700 cal yr B.P. Wright's general model for the Prairie Peninsula and King's work in northern and east-central Illinois established a paradigm for the vegetational history of the Prairie Peninsula in Illinois. Webb et al. (1983) refined this model on the basis of data from 49 pollen-bearing sites from throughout the northern Prairie Peninsula. They constructed isofrequency contours for prairie-forb pollen at millennial intervals between 11,200 and 6800 cal yr B.P. and suggested that the 20 percent isopoll for prairie-forb pollen intersected northeastern Illinois ca. 8800 cal yr B.P. They observe, however, that prairie-forb pollen decreased at Chatsworth Bog between 8800 and 7800 cal yr B.P., indicating a shift back to greater percentages of arboreal components. Prairie forbs did not increase in abundance until 6800–3200 cal yr B.P., a period when prairie forbs were actually decreasing further west (Webb et al. 1983:147).

Baker and his colleagues at the University of Iowa continued to refine this model, questioning whether or not prairie expansion in eastern Iowa, Illinois, and southern Wisconsin was as early and as extensive as some previous authors had claimed (Baker et al. 1992:380). Examining data from fossil-pollen sites along the axis of the Prairie Peninsula, they note the virtual absence in sites in Ohio and Indiana of "such prairie-indicator taxa as *Ambrosia* (ragweed), *Artemisia* (wormwood), Chenopodiineae (goosefoot family and related taxa), Poaceae (grass family), and Asteraceae (sunflower family)" (Baker et al. 1992:380). They observe that Chatsworth Bog exhibits relatively insignificant increases in these prairie elements. Baker et al. (1992) conclude that the climatic signal recorded for Roberts Creek (eastern Iowa) indicates that prairie supplanted mesic deciduous forest in eastern Iowa and northern Illinois only after 6300 cal yr B.P. and that in southern Wisconsin (Devil's Lake and Lima Bog) a xeric oak (*Quercus*) forest replaced mesic deciduous forest after that same time. Grimm et al. (2001:339) subsequently placed the expansion of prairie in eastern Iowa, southern Wisconsin, and Illinois between 6800 and 6300 cal yr B.P., where it replaced forest dominated by elm (*Ulmus*) and oak (*Quercus*).

Recent work is beginning to establish a more precise timing for the development of prairie in Illinois. Paleoecological research at Nelson Lake in Kane County and Chatsworth Bog in Livingston County in the heart of the Grand Prairie suggests that a period of drought occurred ca. 9000 cal yr B.P., when C_4 grasses began replacing the elm-dominated arboreal vegetation. The records at both Nelson Lake and Chatsworth

Bog show increases of NAP from ca. 5 percent at 11,500 cal yr B.P. to ca. 35 percent by 9000 cal yr B.P., suggesting that prairie was expanding as the climate became progressively drier (Nelson 2005; Nelson et al. 2004; Nelson et al. 2006). This initial prairie pulse lasted about 1,500 years. After ca. 7700 cal yr B.P. at Chatsworth Bog and ca. 7300 cal yr B.P. at Nelson Lake, trees again increased, including fire-sensitive taxa such as *Ulmus* (Nelson et al. 2006:2533). During the driest phase of the mid-Holocene (after ca. 6200 cal yr B.P.) NAP increased to ca. 50 percent and C_4 plants were abundant, marking the full development of prairie in Illinois (Nelson et al. 2006:2533). Grimm and Jacobson (2004:392–393) conclude that the prairie initially expanded about 9000 cal yr B.P., then retreated, and then expanded again in northern Illinois, with prairie reaching its maximum extent between 6800 and 3200 cal yr B.P. This "maximum prairie period" was then followed by a period of more moderate climate with increased precipitation. Significantly, once prairie was established in Illinois, this grassland biome persisted with the aid of fire into the Historic period.

Transeau's map of the Prairie Peninsula shows that prairie historically extended east into northwestern Indiana, especially between the Kankakee and Wabash River drainages, with outliers as far east as west-central Ohio and southern Michigan (Transeau 1935:Figure 1). But, overall, the geographic region encompassed by Indiana, Ohio, and southern Michigan was covered by deciduous forests, grading into mixed deciduous-conifer forests to the north. These forests were dynamic throughout the Holocene, with mesic and xeric arboreal species responding individualistically to climatic shifts in temperature or moisture. Kapp (1999:53) has presented a model of changing vegetation for southern Michigan and northern Indiana that is based on the work by Williams (1974) at Pretty Lake in northern Indiana. His summary identifies an early Holocene mesic forest established between 10,700 and 9500 cal yr B.P. that was supplanted by oak savanna and prairie after a period of warming and drying that culminated between 9500 and 8100 cal yr B.P. After 8100 cal yr B.P., the mesic forest returned, following a regime of greater effective moisture, as recorded by increases in beech (*Fagus*) pollen in cores from Pretty Lake (Williams 1974) and Clear Lake (Bailey 1972). This increase marked the beginning of a warm, moist period that was dated ca. 6800–5200 cal yr B.P. After 5200 cal yr B.P., the climate shifted back to a drier regime and reached maximum warmth and dryness. During this interval, prairie expanded and the oak-hickory forest opened (Kapp 1999:53). Kapp (1999:53) identified two prairie phases, with a mesic arboreal phase sandwiched between them. The latter "prairie phase," with scattered stands of open oak-hickory forest and C_4 plants, was the period of peak dryness. This bimodal pattern was first seen in Illinois (Nelson et al. 2004). Given the more refined AMS dating for the Illinois sites, the dates given by Kapp (1999:53) for the initial prairie phase (as well as the dates for the onset of the succeeding mesic-forest phase) seem too early. We would expect the timing of these vegetation changes to be more in concert with those in Illinois. However, some transgressive time lapse would be anticipated further east. Redating the cores from Pretty Lake and Clear Lake would help clarify this issue.

The Holocene pollen record for Ohio is somewhat sketchy, but that from the East Twin Lake site in eastern Ohio (Shane 1989) indicates that the early Holocene deciduous forest was dominated by oak, followed by an interval in the mid-Holocene when beech (*Fagus*) became far more common. Following this mesic interval, climate became warmer and drier after 5000 cal yr B.P. Prairie outliers probably became established in western Ohio at this time. This drier climatic regime would have favored opening of the forest, which was no doubt aided by fire.

River Systems and the Great Lakes

River systems changed dramatically during the Holocene (e.g., Hajic 1990; Knox 1985, 1993), and these changes were not synchronous or unidirectional in their effects on aquatic resources (e.g., Styles 1995, in press). At the end of the Pleistocene, impounded meltwater at the margins of the Laurentide ice sheet overtopped or burst through moraines, causing enormous river floods (Montgomery and Wohl 2004:225). Catastrophic meltwater megafloods flowed down the Mississippi River until 12,900 cal yr B.P., when meltwater, bolstered by a release of water from proglacial Lake Agassiz, was redirected eastward through the now-exposed Hudson and St. Lawrence rivers (Clark et al. 2001:283; Montgomery and Wohl 2004:225–226). This influx of cold water into the Atlantic Ocean forced the abrupt climatic cooling associated with the Younger Dryas between 12,900 and 11,400 cal yr B.P. (Clark et al. 2001:283). Redirection of meltwater through different drainage systems occurred both before and after this time (Clark et al. 2001:284). As meltwater floods subsided and sea levels rose in the Holocene, many streams aggraded.

During the Holocene, climate changes continued to affect levels of discharge and sediment transport and deposition (Montgomery and Wohl 2004:226). For example, the Mississippi and the Illinois rivers ultimately evolved from braided, glacial-outwash streams to meandering streams with flood-basin and oxbow lakes, a change that occurred earlier in the Mississippi River valley (Hajic 1990, 1991). These productive, shallow lakes developed in the Illinois and Mississippi floodplains during the mid-Holocene and provided optimal habitat for spawning fish (Hill 1975; Styles 1986). Annual floods restocked the lakes (e.g., Styles 1981). There is evidence for periodic, Holocene megafloods in the Mississippi River basin (e.g., Brown et al. 1999; Knox 1985, 1993). Geologists are refining the timing of major, possibly episodic Holocene flood events, which are ultimately related to changes in continental precipitation (Brown et al. 1999). For example, Knox (1985) has documented periods of large

Mississippi River floods between 6800–5700 cal yr B.P. and 3500–2000 cal yr B.P. that resulted in channel migration and removal of floodplain alluvium. The impacts of these floods on floodplain habitats, settlement practices, and subsistence strategies are subjects for further research. On the western edge of the study area along the southern border of the Prairie Peninsula and in the central Ozark Highland, fluvial evolution took a different course. Changes in mid-Holocene aridity reduced water flow in small streams in these areas, leading to degradation of habitat for some aquatic species (e.g., Klippel et al. 1982; Warren 1995, 1996).

The configuration, connectivity, and water levels in the Great Lakes changed dramatically as post-Pleistocene deglaciation progressed (Larson and Schaetz 2001). Differential isostatic deformation of the lake basins, catastrophic overflows from proglacial Lake Agassiz, drainage of the lakes variously through northern and southern outlets, channel downcutting, and Holocene climate changes all affected lake levels and areas (e.g., Larsen 1999:28–30; Larson and Schaetz 2001). Water levels rose and fell dramatically in the Great Lakes during the Holocene. Larsen (1999:27–29) provides the following summary of Holocene changes in the Great Lakes: In the early Holocene around 11,300 cal yr B.P., the Lake Superior basin was still covered with glacial ice. Separate lakes occupied deep basins of Lakes Huron and Michigan, and water levels in the Lake Michigan, Huron, Erie, and Ontario basins were lower than their modern levels (Chippewa and Stanley low levels). Lake levels rose, and Michigan and Huron became connected around 9000 cal yr B.P. (pre-Nipissing transgression), but lake levels were still lower than modern ones. Studies of terraces indicate that lake levels were high at 5100 cal yr B.P. (Nipissing I), 4500 cal yr B.P. (Nipissing II), and 3400 cal yr B.P. (Algoma). Lake levels in the Michigan, Huron, and Superior basins were higher than today during these intervals; lake levels in the Erie and Ontario basins were also high, but were still lower than modern levels. Periods of low water, although with higher levels than recorded for the modern lakes, and shorter-term fluctuations in lake levels also occurred. Around 2,000 years ago, Lake Superior was separated from Michigan and Huron. Climate change was probably the primary cause of lake-level fluctuations during the Nipissing and Algoma stages and over the last 2,000 years (Larsen 1999:29). Lake levels in the Holocene varied by as much as 24 to 30 m, which affected plant and animal communities and the rivers that flowed into the lakes (Kapp 1999:41; Lovis 1986; Robertson 1987; Robertson et al. 1999:97).

Faunal Records from Archaic Sites

We have organized our discussions of faunal data under six biogeographic regions (Table 3.2) where Holocene ecosystem evolution has differed because of climate variation, physiography, and edaphic factors as well as time transgression in climate-induced change across the Midcontinent. These issues affect resource patterning and availability on both a local and regional scale.

As a prelude to our quantitative analyses, we present a general discussion of what is known about faunal exploitation and subsistence for each of the geographic regions. Multiple sites with Archaic components containing faunal remains are mentioned in the text, but only 19 sites yielded samples large enough for comparative analyses. The dearth of faunal data for Archaic sites can be attributed to poor preservation in many depositional situations or, in some instances, to early excavations in which recovery techniques and identification of remains failed to meet modern standards. Furthermore, our intent was not to provide a compendium of all Archaic sites that have produced faunal remains. Instead, we discuss sites that aid in clarifying the regional pattern for faunal exploitation, and from those we have selected 19 sites for quantitative analysis. The 48 Archaic components analyzed herein clearly demonstrate different trajectories of regional faunal exploitation that are closely linked to differences in resource availability through time and space across the midwestern landscape.

Western Prairie Peninsula

The western Prairie Peninsula, as defined here, includes the western portions of Minnesota, Iowa, and Missouri, essentially the western portions of the Prairie Peninsula shown on Transeau's (1935) map. Two sites just west of these state boundaries have been included because they contained faunal records useful for comparison with sites further east. These are the Logan Creek site (Sheehan 1998; Widga 2003), in eastern Nebraska just west of the Missouri River, and the Coffey site (Schmits 1978, 1980), situated on the east bank of the Big Blue River in northeastern Kansas. Both sites are located in the tallgrass prairie (e.g., Bailey et al. 1994).

Several Archaic sites in western Iowa have produced faunal assemblages dominated by bison. These are sites that occur along the Little Sioux River in northeastern Iowa and along Pony Creek in the southwestern part of the state. Additional sites that are related to this complex occur in western Minnesota, along the St. Croix River on the Minnesota-Wisconsin line, and in eastern North Dakota just west of the Minnesota state line. Kay (1998:176) has termed this series of sites the "Logan Creek complex," after the Logan Creek site, while others simply refer to it as "Prairie Archaic" (e.g., Tatum 1980:159). Sites included here are Cherokee Sewer, Simonsen, Ocheyedan, Hill, and Lungren in Iowa (Anderson et al. 1980:262); Itasca (Shay 1971) and Granite Falls (Kuehn 2000) in Minnesota; Rustad (Michlovic and Running 2005) and Smilden-Rostberg (Larson and Penny 1991) in North Dakota; and, potentially, Interstate Park (Palmer 1954; Pond 1937) and Nye (Eddy and Jenks 1935) in Wisconsin. Recent research on the Interstate Park collection and records has suggested, however, that the

Table 3.2. Archaic Sites with Faunal Records Analyzed for this Study.

Region	Site	Location, Presettlement Vegetation	Cal Yr B.P.	Period Context ^{14}C Yr B.P. (Component)	References
Western Border Prairie Peninsula	Cherokee Sewer	Iowa, tallgrass prairie	9400	late Early Archaic Horizon III 8400 B.P. (EA2)	Pyle 1980; Semken 1974; Whittaker 1998
	Cherokee Sewer		8300–8000	middle Middle Archaic Horizon II 7450–7200 B.P. (MA2a)	
	Cherokee Sewer		7200	middle Middle Archaic Horizon I 6350 B.P. (MA2b)	
	Logan Creek	Nebraska, tallgrass prairie	7900	middle Middle Archaic Zone D 7070 B.P. (MA2a)	Widga 2003
	Logan Creek		7800	middle Middle Archaic Zone C 7020 B.P. (MA2b)	
	Logan Creek		7200	middle Middle Archaic Zone B 6340 B.P. (MA2c)	
	Logan Creek		6800	late Middle Archaic Zone A 6020 B.P. (MA3)	
	Coffey	northeastern Kansas; Big Blue River; tallgrass prairie	6100	late Middle Archaic Horizon III-8 5270 B.P. (MA3a)	Schmits 1978
	Coffey		5900	late Middle Archaic Horizon III-7 5175 B.P. (MA3b)	
	Coffey		5900	late Middle Archaic Horizon III-5 5163 B.P. (MA3c)	
Ozark Highland	Rodgers Shelter	west-central Missouri, Pomme de Terre River; southern edge of Prairie Peninsula; prairie parkland	12,500–10,800	early Early Archaic, Dalton Shelter levels 21–24 Main Excavation levels 36–41 10,500–9500 B.P. (EA1)	Klippel et al. 1982; Parmalee et al. 1976; Purdue 1982
	Rodgers Shelter		9600–9000	late Early Archaic Shelter level 19 Main Excavation levels 19–25 8600–8100 B.P. (EA2)	

Table 3.2. Archaic Sites with Faunal Records Analyzed for this Study, continued.

Region	Site	Location, Presettlement Vegetation	Cal Yr B.P.	Period Context ^{14}C Yr B.P. (Component)	References
Ozark Highland	Rodgers Shelter		7600–6000	late Middle Archaic Shelter level 11 Main Excavation levels 11–14 6700–5200 B.P. (MA3)	
	Rodgers Shelter		3900–2600	Late Archaic Levels 3–4 3600–2500 B.P. (LA)	
	Little Free-man Cave	central Missouri; Big Piney River, northern Ozark Highlands; de-ciduous forest	9400	late Early Archaic Unit 3, Stratum 4 8400 B.P. (EA2)	Styles and White 1997
	Little Free-man Cave		6600	late Middle Archaic Unit 3, Stratum 3 5800 B.P. (MA3)	
Ozark Highland (Northern Border)	Graham Cave	northern Missouri; Loutre River; dissected hill country; deciduous forest	11,200–10,200	Early Archaic Natural Level 4 Arbitrary Level Zone IV (Level 5B) 9700–9000 B.P. (EA1)	Klippel 1971
	Graham Cave		8700	early Middle Archaic Natural Level 3 Arbitrary Level Zone III (Level 3B) 7900 B.P. (MA1)	
	Graham Cave		8400	late Middle Archaic/Late Archaic Natural Level 2 Arbitrary Level Zone II (Level 2A) 7600–? B.P. (MA–LA)	
Illinois and Mississippi River valleys	Napoleon Hollow	west-central Illinois; Illinois River valley; deciduous forest	7800–7500	middle Middle Archaic Napoleon component 7000–6630 B.P. (MA2)	Styles 1992
	Napoleon Hollow		7000–5700	late Middle Archaic Helton component 6130–5010 B.P. (MA3)	
	Koster		9200–8400	early Middle Archaic Horizons 10B, 10A, 9C/D, 8F, 8E 8200–7600 B.P. (MA1)	
	Koster		8100–7700	middle Middle Archaic Horizons 8D, 8C, 8B, 8A 7300–6850 B.P. (MA2)	

Table 3.2. Archaic Sites with Faunal Records Analyzed for this Study, continued.

Region	Site	Location, Presettlement Vegetation	Cal Yr B.P.	Period Context ^{14}C Yr B.P. (Component)	References
Illinois and Mississippi River valleys	Koster		6500–5600	late Middle Archaic Horizons 6 lower, 6 main 5700–4900 B.P. (MA3)	
	Modoc Rock Shelter	west-southern Illinois; Mississippi River valley; deciduous forest	9500–9200	Early Archaic Central Shelter Strata 30–31, 28, 23/26, 20/21, 15–19, 14 8500–8200 B.P. (EA2)	Styles and White 1991; Thorson and Styles 1992
	Modoc Rock Shelter		8900–8000	early Middle Archaic Central Shelter Strata 12/13, 11/ 10, 9, 7/8, 6 8000–7200 B.P. (MA1)	
	Modoc Rock Shelter		7600–7100	middle Middle Archaic Central Shelter Strata 5, 4, 3, 2, 1; 6800–6200 B.P. (MA2)	
	Modoc Rock Shelter		6400–6000	late Middle Archaic Central Shelter Strata A, A2 5600–5200 B.P. (MA3)	
	Modoc Rock Shelter		5400–4900	early Late Archaic Central Shelter Strata B, 9E, 8 E/C 4700–4300 B.P. (LA1)	
Grand Prairie Illinois	Pabst	central Illinois; tallgrass prairie		Late Archaic (LA)	Lewis 1979
Eastern Decidu-ous Forest	Riverton	eastern Illinois; Wabash River valley; deciduous forest		Late Archaic (LA)	Parmalee 1969:139–144; Winters 1969
	Swan Island	eastern Illinois; Wabash River valley; deciduous forest		Late Archaic (LA)	Parmalee 1969:139–144; Winters 1969
	Robeson Hills	eastern Illinois; Wabash River valley; deciduous forest		Late Archaic (LA)	Parmalee 1969:139–144; Winters 1969
	Black Earth		6200	late Middle Archaic Area A, 3C 5400 B.P. (MA3b)	
	Black Earth		5800	late Middle Archaic Area A, 3B 5120 B.P. (MA3c)	
	Black Earth		5600	late Middle Archaic Area A, 3A 4860 B.P. (MA3d)	

Table 3.2. Archaic Sites with Faunal Records Analyzed for this Study, continued.

Region	Site	Location, Presettlement Vegetation	Cal Yr B.P.	Period Context ^{14}C Yr B.P. (Component)	References
Eastern Deciduous Forest	Bluegrass	southwestern Indiana upland; upper reaches of a tributary to the Ohio River	6100–5700	late Middle Archaic 5300–5000 B.P. (MA3)	Stafford et al. 2000
	Railway Museum	western Kentucky; Ohio River valley; deciduous forest		Late Archaic (LA)	Yerkes and Machuga 1994:194–229
	Raddatz Rockshelter	southern Wisconsin; deciduous forest		Early Archaic Level 12 (EA)	Cleland 1966:98–108; Parmalee 1959:83–90; Wittry 1959a:33–69
	Raddatz Rockshelter		5950	Middle Archaic Levels 5–11 5200 B.P. (MA)	Boszhardt 1977
	Raddatz Rockshelter			Late Archaic Levels 3–4 (LA)	
	Durst Rockshelter	southern Wisconsin; deciduous forest		Middle Archaic Zone VI (MA)	Parmalee 1960:11–17; Wittry 1959b:137–267
	Durst Rockshelter			Late Archaic Zone V (LA)	
Great Lakes	Weber I	northern Michigan; Saginaw Valley; deciduous forest	7100–5300	late Middle Archaic Zone II 6200–4600 B.P. (MA3)	Monaghan et al. 1986; Smith 1989; Smith and Egan 1990
	Weber I		3200	late Late Archaic Zone I 3000–2900 B.P. (LA2)	

remains at this locality represent a natural death assemblage (Hawley et al. 2007), and Hill has informed us that Nye may represent multiple localities within the St. Croix River valley. All of these archaeological sites date between 9500 and 7000 cal yr B.P., except for the two later components at Logan Creek, which date to 6850 and 6000 cal yr B.P., respectively. Summary statements for this complex of Early to Middle Archaic sites have been published by Caldwell and Henning (1978:12–122), Anderson and Semken (1980), Kay (1998:174–177), and Frison (2001:144–145).

Collectively, these sites range from kill sites to processing camps and seasonal habitations, but all seem to have been occupied by hunter-forager bands that shared a common tradition. Although bison hunting seemed to have been a focus, some sites show a broader range of fauna, indicating that, at least seasonally, other animals provided important supplements to the diet. Since many of these sites are bison kill sites or meat processing camps, one would not expect to find much diversity in the fauna. In camps that spanned multiple seasons, such as has been suggested for the Itasca site in north-central Minnesota (Shay 1971:64–65), faunal diversity is greater. According to Shay (1971:64–65), the Itasca site occupation includes a fall bison kill and processing camp but also a spring camp focused on fishing. Widga (2006:58), who recently examined the fauna from the Itasca site, interprets the bison kill as representing more than a single event on the basis of additional ^{14}C dates on purified collagen from bison bone. He also argues that the fish and aquatic turtle remains represent natural accumulations that are unrelated to the archaeological assemblage. Widga based his argument on a lack of burning and modification of fish and turtle bones. However, we offer a word of caution in that bones in food refuse are often unburned or lack modification.

The Itasca site was historically situated in jack-pine barrens with larger openings supporting bluestem prairie. Forty kilometers to the west was the border with the continuous tallgrass prairie. The site report did not present faunal tallies separately by component, so only a gross assessment is possible. Even so, the composition of the Middle Archaic fauna at this site appears to reflect its setting along a shallow bay of Lake Itasca. Remains from fish, including walleye, northern pike, suckers, bass, other sunfish, and minnows dominate the assemblage. They contribute 62 percent of the vertebrate number of identified specimens (NISP) (Shay 1971), but a question has now been raised as to whether these remains represent cultural or natural accumulation. Bison remains far outnumber other mammalian taxa, and recent dates (7970–7790 cal yr B.P. and 8519–8179 cal yr B.P.) suggest more than one death event (Widga 2006:58). Proximal prairie patches may have been larger, and the prairie border may have been closer to the site during the middle Holocene (McAndrews 1966).

Plains archaeologists have characterized these groups as broad-spectrum hunter-gatherers (Caldwell and Henning 1978; Mayer-Oakes 1959; Wedel 1961, 1986) and specialized bison hunters (Reeves 1973) and, more recently, have recognized the use of a mix of strategies (Frison 1991; Sheehan 1998). Nevertheless, the availability of bison as a high-quality, high-quantity subsistence item provides a nice contrast to adaptations by Archaic foragers farther east. We selected two sites from this region—Cherokee Sewer and Logan Creek—for our analysis and for comparison with other sites across the Midwest.

The Cherokee Sewer site lies in the tallgrass prairie along the western border of the Prairie Peninsula in northwestern Iowa. It is situated along the Little Sioux River, but evidence for exploitation of aquatic resources is limited to a few scraps of fish bone. Bison dominate the Early and Middle Archaic components at this site. Other prairie taxa include prairie vole, plains pocket gopher, and ground squirrel, but bison contributed by far the most bones and, by inference, the most meat. Both components are interpreted as winter processing sites for bison killed in close proximity (Tatum and Shutler 1980:251), and, thus, they provide only a partial view of Early and Middle Archaic subsistence strategies in the region.

The Logan Creek site is located along the western border of the Prairie Peninsula in tallgrass prairie in eastern Nebraska. We compare the site's middle Holocene assemblages to Middle Archaic patterns in this chapter on the basis of the age of the site, but they are considered Early Archaic by Plains anthropologists. The faunal remains are primarily associated with short-term bison processing camps. However, the component dated to 7800 cal yr B.P. is slightly more diverse and may represent a longer stay at a processing site (Widga 2003:161). The fauna is dominated by bison and includes numerous other prairie species, including pronghorn, bison, plains pocket gopher, ground squirrel, blacktail prairie dog, jack rabbit, and badger.

In addition to the Prairie Archaic sites described above, we also selected a site from northeastern Kansas that had good faunal preservation. The Coffey site is located in tallgrass prairie along the western border of the Prairie Peninsula. Bones from bison and fish dominate the late Middle Archaic deposits at Coffey (Schmits 1978). Fish bones are surprisingly abundant at this prairie site. This pattern no doubt reflects its location on the Big Blue River, which was the likely source of the ducks, geese, and softshell turtle, in addition to the fish (including numerous catfish). The Coffey site is a unique site in the tallgrass prairie because of the productivity of the Big Blue River. The Big Blue River is a tributary to the Kansas River, which is also known for rich fish resources. On the basis of a variety of archaeological evidence, the Coffey site is considered a base camp (Schmits 1978:155) and, thus, provides a more complete view of the subsistence system in this region. Not surprising, given its location, the three mid-Holocene components at the Coffey site show high proportions of bone from prairie species, primarily from bison, but also including thirteen-lined ground squirrel and plains pocket gopher. The floodplain near the site is forested today, but this riparian habitat may have been reduced during the mid-Holocene.

Another site complements the pattern of bison procurement at these prairie sites. The Sutter site, dating between 8350 and 8900 cal yr B.P. (Katz 1973:168), was located on a small tributary at some distance from a major stream. The location is about 90 km southeast of the Coffey site and contained two large, stained features strewn with bison bones. The site report presented no quantitative faunal analysis, but the inventory consisted mostly of bison elements and a bone each of rabbit and bird. The site is interpreted as a bison processing camp adjacent to a marshy area where, the site investigator believes, the animals were dispatched (Katz 1971:15–17). We added this site because the early Middle Archaic projectile point styles at Sutter are comparable to points from Rodgers Shelter to the southeast, where a modicum of prairie species representing this period was recovered.

The Stigenwalt site in southeastern Kansas provides a contrast with bison procurement and processing sites of the eastern Plains. This settlement contained an Early to Middle Archaic faunal assemblage that more closely resembled the pattern of broad-spectrum, small-mammal procurement described for the Middle Archaic in the western Ozark Highland (McMillan and Klippel 1981; Parmalee et al. 1976; Purdue 1982). The site is approximately 80 km west of the Kansas-Missouri border in Labette County, located on the Osage Plains (Fenneman 1917; Schoewe 1949:276). A buried stratigraphic unit within a small alluvial/colluvial fan along the valley margin of Big Hill Creek contained this cultural horizon (Mandel 1990; Thies 1990:51–65). Radiocarbon dates (Thies 1990:109) calibrated to 9800–9000 cal yr B.P. and 8400–8250 cal yr B.P. provide ages for the top and base of the stratigraphic unit in two discrete areas of the site, allowing separation of the fauna into late Early Archaic and early Middle Archaic components. Rabbits (*Lepus* and *Syvilagus*) and small rodents constitute the majority of the fauna in both these assemblages (Finnegan and West 1990); however, lagomorphs and rodents, which represent 82 percent of the NISP in the late Early Archaic (9800–9000 cal yr B.P.), dropped to 59 percent of the total NISP in the early Middle Archaic component (8400–8250 cal yr B.P.). Small mammals again dominated in this later unit, but medium-sized mammals and deer increased in economic importance.

Ozark Highland

Mid-Holocene drying had differential impacts on terrestrial and aquatic resources in the midwestern United States, and subsistence strategies varied across the region. Prairie expanded earlier in the more xeric prairie-parkland settings, and there is evidence for lowering of water levels in streams along the western and southern edges of the Prairie Peninsula. Late early Holocene and mid-Holocene hunters at Rodgers Shelter, located along the Pomme de Terre River at the southern edge of the Prairie Peninsula in the southern Ozark Highland of Missouri, encountered more prairie taxa than did contemporary Native American groups living in more forested settings. Prairie taxa, including bison (*Bison bison*), spotted skunk (*Spilogale putorius*), and plains pocket gopher (*Geomys bursarius*), are present in Early Archaic deposits. Western grassland species, specifically, pronghorn (*Antilocapra americana*) and plains pocket mouse (*Perognathus flavescens*), have been recovered in early mid-Holocene (9000–8300 cal yr B.P.) deposits at Rodgers Shelter (McMillan 1971; McMillan and Klippel 1981; Wood and McMillan 1976).

Pronghorn appears in eastern Kansas at the Chelsea and El Dorado sites (Kay 1998:181), in northeast Arkansas at the Ten Mile Rock site (Medlock 1978:17) and Albertson Shelter (Dickson 1991:32–33, 2003:12), and at Bryjulfson Cave in western Missouri (Wolverton 2002:203) as early as 9450 cal yr B.P. and is present but rare at some of these sites until 3350 cal yr. B.P. The historical range of the plains pocket mouse extends only as far east as east-central Kansas. This rodent inhabits principally dry, sandy soils with sparse vegetation. Blair (1939) recorded this species from the Cherokee Prairie district of northeast Oklahoma, a distance of 200 km to the southwest of Rodgers Shelter. Bison appear in the record as early as pronghorn and persist in the record throughout the Holocene. Bison are recovered in early or mid-Holocene deposits at the Coffey site (Schmits 1978:135), Albertson Shelter (Dickson 1991:32–33, 2003:12), Rodgers Shelter, Little Freeman Cave (Styles and White 1997:182), Tick Creek Cave (Parmalee 1965:6), and Arnold Research Cave (Wolverton 2002:202), and early Holocene remains are reported from Cattail Channel in northwestern Illinois (Graham and Graham 1990:82; McMillan 2006:73–74). Remains are also described for unknown contexts at Ten Mile Rock in northeastern Arkansas (Medlock 1978:17) and above Late Archaic deposits at the Pabst site in central Illinois (Lewis 1979:180). Populations no doubt fluctuated in abundance as precipitation patterns shifted through cycles of moisture and drought. This landscape almost certainly evolved with fire as part of the ecosystem, and the maintenance of prairie biota through burning may have created, or at least sustained, the conditions for habitat requirements for bison and pronghorn that climate alone would not have provided. Modern studies demonstrate the role of fire in creating preferred grazing lands for these two ungulates (Chasan 1999:1; Risser 1990:136–137; Shaw and Carter 1990).

Deer was the most abundant taxon in deposits dating to the Early Archaic (12,500–10,800 cal yr B.P.), but cottontails, squirrels, and other small mammals were also abundant. Representation of deer declined by 9600 cal yr B.P., and cottontails predominated over deer from 9600 to 6000 cal yr B.P. During this long interval, the subsistence base was a diverse mix of rabbit, squirrel, other small mammals, medium mammals, deer, and box turtle (*Terrapene* spp.). The declining representation of deer and the abundant representation of cottontails and other small mammals in the middle Holocene deposits reflect the relatively early impacts of mid-Holocene drying. We also suggest that burning by humans probably played an important role in the maintenance of prairie and woodland openings across this and other areas of the Midwest.

Clinal variation in the body sizes of squirrels (*Sciurus*) and cottontails (*Sylvilagus*) (Purdue 1980) provides independent evidence for the effects of mid-Holocene drying. Occupants of Rodgers Shelter made little use of fish, as indicated by the paucity of fish bones in the deposits. Changes in species composition of freshwater mussels and clinal variation in threeridge mussels (*Amblema plicata*) suggest that water levels were lower in the Pomme de Terre in the mid-Holocene (Klippel et al. 1982). The emphasis on small mammals and the overall diverse utilization of fauna throughout the record at Rodgers Shelter were adaptations to the more xeric environmental setting, which would not have been an optimal setting for taxa archaeologists normally consider economically important, such as deer or fish. Calculation of a dominance index (Wolverton 2005) reveals that cottontail (a low-rank prey species) is the most abundant taxon in the middle Holocene deposits and white-tailed deer (a high-rank prey species) is most abundant in the late Holocene deposits at Rodgers Shelter, suggesting that foraging efficiency was lower in the middle Holocene. In this region, deer and fish populations did not increase in the mid-Holocene. The diverse subsistence strategy supported seasonal base camps in the Holocene, but the site was virtually abandoned during the interval of maximum dryness (after 7200 cal yr B.P.) and was not reoccupied until around 3900 cal yr B.P. (McMillan and Klippel 1981:230).

Prairie taxa also appear in the early Holocene deposits at Little Freeman Cave, a site situated in the oak-hickory forest overlooking the Big Piney River in the central Ozark Highland of Missouri. A single bison element dated to 8131 ± 30 ^{14}C yr B.P. (9050 cal yr B.P.), suggesting that the Ozark forest had opened and prairie patches were present. Prairies, which historically occurred on interfluves in this dissected region, had expanded eastward. Although there has been some mixing of the Archaic components, the overall faunal composition suggests that Early Holocene and mid-Holocene hunters took deer, squirrel, eastern cottontail, other small mammals, and birds (Styles and White 1997). They made little use of fish in these settlements. Changes in species composition and diversity of freshwater mussels for other cave sites in the same region (Miller Cave and Sadies's Cave) suggest that the magnitude of streams was reduced in the mid-Holocene (Warren 1995, 1996). The faunal subsistence base was diverse for these occupations, similar to the case at Rodgers Shelter.

A second cave site, Tick Creek Cave, is located on a small tributary of the Gasconade River just 32 km northeast of Little Freeman Cave. The cave is situated between rolling uplands that historically supported a mosaic of prairie and forest and a more dissected forested hill country bordering the Gasconade River. Excavations carried out by amateurs in the early 1960s (Roberts 1965) unearthed Archaic and Woodland components that contained extensive deposits of faunal subsistence remains. Paul Parmalee (1965) identified 31,590 bones from Tick Creek Cave, of which deer accounted for more than 75 percent of the mammal bone from all levels. Although the site was excavated in 6-inch levels within 5-foot-square units, the amateurs lacked the experience to sort out postdepositional disturbances, and, thus, mixing was a serious problem. Because of this problem, the site has largely been ignored by most analysts.

Parmalee (1965:4–8) used the simplified breakdown of materials into "Woodland" and "Archaic" categories provided by the excavators to report the fauna. This system for sorting the fauna was patently flawed, and the chronological implications of the fauna, as reported, have very little meaning. Having said this, we still regard Tick Creek Cave as an important site given the sheer volume of faunal remains. McMillan (1963) examined two of the excavation units and plotted the faunal remains by level. Chipped- and ground-stone artifacts from the total excavation were also plotted by level, an exercise that demonstrated that, despite some mixing, there is superposition of cultural materials. Early, Middle, and Late Archaic and Late Woodland materials (as determined by projectile point styles and presence or absence of ceramics) sort out in the appropriate sequence. Given the relative superposition of these components, one can say with some confidence that most of the faunal deposit is representative of the Archaic components, not Woodland, as reported by Parmalee (1965:4–8). In fact, a rich Middle and Late Archaic deposit is represented by extensive remains of white-tailed deer. White-tailed deer remains are so prevalent that this high-rank prey species must have been locally abundant in the extensive edge areas in this region. In addition to deer remains, which made up ca. 78 percent of the fauna, turkey, raccoon, cottontail, and box turtle were also important (McMillan 1963:159–160). As the forested landscape of the interior Ozarks opened during the mid-Holocene, areas of optimal habitat for deer were created, to which Archaic hunters and foragers would have been attracted. Tick Creek Cave, like Graham Cave (Klippel 1971), provides evidence for a coalescence of Middle Archaic hunters and foragers into these resource-rich ecological settings during the mid-Holocene, areas that, because of their relative resource potential, were preferred after 9000 cal yr. B.P. (McMillan and Styles 1979).

At Graham Cave, located near the Loutre River on the northern border of the Ozark Highland in the forested, dissected hill country just south of Missouri's till plain, the pattern is different from that in the more xeric prairie-parkland settings to the southwest. At this site, deer and eastern cottontail increased in abundance and gray squirrel declined in the mid-Holocene (Klippel 1971), a testimony to the opening of the forest. As McMillan and Klippel (1981) and Styles and Klippel (1996) have argued, opening of the forest, perhaps aided by fire, would have improved habitat for open-forest and edge-loving species, such as white-tailed deer. Fish remains are scarce at this cave site, and few prairie elements are present. Plains pocket gopher occurs in the early mid-Holocene and badger (three elements) is reported for one of the early Holocene levels (5A). No western-restricted grassland forms are noted for Graham Cave; however, Wolverton (2002:202) reports a single bison element (a left femur fragment dated to 7850 cal yr B.P.) from nearby Arnold Research Cave. On the basis of data from Rodgers Shelter and Arnold Research Cave, Wolverton (2005:101) argues that foraging efficiency increased from the middle to the late Holocene as hunters in the Ozark Highland relied more heavily on high-rank prey (i.e., deer, which had increased in abundance).

Illinois and Mississippi River Valleys

Excavations at deeply stratified archaeological sites with excellent bone preservation in the lower Illinois and central Mississippi River valleys provide an excellent record of changing patterns of human use of faunal resources throughout the Archaic period. Both valleys are historically characterized by rich aquatic habitats, including large rivers, tributary streams, and flood-basin lakes and sloughs. Flood-basin lakes were naturally restocked with fish during spring floods and were critical to the productivity of these river systems (Styles 1981). The lakes offered excellent fish habitat, and many fish species moved into their shallow waters to spawn in the spring and early summer. The rivers and lakes supported great numbers of freshwater drum, catfish, suckers, walleye, pike, rock bass, black bass, small sunfish, crappies, gizzard shad, bowfin, and gars as well as beaver, muskrat, river otter, and mink. The lakes also sustained large waterfowl populations during their spring and fall migrations along the Mississippi Flyway. In addition to the waterfowl, herons and other wading birds, grebes, rails, and American coot would have been available in aquatic habitats as well as turtles and freshwater mussels. Terrestrial environments in the floodplains and adjacent uplands were also rich in animal resources (Styles 1981). Nineteenth-century terrestrial environments included a variety of animals of potential economic importance, such as white-tailed deer, raccoon, turkey, prairie chicken, and passenger pigeon. This landscape also sustained a wide range of medium and small-bodied animals such as opossum, wolves, coyote, gray fox, bobcat, striped skunk, woodchuck, tree squirrels, ground squirrels, eastern cottontail, numerous small rodents, and box turtles. Large mammals that are less often recorded in historical accounts and archaeological sites, such as elk, or wapiti (*Cervus elaphus*), and black bear (*Ursus americanus*), may not have been abundant in prehistory, and small herds of bison (*Bison bison*), although present in the early and middle Holocene in Illinois (McMillan 2006) probably did not expand significantly until the late prehistoric period (e.g., Griffin and Wray 1945; Purdue and Styles 1986, 1987). Even then, herds were much smaller than those to the west of the Mississippi River.

As noted above, several studies have demonstrated climatic, geomorphic, and vegetation change during the mid-Holocene (e.g., Grimm and Jacobson 2004; Hajic 1990; King 1981; King and Allen 1977; Styles 1985). During this dry period, tallgrass prairie expanded in Illinois, creating a mosaic of grasslands and deciduous forest, and the forest became more open. Prairie reached maximal extent between 6800 and 3200 cal yr B.P. (Grimm and Jacobson 2004:392–393). The aquatic environments of the Illinois and Mississippi River valleys, like the terrestrial environments, changed through time as the rivers evolved from braided to meandering streams (Hajic 1990, 1991). All of these changes had impacts on human subsistence, settlement, and mobility strategies (Brown 1985; Brown and Vierra 1983; Styles et al. 1983).

The Koster and Napoleon Hollow sites in the lower Illinois River valley and Modoc Rock Shelter, located at the base of the bluffs in the Mississippi River valley in southern Illinois, occurred in deciduous forest settings surrounded by upland and floodplain prairies. During the middle Holocene, forests became more open and prairies expanded. Quantitative analyses of faunal remains from these sites document environmental and subsistence changes during the Archaic period. Deer dominates the middle Holocene deposits at the Napoleon Hollow site (Styles 1992), which is similar to the pattern for the Koster site. Also similar to the Koster pattern, fish increased dramatically in the middle Holocene levels. Mid-Holocene deposits at Napoleon Hollow did not include any prairie taxa. Deer and squirrel abound in the early Holocene deposits at the Koster site (Neusius 1982). Deer increased dramatically in the early middle Holocene levels—again linked to the opening of the forest. A dramatic increase in fish occurred in the late middle Holocene deposits dating to around 6,500 cal yr B.P. Increases in quiet-water mussels and fish and in dabbling ducks have been linked by Styles (1986) and Hill (1975) to the emergence of shallow backwater lakes in the floodplain. Prairie elements are rare at Koster, limited to single elements from badger and plains pocket gopher in early Holocene and a few prairie chicken bones in middle Holocene contexts.

The early Holocene deposits at Modoc Rock Shelter are similar to those at Graham Cave and Rodgers Shelter in the high representation of small mammals. Tree squirrels are especially abundant and have been linked to the closed, mesic forests of the early Holocene (e.g., Styles et al. 1983; Styles and Klippel 1996). Representation of squirrel declines and deer increases in the mid-Holocene levels—testimony to the opening of the forest. As was argued for Graham Cave, we suspect that human use of fire contributed to the opening of the forest and actually improved habitat for deer. Fish are relatively abundant in the early middle Holocene levels. Appearance of quiet-water fish suggests that shallow backwater lakes were emerging by about 8900 cal yr B.P. (Styles and White 1991). No western-restricted grassland forms are noted, but prairie species (badger, spotted skunk, and plains pocket gopher) occur in middle Holocene deposits. Representation of prairie fauna increases in late mid-Holocene and persists in the late Holocene deposits. Maintenance of prairie habitat in the more mesic late Holocene was probably due in part to anthropogenic fires.

Overall, human reliance on freshwater mussels increased at about 8300 cal yr B.P. in the lower Illinois River valley in association with stabilization of river systems—a prerequisite for the bottom stability required for the establishment of productive mussel beds, with a subsequent shift at around 6500 cal yr B.P. to more quiet-water species correlated with the emergence of shallow flood-basin lakes (Hajic 1981; Styles 1986). As the lakes matured, reliance on fish increased, and use of mussels declined. A similar pattern of initial reliance on mussels and gastropods during the middle Holocene, followed by decreased importance in later time periods, has also been documented in the Mississippi River valley and across the Midsouth (e.g., Styles and Klippel 1996).

Human reliance on fish increased through time (Styles 1994, 1995, 2000:90). In the lower Illinois River valley, an increase in the importance of fish, particularly quiet-water species, occurred by 6500 cal yr B.P. and has been linked to the development of shallow flood-basin lakes (Hill 1975; Styles 1986), which were both naturally restocked during annual floods and easy to harvest as their depth decreased in summer and fall (Styles 1981, 1986). A similar increase in utilization of quiet-water species such as bowfin occurred earlier (around 8900 cal yr B.P.) along the central Mississippi River (Ahler and Styles 1998), again, at the same time for which independent geomorphic data indicate the development of meandering river systems and associated flood-basin lakes (Hajic 1991). Numerous fish species are represented in Archaic settlements, and small individuals predominate in these sites and throughout the prehistoric record in the Illinois and Mississippi River valleys, suggesting that nonselective procurement technologies, such as nets, traps, or poisoning, were used (e.g., Styles 1986:147; Styles et al. 1983:288). Species composition and body-size distribution suggest that these technologies were already present in the Early Archaic (Styles et al. 1983:288).

Archaic hunters made greater use of white-tailed deer during the middle Holocene. In the lower Illinois River valley, for example, reliance on white-tailed deer increased in the Middle Archaic (e.g., Neusius 1982) and then showed a general decline (Styles 1994, 2000:90). In the central Mississippi River valley the proportional use of deer initially increased at the Early to Middle Archaic transition around 8900 cal yr B.P. (Styles 2000:90). Increased use of deer in base-camp occupations at Koster and Modoc Rock Shelter has been linked to opening of the forest and incorporation of logistic mobility to exploit deer (Neusius 1982; Styles et al. 1983).

The relative abundance of squirrel (Sciuridae) bones is greatest in Early Archaic components in both valleys and then declines in later Archaic-period contexts (Styles 1995). McMillan and Klippel (1981) and Styles and Klippel (1996) have attributed the abundance of squirrels, particularly gray squirrels (*Sciurus carolinensis*), in early Holocene components to the closed and more mesic nature of early Holocene forests in the Prairie Peninsula. The use of a broader variety of mammals, including those that would not be considered high-ranking prey, could reflect the lower faunal productivity of early Holocene environments.

Use of waterfowl and other birds associated with aquatic habitats generally increased through time in the lower Illinois River valley. An increase in dabbling ducks, similar to the increases noted above for quiet-water mussels and fish, in late Middle Archaic contexts at the Koster site has been linked to development of shallow backwater lakes (Hill 1975). Proportional representation of waterbirds in the central Mississippi River valley is generally higher than for the lower Illinois River valley and does not show a clear temporal trend.

In the lower Illinois River valley, a general temporal decline is apparent in the abundance of bones from birds associated with terrestrial habitats (e.g., turkey, prairie chicken, and passerine birds). In the central Mississippi River valley, the pattern is bimodal. The relative abundance of turkey bones, similar to that for most terrestrial resources, shows a general decline through time. Contrary to the predictions of some economic models, turkey never comprises more than a minor portion of vertebrate assemblages in either river valley. Prairie chicken remains are recovered in relatively low numbers in middle Holocene and later sites. Passenger pigeon bones occur in numerous prehistoric sites but are not abundant (e.g., Parmalee 1958:173). Passerine birds are not abundant in Archaic contexts in the lower Illinois or central Mississippi River valley.

Most of the variation in the Illinois and Mississippi River valleys is caused by changes in the relative proportions of squirrels, deer, and fish (Styles 1995, in press). Several studies in the western United States have successfully demonstrated that body size serves as a good proxy for prey rank (Bayham 1979, 1982; Broughton 1994) and suggest that relative abundances of large- and small-bodied prey in archaeological assemblages can be used to measure "selective efficiency" (Broughton 1994:503). These techniques based on body size are useful for assessing changes in mammal exploitation in the Illinois and Mississippi River valleys but are hampered by the great productivity of fish in such environments. Fish, although individually small, can be harvested in large numbers and emerge as a first-line resource in most models, including those based on optimal foraging theory.

Optimal models of diet predict that a decrease in resource abundance will be accompanied by an increase in search time and a resultant increase in diet breadth. An increase in resource abundance will be accompanied by a decrease in diet breadth (i.e., greater selectivity) (Bettinger 1987:133). Most researchers recognize that individual decision making at the point of encounter (Bettinger 1987:133), the division of labor (Jochim 1988), and choice guided by nonsubsistence motives played roles in faunal exploitation and that all strategies accommodated use of second-line and lower-ranked prey.

Following Broughton (1994:506), Styles (1995, in press) developed several indexes to examine the contributions of taxa with different body sizes, in this case, squirrels, deer, and fish in the Illinois and Mississippi River valleys. The Squirrel Index [squirrel NISP / (squirrel + deer NISP) X 100] provides an example of the contribution of low-ranking squirrels as compared with that of high-ranking white-tailed deer. There is a clear decrease in the representation of squirrel at the early to middle Holocene transition as compared with deer, which, according to many, would reflect an increase in foraging efficiency. The Deer Index [deer NISP / (deer + squirrel NISP) X 100] shows the increase in deer relative to squirrel in the middle Holocene and its dominance over squirrel throughout later prehistory. As argued throughout this chapter, squirrel may have been more abundant and deer may have been less abundant in the mesic, closed forests of the early Holocene than in the more open mid-Holocene forests in many areas of the Prairie Peninsula and the eastern deciduous forest. Assessments of selective efficiency must consider the effects of changes in resource abundance. In this case, the mid-Holocene increase in selective efficiency, as manifested by greater reliance on white-tailed deer, was facilitated by environmental change as well as by the likely incorporation of logistic mobility to hunt deer.

The Fish Index [fish NISP / (fish NISP + deer NISP) X 100] (Styles 1995, in press) shows that the proportion of fish relative to deer was greater in the Mississippi River valley than in the lower Illinois River valley, especially in the early Holocene, possibly because of the earlier emergence of productive flood-basin lakes in the Mississippi Valley. Fish and deer were both abundant, and their relative proportions converged in the late middle Holocene in both valleys. Fish generally increased in abundance relative to deer in the late Holocene in both valleys. As noted before, we do not think that this change reflects technological change.

A comparison of faunal assemblages from sites in the Illinois and Mississippi River valleys based on a detrended correspondence analysis shows clear similarity between sites of similar time periods in the two regions (Styles 2000:90, in press). The Archaic site components cluster by time, indicating strong patterning in the faunal data. The two Early Archaic components share a high representation of other terrestrial mammals, specifically, squirrels. The Middle and Late Archaic components cluster primarily on the basis of the high representation of deer. The correspondence analysis highlights the differences in faunal exploitation through time. There is good correspondence between the major shifts in faunal exploitation and recorded shifts in botanical exploitation (e.g., Asch and Asch 1985; Johannessen 1984, 1993; Styles 1994). The Early Archaic sites are characterized by the utilization of a diverse mix of nuts. The Middle and Late Archaic sites show a dominance of hickory nuts.

Early Holocene inhabitants of the lower Illinois and central Mississippi River valleys exploited a diverse assortment of animals, especially white-tailed deer and squirrels. The transformation of the patterning of the biota of the mid-Holocene landscape provided new opportunities for hunters and gatherers in the Mississippi and Illinois River valleys. The formation of flood-basin lakes and a patchy prairie-forest mosaic provided optimal environments for fish and white-tailed deer, and mid-Holocene populations made greater use of these resources, indicating greater selective efficiency and possible changes in mobility strategies to capitalize on these productive resources. The timing and nature of the effects of environmental changes varied slightly from region to region as did the timing of changes in human subsistence practices and settlement strategies (Styles 1995, in press). In this case, the similarities between the two large river valleys are remarkable.

Grand Prairie of Illinois

The Grand Prairie, an extensive area of tallgrass prairie, historically covered the flat till plains that characterize much of the central Illinois landscape. Gallery forests occurred along larger tributaries and on moraines. During the more mesic early Holocene, elm and oak forests were more broadly distributed than suggested for the middle or late Holocene. Distributions of Early Archaic sites suggest that small stream valleys that historically supported prairie were likely forested (e.g., Klippel and Maddox 1977). Sediment did not accumulate rapidly in these upland settings, and, consequently, they were not conducive to the preservation of bone. Although prairie developed in northern Illinois as early as 8000 cal yr B.P., it subsequently retreated, and then expanded again around 7000 cal yr B.P. Prairie reached maximal extent between 6800 and 3200 cal yr B.P. (Grimm and Jacobson 2004:392).

The Pabst site provides a lone record for Archaic faunal exploitation in the Grand Prairie of central Illinois. The site is located along the North Fork of the Salt River, which was forested historically. The fauna from the Late Archaic component at this site suggests that the stream valley was likely forested at the time of occupation, although prairie would have been well established by this time. Bones from deer and other terrestrial mammals dominate the late Holocene assemblage at the Pabst site. The diverse assemblage of mammals includes tree squirrel, eastern cottontail, canids, raccoon, ground squirrels, and plains pocket gopher, and remains from aquatic turtles are relatively abundant (Lewis 1979). Fish are sparsely represented at this site, which Lewis (1979) interpreted as a base camp occupation. Prairie chicken and at least five prairie mammals (elk, badger, ground squirrel, plains pocket gopher, and prairie vole) are represented. The prairie mammals constitute only 3.7 percent of the mammal NISP. A single bison bone was recovered in alluvial sediments immediately overlying the Late Archaic occupation (Lewis 1979:180). Although the Late Archaic inhabitants of this site made some use of prairie animals, they primarily subsisted on white-tailed deer and other denizens of the forest and forest edge. Persistence of prairie and prairie animals in the more mesic late Holocene was likely aided by aboriginal burning.

Eastern Deciduous Forest

Historically, deciduous forest dominated the landscapes to the east, south, and north of the Prairie Peninsula. Prairie outliers were present, however, as far east as west-central Ohio and southern Michigan (Transeau 1935). The forests in this area generally evolved from the more closed mesic forests of the early Holocene to more open woodlands in the middle Holocene. In many respects, terrestrial forest resources would have been similar to those noted for the Illinois and Mississippi River valleys. However, access to prairie resources would have been more limited, and aquatic resources were not as plentiful as in the flood-basin lakes of the Illinois and Mississippi River valleys.

Hunters living in the midwestern deciduous forests to the east, south, and north of the Prairie Peninsula benefited from the opening of the forest in the middle and late Holocene. Late Archaic (ca. 3800–3200 cal yr. B.P.) inhabitants of the Riverton, Swan Island, and Robeson Hills sites along the Wabash River in eastern Illinois lived in a mosaic of deciduous forest and prairie. These Late Archaic sites contain diverse faunal assemblages (Parmalee 1969). White-tailed deer, medium mammals, and box turtles abound. Deer is particularly abundant at the Riverton and Robeson Hills sites, which are interpreted as a base camp and a winter settlement, respectively (Winters 1969). Fish are most abundant at the Swan Island site, which is interpreted as a "transient" spring camp or fall camp or both (Winters 1969), but fish are not particularly abundant at any of these sites, even though they are all located near the Wabash River. They do, however, contain unusually large numbers of freshwater mussels. Excavations at the Robeson Hills site, for example, yielded about 19,000 mussels (Parmalee 1969:143), constituting 97 percent of the total faunal NISP. Elk bones were recovered from all three sites. Prairie taxa included plains pocket gopher at Swan Island and prairie chicken at all three sites. The inhabitants of these sites took deer, medium mammals, box turtles, birds associated with terrestrial habitats, and some fish, and they collected numerous freshwater mussels (Parmalee 1969). The presence of shell middens at the Riverton and Robeson Hills sites has led some authors to group these sites with the Shell Mound Archaic of the Green and Tennessee rivers (Claassen 1996).

The Late Archaic (6400–5600 cal yr B.P.) inhabitants of the Black Earth site in the Saline drainage of southern Illinois just north of the Shawnee Hills, focused their hunting pursuits on white-tailed deer, with collection of aquatic turtles constituting a distant second activity, as indicated by numbers of identified specimens (Breitburg 1982). Deer were probably abundant in the forested environment, which was likely kept open by fire. Aquatic turtles may have been locally abundant in the shallow lake located near the site. Fish remains are rare. A few elements from prairie chicken and plains pocket gopher are the only prairie taxa recovered.

Deer and box turtle dominate the middle Holocene (late Middle Archaic, 6100–5700 cal yr B.P.) fauna from the Bluegrass site, located in the forested uplands of a small tributary to the Ohio River in southwestern Indiana. Remains from aquatic turtle are rare, and no prairie taxa were identified. Stafford et al. (2000) attribute the feasibility of establishing a base camp at this upland locale to the opening of the forest, which increased availability of deer. They further note that the base camp was established in the absence of abundant aquatic resources.

At the Railway Museum site (Anslinger et al. 1994), situated along the Falls of the Ohio River near Louisville, Kentucky, a Late Archaic base camp was established with a faunal subsistence base high in deer, box turtles, and fish (Yerkes and Machuga 1994). No prairie taxa were noted. The representation of fish is much greater than noted for Bluegrass, which is not surprising given the great productivity of this stretch of the Ohio River.

Three sites in Ohio (Purtill, this volume) further illustrate the importance of deer to Late Archaic populations in the eastern deciduous forest. At the Bullskin Creek site, located in southwestern Ohio, deer constitutes about 93 percent of the vertebrate fauna (Purtill, this volume; Slawson 1977). The identified fauna also includes beaver and a few remains of raccoon, opossum, gray fox, eastern cottontail, chipmunk, and gray squirrel. Turtle remains are not common and only include a few elements from softshell and box turtle. Fish remains are rare, and freshwater drum is the only identified fish species. Deer constitutes about 44 percent of the vertebrate assemblage at the Scioto County Home site in southeastern Ohio (Bowen 1987), but Purtill (this volume) suggests that deer abundance is underestimated because many of the bones were classified only as unidentified mammal. The occupants of the site also procured raccoon, squirrel, woodchuck, and other small and medium-sized mammals but in relatively low numbers. Fish and turtles (both box turtles and aquatic turtles) contribute about 13 percent and 9 percent, respectively, of the vertebrate fauna. Fish include freshwater drum, catfish, redhorse sucker, gar, pike, and largemouth bass. The bird assemblage includes a few remains of wild turkey, but most of the bird bones were not identified. Deer contributes 64 percent of the bones at Krill Cave, located in the Allegheny Plateau region of northeastern Ohio (Prufer et al. 1989; Purtill, this volume). The Late Archaic inhabitants of this site also procured raccoon, beaver, woodchuck, bobcat, and other small and medium-sized mammals. In addition, a few remains from dabbling ducks, turkey, passenger pigeon, and hawk are reported. Turtle remains are not common, but both box and painted turtle are present. Fish remains are rare; only freshwater drum was identified.

The Raddatz and Durst rockshelters are in dissected-upland forest settings proximal to prairie patches in southern Wisconsin. Deer dominates in the Early, Middle, and Late Archaic deposits at Raddatz (Cleland 1966). The Early Archaic component is more diverse than the later components, with a greater representation of gray squirrels, perhaps suggesting that the forest was more closed in the early Holocene. It is tempting to argue that the increased focus on deer at the Middle and Late Archaic camps reflects the opening of the forest. The appearance of a few elk elements in the Middle and Late Archaic deposits may also reflect opening of the forest. Faunal composition in the Middle and Late Archaic components at Durst Rockshelter is virtually identical to that at Raddatz in terms of the dominance of deer (Parmalee 1959, 1960). On the basis of his reanalysis of faunal remains from Raddatz Rockshelter, Cleland (1966) proposed that Early Archaic hunters had a focal economy based primarily on white-tailed deer. Data from other rockshelters in this same region suggest that during the Late Archaic period there was a seasonal emphasis on white-tailed-deer hunting (Emerson 1979:285–290; Theler 1987:35–36), leading Theler (2000) and Theler and Boszhardt (2003:212) to caution that short-term encampments (probably fall and winter) at sites such as Raddatz Rockshelter only provide a partial glimpse of the subsistence system. Emerson (2003) has argued, however, on the basis of his analysis of white-tailed-deer mortality profiles and season-of-death information from Raddatz and Durst rockshelters, that Middle and Late Archaic hunters were procuring deer opportunistically year-round. In view of the habitat preferences of animals represented at Raddatz Rockshelter, Cleland (1966) suggested that conditions were cooler and moister in the Early Archaic (early Holocene) and warmer and drier in the Middle Archaic (middle Holocene). Pollen data for Devil's Lake and Lima Bog provide independent evidence that a xeric oak forest replaced mesic deciduous forest in the middle Holocene (Baker et al. 1992:386).

Great Lakes

In many respects, prehistoric faunal availability in the inland areas of the lower Great Lakes region was similar to that noted for the remainder of the interior midwestern United States. Deciduous trees dominated the mixed forests in this area, and white-tailed deer was an important game animal. Prairie openings in the Great Lakes region were smaller than in the Prairie Peninsula. Prairie taxa, such as prairie chicken and bison, were not present, but elk, a denizen of open marshy areas, is commonly reported from archaeological contexts, and may have been relatively abundant. Bison were present on the western fringe of the Great Lakes region and were exploited by the Middle Archaic inhabitants of the Itasca site in north-central Minnesota (Shay 1971). However, as noted above, this site lies within 40 km of the tallgrass-prairie border today, and this border may have been closer to the site area during the middle Holocene. The forested areas of the upper Great Lakes region, including Lake Superior and the northern parts of Lakes Huron and Michigan, include more boreal elements. As one moves north, mixed confer and deciduous forests transition into a conifer-dominated forest (Cleland 1982:765). In the mixed conifer-deciduous forests, white-tailed deer and elk were present but probably not as abundant as in the deciduous-dominated forests. The conifer-dominated forests supported moose and caribou (Cleland 1982:765). Turkey probably occurred in the same habitats as white-tailed deer. Passenger pigeons once nested in the northern part of the Upper Peninsula of Michigan and were also abundant during the spring and fall migrations (Cleland 1966:169).

Fish resources in inland streams in the lower Great Lakes area were similar to, but possibly not as easy to exploit as, those in the large flood-basin lakes of the Illinois and Mississippi River valleys. Freshwater mussels were also considerably less abundant than noted for midwestern streams. However, the Great Lakes themselves offered a unique suite of resources. The lakes are not as productive of fish per unit area as the Illinois and Mississippi rivers and, because of their great size and depth, would have been more difficult to exploit with aboriginal technologies (Cleland 1982:765; Rostlund 1952:65). There were, however, optimal times for harvesting fish. Many lake fish species congregate in shallow waters, and many ascend streams during spring spawning, which would have made them easier to catch during certain seasons (Cleland 1982:766). According to Cleland (1982:766), economically important spring-spawning fish included lake sturgeon (*Acipenser fulvescens*), white sucker (*Catostomus commersoni*), northern redhorse (*Moxostoma macrolepidotum*), channel catfish (*Ictalurus punctatus*), black bullhead (*Ameiurus melas*), brown bullhead (*A. nebulosus*), yellow perch (*Perca flavescens*), walleye (*Sander vitreus),* northern pike (*Esox lucius*), and several species of bass. Many of these species ascend streams to spawn. Important fall-spawning species included lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis),* lake herring (*C. artedi*), other varieties of shallow- and deep-water ciscoes, and round whitefish (*Prosopium cylindraceum*). These species congregate in deep waters offshore to spawn. They would have been difficult to procure without the aid of gill nets, which are not documented until later in prehistory (Cleland 1982; Smith 2004). In the game-impoverished upper Great Lakes region, fish would have been an important resource, especially during spring and fall spawning (Cleland 1982:768), and given Archaic-period technology, procurement of spring-spawning fish is more likely.

The importance of geographic variation in resource availability and temporal changes in climate in the mixed deciduous and coniferous forests of the upper Great Lakes has long been recognized (Cleland 1966). Cleland (1966:50) and others have argued that during the Early Archaic period, the spruce, fir, and pine forests of the upper Great Lakes area would have supported moose (*Alces alces*) and woodland caribou (*Rangifer tarandus*).

The nature and timing of Holocene environmental changes in the upper Great Lakes region has been refined since Cleland's (1966) landmark study, but the basic storyline remains the same. During the early Holocene, around 11,500 cal yr B.P., pine forests with some hardwoods covered much of Michigan, and spruce parkland may have been present in the Upper Peninsula (Shott 1999:72). Pine forests with some hardwood trees dominated until about 9500 cal yr B.P. (Kapp 1999:53). Early Holocene (11,500–8900 cal yr B.P.) faunal remains from the Deadman Slough site in northwestern Wisconsin primarily included bones from indeterminate large mammals, but bones from turtles, white-tailed deer, black bear, porcupine, birds, and fish were also present (Kuehn 1998:466). The early Holocene occupants of the Sucices site in the same region (Kuehn 1998) procured turtle and white-tailed deer as well as beaver and fish, the last taxon represented by a single bone. The occupants of both of these sites appear to have had a generalized foraging strategy that incorporated forest and a few freshwater resources (Kuehn 1998).

From approximately 9500 to 8100 cal yr B.P. (or perhaps a little later), the climate became warmer and drier, and oak savanna and prairie developed in southern Michigan and northern Indiana (Kapp 1999:53). By the end of the Early Archaic period (around 8900 cal yr B.P.), hardwood-dominated forests became established across lower Michigan, and terrestrial fauna would have been more similar to that present under modern conditions (Shott 1999:72). Lake levels for Lakes Michigan, Huron, and Erie dropped dramatically in the Early Archaic to 40 to 100 m below current levels, streams entrenched, and fish resources in the lakes and streams draining into the lakes may have been less abundant than today (Shott 1999:72–73).

Lovis (1999) and others have argued that understanding lake stages is critical for interpreting settlement distribution and the development of aquatic resources in the Great Lakes region. He argues that by the middle Holocene, the Great Lakes "were beginning to assume fully their modern shapes and drainages" and that during the mid-Holocene, climate was warmer than present (Lovis 1999:83). Throughout parts of the mid-Holocene, conditions were generally warm and moist (Kapp 1999:53). By 7800 cal yr B.P., or perhaps as early as 8900 cal yr B.P., mixed deciduous forest had become established in the southern Lower Peninsula of Michigan, and more settlements were present in the area (Lovis 1999:86). Water levels in the Great Lakes were high during the middle Holocene but lower than today (Robertson et al. 1999:96). Lovis (1999:85) suggests that productive wetland habitats were developing in the Saginaw basin during the Middle Archaic. No deeply stratified sites with adequate faunal preservation have been reported for this region that would allow tracking of long-term changes in use of fauna from a single locality, but Middle Archaic (7100–5300 cal yr B.P.) and Late Archaic (3200–3000 cal yr B.P.) occupations are present at the Weber I site, located along the Cass River in the Saginaw Valley (Lovis 1999). At the time of occupation, a mixed deciduous forest, including oak, black walnut, butternut, hazelnut, and hickory, was present (Smith and Egan 1990). Prior to the middle to late Holocene transition, the climate became warmer and dryer and open oak forest was established (Kapp 1999:53). Both occupations at Weber I are interpreted as summer–fall residential base camps (Lovis 1999). Deer dominates the fauna for both occupations (Smith 1989; Smith and Egan 1990). Elk and fish are present in both components but are more abundant in the Late Archaic (Smith and Egan 1990). The increase in elk may reflect the opening of the forest, and the increase in fish may reflect higher lake stages in the Late Archaic than in the Middle Archaic. Lovis (1999) and Robertson et al. (1999) note that the Great Lakes were lower in the Middle Archaic than in the Late Archaic, and, thus, sites such as Weber I would have been further inland in Middle than in Late Archaic times.

Resource use has been studied at a series of other sites in the region. For example, Beverley Smith identified remains from white-tailed deer, raccoon, beaver, muskrat, ruffed grouse (*Bonasa umbellus*), black duck (*Anas rubripes*), and fish in the Middle Archaic Bear Creek site in the same county as Weber I and suggested that the site represented a spring logistic camp (Lovis 1999:91). Middle Archaic and Late Archaic settlement systems included residential base camps and logistic camps for the exploitation of both upland and lowland resources (Lovis 1999:94).

Water levels in the Great Lakes fluctuated on both a long-term and short-term basis during the Late Archaic between 5700 and 2600 cal yr B.P. (Larsen 1999; Robertson et al. 1999:95–97). By 5400 cal yr B.P., lake levels (Nipissing I, or Nipissing maximum) were much higher than today, as indicated by archaeological data (Robertson et al. 1999:96). Water levels fell below maximum, but they rose again around 4900 cal yr B.P. (Nipissing II, or Nipissing transgression). Water levels were also high from 4500 to 3200 cal yr B.P. (Algoma stage) but were lower than noted for the Nipissing stage. Waters levels in the Huron-Michigan lake basin dropped below historical mean levels by 3200 cal yr B.P., the post-Algoma low (Robertson et al. 1999:96). These changes in lake levels had dramatic effects on the availability of land for settlement, aquatic resource productivity, and the visibility of the archaeological record. Human populations dealt with risk and uncertainty by developing flexible settlement and subsistence strategies and incorporating a diverse set of resources (Lovis 1986; Robertson et al. 1999:95). Cleland (1966, 1976) used the term *diffuse* to describe Middle and Late Archaic subsistence patterns in the upper Great Lakes.

Taggart (1967), Keene (1981), Lovis (1986), Robertson (1987), and Egan (1993) all postulate a seasonally mobile settlement system that could accommodate desirable (but perhaps unpredictably available) fish and other wetland and aquatic resources as well as white-tailed deer and a wide range of smaller animals. Keene's (1981:195) linear programming models of Late Archaic subsistence in the Saginaw Valley are regulated by limiting elements (specifically, requirements for hides, calcium, and ascorbic acid) and predict focal exploitation of spawning fish in the spring and deer hunting in the fall, with more "diffuse and variable" procurement during the remainder of the year. At some Late Archaic camps in the Saginaw basin, such as the Feeheley (Cleland 1966: 112; Keene 1981; Taggart 1967) and Hart sites (Cleland 1966:113; Keene 1981), fish dominate the faunal assemblages, suggesting a warm-season (spring and/or summer) occupation, while at others, such as the Schmidt site, more species are represented and bones from deer and waterfowl dominate, suggesting a fall occupation (Cleland 1966:116). At the Weber I site, both deer and fish were exploited from the same residential base (Smith and Egan 1990), suggesting considerable variability in the subsistence-settlement system. At the Screaming Loon site in the northern part of the Lower Peninsula of Michigan, Terrance Martin identified remains from indeterminate medium to large mammal, common loon (*Gavia immer*), catfish, bass (*Micropterus* sp.), whitefish or cisco (*Coregonus* sp.), northern pike or pickerel (*Esox* sp.), and bowfin (*Amia calva*) in a series of deposits interpreted as repeated warm-season occupations (Lovis 1990:247).

In southern Ontario, bones from sturgeon, trout, pike, bass, walleye, sucker, catfish, and freshwater drum dominate in the early levels at two Late Archaic sites along Lake Huron (Rocky Ridge and Knechtel I) (Ellis et al. 1990:111). Deer bone increased in the upper levels at these sites, and this increase has been attributed to local environmental change as lake levels dropped. At the Crawford Knoll site, located in the Lake St. Clair Delta, between Lake Huron and Lake Erie in southern Ontario, deer abounds, along with muskrat, turtle, and fish, especially bowfin and freshwater drum (Ellis et al. 1990:112). All of these lakeshore sites are interpreted as spring through fall occupations. Fall and winter camps would have been located in interior environments and presumably would have focused on procurement of deer. Given the locations of Terminal Archaic mortuary sites, settlements may also have been established along rivers to harvest spring-spawning sucker and walleye (Ellis et al. 1990:114). The Late Archaic occupation at the McIntyre site in southeastern Ontario, located on the north shore of Rice Lake, primarily yielded remains from small bullhead, bass, freshwater drum, and sucker, along with white-tailed deer, dog, beaver, muskrat, and bear (Ellis et al. 1990:120; Naylor and Savage 1984:118; Waselkov 1984:152). The site is considered a locus of repeated spring and summer occupations on the basis of the macrofaunal remains (Naylor and Savage 1984:133) and of fall occupations on the basis of analyses of annuli on fish scales recovered through flotation (Waselkov 1984:157). Waselkov (1984:141) suggests that the small size of the fish may indicate procurement with nets, possibly used in combination with a weir.

Fishing technology changed through time in the Great Lakes region, but the degree of change within the Archaic period is debatable. Cleland (1982:768) has argued that by the Late Archaic period in the upper Great Lakes (around 5700 cal yr B.P.), fish were procured through spearing, angling, and use of weirs (documented in Ontario) by societies that primarily relied on hunting. Late Archaic sites attributed to the Old Copper culture have yielded fishhooks, gorges, spears, gaffs, and numerous fish bones (Cleland 1982:768). For the northern Great Lakes, Cleland (1982:773) conservatively has suggested that spearing and angling were used during the Late Archaic. However, he (Cleland 1982:769) notes evidence for earlier use of nets in the Lake Erie and Ontario basins and to the east along the Atlantic Coast. As noted above, recovery of small fish in Late Archaic camps at the McIntyre site in southern Ontario (Waselkov 1984) may indicate early use of netting technology in this area. Net sinkers have been recovered from even earlier contexts, including Middle Archaic components of the Harry's Farm site in New Jersey (Kraft 1986:58). Thousands of net sinkers preserved in the Late Archaic component from the Lamoka Lake site in north-central New York suggest that net fishing was in use in the lower Great Lakes by at least this time (Cleland 1982:769). In addition to net sinkers, Late Archaic sites in New York have yielded bone and copper fishhooks, fish spears, harpoons, and gorges. On the basis of the recovery of perishables (cordage and other preserved fibers), net sinkers, and fish remains, Petersen et al. (1984:199–200) argue that nets were used to exploit fish in eastern North America by at least the beginning of the Early Archaic period. Although weirs were likely used to harvest fish in the Michigan area, especially lake fish when they ascended streams in the spring to spawn, none have been documented in this area. However, to the north and east, evidence is mounting for Late Archaic or even earlier use of weirs (e.g., Petersen et al. 1994).

Geographic Variation and Temporal Changes

To further examine geographic variation and temporal changes in midwestern faunal exploitation, we selected 48 components from 19 sites with adequate faunal preservation for quantitative comparisons. In the following analyses, site components are identified as Early Archaic, Middle Archaic, and Late Archaic on the basis of cultural assignments by regional archaeologists. These broad divisions are grossly subdivided into early Early Archaic (EA1; ca. 12,500–9600 cal yr B.P.), late Early Archaic (EA2; ca. 9600–9000 cal yr B.P.), early Middle Archaic (MA1; ca. 9000–8300 cal yr B.P.), middle Middle Archaic (MA2, ca. 8300–7000 cal yr B.P.), late Middle Archaic (MA3; ca. 7000–5400 cal yr B.P.), early Late Archaic (LA1; ca. 5400–4000 cal yr B.P.), and late Late Archaic (LA2, ca. 4000–2600 cal yr B.P.) based on the ages of the components in our sample. This practice allows us to compare sites of similar age across the transect. If a component spanned a considerable period of time, we assigned it to the subdivision with the most overlap.

We divided the fauna into 12 categories on the basis of habitat and economic criteria: fish, aquatic turtles, terrestrial turtles, birds associated with aquatic habitats, other birds, small mammals (smaller than squirrel), tree squirrel (fox, gray, and red squirrel), rabbit (eastern cottontail, swamp rabbit, and jack rabbit), other medium mammals (ground squirrels to smaller than deer), deer, bison, and other ungulates (elk and pronghorn). Quantitative summaries of fauna are based on NISP. Given that the goal of this analysis is to examine broad differences and changes in the proportional representation of taxa, the use of NISP is appropriate (Grayson 1984:63–67). Analyses are based on the proportion of vertebrate NISP for each faunal category (Table 3.3). Following the methods devised by Styles (1995, in press), we calculated special indexes on the basis of comparative relationships of the NISP for bison, deer, rabbit, squirrel, and fish. The indexes for deer, squirrel, and fish are the same as those developed by Styles (1995, in press) for the lower Illinois and Mississippi River valleys and discussed above. We used the same approach to develop the Bison Index [bison NISP/(bison + deer NISP) x 100] and the Rabbit Index [rabbit NISP/(rabbit + deer NISP) x 100]. The Bison Index allows us to examine the relative importance of this large prairie mammal on the western edge of our study area. The Rabbit Index simultaneously allows us to examine the contribution of a small-bodied mammal that, unlike squirrel, indicates exploitation of more open habitat. Only the Bison Index is appropriate for the Cherokee Sewer and Logan Creek sites because deer is so rare at these bison processing camps that plots of other categories of fauna against deer NISP are meaningless.

Early Holocene Faunal Exploitation (12,500–8900 cal yr B.P.)

Two sites in our sample yielded faunal remains from earliest Holocene contexts—Rodgers Shelter (EA1) and Graham Cave (EA1), both in the Ozark Highland but in very different environmental settings. Deer, rabbit, and other small mammals dominate in the earliest levels at Rodgers Shelter, which are associated with Dalton cultural material

Table 3.3. Proportion of Vertebrate NISP for Each Faunal Category for Site Components Used in the Quantitative Analyses.

Site	Component	Fish	Aquatic Turtle	Terrestrial Turtle	Aquatic Bird	Terrestrial Bird	Small Mammal	Tree Squirrel	Rabbit	Medium Mammal	Deer	Bison	Other Ungulate
Western Border of the Prairie Peninsula													
Cherokee Sewer	EA2	.5	.0	.0	.0	.0	2.0	.0	.0	.0	.5	97.0	.0
Cherokee Sewer	MA2a	.5	.0	.0	.0	.0	5.9	.5	.5	.0	.0	92.8	.0
Cherokee Sewer	MA2b	.0	.0	.0	.0	.0	5.7	.0	.0	12.4	.0	81.4	.5
Logan Creek	MA2a	.0	.4	.0	.4	.0	3.1	.0	.0	1.2	1.5	93.5	.0
Logan Creek	MA2b	.9	.4	.0	.0	.9	18.7	.0	.4	4.9	3.1	60.0	10.7
Logan Creek	MA2c	.2	.0	.0	.0	.1	2.9	.0	.0	1.8	.8	93.9	.3
Logan Creek	MA3	.0	.0	.0	.0	.0	1.6	.0	.8	.0	1.2	96.5	.0
Coffey	MA3a	30.4	1.5	16.9	21.9	15.4	.4	.4	2.7	2.7	3.1	4.6	.0
Coffey	MA3b	26.0	.0	5.8	1.3	.0	.7	.2	.0	.7	1.2	64.3	.0
Coffey	MA3c	41.1	1.3	2.2	14.4	12.5	.6	.0	3	.6	3.1	23.8	.0
Ozark Highland													
Rodgers Shelter	EA1	.4	.0	2.4	4.0	2.8	20.0	12.0	20.4	9.2	28.4	.0	.4
Rodgers Shelter	EA2	2.7	.0	4.1	.2	2.9	17.3	19.5	36.0	7.6	8.5	1.0	.1
Rodgers Shelter	MA1	6.9	.6	5.5	.2	2.7	23.3	15.5	35.7	3.0	6.3	.2	.1
Rodgers Shelter	MA2	2.2	1.8	7.6	.1	2.6	7.2	11.0	38.5	7.2	21.8	.0	.0
Rodgers Shelter	MA3	2.3	1.0	13.4	.1	2.1	12.4	8.9	37.4	6.8	15.5	.0	.1
Little Freeman	EA2	1.7	.0	.0	16.8	14.7	23.3	6.9	15.4	11.3	9.6	.3	.0
Little Freeman	MA3	2.1	1.3	.9	9.9	14.5	20.5	14.6	13.7	4.9	17.6	.0	.0
Northern Border Ozark Highland													
Graham Cave	EA1	.0	.7	.4	.0	4.8	.4	38.1	2.2	18.1	35.3	.0	.0
Graham Cave	MA1	.0	.5	1.6	.2	7.9	.8	17.7	4.0	19.0	48.1	.0	.3
Graham Cave	MA-LA	.2	1.7	5.2	.2	6.0	.6	12.9	7.0	14.5	51.8	.0	.0
Lower Illinois River Valley													
Napoleon Hollow	MA2	8.1	1.6	1.6	.0	1.6	1.2	1.2	1.2	4.9	78.5	.0	.0
Napoleon Hollow	MA3	41.6	7.5	1.1	.9	.7	.4	1.8	1.6	15.0	29.4	.0	.0
Koster	EA2	5.2	1.2	2.0	1.5	3.8	.6	43.8	2.3	7.5	32.2	.0	.0
Koster	MA1	13.2	2.5	5.5	2.6	2.1	2.2	6.0	1.8	1.7	53.4	.0	.0
Koster	MA2	8.9	4.1	9.0	.6	.8	.3	.9	1.4	5.4	68.7	.0	.0
Koster	MA3	39.0	2.9	.8	6.3	2.2	.2	.4	1.4	6.4	4.5	.0	.0
Central Mississippi River Valley													
Modoc	EA2	18.1	2.5	2.9	10.9	11.1	9.5	15.4	6.6	13.1	10.0	.0	0
Modoc	MA1	36.8	3.2	1.8	9.2	7.0	2.8	6.6	3.1	6.3	23.1	.0	.0
Modoc	MA2	31.0	3.7	2.5	7.3	3.8	3.0	5.0	5.1	7.8	30.9	.0	.0
Modoc	MA3	18.4	7.0	5.1	13.1	2.1	4.9	2.5	4.2	7.0	35.8	.0	.0
Modoc	LA1	23.7	7.5	7.5	18.5	2.8	2.3	1.0	3.1	6.7	27.0	.0	.0

Table 3.3. Proportion of Vertebrate NISP for Each Faunal Category for Site Components Used in the Quantitative Analyses, continued.

Site	Component	Fish	Aquatic Turtle	Terrestrial Turtle	Aquatic Bird	Terrestrial Bird	Small Mammal	Tree Squirrel	Rabbit	Medium Mammal	Deer	Bison	Other Ungulate
Grand Prairie of Illinois													
Pabst	LA	1.9	10.9	4.8	1.0	1.1	24.4	2.3	3.0	7.3	43.3	.1	.1
Eastern Deciduous Forest													
Riverton	LA	8.4	4.4	10.3	.2	4.3	.2	5.0	.4	15.3	49.2	.0	2.2
Swan Island	LA	20.8	8.6	9.4	1.8	4.2	1.9	7.6	2.6	10.1	32.9	.0	.3
Robeson Hills	LA	5.3	4.2	2.9	2.2	5.9	.0	1.9	1.4	7.0	69.2	.0	.2
Black Earth	MA3a	2.5	12.3	1.3	4.0	2.1	.1	1.3	.2	2.3	73.9	.0	.0
Black Earth	MA3b	2.4	10.9	2.3	2.6	2.2	.1	.5	.3	2.8	75.8	.0	.0
Black Earth	MA3c	2.2	11.9	1.0	3.1	1.5	.2	.8	.6	3.3	75.5	.0	.0
Black Earth	MA3d	4.4	8.5	1.7	2.4	2.0	.1	.7	.5	2.4	77.2	.0	.0
Bluegrass	MA3	.9	1.9	38.3	.0	.6	.6	9.1	1.4	14.2	33.0	.0	.0
Railway Museum	LA	31.2	2.8	22.1	.7	1.1	5.4	1.4	.2	4.6	30.3	.0	.1
Raddatz	EA	.0	5.0	.0	1.3	21.3	3.8	7.5	1.3	2.5	57.5	.0	.0
Raddatz	MA	.0	1.1	.3	.1	3.2	1.7	.6	.3	3.2	89.0	.0	.6
Raddatz	LA	.0	1.2	.3	.2	2.3	.3	.2	.0	2.3	92.9	.0	.3
Durst	MA	.0	3.1	.2	.0	.7	.7	.0	.0	4.0	90.2	.0	1.1
Durst	LA	.0	1.9	.8	.0	1.0	.0	.2	.2	2.3	93.2	.0	.4
Great Lakes													
Weber I	MA3	1.5	1.1	.0	.4	.0	.0	.0	.0	.7	91.5	.0	4.8
Weber I	LA2	12.2	.9	.0	.0	.0	.0	.0	.0	.9	52.3	.0	33.6

Note: NISP = number of identified specimens.

(Figure 3.2; Table 3.2). Deer is more abundant in the Dalton levels than noted for later occupations, perhaps a result of the more mesic conditions of the early Holocene. The early Holocene forests of the western Ozark Highland were more open than mesic deciduous forests to the east, thus, providing better deer habitat during the earliest part of the Holocene. This situation was short lived, however, for after 10,000 cal yr B.P., more xeric conditions prevailed and the region was invaded by C_4 plants from the west. At Graham Cave to the east, squirrel remains are more numerous than deer remains, a pattern that is then reversed for later occupations (Table 3.2). In this area, the early Holocene forest was denser, as well, but in this case was perhaps too closed to offer optimal habitat for deer, which thrive in open forest.

Six sites in our sample yielded faunal remains associated with the latter part of the early Holocene. Some differences in faunal exploitation are attributable to differences in resource availability across the Midwest. Bison dominates the Cherokee Sewer site assemblage, while deer dominates the assemblage at Raddatz Rock Shelter. If we exclude the bison processing camp at Cherokee Sewer and the possible fall–winter camps at Raddatz, the other early Holocene components show diverse assemblages—many with relatively high frequencies of small mammals such as rabbits or tree squirrels (Figure 3.3). Deer was important, but not as important as it became in the mid-Holocene, when deer populations are inferred to have expanded. On the western edge of the Prairie Peninsula, the decline in deer and increase in rabbits at Rodgers Shelter suggest that warming and drying was already underway. Presence of bison and other prairie taxa lends support to the evidence for warming and drying in this area. The abundance of squirrels, particularly gray squirrels, at sites to the east of Rodgers Shelter suggests that forests there were still somewhat closed.

We examined variation in the body size of prey species across the study area using the Bison, Deer, Rabbit, Squirrel, and Fish indexes (Figures 3.4–3.8). Only a single deer bone was recovered in Early Archaic levels at Cherokee Sewer, so we only plotted the Bison Index for this site. These analyses support the patterns observed in the proportional data. Bison, the largest prey species in our sample, is only present in our westernmost sites and is only important at Cherokee Sewer (Figure 3.4). Deer, the second largest common prey species in the study area, is most abundant at Raddatz Rock Shelter (Figure 3.5). The dominance of deer at this site may reflect a variety of factors, including bias toward recovery of large mammal bones during excavation and a more specialized settlement function (perhaps a fall or winter camp). Rabbits, small mammals associated with more open habitats, are most abundant at sites along the western edge of the Ozark Highland (Figure 3.6), where the environment was already opening but conditions were not optimal for deer. Rabbits are only moderately represented at Modoc Rock Shelter and show even lower numbers in the Illinois and Mississippi River

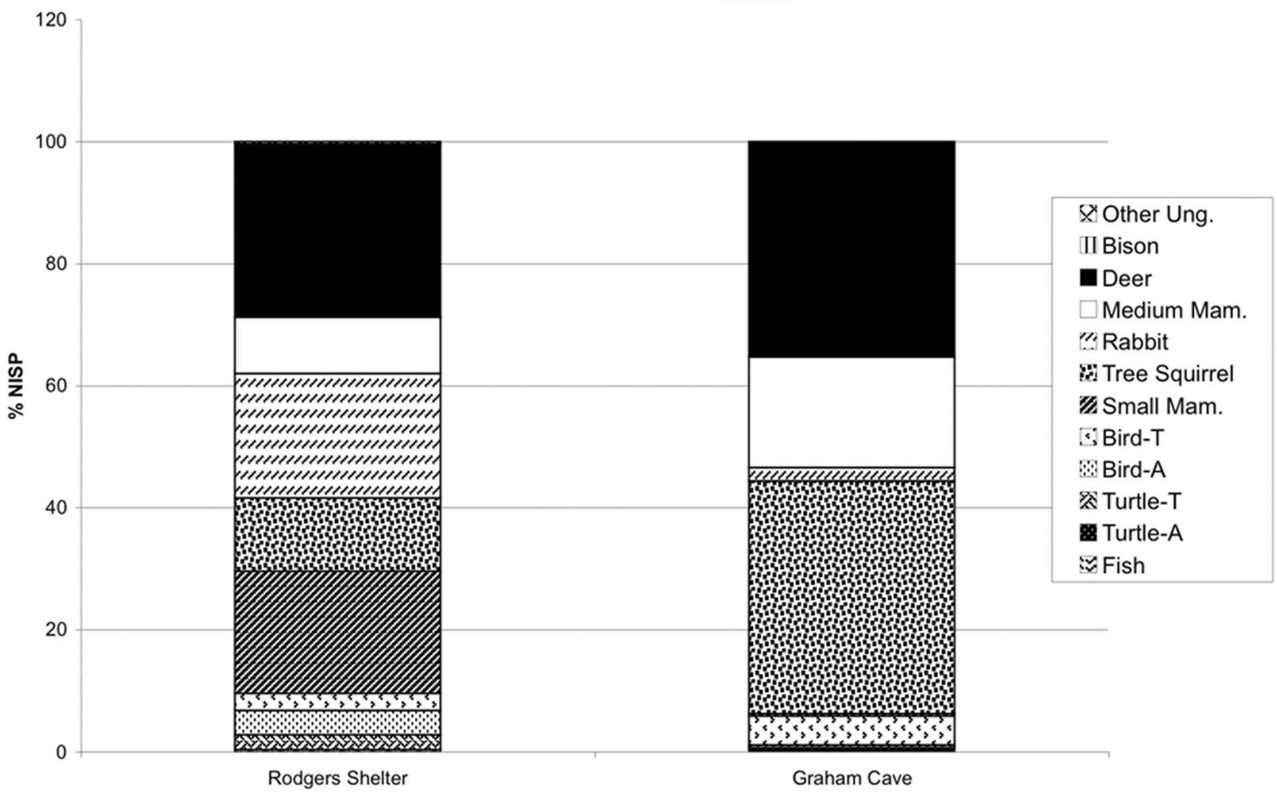

Figure 3.2. Proportion of vertebrate NISP (number of identified specimens) in each faunal category for early early Holocene site components.

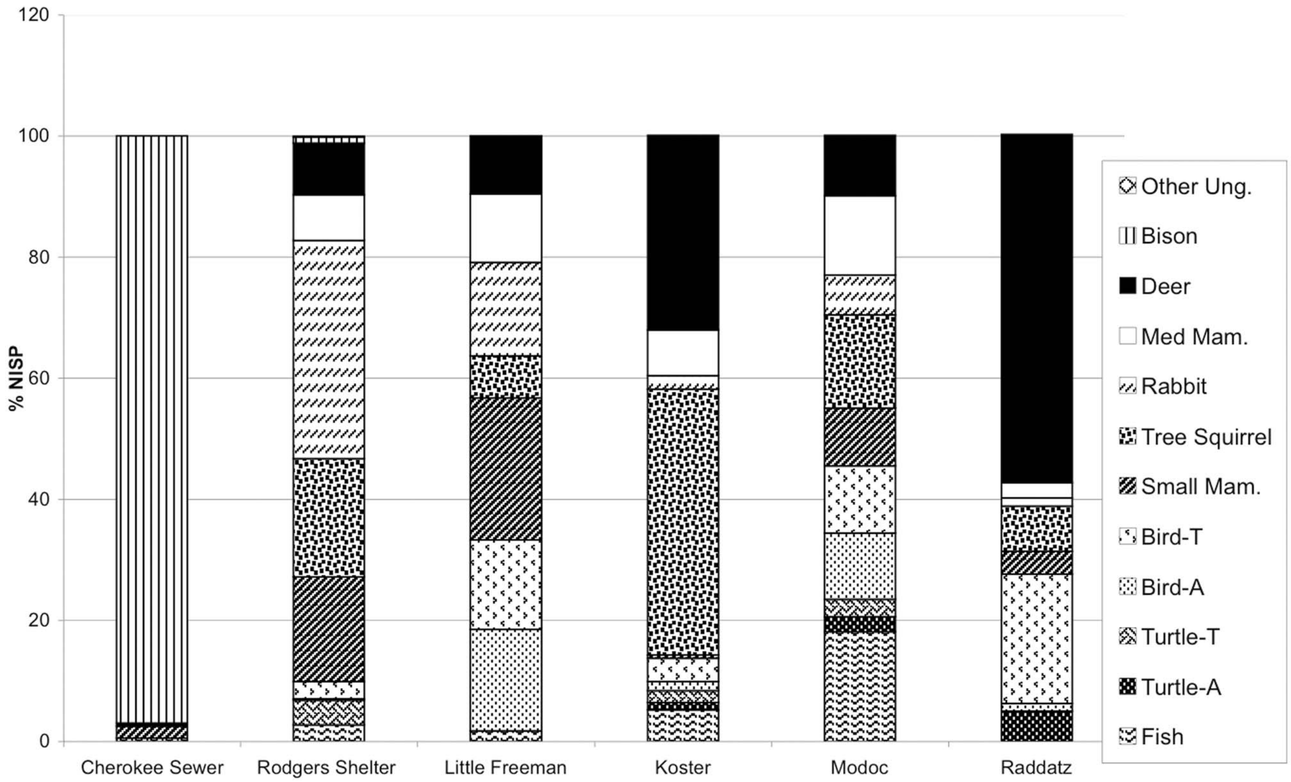

Figure 3.3. Proportion of vertebrate NISP (number of identified specimens) in each faunal category for late early Holocene site components.

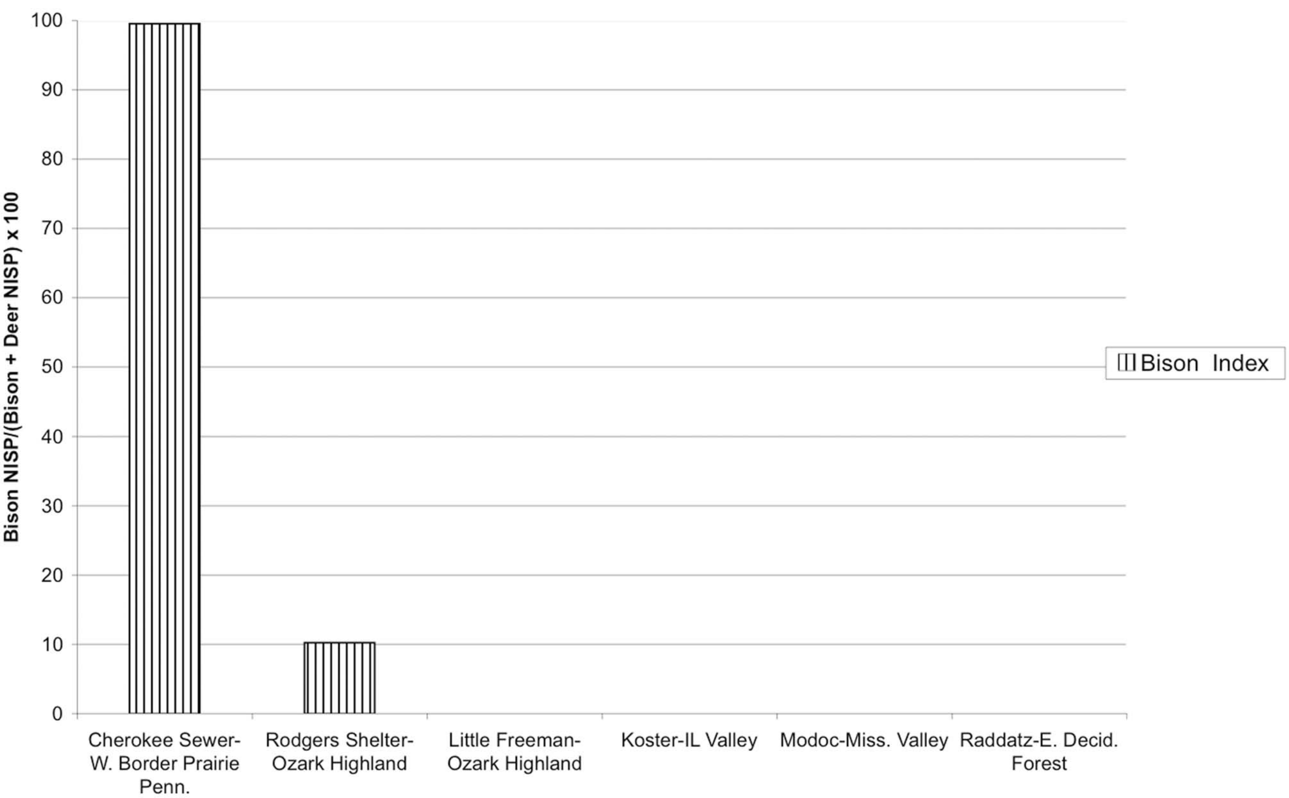

Figure 3.4. Bison index [bison NISP / (bison + deer NISP) x 100] for late early Holocene site components.

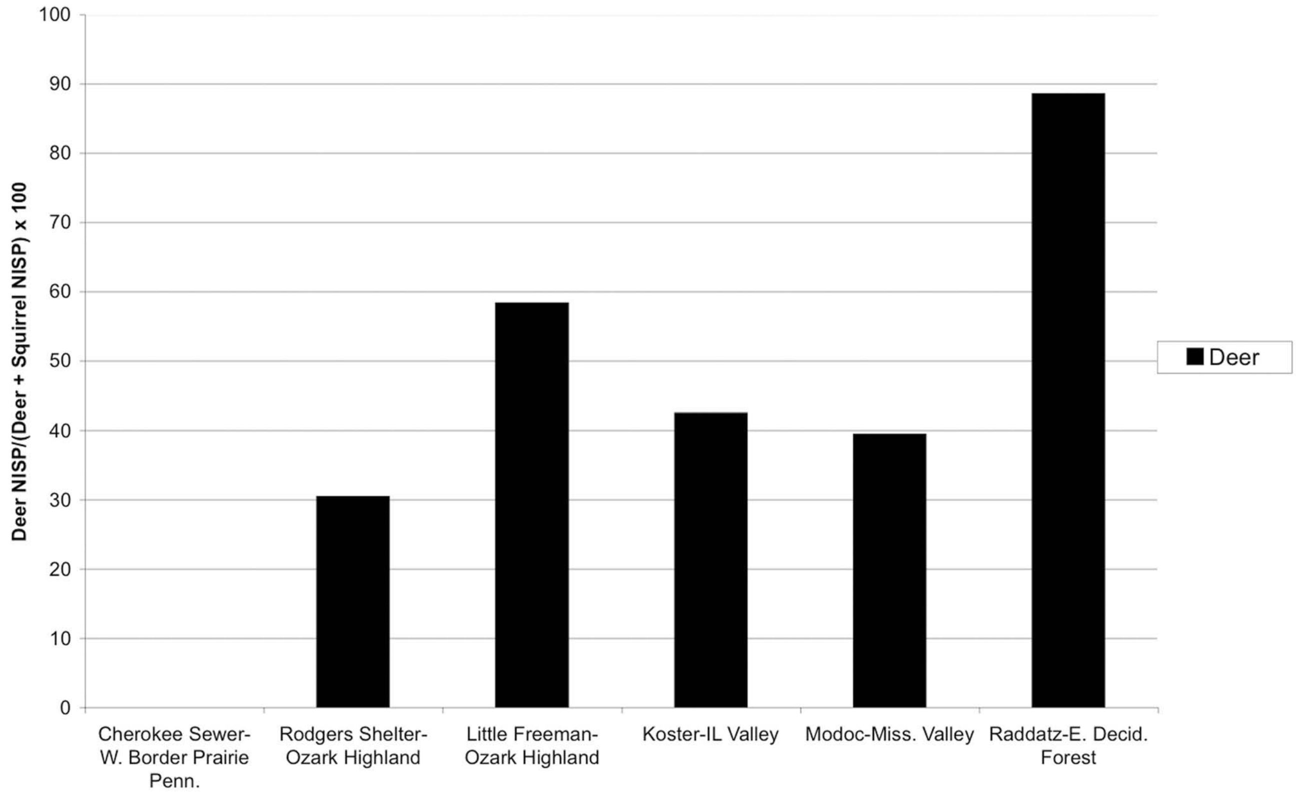

Figure 3.5. Deer index [deer NISP / (deer + squirrel NISP) x 100] for late early Holocene site components.

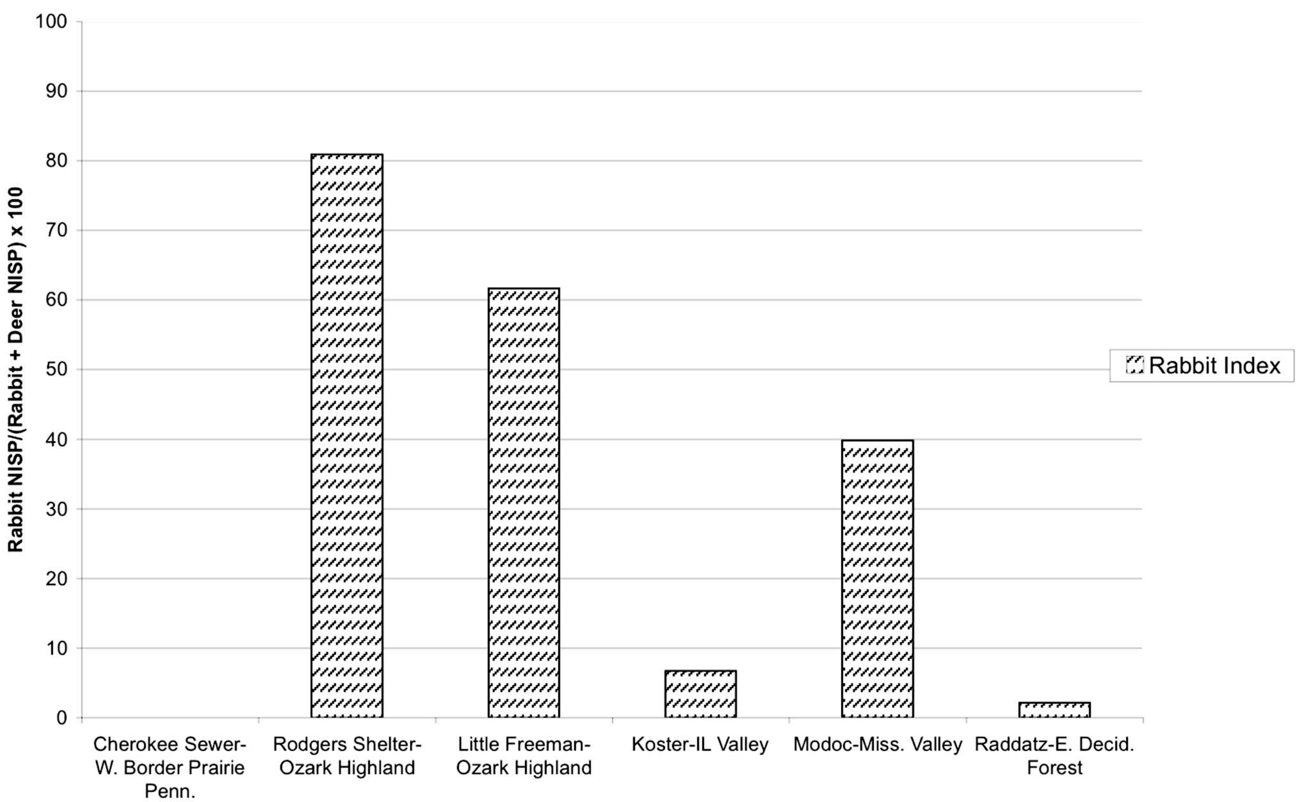

Figure 3.6. Rabbit index [rabbit NISP / (rabbit + deer NISP) x 100] for late early Holocene site components.

valleys and along the northern edge of the Prairie Peninsula, where forests remained closed. Squirrels, denizens of closed forests, are relatively abundant except at Raddatz Rock Shelter (Figure 3.7). We would expect more squirrel remains; as noted above, small mammals may be underestimated at this site because of recovery techniques. Fish are not dominant at any of the sites but are most abundant at Modoc Rock Shelter in the central Mississippi River valley (Figure 3.8).

Middle Holocene Faunal Exploitation (8900–5700 cal yr B.P.)

We divided the middle Holocene into three time slices to tease out time-transgressive effects of mid-Holocene warming and drying. Four sites have faunal-bearing components dated to the early part of the middle Holocene (Figure 3.9). At Rodgers Shelter in the western Ozark Highland, rabbits continue to dominate assemblages and deer shows an even lower representation than in components dating to the latter part of the early Holocene, showing the continuing effects of warming and drying in this setting. The presence of remains from bison, pronghorn, plains pocket mouse, and jack rabbit provide additional support for this interpretation. At Graham Cave, Koster, and Modoc Rock Shelter, deer is more abundant and squirrel is less abundant than in the late early Holocene levels, suggesting that the forest had opened in the northern Ozark Highland, lower Illinois River valley, and Mississippi River valley. Koster and, especially, Modoc Rock Shelter also show increases in the representation of fish. As noted above, the earlier emphasis on fish at Modoc Rock Shelter when compared with Koster has been linked to the earlier development of productive flood-basin lakes in the Mississippi River valley (Styles 2006).

Six site components are dated to the middle segment of the middle Holocene (Figure 3.10). The three middle middle Holocene components at the Logan Creek site were treated as a single sample for these analyses. Bison dominates in the bison processing camps at the Cherokee Sewer and Logan Creek sites on the western edge of our study area. Exploitation of a diverse assortment of small mammals, especially rabbits, continued at Rodgers Shelter. At the Koster site in the lower Illinois River valley, deer increased in abundance over the early part of the middle Holocene and dominates the assemblage. Mussels constitute a greater proportion of the total NISP than in assemblages of other time periods at Koster, and species are associated with a flowing-water habitat. These data suggest that stream systems had stabilized sufficiently for the development of productive mussel beds (Styles 1986). The dominance of deer, and the overall faunal composition at the Napoleon Hollow site, also in the lower Illinois River valley, is very similar to that recorded for Koster. The inhabitants of Modoc Rock Shelter also procured more deer than their early mid-Holocene predecessors did, but subsistence was more

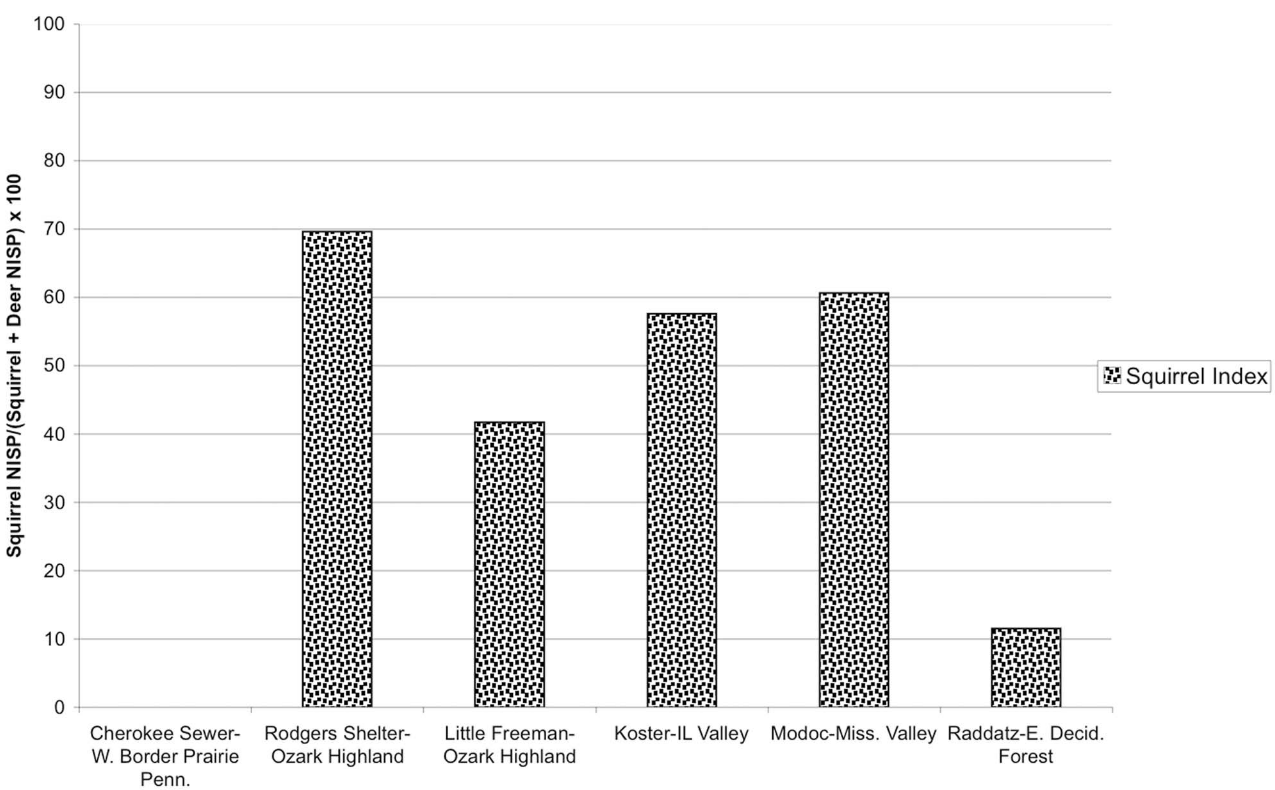

Figure 3.7. Squirrel index [squirrel NISP / (squirrel + deer NISP) x 100] for late early Holocene site components.