Landscape Engineering and Organizational Complexity among Late Prehistoric Bison Hunters of the Northwestern Plains

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Studies of hunter-gatherer sociopolitical organization consistently exclude terrestrial big-game hunters—pedestrian bison hunters, in particular—from discussions of emerging complexity. To an important extent, this exclusion stems both from the ethology of bison and its consequences for mobile hunters and from the character of their archaeological record, which lacks conventional indicators of organizational complexity such as high-status burials and long-term storage facilities. However, this record exhibits stone architecture of monumental proportions. We argue that evidence of emerging sociopolitical complexity is embodied in the hunters’ ability to (1) invest extensively on landscape engineering to amass communal bison wealth for consumption, storage, and exchange, and (2) produce and reproduce ritual wealth among individuals and restricted sectors of the group. Through a multiscalar research design that integrates thousands of surface stone features with data recovered from kill site excavation, ethnohistorical records, and Blackfoot traditions, we demonstrate that Late Prehistoric bison hunters of the northwestern Plains endeavored to create conditions for permanence in their hunting territory by strategically emplacing and maintaining hunting facilities. These, in turn, would be used by ensuing generations of culturally related groups for whom the communal hunt was a formal and ritually managed act.

The Pikunis were rich; meat was their staff of life, and they had plenty of it. (James Willard Schultz, *Blackfeet and Buffalo* [1962:30])

Pedestrian bison hunters of the North American Plains have been conventionally categorized as highly mobile, egalitarian bands whose lives and annual schedules were tethered to the behavior and environment of their resource (e.g., Binford 2001:226; Oliver 1962; Wheat 1972). On the surface, it may seem a fitting portrayal of ancient terrestrial big-game hunters but does not explain the full range of variability in their trajectories and organization. Narrowly focused on behavior and technology, this categorization excludes the existence of an enduring present, where decision making may have targeted not only economic and reproductive pursuits but also political goals and a future shaped by intended and unintended consequences of hunters’ actions (Feit 1994:421; Weisner 2002:411). It certainly fails to characterize northwestern Plains societies of the last millennium, whose communal bison-hunter tradition stands out as an anomaly in terms of scale and complexity (Bamforth 2011:36; Cooper 2008:206, 303). We propose that the archaeology and history of bison hunters provide a fertile ground for redressing the frameworks used in the study of diversity and complexity among terrestrial hunting societies.

Hunter-gatherer complexity has been repeatedly defined and scrutinized by anthropologists; as Sassaman’s (2004) exhaustive literature review shows, there are numerous and somewhat complementary conceptual and practical approaches to this topic. We follow Fitzhugh’s (2003) definition of complexity as a relative measure of structural differentiation (horizontal or vertical), for it provides a flexible departing point to unpack the rise of large-scale communal bison hunting. Trajectories toward organizational complexity depend largely on the interplay of environmental and demographic conditions, political agency, historical contingency, and cultural logic; these trajectories may involve the evolution of
Pedestrian Bison-Hunting Organization:
Identifying the Anomaly

Game drives generally found in the Subarctic, Plains, Great Basin, and Rocky Mountain regions of North America date to the early Prehistoric period (early Archaic), with possible antecedents in the Paleoindian period (Frison 1991:164; Gilmore et al. 1999:116; O'Shea and Meadows 2009; Wilson 2007). The association of this resilient technology with the onset of massive bison kills date to the Middle Prehistoric period (ca. 500 BC), flourishing among groups known for their Besant dart points and effective kills (200 BC–AD 500; Frison 1991:199; Peck 2011:241). It has been suggested that, with the addition of the bow and arrow around AD 200, mass-killing success may have improved dramatically (Kornfeld, Frison, and Larson 2010:260, 268; Reeves 1990:168). Reeves, for example (1983a, 1990:185–189), suggests that the combination of driving technology, storage technology, and the bow and arrow were the catalyzing factors for economic intensification and internal differentiation beginning 2,000 years ago, although the impact of this process does not appear in the archaeological record until after AD 1000 (Brink and Dawe 1989:296). In the northwestern Plains, economic intensification is associated with the Avonlea projectile point complex (AD 600–900). While Avonlea shows an increasing preference for bison hunting supplemented by other animal foods in some areas, specialized intensive bison hunting is characteristic of the subsequent Old Women’s phase and complex (AD 900–1750; Peck 2011).

Despite years of research, satisfactory explanations about the origins and genealogical relationships of the Middle and Late prehistoric populations in the Montana-Alberta region are not easily forthcoming (e.g., Brumley and Dau 1988; Byrne 1973; Greiser 1994; Kehoe and Eynman 1973; Reeves 1983a; Vickers 1986, 1994). The reluctant consensus, based on stratified findings in a handful of sites, seems to be that the Old Women’s phase represents an in situ amalgamation of local and nonlocal people (or of cultural knowledge) associated with Middle Prehistoric period game-driving systems and Avonlea weapon technologies. Old Women’s, in turn, is currently considered ancestral to Blackfoot speakers (Peck 2011:455; Peck and Hudecek-Cuffe 2003:77, 90; cf. Duke 1991).

While advanced technological knowledge was present among the Middle Prehistoric bison hunters, communal kills predating AD 600 differed from subsequent ones in important ways. First, earlier kills most commonly involved luring a few animals into pounds or traps rather than cliff jumps, though these were used, notably at Calderwood, Alberta (Brink 2008; Peck, personal communication, 2012). On the other hand, the classic jump with its extensive cairn-lined driving systems predominated in the Late Prehistoric period. Second, the ability to process large quantities of transportable and storable dry meat and pemmican made it possible to take full advantage of large bison harvests, but not until the Late Prehistoric
Figure 1. Study area, Blackfeet Indian Reservation, Montana. A color version of this figure is available online.
Period, when the expansion of rock-ring encampments and construction of multiple drive-line systems and jumps in given areas suggest an increase in labor pool size. And third, the few known Middle Prehistoric processing sites show moderate to low carcass-processing intensity, which points to preference for meat retrieval (Peck 2011:322). In contrast, transitional sites such as Pigeon Mountain, Alberta (Clarke et al. 1998); Wardell, Wyoming (Brink 2001), and Late Prehistoric occupations in multicomponent sites such as Head-Smashed-In (Brink 2008) generally exhibit crushed bone deposits, fat-rendering features, and berry-smashing tools associated with the production of pemmican.

Thus, the distinguishing characteristic of Old Women’s phase hunting technology is the unrivaled frequency, size, and elaboration of cairn-lined bison drives associated with deeply stratified bison bone beds below cliff jumps and intensive processing of by-products (Cooper 2008, fig. 7-7). The monumentality of Old Women’s hunting complexes, with thousands of surface stone features forming a vast palimpsest, attests to the impact that integrating two bodies of technological and ecological knowledge had on the effective exploitation of bison herds. As T. Kehoe noted in 1967, this was an activity of industrial proportions. It further indicates that the economic foundation for complexity, that is, the capacity for regularly securing abundant supplies of a staple and storable resource, was at hand (after Ames 1991).

Peck (2004; 2011:335; also Cooper 2008) recently examined ecological, prehistoric, and historic records of bison distribution and abundance in the northwestern Plains. He suggests that the end of a long drought around 2,000 years ago fostered unprecedented resource abundance and available surface water, followed by a warm and dry period similar to modern conditions that was interrupted only by the onset of the equally productive Little Ice Age (ca. AD 1400–1800). These conditions encouraged migratory bison herds to winter along the northern Rocky Mountain foothills; large herds tended to break into smaller, localized ones each with its own niche and seasonal round. Differential movement of splitting herds thus created an impression of idiomatic movement (Epp 1988), but in actuality it may have favored hunter groups who depended on local herds to secure a reliable meat supply near their winter camps. By AD 600, conditions were ripe for intensification (Cooper 2008:279). At that time, increasingly larger hunting bands appeared to have settled in sheltered foothill valleys for the 6 cold months of the year. Following along the lines of J. Arnold’s thinking (1996), it is likely that more people signified more kin and non-kin labor, creating the need for orchestrated decision making on and off the hunt.

Throughout the Old Women’s phase, opportunistic hunting occurred year-round, but the planned communal harvests were organized primarily in the late fall–early spring with the goal of killing hundreds of animals by driving them into a deadfall (Brink 2008:67; Cooper 2008:296). Communal hunting was episodic and entailed one or several successive drives. In this manner, large quantities of meat, fat, bone, and hides were obtained and processed within a short period of time (Ewers 1958; Forbis 1962; Kehoe 1967; Peck 2004; Schaeffer 1978; Verbicky-Todd 1984; Vickers 1991; Yellowhorn 2002). The magnitude of this task and its facilities demanded organized labor from most or all members of the hunting community—here, millennial knowledge of landscape and prey were put to practice daily (Barsh and Marlør 2003). Yet the scale of landscape engineering needed to accommodate intensive, multigenerational bison hunting remains largely invisible in discussions of hunter-gatherer complexity, even though it was comparable to the kind of investment that made Arctic whale hunters prosper (Fitzhugh 2003; Sheehan 1985).

There is ample evidence of communal pedestrian bison hunting along the foothills and high prairies of Alberta and Montana (Carlson 2011; Cooper 2008; Frison 2004; Kornfeld, Frison, and Larson 2010; Peck 2011) and extensive historic and ethnographic description of associated social and ritual practices (Arthur 1975; Peck 2004; Verbicky-Todd 1984). But the specific structure of social relations and historically contingent events that recursively emerged from, and shaped, bison exploitation remain poorly understood archaeologically. Palimpsests of surface stone architecture can be somewhat intractable, as Brink, Wright-Fedy niak, and Wetzel (2003) point out, and challenging to conventional research frameworks that depend on diverse artifact assemblages, permanent storage facilities, continuously occupied structures, or lavish burial offerings to measure internal differentiation. Yet, developmental trends inferred from Old Women’s phase kill and processing sites, rock art, local and exotic artifacts, and domestic and nondomestic architecture diverge from the traditional view of a highly mobile, egalitarian hunter society who sought only immediate returns for its efforts.

Alternative Views of Structural Differentiation

Plains scholars have historically attributed pedestrian bison-hunter organization to the deceptively idsyncratic behavior of the herds. Initially it was understood that at specific times of the year, particularly after the rutting season, bands would harvest large numbers of animals for winter storage and hides (Frison 1978:243; Keyser 1979:140). These large-scale kills are thought to have caused rapid local herd depletion, forcing bands to fission and move frequently, particularly in the winter (Wheat 1972). A considerable degree of “social fluidity” (Oliver 1962:17) needed to adapt to a migrating resource would have precluded social integration beyond the band level (Vickers 1986:86; Vickers and Peck 2001).

Climatological, ecological, and archaeological research conducted at the Vore site in Wyoming led Reher and Frison (1980:46) to propose instead that communal bison hunts took place during episodes of increased precipitation and high grassland productivity. During these periods, growing herds of well-fed bison would congregate on the most productive basins for longer periods of time, thus allowing hunters to execute large-scale kills. Reher and Frison (1980:137) sug-
gusted that those areas where bison aggregated periodically, and which hunters sought and repeatedly utilized, supported the development of territoriality and social integration, emergence of sodalities, formalization of leadership positions and lineages, and food redistribution—the northwestern Plains being an example in point.

That there were certain habitual gathering basins with periodically large herds is not only evident at Vore but also at many other kill sites to the north where, over generations, bands returned to participate in the communal harvest, including Head-Smashed-In (Brink 2008), Old Women’s (Forbis 1962), Ramillies (Brumley 1976), Wahkpa Chu’gn (Davis and Stallcop 1966), King (Brumley and Rennie 1999), Gull Lake (Kehoe and Eynman 1973), Boarding School (Kehoe 1967), Ulm (or First Nations, Aaberg et al. 2009), and Antonsen (Davis and Zeier 1978), among others (see Peck 2011:335). Yet, habitual gatherings of bison and people were not always associated with wet climatic episodes. For instance, in certain prairie environments bison aggregation and communal hunts took place during periods of aridity, which promoted short-grass growth (Speth and Spielmann 1983). In other regions, communal hunts apparently occurred regardless of climate or herd condition as, for example, at the Henry Smith site (Wilson 1988).

Fawcett’s (1987:156–170) analysis of bison remains from kill sites in different regions and time periods suggests that the motivations for large-scale harvesting in the Late Prehistoric period had to do with the social need to hunt. He proposed that communal hunts were carried out at times when internal or external social tensions threatened the coherence of the hunting bands. An association between communal hunting sites and ceremonial structures and rock art in the Sun River Valley, Montana, suggested to Fawcett (1987:171) that the highly ritualized and regulated hunt would have engaged community-wide support and avoided group fission by procuring means to interact successfully with other hunting bands. He hypothesizes that the organization of Late Prehistoric communal hunts helped to standardize technology, systematically rotate hunting localities, maintain a year-round ceremonial calendar, secure non-kin labor, redistribute food, and engage in various social activities that reproduced the status quo. More recently, Cooper (2008) tested this social model with a broad data set and found that it applies to Late Prehistoric bison hunters in the northwestern Plains but not to those elsewhere, thus strengthening the notion that emerging complexity during this phase was contingent on conditions specific to the northern Rocky Mountain foothills and on the consequences of culturally bound decisions made by its denizens.

Looking at developmental patterns across the northern Plains, Walde (2006:291, 298; also Brink and Dawe 1989) hypothesized that economic intensification and sustained interaction and trade with Middle Missouri farmers pushed Old Women’s phase bison hunters toward a process he calls “tribalization”—a quaint choice of term for what could well be called emerging complexity. In the northwestern Plains, this process was associated with the formation of increasingly larger, semisedentary, specialized hunting communities who rejected farming and its trappings but invested abundantly in bundle groups and esoteric societies of exclusive and expensive membership (Wissler 1916a). The influence of historical processes associated with multiethnic interaction cannot be overstated (Brink and Dawe 1989:299). Trade of raw materials and foodstuffs has been identified directly from lithic raw materials such as obsidian and Knife River flint and from corn starch grains imbedded in northwestern Plains pottery (e.g., Brink and Dawe 1989; Davis 1972; Zarrillo and Kooyman 2006; Zedeño et al. 2010). Exchange of ritual knowledge, on the other hand, may be visible in the arrangement of objects that compose ceremonial bundles common to upper and middle Missouri River basin groups and even Cahokia, where bundles are represented archaeologically in various contexts (Pauketat 2012).

In sum, bison procurement in the northwestern Plains intensified through time regardless of climate, but the concomitant increase in group size, decrease in mobility, and socially invested communal hunt appear to have been restricted to late Prehistoric period groups in Alberta and particularly Montana (Cooper 2008). We hypothesize that the adoption and year-round commitment to the functions of esoteric societies and bundle groups responded to the intensification of bison harvests in order to support a larger and increasingly circumscribed population and to engage in long-distance trade. This development, in turn, could have had multiple consequences for the social and political goals of individuals and sectors of the population. First, it would have strengthened political alliances within and between bands through the participation in integrative rituals, exchange of goods and inalienable possessions, and the communal hunt. And, second, it would have created the need for individuals to seek sources of wealth and prestige to be eligible for induction into exclusive societies. Individuals could have also challenged the status quo by starting new societies or taking over alternative political offices. Political leaders and society leaders may have sought means to gain non-kin labor and control over the hunt by brokering ecological and ritual knowledge and by linking the hunt with the sacred domain. A cursory overview of organizational complexity among the historic Blackfoot, for whom ritual wealth and bison wealth were central to replicating and restructuring social and political institutions and relationships, provides insight into ancestral connections between their institutions and the specific trajectories of those groups who immediately preceded them.

Bison Wealth and Ritual Wealth: The Blackfoot Model

When J. C. Ewers published The Blackfeet: Raiders of the Northwestern Plains (1958), he outlined what would become a standard model of bison-hunter lifeways that may, or may not, help to fully characterize prehistoric group trajectories
across the Plains (Bamforth 1988, 2011; Cooper 2008). From his and other studies (Ewers 1955; Kehoe 1993; McClintock 1999; Schultz 1962; Wissler 1916), it is clear that Blackfoot speakers variously exhibited structural conditions of egalitarianism, affluence, and complexity (after Arnold 1996; Kelly 2007:294; Kornfeld 2003; Rowley-Conwy 2001). For example, the Blackfoot were seasonally mobile people organized in suprafamily bands. They focused their annual cycle of economic activities on bison and the processing of storable and transportable by-products such as pemmican and hides. They warred with their neighbors. Blackfoot speakers kept close political and kinship alliances among four geopolitical divisions of which the Pikaani (also known as South Peigan or Blackfeet) were the largest, numbering almost 3,000 individuals in 1800 (Dempsey 2001; Jackson 2000:35).

The earliest historical accounts (1691–1791) describe not only a wealth of bison in Blackfoot territory (Bell 1928; MacGregor 1954) but also the existence of powerful regulatory institutions, such as esoteric societies and bundle groups, and of leadership lines in certain bands (Ewers 1955:248; Tyrrell 1916:346). At the time of contact, tools, weapons, and other means of production were individually owned (Klein 1983:151; Tyrrell 1916:363), but the large jump sites belonged to specific bands that wintered in their vicinity (Schaeffer and Schaeffer 1934). The right to own knowledge of the hunt was worn as a badge of honor, as indicated in men’s ceremonial shirts that depict bison drive lines and corrals (Pitt Rivers Museum, image 1893.67.1), in the possession and transfer of bison-calling bundles, and in the ownership of buffalo painted lodges and ceremonies (McClintock 1999), among other manifestations.

Among the Blackfoot confederacy, the Pikaani showed the strongest tendency toward social heterogeneity (Bamforth 1988:123) and visible, but not extreme, differential accumulation of power, prestige, and wealth. They self-described as having three social classes: “the rich, the poor, and the in between” (Ewers 1955:240). Unequal access to material goods and social benefits crosscut gender and age groups, with powerful families dominating the less fortunate (Nugent 1993; cf. Klein 1983:152). Adoptive children were part and parcel of Pikaani life because they replaced group members lost to war and disease, while captive wives added to the labor pool needed in processing meat and hides (Jackson 2000). One of the group’s greatest assets was the possession of a territory highly attractive to bison (Arthur 1975; Bamforth 1988:119; Schultz 1962:30). In addition to providing meat and hides to consume and trade for agricultural products, weapons, raw materials, and ritual objects and knowledge, bison wealth opened the door to leadership positions in band politics, the organization of the hunt, warfare, and religion. Esoteric knowledge could be manipulated by individuals to achieve prestige and material wealth. It was obtained through individual visions, secret society induction, and highly formalized ceremonial bundle transfers within and between ethnic groups, all of which required rituals, feasting, and gifting (McClintock 1999; Wissler 1916a). Because Blackfoot esoteric societies that controlled the communal hunts crosscut age, gender, bands, and geopolitical divisions, they provided a formal means to unify people when subsistence and warfare (among other things) required it. These institutions were stable and active throughout the year and persisted through generations, as indicated in first accounts (MacGregor 1954; Molenaar 2000; Tyrrell 1916), historic journals (Witte and Gallagher 2008); and ethnographies (McClintock 1999; Schaeffer and Schaeffer 1934; Wissler 1916a; Zedeño 2008).

Plains scholars have traditionally attributed many of the aforementioned characteristics to the adoption of the horse in the mid-eighteenth century and a newly found access to the global exchange economy (Nugent 1993). Without question, the horse had significant impacts on land-use patterns, wealth accumulation, warfare, and mechanics of the hunt (Ewers 1955; Frison 1971; Hamalainen 2003; Oliver 1962; Osborn 1983). For example, while horses allowed hunting groups to travel farther and faster, they also confined them to areas where abundant pasture and water were found, such as river valleys and coulees (Landals 1995). With the horse, communal summer hunts and group ceremonies such as the Sun Dance, which attracted hundreds of distant participants from different groups, became the norm (Kehoe 1993; Schultz 1962:30). On the other hand, the demands of horse husbandry made it difficult for owners to aggregate for long periods of time, especially during the winter when pastures were dormant and covered with snow. Despite these contrasts, we argue that the seeds of the equestrian Blackfoot society—bison wealth and ritual wealth—were sown centuries earlier, when the monumental, engineered landscape became a common sight along the northern Rocky Mountain foothills. Pedestrian hunters continued to use the drive-line and jump systems (particularly in winter) until they obtained and trained enough buffalo horses to make the surround a more practical mass kill method than the jump (Ewers 1955:164–165). And perhaps most importantly, the Rocky Mountain foothills remained the territorial core of at least the Pikaani division of the Blackfoot confederacy.

It has been argued that ritual power, when linked to the successful reproduction of staple resources, can influence the restructuring of social relations and provide opportunities for political action and wealth accumulation (Aldenderfer 1993, 2010; Hayden 1995). This may well be the case for the Blackfoot, where the three most powerful esoteric institutions—the Matoki, or Buffalo Women society; the Beaver Bundle society; and the Buffalo Chaser society—controlled the ritual knowledge and rules of the communal hunt. For example, according to the witness account of a Blood Sun Dance by Prince Maximilian of Wied in 1833:

When they [Matoki women] finish the dance on the final day, they imitate the buffalo park. The men, children, and others form two diverging lines. Several men imitate buffalo bulls, whom the women initially drive back. Then, [a] fire
is started upwind, just as during the hunt; when they scented the fire, the women withdraw into the lodge, and this concludes the ceremony (Witte and Gallagher 2008:435).

This account is important in three ways. First, it describes the ritual enactment of the communal hunt in an integrative ceremony, where people actually lined up to symbolize the rock piles of the drive-line funnel found in Old Women’s phase sites and thus sanctified it. Second, it shows a planned, formalized segregation between integrative space, where esoteric reproductive rituals transpired, and hunting space, where the bison-calling rituals were performed, usually by the owners of the Black and Yellow Buffalo tipis (Duvall 1910). And, third, it indicates that control of the communal hunt transcended gender differences. The purposeful construction of consecrated space for symbolic enactments of the hunt reveals that formal gatherings functioned as political theaters where the roles, status, and wealth of individuals, esoteric societies, and other sectors of the group were made explicit to the public. The collusion of sacred space, spectacle, and social power was characteristic of groups whose decision makers employed ritual to integrate people and manage conflict (Inomata 2006). It helped to maintain the status quo by binding community identity to the hunting ground and limiting the number of individuals who could question or change the liturgy and politics of the hunt.

That esoteric societies and leadership lineages were already in existence at the time of first contact with European explorers certainly supports the notion that important elements of organizational complexity seen in the Equestrian period developed out of a much older, highly ritualized, bison-based political economy. This economy seemingly required community-wide social investment at various scales as well as planning and deliberation at the hands of the experts. The Old Women’s phase occupation of the Two Medicine River Valley in north-central Montana lends support to these points through its engineered landscape.

Planning for the Future: Late Prehistoric Bison Hunters of the Two Medicine River Valley

The Two Medicine River is one of three major southwest-northeast trending streams that connect the Rocky Mountains to the grasslands and parklands of the Marias River Basin in Montana, cutting across 150 km of glacier till and Cretaceous formations (fig. 2). The river lies between two of the most extensively occupied drainages in the region: the Milk River to the north and the Sun River to the south. Available data on settlement patterns along the Two Medicine River suggests that this watershed was explored and sporadically utilized since at least the early Holocene (Davis 1972; Kehoe 2001). After AD 900, however, the basin underwent a process of colonization and entrenchment by communal bison hunters who permanently modified its landscape in ensuing generations (Ballenger, Zedeño, and Miller 2012; Kehoe 1960, 1967; Zedeño et al. 2010).

Although this area is not generally included in discussions of Avonlea and Old Women’s phase culture history (e.g., Cooper 2008; Peck 2011; Vickers and Peck 2009), its Late Prehistoric sites exhibit the phase’s diagnostic site layouts, lithic technologies and side-notched projectile points, surface stone architecture, Blackfeet or Ethridge pottery (Ewers 1945; Kehoe 1959), stone effigies, and ammonites or Iniskim (marine fossils used ritually to attract bison) in archaeological contexts (Peck 2002). Thus, we targeted this little-known but heavily occupied region with the explicit purpose of ascertaining the nature and structure of Late Prehistoric bison-hunter organizational complexity, with particular attention to archaeological evidence of landscape engineering as its proxy measure.

The “Two Medicine Lodge” River is critical to understanding the developmental trajectory of the Pikaani (Blackfeet), from both native and scientific perspectives. Well before Maximilian’s time, the river was named after two Okan or Sun Dance lodges that were built across from one another. It is closely associated with Pikaani versions of the origin stories that pertain to the Iniskim, the origin of the Buffalo Chasers society, and the birth of the culture hero Kutoyis, or Blood Clot (Bulchild 2005; Duvall 1910; Grinnell 1962). Two bands (300 people each)—Grease Melters and Lone Eaters—historically wintered in the valley and owned the bison jumps (Schaeffer and Schaeffer 1934). The central part of the valley was named Motaátusi or “Place Where the Bundle Owners Live.” It is plausible, then, to derive an ancestral relation between prehistoric and historic Blackfoot speakers here, just as has been done in Alberta (Peck 2011:419).

The massive bison kill sites that existed in the remote foothills of Pikaani territory were barely known to Europeans when Merriwether Lewis came to the Two Medicine River in 1805 and described the horrible stench of bison carcases. In 1833, Maximilian obtained from a trader the first map of the Marias River basin and its named tributaries (Witte and Gal- lager 2008:490). Explicit mention of archaeological remains of hunting and habitation in the valley first appeared in the anthropological literature in the late nineteenth century (McClintock 1999; Wissler 1910). Reconnaissance surveys of bison kill sites were carried out in the 1920s (Barrett 1922) and 1940s (Lewis 1947). Wissler and Lewis explored and mapped the bison jump site we have named Kutoyis and commented on its impressive size and strategic location. Schaeffer and Schaeffer (1934) recorded important ethnographic information associated with bison and antelope hunting sites in the valley, including the names of Pikaani bands to whom the kill sites and winter camps belonged. Although a few of the major kill sites were hit by bone collectors in the 1930s (Davis 1978), enough intact deposits remain as evidence of their significance.

In the 1950s, Tom Kehoe (1960, 1967) combined site surveys and interviews with Blackfeet elders to locate a large number of habitation, kill, and other sites in the Blackfeet...
Indian Reservation. Of the 54 bison kill sites he visited or recorded from interviews, 16 had evidence of a single rock alignment or double rock lanes, and five had no evidence of drives or bone beds. He noted, however, that between Cut Bank Creek and Two Medicine River, and between this river and Birch Creek, there are numerous drive-lane segments in addition to the known major and minor habitation and kill sites (Kehoe 1967:83). Although Kehoe (1960:421, 1967:10) did not personally visit all the sites, he used interview data to map the location of 18 campsites on both banks of the Two Medicine River as far east as the mouth of Little Badger Creek, 14 bison kill sites along Two Medicine River to its mouth, and numerous other sites on its southern tributaries—Little Badger, Big Badger, and Birch creeks. Kehoe’s (1967) excavation of the Boarding School Bison Drive site on the south bank of Cut Bank Creek has contributed substantive information on stratigraphy, site structure, and artifact variability of a late prehistoric bison kill site of comparable age and significance to other Avonlea–Old Women’s sites in Alberta and Montana. More recent archaeological studies of the Two Medicine River include two Cultural Resource Management surveys by Ferguson (2007) and by Comer et al. (2010). Relevant data from these reports were incorporated into our study.

Two Medicine River Survey and Excavations

Systematic mapping of surface stone architecture and exposed bison bone beds along the Two Medicine River was undertaken from 2007 to 2012 by members of the Kutoyis Archaeological Project (KAP). The survey was designed to relocate and map known sites and utilize resulting data on the association between these and the local topography to identify additional localities with high archaeological potential. The surveyed area comprised the upper and middle portions of the Two Medicine River Valley and adjacent uplands, from the mouth of the South Fork of Two Medicine to the mouth of Badger Creek (42 km in Euclidean distance). The lower valley was explored but deemed of low potential for site recovery because of extensive agricultural activity on the uplands and flood damage. Of the four bison jump sites previously reported below Badger Creek (Kehoe 1960; Lewis
1947), only one site located at the mouth of the river (Thirty Knot; Ferguson [2007]) was included in our study.

The integrated KAP survey resulted in the detailed mapping of more than 14,000 cairns, rock rings, and ancillary features, and the recording of 11 archaeological sites (fig. 3). These are, from west to east, six drive-line systems (South Fork, Stranglewolf [ca. AD 1468], Runningfisher, Racine [ca. AD 1556], Mission, Spring Coulee, and Lower Badger [ca. AD 956]; four hunting complexes (Magee, Two Medicine/Schultz [ca. AD 1544], Kutoyis [ca. AD 1210–1886], and Thirty Knot); and an encampment with 211 structures located on East Mission Lake, 8.5 km east of Two Medicine/Schultz and within its viewscape. Of these, the Kutoyis jump site has been extensively investigated through subsurface mapping and excavation (Ballenger et al. 2008; Jones et al. 2010; Zedeño et al. 2010). Paleoenvironmental studies to determine whether fire was used to manage bison herds and grassland, as asserted in Blackfoot tradition (Yellowhorn 2002), are ongoing at Kutoyis, Stranglewolf, and Spring Coulee (Roos 2011).

Drive-Line Systems

The architecture of drive-line systems on the Two Medicine River conforms to the funnel-shaped ceremonial enactment of the Matoki society that Maximilian sketched (fig. 4A). At its simplest, a funnel connected a bison herd’s gathering basin to a corral or “pound” or to a cliff or “jump.” Among the Blackfeet, corrals were also built under some jumps (Wissler 1910:36). In practice, the system as a whole involved the construction of numerous component parts that facilitated herd manipulation—notably, splitting lines, extensions, realignments, barriers, and signaling cairns (Ballenger, Zedeño, and Miller 2012). Simple funnels (fig. 4B) consist of two main drive lines built of small rock piles placed equidistantly from one another, usually 3–5 m apart; rock piles were used by hunters to support scarecrows or to stalk bison without being seen. Funnels vary in length and width from about several hundred meters to several kilometers; the largest and most complex funnels recorded thus far are Kutoyis (4 km in length and 16 sq km in area) and Mission (5 km in length and 20 sq km in area). Funnels could also include a third drive line (fig. 4C, 4F) used to split a large herd into smaller, more manageable units (Wissler 1910:36–38), although in archaeological reality splitting lines are difficult to distinguish from realignments.

Heavily used drive-line systems exhibit extensions and repairs and alternate jump locations. Extensions expand the reach of a funnel into gathering basins and herd pathways located at some distance from the jump (fig. 4D, 4E). Extensions may incorporate earlier features, such as short segments from discontinued funnels, into a single system. Occasionally they superimpose features unrelated to the drive itself, such as older campsites; however, contemporary elders attribute the presence of one or more rock rings (anchor structures for bison hide dwellings called “tipis”) close to the cliff top or at the end of the lines to the painted buffalo tipi owners. Drive-line reinforcements appear in areas prone to erosion or that offered bison an easy escape, where hunters placed rock piles in close intervals to form a continuous line of rock parallel to the main drive line. Realignments are associated with the use of a common gathering area to feed two or more jumps (see figs. 4D, 7). Most are likely the product of system maintenance and reuse over a long period of time, while others may have been built to offset or enhance the particularities of a given landform or to adjust to weather conditions and herd behavior.

Short, isolated, single lines functioned as more distant visual barriers, and these may be located hundreds of meters from the drive lines, or next to them. In some cases, barriers were located to prevent bison from jumping off the wrong cliff, as at the Two Medicine/Schultz site (see fig. 4F), or from straying away from the funnel through chutes and swales. The barriers we identified in the survey area are associated with large and repeatedly used kill sites. Barriers were also observed in areas where drive lines came in close proximity to encampments. Also unattached to drive lines are cairns or rock piles at least twice the size of those forming the drive line itself. Such “mega-cairns” are found alone or as part of a cluster or line; they seem to be deliberately located in high-visibility landforms (fig. 5). In an area where massive glaciers shaped the undulating terrain, mid-distance visibility is always problematic; hunters likely had to create means of communicating with one another during the communal hunt. Well-preserved cairns are indeed visible from different locations. In the ancestral Blackfoot territory, mega-cairns are also associated with burials.

Topographic and Environmental Considerations

The most salient topographic features of the upper and middle Two Medicine River where the drive-line systems are located are the high, steep ridges and sandstone cliffs that confine the valley (up to 35–40 m above the valley floor). Extending away from the river are vast, undulating uplands characterized by kettle lakes and springs that often form small drainages, or coulees, which could be used as natural traps. The uplands are covered with numerous species of short grass that supported the bison herds through the fall, winter, and early spring (Knapp et al. 1999). The widest floodplain and most extensive terraces occur in the middle portion of the valley; above South Fork and below Badger Creek the river cuts too deeply into its bed to offer good driving opportunities. Meander scars indicate that fluvial processes have modified the valley considerably since it was last used for pedestrian hunts, but areas suitable for the construction of drive-line systems and pounds are still evident in the landscape. Variables such as the westerly direction of prevailing winds as well as the immediate availability of construction materials, firewood,
Figure 4. Drive-line system components: (A) Maximilian’s Plan of buffalo park or pound and of the ceremony related to it: “b” and “c” lead out from the medicine lodge, “a,” from which the women crawl out on all fours, imitating buffalo cows. Witte and Gallagher 2008, fig. 13.12); (B) simple funnel remnant, Racine; (C) possible splitting line remnant, Magee complex; (D) multiple funnels, extensions, and repairs, Mission; (E) realignments, Stranglewolf site; (F) barriers, Two Medicine/Schultz site.
berries, roots, and medicines on the sheltered bottoms made the valley attractive for cold-season habitation.

The highest density of drive-line systems is found between South Fork and Badger Creek. Regularities in orientation, exposure, elevation, and angle of the slope leading to the jump shaped decisions about funnel layout and hunting tactics and helped to predict future system uses (Ballenger, Zedeño, and Fenner 2009). Of the Two Medicine River systems, Strangle-wolf has a northwest-facing cliff, while the adjacent Runningfisher has an east-facing cliff and funnel that parallel the river. A pattern of multiple funnels that shared a gathering basin required ideally located cliffs and valley floors and was thus not possible everywhere. All but one funnel lead downslope to a cliff; in contrast, the Two Medicine/Schultz system, which was one of the most heavily utilized, runs gently upslope from the gathering basin to the edge of a high precipice. Height of the jump varies from site to site, but generally Two Medicine River jumps are 20–30 m in height, from the top of the cliff to the bottom of the talus slope.

The effective gathering, moving, and jumping of bison was only part of site selection criteria. The bottom of the cliff required suitable land to work and camp in the winter. The Two Medicine Valley is characterized by vertical cliffs that confine a meandering river channel; floodplains are generally small and temporary. Cliffs overlooking water would be unsuitable, and the seasonal meander of the channel would have decommissioned some funnels and necessitated the design and construction of new ones; beaver activity alone could ruin a kill location. Not surprisingly, short-lived funnels in the Two Medicine Valley lead to high-energy fluvial settings,
whereas complex systems with bone beds overlook protected terraces and wide floodplains.

No doubt, trial and error played a part in the construction, reuse, and abandonment of drive-line systems, as we found variation in funnel area, in number of component features, and in size of the bone beds. Of the sites mapped and tested by the KAP, Kutoyis, Lower Badger, Two Medicine/Schultz, and Racine have substantial bone beds; Stranglewolf has articulated, well-preserved bone found in shovel tests, but it is deeply buried. While bank erosion may account for the absence of substantial bone beds in some sites, we suspect that there were localities where bison drives were simply unsuccessful. For example, the shale-capped slopes of the upper valley are so high and steep and that drives like South Fork may have been used only incidentally.

Overall, site density and diversity as well the temporal depth represented in multiple, stratified bone beds at Kutoyis, Two Medicine/Schultz, and Lower Badger indicate that hunter groups who colonized the middle valley after AD 900 met with early success. In turn, success led them to structure future opportunity by adapting the funnel-shaped template to the particularities of this landscape. Funnels were laid out in such a way that bison herds could be driven from connected gathering basins into any one or more accessible jumps. In fact, McClintock (1999:438) was told by Blackfeet buffalo hunters that switching from one jump to another was common practice among Two Medicine River bands; this practice likely responded to the hunters’ need to adapt tactical decisions to weather conditions and herd behavior.

The Complex

“Complexes” on the Two Medicine River are foci of bison-hunter occupation that comprise clusters of surface stone architecture, artifacts, and other objects associated with hunting facilities, kill events, domestic life, and religious worship. Such complexes have been described throughout the area occupied by Old Women’s phase hunters, notably at Head-Smashed-In (Brink 2008), on the Milk River (Deaver, Peterson, and Roberts 1999), Sun River (Fawcett 1987), and Three Forks of the Missouri River (Davis et al., forthcoming). Unfortunately, lack of appropriate mapping and dating techniques has resulted in incomplete knowledge of how these components worked together. With access to satellite cartography and optically stimulated luminescence (OSL) dating techniques for stone architecture (Feathers 2012), it is now possible to explore the nature of these complexes and their spatial and temporal associations (see supplement tables A1, A2; available online). In addition to Thirty Knot (Ferguson 2007), the KAP recorded three complexes on the middle Two Medicine River—Magee, Two Medicine/Schultz, and Kutoyis—the latter of which we also excavated. Additionally, other drive-line systems along the river, including Stranglewolf and Mission, exhibit a partial inventory of component features and sites. Magee and Kutoyis represent two ends of a continuum in frequency and intensity of occupation along the valley.

The Magee Complex

Magee is located on a high ridge on the north bank of the river and directly across from Stranglewolf (fig. 6). Two relatively well-preserved drive lines begin atop the ridge on the gathering basin and run north-south between deep coulees, blocking escape routes as they lead onto a cliff. A third line was partially destroyed and rebuilt during the construction of a wagon road at the turn of the twentieth century. The 170 m difference in elevation from the gathering basin on the ridge top to the cliff edge makes this the steepest of the drives in the central valley; driving a herd down this ridge likely carried a high risk of panicky behavior and accidents, thus increasing driving difficulty and danger to hunters. Absence of a significant bone bed below the jump could be attributed to infrequent use of this site, to postdepositional channel migration that cut into the bank, or both. Immediately to the west of the drive-line system and separated from it by a deep coulee is a large campsite with 96 rock rings arranged in small clusters that fill the few flat areas suitable for habitation on the lower portion of the ridge. A snake-like effigy was built on one of these flats. Other features include cairns, a cobble-paved area, and a possible fasting circle on a high ridge above the campsite. No dates are available for this complex.

The Kutoyis Complex

Kutoyis is the largest complex on the Two Medicine River with over 3,000 well-preserved rock features and bone scatters extending across 16 km² on the plateau overlooking the river and in its floodplain (fig. 7). The complex rests mostly on the south bank of the river above the mouth of Badger Creek but also has a campsite directly across the river from the kill site. The kill site below the main drive-line system contains stratified evidence of repeated communal bison-hunting episodes, a primary butchering area, a processing area, and an encampment that extends across the floodplain (fig. 8). Eighteen calibrated radiocarbon dates on bone collagen, blowfly pupae, and annuals from stratified contexts range between ca. AD 1210 and AD 1886, with 10 stratified dates clustering in the mid-AD 1500s. OSL samples taken from the surface beneath cairn rocks dating between ca. AD 1270–1850 indicate that the drive-line system was constructed to perform the earliest kills and was reused and expanded through time until it reached 4 km in length by the historic period. Reinforcements and repairs of the drive lines show that slope erosion and river meandering during the lifetime of the site may have forced hunters to abandon one cliff and realign the funnel at least once.

Partial destruction of the primary butchering area adjacent to the kill site was determined through excavations at the bottom of the slope, where intact bone beds were cut through...
by a large hole; a piece of modern wire was found inside it. Shallow pits next to dirt piles also reveal bone-hunting activity. Yet, intact bone deposits excavated beneath the cliff and beside disturbed areas clearly show that Kutoyis was utilized repeatedly, with at least three palimpsest-like bone layers, separated by silt deposits, dating to the mid-sixteenth century. These layers are so dense that it is difficult at best to estimate the number of kill episodes each layer represents. Early eyewitness accounts describe instances of the intentional burning of kill sites (e.g., Tyrell 1916). Although natural fires cannot be discounted at such sites (Kornfeld, Frison, and Larson 2010:280), human action could be responsible for the isolated patches of intense burning that calcined the bone of nonfleshy elements. These are interspersed with extensively carbonized bone deposits, a pattern we attribute to the location of stomach contents and intact tissues (Ballenger et al. 2008). Our sample from the Kutoyis bone beds is too limited to determine the number of bison contained in each burn event, but we
suggest that several dozen animals were killed at once, as was the case at the well-known Boarding School site, which is located 40 km to the north (Kehoe 1967). Where not burned, the bone beds have such excellent preservation that it was possible to recover patches of bison hide, hair, and dense concentrations of blowfly pupae.

Gradiometry revealed discrete clusters of potential heat features scattered across the entire floodplain below the jump (Jones et al. 2010). Test pits and areal excavations confirmed that these clusters corresponded to living quarters as well as discrete, stratified processing areas, each with evidence of quartering, marrow extraction, bone crushing, boiling, and meat roasting. Fat-rendering evidence is particularly important, as large quantities of it were required in the production of pemmican (e.g., Quigg 1997). Kutoyis not only exhibits thick deposits filled with crushed bone next to a boiling pit but also has stone “berry mashers.” Recovery of bone tools, bone beads, projectile points, lithic tools, and debitage indicates that the hunting community engaged in tool repair, bead making, and paint preparation aside the bison-processing work in the floodplain encampment (Curry 2011; Richard 2011). Bison tooth eruption and wear schedules point to late fall–early winter harvests of cows and calves 1.5 years in age while preliminary analysis of developed fetus bone indicates winter-spring kills (Ballenger, Zedeno, and Miller 2012; Ballenger et al. 2008). These findings, in turn, support oral history accounts that describe the Two Medicine River as a wintering ground for Blackfeet bands.

The enduring presence of the hunting community at the complex is further suggested by the sheer size of two camping facilities in close spatial and temporal association with the kill site. Lower Kutoyis (fig. 9) is a 651-structure campsite located on the ridge directly across the river from the kill site. The area of the site farthest from the river was destroyed by road construction, thus it potentially had many more structures than those currently preserved. Rock rings are arranged in a few large clusters that could indicate multiple discrete occupations. Numerous ancillary features point to outdoor activity areas; social engagements were perhaps associated with the construction of cairns and alignments attached to rock rings, which may represent burials and memorial monuments for important individuals (Brumley 1988; Kehoe 1954). Within the rings there are stone-lined hearths and distinctly patterned vegetation disturbance that suggests the presence
of additional features, such as shallow pits near the entryway and domestic altars on the opposite side (e.g., Oetelaar 2003). Rings vary in size, ranging from 3–9 m in diameter (fig. 10). Three sets of double rings are also present at the site; ethnographically, double rings and oval rings were associated with polygamous households, society leaders, and feasting occasions (Schaeffer and Schaeffer 1934), but they must be excavated to determine association. OSL dates and one radiocarbon date placed the site between AD 1230 and 1770, which is the same age range as the kill site and drive-line system. Seasonality of occupation is not yet known.

Upper Kutoyis is located upstream from the kill site on the south bank of the river (see fig. 7). It is formed by 248 preserved rock rings; fluvial activity, road construction, and plowing have taken a toll on the site, but the remaining structures cover two river terraces. Two OSL dates for Upper Kutoyis fall around AD 1560 and AD 1760. The encampment is adjacent to a presumed ceremonial area, which is located on the northwest corner of the complex and on the first river terrace. It consists of a circular structure with two concentric rings and a linear alignment, thought to be a kind of memorial monument or ceremonial area known as a “medicine wheel” (Brumley 1988; Kehoe and Kehoe 1979; Vickers and Peck 2009). It is flanked by two large rock rings or “lodges” (10–12 m in diameter) on either side. An additional 24 rings are arranged in a rough circular pattern (see fig. 7), which was characteristic of Blackfoot ceremonial encampments (Banks and Snortland 1995; Kehoe 1960). Two lodges at this site are dated ca. AD 1350; that is, they fall within the early use of the kill and camp sites, but the medicine wheel is more recent, with a date of ca. AD 1590. Medicine wheels in Alberta are known to have been used ceremonially during the Old Women’s phase (Peck 2011:418); Blackfoot elders now attribute these features to cosmological events described in the Star Stories. Without additional dates, questions remain about the relationship between the campsite and the ceremonial feature at Kutoyis.

In sum, the Two Medicine River archaeological landscape exemplifies a regional pattern of communal hunts, most of which took place between AD 1400 and 1600. This is demonstrated by the presence of at least 11 drive-line systems located within a few miles from each other and by kill sites utilized multiple times during this time span. Some kill sites were extensively and repeatedly burned, perhaps intentionally, to accelerate decomposition so the site could be reused, resulting in the absence of blowfly pupae in bone beds and
carrion reduction. The presence of multihousehold hunter groups in the valley is accounted for in campsites that are five- to ten-times larger than the largest single-occupation sites recorded in the northwestern Plains (Deaver 1989; Oete-laar 2003). This in turn hints at population increase, periodic reoccupation, or both. Campsites are in close proximity to kill sites and along physiographically diverse rivers and river confluences with high potential for multiseason bison harvests—a pattern typical of the Late Prehistoric period (Reher 1983; Walde, Meyer, and Unfreed 1995). Elsewhere in the region, these patterns, together with effigies, medicine wheels, rock art, and vision quest sites, have been proposed as indicators of social change in the centuries before contact (Fawcett 1987; Kehoe and Kehoe 1979; Walde 2006).

Other than participation in interregional trade networks (suggested by the presence of artifacts made of red pipestone, obsidian, and Knife River flint), a number of factors could have propelled the construction of numerous and massive bison-procurement facilities within close proximity to one another. These include (1) an increase in the size or number of hunting bands exploiting the same bison range (Reeves 1990:185), (2) a period of climate cooling (Little Ice Age) beginning in the fourteenth century that attracted bison herds and stimulated the growth of nutritive grasses along the foothills (Bamforth 1988:72–74), (3) a purported northward expansion of Shoshone groups into central Montana (Kehoe 1960:440), and (4) the arrival of Middle Missouri immigrants to southern Alberta shortly before contact (e.g., Binnema 2004:77; Byrne 1973:481; Walde 2006). Any of these conditions could have brought opportunities as well as real or perceived threats to both the land and the resource base of bison hunters, thus motivating them to seek better ways to ensure a year-round supply of bison. The location of the Two Medicine River and the abundance of its resources likely made it ideal for regular habitation and for refuge, while climatic conditions during the height of its occupation were well suited for managing bison and grassland through fire (Roos 2011).

If economic intensification in the northwestern Plains was indeed a response to internal or external factors or to far-reaching influences from the east, then, sometime during the Late Prehistoric period more efficient bison-hunting strategies that involved not just the opportunistic drive or trap but carefully planned harvests became requisite. On the Two Medicine River, access to multiple drive-line systems reportedly allowed hunters to maximize the success of the hunt. While resource diversification was certainly a viable complement to bison, the regional bone record shows that Old Women’s phase hunters were intent at expanding bison harvests (Peck
2011:378), which yielded quantities of storable, transportable, and exchangeable by-products. Planned communal hunts along the foothills would have been needed to support growing local bands during the cold months of the year and to decrease the cost and risk of moving often—hence the need for an engineered landscape that promoted efficient bison management while permitting hunters to remain in place longer and to invest at length in social, political, and ritual engagements.

Toward a New Vision of Pedestrian Big-Game Hunters

One of the most challenging issues in resolving organizational anomalies among Late Prehistoric pedestrian bison hunters is how these people confronted the need to secure present and future affluence while decreasing uncertainty. One logical solution is that mobile hunters satisfied this need by creating conditions for group permanence in a given area. This could be achieved through inscription of essential knowledge on the landscape; retention of hunting-ground ownership rights through kinship, lineage, and band structure; management of staple prey and its environment; and integrative rituals, among other strategies (e.g., Turner 1979). Because sighting and driving bison did not always lead to success (e.g., MacGregor 1954; Molenaar 2000), economic diversification was a likely option for bison hunters elsewhere in the Great Plains but not necessarily for the bison wealthy.

The archaeological record indicates that Old Women’s
phase bison hunters did not seek diversification as a productive alternative to bison although the means were at hand (e.g., game that shared bison ranges). On the contrary, they banked on bison wealth in choice areas, as the location of monumental surface stone architecture, together with historically documented Blackfoot landscape knowledge and practice, indicate. Our interpretation of the Two Medicine River archaeology in regional context is that landscapes were engineered by hunting bands to create conditions for long-term permanence and short-term sedentism in areas previously used by dispersed groups. They were structuring opportunities for hunting success by establishing territorial cores and pathways of movement between them (Zedeño and Anderson 2010). Taking Reher and Frison’s (1980) notion of cyclic presence of hunter and prey on specific locales and times as a departing point, one may begin to outline the characteristics of bison-hunting temporality that led to the formation of defendable territories before European contact.

Preparing the communal hunting ground involved logistical variables, such as: access to sheltered campsites near critical resources; selection of suitable kill and processing locations in proximity to encampments; layout, construction, and maintenance of drive lanes that connected two or more avenues of herd movement to gathering basins and kill sites; construction of corrals adjacent to the kill sites; processing and storage of meat and hides for consumption and trade; and improvement of the short-grass prairie through prescribed fires. While not every hunting site implied this level of commitment to a particular location, Kutoyas and many of the largest Old Women’s phase sites do, suggesting that, to make long-range investments worthwhile, territorial control would have been requisite for securing future use of these facilities.

We interpret territorial organization as one important measure of emerging complexity, as it is strongly associated with circumscription (e.g., Aldenderfer 2010:82; Fitzhugh 2003:111). Exploration and experimental utilization of promising hunting and living areas is likely responsible for the ubiquitous, low-density record of bison hunting that consists of isolated artifacts, small clusters of surface features, and ephemeral bone accumulations scattered across much of the Plains. However, along the southern Alberta-Montana foothills, the high density of surface stone features and bone beds on primary and secondary watersheds indicates that this landscape was colonized and entrenched by people who shared a cultural logic and a distinctive tradition of landscape engineering. This time-averaged archaeological record was cumulatively shaped through persistence or place reuse and repeated movement across pathways that connected sacred sites, living areas, resource locales, and other meaningful places (Dooley 2004; Oetelaar 2006; Oetelaar and Meyer 2006; Oetelaar and Oetelaar 2006; Zedeño and Anderson 2010). Movement, in turn, reified tradition and at the same time expressed rising processes of differentiation. This social juncture may be represented archaeologically in the segregation of domestic spaces (e.g., Quigg 1983), pictorial demarcation of meaningful places, erection of monuments, and creation of spaces for public gathering (fig. 10; Mirau 1995; Zedeño and Bowser 2009).

The cyclic, habitual geography of bison hunters, who over centuries imprinted the land with their practices and, recursively, were shaped by the intended and unintended consequences of their actions and decisions, highlights processes of territory formation and long-term planning strategies aimed at controlling the hunting ground. A bird’s eye view of the engineered landscape further insinuates that the naturalization of territorial identity was achieved by emplacing diverse and monumental structures in an area large enough and lush enough that it could support substantial bison herds and large bands during the nongrowing season. This area extends from the North Saskatchewan River in Alberta to the Three Forks of the Missouri River in Montana (Cooper 2008; Vickers and Peck 2009).

The second challenging issue deals with the nature and degree of social change that economic intensification and specialization both required and produced. Drawing once again from the Blackfoot model and northwestern Plains archaeology, another logical solution is that hunters devised means to recruit and organize kin and non-kin labor to take advantage of bison wealth. Historically, this task fell in the hands of two distinct offices: the esoteric societies, whose year-round rituals were essential for encouraging the return of the herds to the core territory and entrapping bison into the drive; and the leaders of the hunt, who were warrior hunters of great prowess, whose achievements were sometimes memorialized in monuments (Dempsey 1956; Kehoe and Kehoe 1959; Mirau 1995; Quigg 1978). While this office was temporary and changed hands often, the institutional role of the societies was enduring, as it ensured that the fundamental knowledge needed to succeed in the hunt was reproduced in a formal and exacting way, by creating and enacting hunting rituals in dedicated public spaces and transferring knowledge through highly regulated rituals. An unintended consequence of this process may have been the progressive accumulation of ritual wealth by a few initiated individuals and families, thus increasing internal differentiation and inequality.

Last, we suggest that the most voluminous, albeit indirect, evidence of ritual wealth is the construction of monumental hunting facilities, as they imply the need and ability to organize and integrate labor under a shared worldview that sanctified order and compliance while helping to retain the hunting ground. The construction of geographically and functionally connected drive-line systems, each uniquely suited to the local topography but all responding to the overarching principles that reified sacred knowledge, provided means to manage not only the movement of the bison herds across gathering basins but also the flow of friend and foe through prime hunting grounds (e.g., Joyce, Hendon, and Loipparo 2009:70). Opportunity, therefore, was structured so that hunting facilities would be known and accessible to generations.
of culturally related hunters utilizing different areas of their hunting territory. For example, the earliest accounts of Hudson Bay Company traders traveling alongside Blackfoot hunters describe familiarity with, and use of, drives and jumps along distant trails (Molenaar 2000). By the same token, a landscape engineered under readily recognizable cultural or ethnic imperatives could have helped deter the flow of unrelated people through the territory.

In closing, we propose that organizational complexity among Late Prehistoric bison hunters emerged among increasingly large hunting bands in the course of structuring opportunity to sustain or improve conditions for permanence in areas frequented by large herds. Big-game hunters engaged millenary technological, ecological, and ritual knowledge in every hunting episode, but the communal hunt required periodic social and political adjustments that allowed people to deal with growth and conflict and to carefully control the outcome of the hunt and its by-products. Individually and socially, hunters overcame uncertainty by simultaneously replicating ancient landscape knowledge and transforming sociopolitical relationships in order to secure access to the best bison habitats. Their social investment in hunting is thus embodied in the engineered landscape—a resilient setting created for this task through the construction of permanent stone features and manipulation of people and resources.

Hitherto buried under an exaggerated attention to single kill sites and lithic technology, the multifaceted nature of the engineered landscape is beginning to reveal the profound effect that bison hunting had on land and social institutions. A focus on the materiality of social investment can thus help update traditional models of terrestrial hunters that, by juxtaposing snapshot events onto long-term culture histories, overstress homogeneity and conservatism. But as Sassaman (2005:336) points out, what seems homogeneous and unranked at one scale becomes ranked and heterogeneous at another, and we think this is precisely the case for northwestern Plains bison-hunter society and culture.

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Comments

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During most of human evolution, hunting was typically practiced by individuals or small kin-related groups, commonly targeting one or very few prey animals at a time. The development of strategies and techniques for mass hunting of ungulates became widespread across several continents only during the Terminal Pleistocene and more vigorously in the Holocene (papers in Bar-Oz and Nadel 2013; Smith 2013). These mass kills not only provided large quantities of meat accompanied by a plethora of essential raw materials (e.g., hides, fur, antler, sinews, etc.). They also had direct impact on group organization, seasonal and year-long planning of routes, as well as on social life and territoriality. The two most studied areas with evidence for complex landscape structures devised to lead herds into mass killing locales (e.g., cliffs, ponds, etc.) are North America, where bison were the target prey (Speth 2010, 2013, and references therein) and the deserts of the Near East, where gazelles, onagers, and other species were harvested in large numbers (Bar-Oz, Zeder, and Hole 2011; Bar-Oz et al. 2011; Zeder, Rufolo, and Hole 2013). The advantage of the first area is found in the historical accounts that provide firsthand data regarding the construction and operation of the complex drives and associated features. Similar accounts are missing in the second area, with no direct continuity from the archaeological periods unto recent historical times.

Within the framework of many North American studies, this paper by Zedeño, Ballenger, and Murray stands out as an original contribution focusing on social complexity and the evolution of group organization entwined with the increasing reliance on mass bison kills. The specific contribution of this paper is in its fine-tuning and zooming into the Two Medicine River archaeological landscape, demonstrating the diachronic intensification of communal hunts. The number of drive lines located near kill sites, the number of specimens

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harvested, the intensity of bone processing to obtain grease to produce pemmican, and the size of the sites that were repeatedly occupied reveal an increase and intensification of bison hunting. The compellingly rich ethnographic data on the late hunters provide further vivid information on the hunting methods; season of hunt; the social (and sometimes also the spiritual) organization of the hunt; and the ways meat was processed, utilized, and redistributed. Significantly, the geographical position of the bison jumps, associated with substantial structural modification of the landscape, which included the construction of multiple drive-line systems near jumps to enhance management and harvest of bison resources, is important in reconstructing land use and the social network of the hunt.

What we find missing are sufficient basic archaeological data, needed for a better characterization and understanding of the described complexes, especially the architecture and the faunal assemblages. For example, our excavations in the Negev desert of Israel revealed sophisticated planning of the drive lines and kill sites, including pit digging and ramp building (Bar-Oz et al. 2013; Nadel et al. 2010). Here, we could not find a detailed description of the drive lines and the cairns. How many (if at all) were excavated? Where are the metric details? Some intriguing features are mentioned, though no data, photos, or plans/sections are provided (e.g., lodges, medicine wheel, snake-like effigy). These are probably understood by local scholars, but for most of us they remain vague though apparently very important components of the studied complexes.

Most importantly, we would have expected the paper to provide more “meat” and display knowledge of bison taphonomy, including the population structure (mortality and demography) of the bison death assemblages. These data are an important proxy for reconstructing population dynamics in the kill localities, season of hunt, and increase in hunting pressure through time. Was hunting designed to harvest complete herds or aimed to catch selected individuals? It would have been interesting to learn more if sustainable hunting was practiced and how bison resources were secured for future generations. Age distribution analyses can tell if the bison populations underwent rapid turnover as might be induced by high-hunting pressure. This is especially important given the fact that there is no evidence for economic diversification among late hunters. In this respect the ecological behavior of the bison herds should be considered and used as an additional tool to explore the change in land use through time.

Though the paper reflects a great deal of knowledge, a large body of field data, a comprehensive cultural-historical framework, and a novel approach to a fascinating issue, we feel that additional data regarding the architecture and faunal assemblages would have been useful. Such data are needed for local, continental, and even intercontinental levels of analysis and comparisons.

In this comment I would like to emphasize three points: the archaeological visibility of the material remains dealt with in this paper and some of the consequences related to it; the perspective of research about the relation between landscape and memory; and the integration of ethnography, ethnohistory, and archaeology to the understanding of long-term processes. Besides the discussion about landscape and its importance to the understanding of human society through time, it is still common to see in Brazilian archaeology projects that deal with sites as isolated entities in a sense that human activity is spatially confined and restricted to specific points in the landscape. Those works tend to focus on traditional artifacts, identified by “clear” patterns of human-made origin, which means human-made transformations in formal properties. What this paper is showing is that such an approach, for both site and artifact scales, is not sufficient to identify and to understand human interaction and construction of landscape. But more important, it is exactly such interactions that give us clues to understand political and cultural dynamics in a prehistoric period. This paper is essentially based on what the authors call “landscape engineering.” The most striking evidence to characterize it is the intensity of acquisition and transportation of different kinds of rocks to construct drive-line systems that oriented bison herds to cliff jump. If we take those rocks in isolation they will not show us any clear modification pattern—there is no human-made technique applied to modify their shape. They are “just” transported. In this way, this work advises us to open our eyes and minds to identify, amplify, and incorporate broader categories of remains in our research.

Regarding the site scale, in this case, the classic archaeological features are the massive kill sites. But, this is just the visible part of the iceberg. There is an intense planification, preparation, and transformation of the landscape to produce such sites. There are hundreds of kilometers used to articulate and integrate different kinds of activities performed in this social practice. All these features are regarded as evidence of landscape engineering. There is not a point in the landscape, or a specific or most important place, because each place gains meaning in relation to the other. This is a central question because it is exactly these features that are utilized by the authors to discuss variability in prehistoric bison hunting and, in this case, a proxy measure of organizational complexity. And this is a really interesting point: there are different ways, specific historical trajectories, and a wide variety of material evidence to discuss the process of organizational complexity. To perceive and understand such a process, we need an integrative approach that deals with ecological, social, political, and ritual aspects, articulated to define specific historic contexts.

According to Zedeño, Ballenger, and Murray, the planification of the landscape is a social practice that at the same
time acts as a drive-line system to “capture” bison herds and as a way of giving “land rights” for people and to inscribe memory in the landscape. But more than that, it is a way of planning for the future. Memory is constructed and inscribed in the landscape by social practice but not only one that constantly reconstructs a discourse of the past in the present but a practice that involves a planification for the future. Such practice, and its materialization in the landscape, could be the clue for us to deal with long-term process, where internal cultural structures are maintained through time. On this point we could make a parallel with M. Heckenberger’s research in Upper Xingu, where site planification, land transformation for planting, site communication, and fish consumption are essential characteristics of human occupation from AD 800 until the present. And as in Zedeño and colleagues’ paper, this is not to say that we have stabilized societies or that there are no changes. We do have changes, but we do have continuities too. There are a lot of political transformations, and we have different ethnic formations, but there is some kind of permanence besides these demographic, social, and political modifications. This brings us to the last point: the importance of articulating ethnohistory, ethnography, and archaeology to understand human society in the long-term process. One question that always arises when talking about ethnographic contexts in the Americas is the impact and intensity of European invasion of the Americas by AD 1500. Research such as this and that by Heckenberger (2001, 2005) or by Neves (1999), both in the Brazilian Amazon, show that indigenous societies have perceived and interacted with this process in different ways. There are no homogeneous responses. Despite its intensity, this was incorporated as one more thing in a long historical process, and even when and where it caused drastic transformations, especially in demographic terms, it is possible to identify structural permanence within the indigenous societies’ organization. In both cases, the authors stress that the people engaged in this process were always agents of their own history. It is a history of contact, interaction, and innovation, and is deeply inscribed in the landscape. This landscape can be seen as evidence of the materiality of social investment and as a way of integrating the past, present, and future in the process of perceiving, owning, negotiating, and transmitting territorial knowledge.

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The authors report some significant archaeological results and interpretations that have broad relevance and value. First, they provide comprehensive documentation of landscape use and modification over many centuries by pedestrian bison hunters. Second, they add further weight to the position that environment, culture history, and adaptive responses in the northwestern Plains and adjacent regions were not homogeneous across space and time. Thus, local histories are contingent on a wide range of factors that must be investigated thoroughly before developing narratives of cause and effect. Third, they show that archaeological data can expand the understanding of foraging societies beyond the limits laid down by ethnographies of the last few centuries. Fourth, they set a high standard for landscape-based archaeological field research that should be emulated by others in the region. My comments identify a few points of disagreement and suggest future research directions.

I am not convinced that the use of the term “monumental” is appropriate to describe landscape features reported here. In my opinion, this term should be reserved for structures and features that required significant investment of labor to build and maintain. The authors offer no labor estimates, but I would expect that 10 kilometers of drive lanes could be constructed with less than 5,000 person hours of work, assuming that rocks were available nearby. As the drive lanes were not necessarily built in a single year, this is a low level of commitment, even for bands numbering in the hundreds. I agree with the authors that drive lanes and the accompanying stone cairns and effigies, wooden structures such as lodges, and even the bison jumps themselves would have been highly visible, and that high visibility may have sent important signals to neighboring groups. We need a better term for these kinds of environmental modifications than “monumental.” Perhaps “landscape engineering,” a term that the authors themselves use, is a better descriptor.

Although the intensity of bison hunting and processing over the last 2,000 years is well documented (Reeves 1990), there is good evidence that earlier periods were more varied than the authors suggest. It is not correct that earlier kills only consisted of traps with small numbers of animals. Head-Smashed-In extends the use of bison jumps back into mid-Holocene times; some early kill sites, such as Olsen-Chubbock (Wheat 1972), contained large numbers of animals, and some localities have histories of repeated use. As the entire Holocene history of human-bison relationships is gradually revealed in more detail, we can anticipate that a less unilinear account will emerge.

I suggest a few directions for future research. If drive lanes and associated stone features were a way of documenting a group’s claim to long-standing use of a locality, would the legitimacy of the claim have been enhanced by the construction of features that looked complementary to natural landforms, such as ridges and swales? Such a correspondence might suggest that the natural landforms and the features associated with bison driving had equally long histories and that perhaps supernatural or ancestral actions were involved in the creation of both the landscape and the features and structures. If the Pikaani made such a claim, it would have been enhanced by the fact that lichen-covered cobbles and boulders are a natural component of the landscape of the northwestern Plains.
Although the prairie topography has probably remained stable since the end of the Pleistocene, understanding settlement patterns of even the last 2,000 years requires an appreciation of dynamic geomorphological change in river valleys, as the authors note. Understanding even earlier times will require comprehensive assessment of river valley dynamics and archaeological site visibility. Michael Wilson demonstrated this in his detailed study of the Bow River valley in Alberta (Wilson 1983), but few other attempts have been made.

The paper mentions a number of hypotheses for the intensification of bison hunting and processing, including movement and changing dynamics of human populations, environmental change, adoption of the bow and arrow, and trade. Closer examination of the archaeological record will be required to establish local and regional cultural and environmental histories. The authors have shown the value of intensive mapping, strategic excavation, and close attention to chronology. More work of this type is needed and could be augmented by lithic studies to establish seasonal rounds and trade strategies; detailed studies of bison seasonal movements through stable isotope and trace element analysis; reconstruction of bison population history through DNA; and more intensive and more precise dating projects to better understand temporal continuity and discontinuity in the use of sites and "engineered landscapes."

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Zedeño, Ballenger, and Murray are to be congratulated on providing an original, comprehensive, and stimulating examination of the evolution/development of social complexity in the Late Prehistoric era in the northwest Plains region. The landscape scale examination and comparison of bison drive complexes (drive lines, deadfalls, processing features, camps, and ceremonial emplacements) along the Two Medicine River region allows the authors to develop a comprehensive case study of hunter-gatherer social change. Importantly, the article makes and supports the case that the northwest Plains did develop a degree of complexity not previously recognized by prior scholars of the region. The nature of that complexity and the causes for its development are modeled through a combination of archaeological evidence, ethnographic detail, and logical inference. The model is both sophisticated and challenging. The inclusion of a wide range of structuring variables, from demography to ritual knowledge, recognizes the inherent complexity of social processes and is far from the deterministic and mono-causal accounts of the past. The project is ambitious and necessarily incomplete with both logical and empirical loose ends and ambiguities, but the overarching articulation of a plausible account for emerging social complexity that combines material, social, and ideological variables is refreshing and at times inspired.

From the account presented, I am convinced that horizontal dimensions of complexity expanded in the late prehistoric phase as manifested in the construction of "monumental" drive-line features, repeated utilization of hunting complexes, intensified use of bison products, and elaborated ritual practices with differentiation of social roles in hunting and ritual. These are clearly indicators of increasingly complex economic and social organization. The degree to which vertical complexity (institutional inequality) emerged through at the same time is less convincingly argued.

Assuming that the origins of the (ethnographically documented) system of sacred knowledge date to the development of intensive bison driving after AD 900, as the authors speculate, the challenge for me comes in how one might understand the social acceptability of that new system of authority. Perhaps the control/creation of sacred knowledge was sufficient to compel social cohesion, especially if the result was advantageous to the group as a whole. The authors propose that differential social power emerged with the institutionalization of sacred knowledge held exclusively by a subset of actors in the bison hunt ceremonies and the hunt itself. We might expect that rank-and-file bison hunters would be happy to go along with such a development if the result was good for all. However, the extent to which sacred knowledge holdings would translate into power beyond the enactment of a hunting ceremony—that is, into institutional social inequality—remains unclear. The implication in this argument is that ritual authority translated into social and material benefits. If so, the questions remain: on what basis did sacred knowledge holders gain access to knowledge, and how did they leverage it into exclusive benefit? The authors explore potential causes, such as environmental change, increased social networking with agriculturalists to the east, and circumscription by neighboring groups. Any of these might have been a sufficient incentive, each has testable implications, and each would be clarified with more attention to the logic of causal relationships and empirical expectations.

I am struck by the observation that Two Medicine River hunters intensified their exploitation of bison but did not appear to diversify to include other resources commonly exploited elsewhere in the Plains. Economically, it only makes sense that bison hunters would forego other resources if and when bison (and their by-products) were always available and always more profitable than other resources at times when other resources could have been taken. The development of intensive drive systems implies that ancestral and less specialized hunting strategies were inadequate and would need to be supplemented with other resources or changed. If the development of the drive systems rendered supplementary resources unnecessary, we would have to conclude that standards of living improved across the system. If so, there would be incentive to support the social organization that made it possible, including the social divisions of labor and roles in
the hunt. It is less clear whether well fed people (in relatively small-scale and intimate communities) would support significant power inequality. If they did, we would like to know the mechanisms by which ritual status translated into tangible social power. If they did not, we might interpret the Two Medicine River case as one of emergent horizontal/organizational complexity in the absence of tangible vertical complexity. Perhaps the bison hunters of the Two Medicine River Valley maintained relatively egalitarian social relations throughout the intensification of a socially and infrastructurally complex drive-hunting system. In this case, social relations might have been held in balance by the tensions between a collective need for leadership in communal engineering and hunt coordination balanced by individual tendencies to avoid subordination when possible.

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Zedeño, Ballenger, and Murray have written a thought-provoking paper on the nature of complexity among Late Prehistoric Period (LPP) bison hunters on the northern Plains (NP). They propose that decisions in the past, beyond economic and reproductive pursuits, also focused on political goals such that organization complexity emerged among increasingly large hunting bands to sustain or improve conditions for permanence in areas frequented by large bison herds. They claim that material clues of this complexity can be found in landscape engineering. Their paper can be appreciated on at least two levels: addressing the development of complexity prior to the adoption of the horse during the LPP on the NP (Plains scholars have traditionally attributed many of the characteristics of complexity to the adoption of the horse) and relating the development of complexity to material clues found in landscape engineering. This response will first critically examine some of the basic tenets about NP archaeology that underlie their arguments and then will briefly discuss the article’s perspective on material clues to emerging complexity.

Zedeño et al.’s position is that complexity is a LPP phenomenon. The Old Women’s phase, considered ancestral to Blackfoot speakers, is characterized as unrivaled in frequency, size, and elaboration as illustrated by cairn-lined bison drives. This position is founded on the tenets that, prior to this time period, (1) kills lured few animals, (2) there were no signs suggesting an increased labor pool, and (3) kill sites exhibited low carcass processing intensity. While there is no doubt that the LPP represents a pinnacle in bison kill sites, there is ample evidence to indicate an emergence of the aforementioned indicators of complexity dating back to at least 2800 BP (Peck 2011:256–281). Most of the large bison kill sites on the NP begin their “continuous” use cycle during the Bracken Phase (2800–2100 BP). Sites used at this time include Head-Smashed-In, [Old] Women’s, Walt Felt, and Keaster Buffalo Jump, to name a few (Peck 2011). These were large kills: for example, EgPn 362 is a single event Bracken Phase pound in modern Calgary that took a least 145 bison. In terms of increased labor pools, the first large stone circle campsite in Alberta—Bow Bottom—consists of 16 buried, contemporaneous stone circles aligned in a row along the north bank of the Bow River. Few processing pit features have been identified, but intensive bone smashing and substantial fire broken rock scatters are evidenced at many of these large kill sites, suggesting moderate-to-heavy processing. These large, often repeatedly used kill sites allowed for more people to remain together for longer periods of time than in previous eras. The pattern Zedeño et al. find in the LPP is an emergent phenomenon from the Late Middle Prehistoric Period (cf. Brink and Dawe 1989; Walde 2006:291, 298).

Furthermore, the article’s argument that population pressure led to increases in group size, decreases in mobility, and social investment in communal bison hunting with the ultimate unintended consequences of accumulation of ritual wealth and internal differentiation is not entirely satisfactory. I would argue that the material clues of ritual intensification, differentiation, and integration have more time depth than those associated with the actual pragmatics of the bison hunt. For example, Majorville medicine wheel and cairn is known to have been created accretionally from a small boulder pile starting 5500 BP. The items within the cairn have largely been interpreted as offerings, some of which are thought to be related to bison procurement. There are numerous large cairns of this nature throughout Alberta, Saskatchewan, and Montana. Interestingly, during the Bracken Phase, when the first intensification of bison driving begins, the cairn fell into disuse. Still, as Zedeño et al. suggest, the pinnacle of bison hunting is recorded in the outermost layers of the Majorville cairn by highly increased numbers of offerings including Iniskim (buffalo-shape fossils related to bison procurement during the Old Women’s phase). The intensification, diversification, and integration of ritual practice related to bison hunting, as represented by these large features, actually precedes that of the pragmatics of bison hunting. Is it not reasonable to suggest that much of Late Middle Period ritual complexity was present when population pressure promoted the intensification, differentiation, and integration of pragmatic bison hunting?

Zedeño et al. have written a valuable and thoughtful study that will most certainly stimulate discussion of the nature of complexity in NP bison-hunting groups. I appreciate their stance that bison-hunter complexity arose before the introduction of the horse, but I do not believe that this complexity began during the LPP. Rather closer scrutiny of the data may indicate that population pressure in the Late Middle Prehistoric Period actually led to pragmatic bison-procurement intensification and the beginning of visual clues on the landscape, the pinnacle of which is seen during the Old Women’s phase. Furthermore, ritual complexity, which leaves few physical clues
behind, may be found to predate pragmatic bison-procurement intensification and its related engineered landscapes.

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With publication of “Landscape Engineering and Organizational Complexity among Late Prehistoric Bison Hunters of the Northwestern Plains,” Zedeño et al. have firmly placed the people of the northwestern Plains at center stage in discussions of emergent socioeconomic and political complexity among hunter-gatherer societies. As they aptly point out, there has been a long-standing assumption that bison-hunting people during pre-horse times were effectively foragers (per Binford 1980) and thereby lacking the trappings of horizontal and vertical social complexity more typical of their complex forager-fisher neighbors on the plateau (Prentiss and Kujit 2012) and Northwest Coast (Matson and Coupland 1995) or agriculturalists to the east (Pauketat 2004). While this may have been true for the Great Plains region during much of the Upper Pleistocene and Holocene (e.g., Bamforth 1997), it is clear that the assumption can no longer be maintained for the area of the northwestern Plains north of the Missouri River during the past 1,500 years. The challenge now concerns measurement of temporal and spatial variability in the many cultural practices identified in the ethnographic record. Zedeño et al. offer one useful pathway into this problem via examination of landscape modification in the form of tipi ring villages, drive-line systems, stone effigies, vision-questing sites, and large cairns.

Zedeño et al. take us beyond simply documenting the presence of complex hunter-gatherers in late Holocene Montana and Alberta. They engage in a discussion of a number of critical factors associated with the evolution of social complexity. First they are concerned with the evolutionary underpinnings of the communal bison-hunting strategy. They suggest that innovations of the Besant and Avonlea complexes that included driving technology, storage technology, and bow and arrow under optimal grassland conditions after 2000 BP (Peck 2004) were enough to stimulate large-scale bison hunting associated with the major landscape modification and eventually emergent social complexity of the Old Women’s complex. Drawing from innovation theory (e.g., Johnson 2010), I would suggest that they are effectively recognizing a “platform” from which later innovations evolved. However, with the exception of the bow and arrow, the greatest package of innovations favoring communal bison hunting had already crystallized during the earlier dating portion of the Pelican Lake complex of ca. 2000–3500 BP. Archaeological sites belonging to Pelican Lake are nearly as abundant as those of Old Women’s and far more abundant than Besant and Avonlea combined. Pelican Lake sites include tipi villages of a variety of sizes (Foor 1982), large- and small-scale bison kills (Davis and Stallcop 1965; Foor 1982; Reeves 1983b), specialized bison-processing camps (Burns et al. 2004), base camps in high-elevation valleys (Prentiss et al. 2008), cave and rock-shelter camps (Frison 1965; Husted and Edgar 2002), and hard rock quarries (Foor 1982). It is impossible to avoid the fact that Pelican Lake hunter-gatherers operated an annual cycle that included dispersed and aggregated camps, communal bison hunts, logistical organization, food storage, and mass production of goods (e.g., lithic tools) for transport and exchange under generally excellent range conditions of the Neoglacial period. Consequently, I would suggest that socioeconomic evolution on the northwestern Plains was highly complex and worthy of significant further study.

The greater contribution of this paper concerns sociopolitical evolution. Zedeño et al. offer a sophisticated consideration of historical/evolutionary factors that favored the emergence of the complex social traditions associated with the classic bison hunters of the Late Prehistoric and early Historic/Colonial periods. Most critically, Zedeño et al. avoid the pitfalls of neofunctionalism and vitalism in their model of emergent social inequality that emphasizes historical trajectories involving situational decisions and unintended consequences. Their model asserts that wealth-based inequality evolved as a by-product of differential participation in esoteric societies and hunting leaders associated with the operation of communal bison drives in circumscribed environments. Zedeño et al. join a growing number of scholars viewing inequality as not an inevitable outcome of cultural evolutionary process but as one possible outcome in a range of possibilities. I (2011) have argued that inequality in the Pacific Northwest probably had its historical origins in simple variability in the size and economic wherewithal of households. Rosenberg (2009) recognizes emergent inequality in the extrapolation of wartime powers beyond the military arena. But inequality is not necessarily a requirement for organizing large-scale cooperative labor. For example, Ortman and Kidder (2013) implicate significant landscape modification and implied operation of sophisticated ritual activities without archaeological obvious markers of social inequality at Poverty Point.

Ultimately this paper takes us into a new arena to debate social evolution and offers a provocative vision of the evolutionary process. I suggest that we consider the critical roles of evolutionary platforms and expatiations as we craft new diachronic visions of the past and ponder our future.

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It is always pleasing to see archaeology employed to add a textured time-depth to the otherwise ahistorical “ethno-
graphic present.” It is particularly so when archaeology reveals that things were rather different in the most recent past than the ethnographic present has been taken to imply. That is the case in this remarkable paper. Nomadic and pedestrian hunter-gatherers in continental interiors are often assumed to be, in James Woodburn’s (1982) terms, “immediate return” (IR), with rather little resource ownership, territorial ownership, or concomitant social differentiation and hierarchization. The archaeological study described here reveals something quite different over the past thousand years: a “delayed return” (DR) society, based on the mass killing of bison. The major bison drive lines, involving thousands of individual structures, are the dry-land equivalents of Woodburn’s large fish traps, classic ingredients in many DR economies. The DR pattern is completed by territorial ownership of the drive lines and suitable areas of terrain, the single-episode killing of large surpluses, the storage of meat and hides, and social hierarchization. To this commentator, a European, the sheer scale of the landscape engineering that the drive lines involved is eye-opening.

In their initial discussion of the Blackfoot DR system, the authors highlight three things: ecological change, specifically changes in grass growth encouraging bison herds to winter in the Rocky Mountain foothills; social change; and interaction with Middle Missouri farmers. Later in the paper it becomes clear that they regard social changes—the elaboration of social hierarchization, esoteric societies—as resulting from economic intensification, and probably few people would disagree. Ecological change emerges as the major causative variable. This, however, raises the issue of directionality, specifically the way in which the authors view the “emerging complexity” that they describe. The radiocarbon dates place the Kutoyis site firmly within the last millennium. How (and how well) the other sites in the area are dated is not immediately clear—where does a date like “ca. AD 956” for the Mission, Spring Coulee, and Lower Badger sites come from?—but assuming that they are indeed broadly similar to Kutoyis, it is clear that the last thousand years on the northwestern Plains saw the development of something substantially different to what went before.

“What went before” is not the focus of this paper, so directionality is not explored. But one possible impression could therefore be that all earlier inhabitants of this region were IR hunter-gatherers. This in turn could imply that the change from IR to DR in the last millennium is viewed as a “step up the ladder” of social evolution. To be fair, the authors nowhere say this, and indeed their emphasis on ecological conditions as a major contributing factor suggests that they would take the opposite view: that socioeconomic organization might fluctuate between IR and DR depending on the prevailing conditions. If this is the case, DR systems might have appeared in previous ecological episodes that favored them—is there any sign that drive lines might have existed at times in the more distant past? As such episodes ended, more IR-focused systems would reestablish themselves, and the drive lines fall into disuse and disrepair. If the twin contingent events of the arrival of the horse and the arrival of European colonists had not interrupted the most recent DR phase, that too might have come to an end.

Finally, I am intrigued by one aspect of the situation, mentioned but not much elaborated: the role of contact between the Blackfoot and the Middle Missouri farmers. In Europe such contacts between Mesolithic hunter-gatherers and Neolithic farmers across static boundaries between the two are commonly regarded as having a transformative effect on the hunter-gatherers: vying with each other for imports from the farmers, hunter-gatherers indulged in competitive feasting and social hierarchization as they became forest clients of the farming communities. However, this conception is probably rooted far too much in the recent past, when European voyagers supplied steel axes and knives, dyed cloth, and colored glass beads to awestruck savages. But when neither party has dyed cloth or glass beads, and both make serviceable ground-stone axes, and nobody has steel ones to trade, then relations will be characterized by a greater degree of technological symmetry. Which group, if either, would then become the clients? The archaeological record described in this paper would seem an ideal arena in which to explore this.

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The authors make a compelling case for locating cultural complexity in the temporality of futures planning. The merciless tendency to classify mobile hunter-gatherers as “simple” societies is usually associated with a sense of immediacy that would exclude not only preoccupation with the past but no reason for looking beyond the here and now. Arguably, this presentist temporality exists only as a rhetorical (not empirical) benchmark for simplicity, against which complex senses of time stand in contrast. Taking the rhetoric further, any society that planned for its futures was somehow more complex than one that did not.

The complexity of northwestern Plains bison hunters of the Old Women’s phase resided in communal efforts to engineer the landscape to ensure future success in hunting, and it was embedded in ritual and medicines that continuously reproduced, through practice, the rationale for cyclical social gatherings. As the authors argue, the material evidence for this complexity spans multiple sites and facilities, encom- passing landscapes commensurate with the spatial scale of the prey they sought. Invested with so much material and ritual capital, this engineered landscape took on a life of its own. Of course, Plains bison hunters have long been known to build facilities whose return on investment was protracted over generations, and they routinely planned for overwinter-
ing by dispatching and processing lots of bison. However, the material dimensions of these endeavors have not always been situated in appropriately large and long-term scales to perceive the complexity, if not the hierarchy, of the social bodies involved. The archaeological data backing up the authors’ argument are robust and intriguing.

My only conceptual quibble with this paper is its perpetuation of the concept of “territorialism.” I understand that this term has a deep and enduring history of use in Plains archaeology and ethnohistory. However, the mainstream connotation of territory—the resource purview of a corporate group centered in a space/place they mark, defend, and draw identity, vis-à-vis “others”—may not apply here. This case study invites serious consideration of the multicultural and translocal nature of “territory.” Is the constellation of drive lanes, villages, ritual sites, and intervening spaces of bison and human movements a “meta-territory”? I loathe neologisms when perfectly good, commonplace terms are available, but the case described here arguably falls well outside the bounds of “territorialism” and not only because it is manifested in relational places spread out over land used habitually by people who may not interact with one another all that often but also because it is actuated and reproduced through movement. This poses something of a contradiction between the argument that facilities helped to ensure the future viability of particular places of aggregation and dwelling, and the reality that people and bison were in flux, at times unpredictably. But that is what is original about this particular history, and it deserves even more theorizing. Eastern North American archaeologists have a similar challenge in describing the moundscapes of Adena and Hopewell, even the earthworks of the Archaic era. What used to be considered territorial markers are now seen as points of gathering between locations of dwelling. One may presume that such gatherings involved people of distinctive dialect, if not language, or at least people who did not coreside outside of ritual aggregations.

This case study takes us much farther than anything in the East because it is grounded in the economy and ecology of subsistence. In this regard, it may be worth considering that the intensification of bison hunting after about AD 900 was influenced at least indirectly by the goings-on around it. The processes in motion at this time in the Midwest, Southwest, and Southeast involved large, intricate webs of interactions and movements, from migrations, to exchanges, to pilgrimages. This is not to say that the northwestern Plains history outlined in this paper involved the coming and going of particular persons or communities from without, only that the massive, interregional ritual economies of afar could have penetrated local economies in subtle ways to stimulate increased production.

A final point worth considering is the way that long-term cycles affecting bison ecology (e.g., precipitation patterns) structured futures planning. Were parts of an integrated, engineered landscape activated in serial but regular or cyclical fashion (e.g., Fawcett 1987) and over cycles greater than annual? If so, was this expressed metaphorically in ritual performance, encoded in bundles, or marked in ritual landscape features? And if so, were they related in any fashion to the movements of celestial bodies, a potential atlas for locating time in space? In this sense it may be useful to see if large-scale movements of people and bison and the constellation of places in this landscape were referencing things in the sky that people distributed across the greater region could experience simultaneously and hence fall into place all at once.

Of Anomalies and Alternatives

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The authors of this thought-provoking article tackle what may be the most enduring icon of North American Plains archaeology: the bison jump. They follow a century-long tradition of ethnographers and archaeologists working within Blackfoot communities, notably Clark Wissler and Samuel Barrett in the 1910s and 1920s, John Ewers starting in the 1940s, and Thomas Kehoe and Alice Kehoe starting in the 1950s. During the last several years, the authors have documented a truly amazing precontact hunting landscape intensively used for some 500 years. With at least 11 drive-line systems, numerous stratified kill-butchery sites, ritual locales, and nearly a thousand tipi rings, these are some of the most elaborate hunting features on the North American Plains. The authors propose that the complex hunting landscape of the Two Medicine River Valley is evidence of an organizational anomaly among Late Prehistoric pedestrian hunter-gatherers who developed complex political, social, ritual, and economic means of capitalizing on the predictably large herds of bison by engineering the landscape for future returns. They previously described these features as examples of horizontal monumentality (Ballenger, Zedeno, and Miller 2012).

The strength of this article for me lies in three primary areas: collaborative archaeology, surface architecture, and precontact baselines. First, this research is a compelling example of community-based archaeology involving the insights, opinions, and participation of descendant peoples. The authors present innovative interpretations of hunting landscapes that convincingly incorporate indigenous knowledge of the land. They connect archaeology and ecology to place names, cultural narratives, and esoteric societies. Two Medicine figures prominently in origin stories and remains extremely important to the Blackfoot people. This project serves as a model for contemporary archaeology. Hopefully we will continue to see more of these collaborations in the future, on the Plains and elsewhere (Scheiber et al. 2011).

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Second, the authors make sophisticated arguments about palimpsest surface stone architecture that is nearly lacking in the archaeological literature of hunter-gatherers. Cairns, drive lines, and stone circles (tipi rings) are ubiquitous on the northwestern Plains, but they are rarely associated with artifacts, leaving unknown relationships between rock structures adjacent to one another. Therefore, research of stone architecture on the Plains is underdeveloped and poorly theorized. One of the most impressive aspects of the archaeology at Two Medicine is the scale. The authors convincingly argue that long-term hunter-gatherer decision making can be viewed through complex landscape engineering. I encourage more researchers to adopt similar broad landscape perspectives even in smaller-scale contexts. For instance, in southern Montana we have documented a nearly continuous stone circle landscape interspersed with drive lines and cairns and rock architecture for several kilometers following Bighorn Canyon. Our best interpretations come from combinations of multiple-scale analyses and perspectives from Crow community members, not from viewing these sites separately (Scheiber and Finley 2010).

Third, the authors establish a critical precontact baseline for considerations of long-term culture change and parameters for purely indigenous economic intensification (Mitchell and Scheiber 2010). The characteristics of bison hunting on the northwestern Plains of Wyoming, Montana, Alberta, and Saskatchewan have been attributed to the adoption of the horse in the 1700s. The way archaeologists understand late prehistoric hunting societies is influenced by an overemphasis on the later effect of the horse. The authors demonstrate a solid foundation for pedestrian hunting that was in place centuries before equestrian patterns emerged.

Zedeño, Ballenger, and Murray propose that the southern Alberta/Montana foothills landscape indicates a shared cultural logic and distinctive traditions of landscape engineering. I would argue that this kind of knowledge and tradition is also indicated at other Late Prehistoric sites, such as the multiple component Vore site in northeastern Wyoming (Reher and Frison 1980). Additionally, evidence for other traditions of landscape engineering, such as high-altitude wood-hunting features, may have already disappeared (Frison, Reher, and Walker 1990). The Two Medicine River Valley is clearly a place characterized by persistence. Many other people also practiced place reuse and repeatedly moved along pathways that connected meaningful places. The concept itself is not unique on the Plains, but the way it was manifested among the ancestral Blackfoot in northern Montana appears to have been. These sites still represent palimpsests, and connections among features even a few meters away from each other remain tenuous. Multiple re-occupations cannot be separated from contemporaneous ones.

Place does matter, and focal points on the land to which people repeatedly return provide important windows for exploring the junctions between everyday practices and generational traditions. Too often archaeologists are concerned with removing the cumulative effects of land use in order to get to single occupations. This article emphasizes that palimpsest deposits can be a starting point (or creation) for new interpretations, not just as destruction or loss of data about particular events. The hunting landscape that remains today is indeed impressive. One wonders whether continued contemporary land-use practices, including mineral extraction, will soon destroy what remains.

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Zedeño and coauthors provide an important reminder that the complexity of prehistoric hunter-gatherer societies varied widely in time and space. Their cultures, while intimately connected to their natural environments, were not entirely controlled by them. Rather, they lived in culturally constructed environments over which they exerted a certain amount of control and into which they built both cosmological and physical structure. The authors use the example of the prehistoric northwestern Plains of North America to support their contention that landscape engineering—"the intentional modification of place and resource networks through sequences of actions and inscriptions"—provides important clues to emerging complexity there. They are especially interested in exploring the roles of extensive rock configurations in not only facilitating large-scale communal bison hunting but also as constructed sacred spaces that integrated people and communities.

Overall, I welcome this approach to understanding certain late prehistoric cultural dynamics on the northern Plains, although I do think they began earlier than suggested. It is difficult in a continuum of change to select a starting point for a particular process, but it seems clear to me (and others) that the beginnings of routine communal bison hunting on the northern Plains generally are to be found about 2,500 years ago with Besant groups. However, the authors are quite correct in suggesting that complexity and intensity of landscape engineering increased through time. Their approach is part of an increasing acceptance and deeper understanding in the archaeological community of the relatively sophisticated northern Plains cultures (e.g., Brink et al. 2003; Brumley and Dau 1988; Duke 1991; Quigg 1983; Reeves 1983a; Walde 2006).

I do wonder, however, about the authors’ concentration on the northwestern Plains to the apparent exclusion of the remainder of the Canadian Plains. This may be due in part to the subject matter of the work, namely, a deeply and locally contextualized report on survey results of the Two Medicine River Valley in the Blackfeet Reservation in Montana. However, one is left with the impression that complexity organized bison-hunting cultures with their extensively constructed
monuments were restricted to the northwestern Plains of southwestern Alberta and western Montana. Zedeño et al. do not quite state this, but the implication feels very apparent. And it is this issue I address in this brief comment.

We must acknowledge that the past Canadian Plains cultural landscape has been heavily edited by cultivation, dam construction, deliberate destruction, and so on (Wilson 2004). Many areas in which the landscape and its monuments have been preserved are in widely separated areas of sparsely populated nonarable land that have been minimally impacted by postcontact development. Nonetheless, remnant traces of a complex and enduring Canadian Plains cultural landscape suggest that the complexity organized communal bison-hunting tradition with associated constructed spaces described by Zedeño et al. was more widely spread among multiple groups than they appear to suggest. The Jelly Ranch site of south-central Saskatchewan with its very large complement of stone circles, rock alignment, effigy, and medicine wheel is but one example. The Big Muddy Valley area of southern Saskatchewan is characterized by multiple bison jumps, stone effigies, boulder alignments, tipi ring sites, and ceremonial circles (e.g., Brace 2005; Larsen 2012), and similar concentrations of cairns, tipi rings, ceremonial circles, and rock alignments are being recorded in the Cabri Lake area of southwestern Saskatchewan (e.g., Kennedy, Foley, and Foley 2013). Surface reconnaissance in the Grasslands National Park in the extreme south of Saskatchewan also revealed a highly complex built cultural environment of stone features (e.g., Adams 1986), and concentrations of ceremonial circles and medicine wheels are evident in southeastern Saskatchewan (e.g., Brace 2005; Kehoe and Kehoe 1979). The foothills example discussed by Zedeño et al. is part of a larger pattern common throughout much of the Canadian Plains. I must note as well, that this cultural pattern was present historically in the parklands of north-central Saskatchewan and Alberta, although communal bison-hunting structures there were generally constructed of wood and leave no material trace in the archaeological record.

Zedeño et al. quite correctly discuss the socially unifying aspect of communal bison hunting, but I must wonder if they underestimate the role of late precontact warfare in increasing social complexity on the northern Plains. With the first shield-bearing warrior motifs appearing in rock imagery as early as the first century AD (Keyser and Klassen 2001), I suspect intersocietal rivalries may have played an important role in developing complexity. The authors note the importance of trade with larger horticulturalist social formations during late prehistoric times (see also Lints 2012), and it is well known from the historic record that raiding and warfare were often intimately associated with trading relationships. External pressures were probably at least as important as internal factors to the development of complex social organizations on the northern Plains.

Reply

The intent of this article is to reigate discussion about the organization of pedestrian bison hunting from a contemporary perspective that emphasizes connections among technology, ritual, and the sociopolitics of the hunt. Our arguments are founded upon material evidence for the development of a vast and sophisticated landscape that uniquely captures many of these connections. From this vantage point, it is possible to build a case for emergent complexity among Late Prehistoric communal bison hunters of the northwestern Plains. Because our case rests on the production of bison wealth and ritual wealth, we employ a broad-stroke layout that integrates ethnohistory, ethnography, and archaeology; a forthcoming technical report will address data gaps noted by our colleagues. Nevertheless, the comments received demonstrate that we have achieved our goal, as they bring new, intriguing aspects of bison-hunters’ complexity to the table—each worthy of its own scholarly essay.

The most rewarding result of this forum is the widespread acknowledgment that bison-hunter societies exhibited characteristics of emergent complexity. But because the article addresses only the last 1,000 years of a specialized bison-hunting trajectory (250 of which are historical), the temporality of this process is a major concern among the commentators. This is a reasonable concern, for bison hunting was an ancient, multiscale, and multidimensional way of life; the knowledge, practices, and resources it encompassed have diverse origins and trajectories. While certain expressions of complexity, including technological innovation and hunting intensification, may have evolved in the deep past, as Anna Prentiss, Trevor Peck, Dale Walde, and Jonathan Driver point out, the substance of bison-hunters’ organizational change did not materialize until other components emerged centuries or millennia later. Such components include demography, warfare, corporate ritual, and opportunity for economic gain.

To the cultural history of communal bison hunting one must add climate and its effect on local and regional conditions for the hunt. Guy Bar-Oz and Dani Nadel note that our study has not addressed bison ethology vis-à-vis climate and human impact; research by Peck (2004) and Cooper (2008), which the article discusses in some detail, certainly helps to clarify this crucial relationship. Peter Rowley-Conwy suggests that, given adequate technology and organization, the ebb and flow of climatic and environmental conditions suitable for intensifying bison hunting may have led to cycles of complexity. Prentiss makes a compelling argument for excellent natural and social conditions for complexity among Pelican Lake people (1500–1BC), whose hunting complexes existed multiple generations before the rise of Late Prehistoric Old Women’s phase hunters (AD 1000–1750). Likewise, Peck and Walde contend that the underpinnings of complexity date at least to the Late Middle Prehistoric period, or 2,000 ago,
with the Old Women’s phase hunting complexes representing the culmination of an earlier trend. Cyclical complexity among hunter-gatherers is predictable and has been documented elsewhere (e.g., Habu 2002), thus it merits serious consideration.

Taken together, our data and these comments suggest that, since the early Holocene, there may have been two or three junctures in the evolution of bison hunting when conditions were ripe for innovation and economic intensification, eventually leading to the emergence of complex organization. Such a deep time frame must be qualified by placing each element of complexity in its proper time, place, and cultural context. Processes of intensification, circumscription, and differentiation that characterized the emergence of hunter-gatherer complexity as outlined by Ben Fitzhugh (2003) probably differed from earlier to later cycles by several orders of magnitude, if they were at all present. Furthermore, social investments that were necessary not only for achieving success in isolated hunting events but also for building a viable and resilient way of life with promising future returns were not coeval but exhibited diverse temporal ranges (Zedeño and Anderson 2010:16).

In all likelihood, investments derived from ecological, technological, and cosmological knowledge associated with bison hunting are the most ancient (Barsh and Marlor 2003). Let us reemphasize that the seeds of big-game hunting technologies such as the construction of game drives in North America go back to the Paleoindian period (O’Shea, Lemke, and Reynolds 2013). Evidence of bison drive-line and corral or pound construction abounds during the Middle Prehistoric period (Kornfeld et al. 2010; Peck 2011); as Prentiss stresses, 3,000 years ago bison hunters already had a fine understanding of ecology and topography of not only the prairie but also the mountains, and they used these environments in diverse ways. Yet, the strategic construction of two or more drive-line systems, which connected multiple gathering basins and water bodies to high jumps and could be used in tandem to ensure repeated success in large-scale communal hunts, was simply absent before AD 1000.

Such an engineered landscape with vast horizontal architecture that multiplied earlier hunting returns required time and labor in its construction and multigenerational maintenance and repair. Monumental architecture is a feature of complex societies around the world, and its creation typically symbolizes prestige and power (Trigger 1990). Horizontal monuments such as drive lines and memorial features may lack the flagrant symbolism of power characterized by verticality, but they transform physical and social landscapes with a scale and efficiency that cannot be realized by vertical monuments. Driver dissent from calling cairn architecture “monumental,” but other commentators recognize that it is hard not to be awestruck by drive-line systems that covered several thousand acres each and maximized access to bison herds. Survey data show that the Two Medicine River and adjacent drainages and lake basins were connected by numerous bison drive lines composed of tens of thousands of individual cairns and that perhaps their creation symbolized a level of authority and power comparable to mounds and other vertical monu-ments (Ballenger, Zedeño, and Miller 2012). Ken Sassaman asks whether these drive-line systems were subjected to serial use in a regular cycle; it is certainly possible, given the number of sites in the valley and adjacent streams, but many more absolute dates are needed to pinpoint use cycles.

Stone tool technology is another long-range investment. Atlals and dart points were the hallmark of communal bison hunting for millennia. The relatively rapid adoption of the bow-and-arrow approximately 2,000 years ago, coupled with the development of food-storage technology, paved the road to intensification because it increased the effectiveness of mass killing and processing of large quantities of meat and hides for storage, transport, and trade (Reeves 1990). Yet, the true impact of these innovations is nowhere as extensive as during the Old Women’s phase. Apparently, the Late Prehistoric communal bison-hunting complex was designed for delayed consumption, Rowley-Conwy observes. Delayed consumption was not only limited to the preparation of food stores for times of need but also for commodity exchange; it also extended to ceremonial foods, such as bison tongues. Tongues were procured during the winter harvests, dried, and consumed the following summer at the Blackfoot Okan or Sun Dance (Allan Pard, personal communication, 2013). Storage facilities, or what contemporary Blackfoot call “ice-houses,” were requisite for mass harvests. Thus, uninterrupted access to productive hunting grounds in the winter and to areas suitable for winter encampments that could sustain multifamily bands for several months of the year must have been essential to the success of this mode of production.

A second aspect of emergent complexity deals with demography and circumscription. Complexes ancestral to the Old Women’s phase—Besant and Avonlea—presumably represent people of different origins, geographies, and ethnicities who nonetheless contributed key pieces of technological knowledge that made large-scale harvesting possible. While few sites in the northern Plains document their overlapping presence and the transition to more recent hunters (Cloutier 2004), there is no integrated database about population dynamics that would explain the formation of large groups such as those recorded at the time of European contact. We second Laura Scheiber’s observation that the Plains archaeological palimpsest has presented unique methodological challenges, namely, difficulties in dating surface stone architecture and mapping them accurately without a Global Positioning System. Two Medicine River campsites are significantly larger than any site previously mapped in the region; statewide clear-
are no smaller than 40; this statistic does not include all the campsites recorded by Tom Kehoe (1960) in the valley and adjacent streams. If data from the Canadian Plains were to be added to those from the Montana-Alberta foothills, as Walde suggests should be done, a far stronger demographic pattern for the Late Prehistoric period than the one we present would surely emerge.

Thus, while the size and diversity of Middle Prehistoric period sites and individual complexes may indicate a rich tapestry of economic and social practices among bison hunters, we think it is legitimate to question whether a population threshold high enough to warrant investment on intensive and sustained bison harvesting and processing existed before the climatic and ecological bonanza of the last 1,000–1,500 years. All we can propose, on the basis of incomplete survey data but detailed records of Blackfoot wintering grounds (Schaeffer and Schaeffer 1934) is that, for the better part of the last millennium, each major valley that irrigated the Rocky Mountain Front and drained into the Missouri River was heavily inhabited and utilized by communal bison hunters during the cold months of the year. This may well be the case for Blackfoot wintering grounds to the north and northeast of the upper Missouri.

The effect of valley-wide population aggregation and longer periods of cohabitation of bison and people on the regulation of harvests, labor, and other areas of social life has yet to be measured for the entire region. We echo the observation by Lucas Bueno and Laura Scheiber that large-scale archaeological approaches must incorporate native landscape logic to reveal meaningful land-use patterns among hunter-gatherers. The construction and long-term maintenance of multiple drive lines leading to jumps on the high ridges of the Rocky Mountain foothills and adjacent prairies strongly suggest that an overarching pattern of colonization and development of areas suitable for mass harvesting came into place during the Late Prehistoric period. Higher population density likely presented challenges and opportunities due to competition for localities with ideal conditions for large-scale bison drives; on the other hand, it furnished a large pool of non-kin labor. Radiocarbon and OSL assays for the Two Medicine River Valley (supplement tables A1 and A2) support our contention that this area was colonized by specialized bison hunters at the turn of the last millennium but was exploited most intensively and extensively during the Little Ice Age (ca. AD 1400–1800), when climatic conditions were optimal for large grazers.

Walde observes that processes of emergent complexity must be understood in a broader context than the northwestern Plains. We wholeheartedly agree, because bison-hunting trajectories were punctuated periodically by participation in long-distance interaction. It has been suggested that intensification beginning in the Late Middle Prehistoric period was associated with this interaction (Reeves 1990). There is some evidence of trade in copper and stone possibly for hides and dried meat earlier on, but a spike in bison hunting beyond local needs and the onset of pemmican production was likely associated with participation in Cahokia’s long-distance exchange networks, through which hunters obtained plant foods among other things (Brink and Dawe 1989:297–303). It is possible that population aggregation at key localities and concomitant need for regulatory institutions arose around this time. On the other hand, protohistoric-period conflict and interaction along the Missouri River and across the Rocky Mountains was decidedly different than previous trans-Mississippian relations, particularly in regard to the identity of partners and competitors.

Sassaman questions the need for a discussion of hunter-gatherer territoriality, at least as the conventionally defined “perimeter defense.” While we agree with him and Bueno that hunter-gatherer territories must be redressed and theorized from a standpoint that emphasizes movement (see Zedeño and Anderson 2010), territorial circumscription is an important component of emerging complexity. Warfare waged by the Blackfoot against the Shoshone and Kootenai is well documented historically and generally attributed to competition for the control of European trade networks (Moore 2012). Yet, such animosity may have been rooted in competition for prime hunting grounds, leading to the formation of social and political boundaries. During the Old Women’s phase, specialized bison hunters had to contend with other ethnic groups that customarily crossed the Rocky Mountains to obtain bison and other resources along the eastern foothills. Elsewhere, we combined information on the distribution of protohistoric Shoshone material culture (Newton 2011), Old Women’s phase material culture (Vickers and Peck 2009), and Kootenai precontact boundaries in Montana to make the argument that specialized bison hunters were under the pressure of territorial circumscription along the front prior to the arrival of the horse (Zedeño et al. 2013). Given the recent discovery of Plains warrior rock art just 12 km northwest of the 30 Knot complex (see fig. 3), we now think, like Walde, that warfare was a significant component in emergent complexity and acknowledge that the analysis of landscape engineering with defensive functions in mind must be developed further.

The defense of core hunting grounds and access routes from intruding neighbors takes a decidedly new twist if we add the factor that mass harvests were at least partially geared toward commodity exchange. Interaction and trading partnerships with the more distant Middle Missouri farmers is poorly documented, even though it may have begun as early as 2,500 years ago (Foreman 2010). Nevertheless, this interaction likely provided opportunities for sustained exchange of not only foodstuffs and material goods but also esoteric knowledge and valuable ritual objects (Catlin 1965 [1841]). The documented presence of Middle Missouri immigrants in the aboriginal Blackfoot territory during the Protohistoric period (or earlier) is suggestive of close ties among these people (Zarrillo and Kooyman 2006). From a different perspective, Binememma (2004) goes as far as to propose that a push from
the Middle Missouri region may have encouraged Blackfoot ancestors to colonize the Missouri River headwaters before the arrival of the horse. Clearly, much more research on the exchange of commodities and ritual knowledge and objects should be undertaken to ascertain the relationships among hunting intensification, trade partnerships, and the rise of corporate organization in the Late Prehistoric period.

The third aspect of emergent complexity is differentiation. Although domestic stone architecture and memorial monuments provide a glimpse into social differentiation, a satisfactory argument must also incorporate ethnography. There is little doubt that Blackfoot corporate organization, in the form of age, class, and gender sodalities, as well as societies that crosscut not only age and gender groups but also band and division membership, was in place by the time of first contact with European traders in the late eighteenth century (Tyrrell 1916). Fitzhugh and Prentiss ask whether and how these institutions exerted effective power over the group beyond the actual hunt. Societies regulated the communal hunting cycle, of course, but other aspects of life including protection from intruders, marriage rule observance, law and order, sacred tobacco planting, and the annual movement to and from the winter camps, were part of their duties. Challengers were punished with ridicule, expulsion from the community, or death in extreme cases. That much can be said of other Great Plains tribes who practiced mixed subsistence economies (Wissler 1916b). Among the Blackfoot, however, there were also esoteric or secret societies of expensive and exclusive membership that co-opted ritual knowledge associated with the reproduction and calling of bison, drive-line layout, and corral construction, as well as other realms of life and death; the community at large had no ready access to such knowledge.

In addition to these institutions, there were individually owned ceremonial painted lodges and bundles that could be combined with society privileges on and off the hunting ground. In other words, ritual power was both corporate and individually held; it was cumulative, and it was hierarchical. Fitzhugh inquires how ritual knowledge came to be: it was originally obtained through the vision of an individual, who received power from supernatural forces or beings. Thereafter, this individual could transfer his knowledge in exchange for goods or new ritual knowledge. Vision seeking goes back untold years, but at some point it became the means to establish a corporate institution (Duvall 1910). Esoteric societies owned liturgy, songs, and bundles that legitimized their supernatural power to accomplish specific tasks. Their leaders would evaluate individuals’ visions for compliance with tradition and then endorse them (or not).

In closing, we suggest that the pivot of the Blackfoot regulatory system revolved around the abduction of hunting ritual and technology by exclusive institutions and certain bundle and lodge owners. In Blackfoot tradition, abduction can be traced back to the adoption of the bow and arrow, which is regarded as a gift from the Sun. This event belongs in the suite of Star Stories, which postdate the creation of the world, its re-creation after the great flood, and the Blackfoot ethogenesis. Star Stories are populated by gods, demigods, and Blackfoot culture heroes at a traditional time when social and moral rules were being established (Hernandez 1999). Arrow making was imbued in ritual. Ceremonial bow-and-arrow sets that belonged in bundles once used in the hunt and in the Sun Dance were still ritually active in the twentieth century (Duvall 1910:172). In answer to Sassaman’s inquiry about the role of cosmology in emerging complexity, celestial knowledge and celestial people played a central role in the organization of communal hunting symbolically, by providing moral justification for the abduction of technology, among other things, and logistically by marking the passage of ritual and hunting cycles (e.g., the position of the Big Dipper on the horizon). That the knowledge bison hunters presumably had held in common for millennia eventually became a ritual privilege that could only be obtained through formal transfer, is a form of power that speaks loudly of social differentiation beyond the mere act of hunting. The most obvious benefits of participation in such a system were social prestige, entitlement, and acquisitive freedom, which often went hand-in-hand with positions of political leadership (Ewers 1955).

While it is indeed difficult to establish how the relationships between the have- and the have-nots played out from the Plains material record, it is clear from contact-period observations that Blackfoot society was divided by economic wealth (Nugent 1993) and that bison was the main source of that wealth (Schultz 1962). An explanation for how corporate organization translated into effective decision-making power may be found in the fact that ritual knowledge (and bison-hunting knowledge) was both a gift from the higher powers and a commodity used to access foodstuffs, raw materials, prestige goods, and even higher ritual knowledge (Lokensgaard 2010). Finally, we propose that a society built on bison wealth could partake of that wealth if its members submitted to the ritual system regulated by individual and corporate power. In turn, this system restricted access to knowledge essential to the reproduction of wealth and punished community detractors who challenged it by hunting outside the sanctioned cycle. It was a complex and self-perpetuating system with diverse social institutions, many of which have outlasted the demise of bison hunting—a system we have only begun to imagine in an archaeological framework.

—María Nieves Zedeño, Jesse A. Ballenger, and John R. Murray

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