The Donovan Site (5LO204): An Upper Republican Animal Processing Camp on the High Plains

Laura L. Scheiber and Charles A. Reher

DO NOT CITE IN ANY CONTEXT WITHOUT THE PERMISSION OF THE AUTHORS

To Be Published in Plains Anthropologist
(scheduled for February 2008 issue)

Laura L. Scheiber, Department of Anthropology, Indiana University, Student Building 130, Bloomington, IN 47405. scheiber@indiana.edu

Charles A. Reher, Department of Anthropology, University of Wyoming, Dept. 3431, 1000 E. University Avenue, Laramie, WY 82071. arrow@uwyo.edu
ABSTRACT

The Donovan site (5LO204) is a Late Prehistoric animal processing campsite located in northeastern Colorado. The site has been extensively excavated by the University of Wyoming High Plains Archaeology Project since 1992. Containing at least eleven stratified occupation surfaces dating between about A.D. 1000 and 1300, Donovan represents a frequently visited western expansion of the Upper Republican phase of the Central Plains tradition. Material culture includes thousands of fragmented bison bones, lithic debitage, diagnostic ceramics, side-notched projectile points, and bifacial knives. Long thought to represent the activities of either indigenous High Plains occupants or Central Plains hunting parties, this site and others on the western High Plains provide evidence for the complex interactions between foraging and farming communities on the Plains.

Key words: Upper Republican, Central Plains tradition, High Plains, Late Prehistoric, Foragers and Farmers

Research at the Donovan site (5LO204) has great potential to resolve a long standing debate about the nature of central/western Plains relations during the Late Prehistoric. For decades, Plains archaeologists have debated the presence of an Upper Republican phase or Central Plains tradition occupation on the western High Plains (ca. A.D. 1000-1400) (Bell and Cape 1936; Champe 1946; Reher 1973, 1986a, 1986b, 1987, 1988, 1989b, 1990, 1996; Strong 1935; Wedel 1986; Wood 1971). William Duncan Strong, Waldo Wedel, and others first recognized distinctive Central Plains tradition pottery at sites in western Nebraska such as Signal Butte (25SF1) (Strong 1935) and the Dalton Rockshelters (Bell and Cape 1936). These sites were located several hundred kilometers west of traditionally defined Upper Republican phase
farming hamlets on Medicine Creek in south-central Nebraska and Solomon River in north-central Kansas (sometimes now separated into a distinct phase known as Solomon River). Sites on the High Plains of western Nebraska, western Kansas, northeastern Colorado, and southeastern Wyoming provided no evidence for farming or earthlodge architecture, which are diagnostic traits of the Central Plains tradition in general and the Plains Villager tradition more broadly (Wood 1998).

Early investigators believed that these sites may represent hunting camps of periodically nomadic farmers traveling west to hunt buffalo (Bell and Cape 1936; Lehmer 1954; Wood 1969). Since then, archaeologists have reasoned that the hunting camp hypothesis may lack supporting evidence (Reher 1973, 1986a, 1986b, 1987, 1988, 1989b, 1990, 1996; Wedel 1970; Wood 1971, 1990). Central Plains inhabitants probably had access to sufficient local resources to support year-round residency, although they may have had other reasons for periodic buffalo hunting trips. Moreover, the magnitude of local resources used at the supposed High Plains hunting camps suggests more permanent occupation than would be expected for a transitory hunting party. Therefore, some have proposed that a local population, composed of either former migrants or unrelated neighbors, occupied the sites (Roper 1990). In current discussions of Upper Republican sites and distributions, many authors explicitly limit their interpretations to the cluster of farming hamlets in the Medicine Creek and Solomon River river drainages without addressing the spatially widespread atypical sites to the west (e.g. Blakeslee 2002; Bozell and Ludwickson 1998a; Bozell 1995; Ludwickson and Bozell 1998). From this perspective, these sites and the people who occupied them are considered peripheral and/or unrelated to eastern Upper Republican groups (but see Roper 2002; Scheiber 2006).
Located on the western High Plains of northeastern Colorado, approximately halfway between Kansas and Nebraska hamlet sites to the east and the northernmost Wyoming frontier sites farther north, the Donovan site (5LO204) has unusual potential to contribute to this discussion. The Donovan site is a bison meat, marrow, and hide processing area containing multiple Upper Republican occupations and representing an unusually long presence of the same people over the course of several hundred years. The material inventory includes triangular side and basal notch projectile points, endscrapers, bifacial knives, utilized flake and blade tools, distinctive cord-marked ceramics with collared-rims, bone and shell tools and ornaments, and tens of thousands of bone fragments and pieces of debitage. If it were not for the absence of cultigens and earthlodge foundations, this list would fit well with most other Upper Republican sites in Kansas and Nebraska (Steinacher and Carlson 1998).

Professional academic research has been on-going at the Donovan site since 1992, and the site has been the topic of numerous conference papers (Adams et al. 1997; Midgett and Reher 1996; Reher et al. 2001; Reher and Scheiber 1996; Reher et al. 1994; Scheiber 1996), graduate theses (Cobry 1999; Page 2006; Scheiber 2001), and student class projects. We here present evidence from recent investigation of the site, including ecological and temporal context, history of archaeological investigation, excavation methodologies, depositional history, absolute dates, and artifact descriptions. Although several authors have written about High Plains Upper Republican sites in synthetic overviews (Cassells 1997; Cobry and Roper 2002; Gilmore 1999; Roper 1990; Wood 1990), few thorough descriptions of the sites themselves can be found in recent literature (for older examples see Bell and Cape 1936; Bowman 1960; Irwin and Irwin 1957; Reher 1973; Steege 1967; Strong 1935; Withers 1954; Wood 1971).
ECOLOGICAL AND GEOGRAPHIC CONTEXT IN THE HIGH PLAINS

The Donovan site is located on a small terrace on the west side of a tributary canyon of Lewis Canyon, in Logan County, northeastern Colorado (Figure 1). Lewis Canyon is composed of a series of canyons along the eastern edge of a long escarpment that flanks the south side of the Peetz Table, a 25 square mile (40 km) plateau upland, located north of the South Platte River (Conklin 1928:175). The canyons encompass roughly four by two square miles (six by three km), bisected by Lewis Creek, which flows only intermittently in this upper section. The site is located almost equidistant from Sterling, Colorado, and Sidney, Nebraska.

Figure 1. Map of selected High Plains Upper Republican sites, Central Plains Upper Republican localities, and primary lithic raw material sources. Dotted line represents source location for Republican River jasper (Smoky Hill jasper).
Numerous physical and biological factors have created the environment at the Donovan site (Figure 2). Northeastern Colorado is located within the High Plains portion of the Central Plains, which extends north to the Pine Ridge Escarpment (at the western South Dakota/Nebraska border) and south to the Llano Estacado in the Texas panhandle (Fenneman 1931; Wedel 1986). To the west lie the foothills of the Rocky Mountains, and to the east the tall grass prairies of the Central Plains proper. The High Plains, which are sometimes called the Western Plains, are generally transitional between the prairie grasslands and the mountains (Wood 1967).

Figure 2. Donovan landscape, Lewis Canyon, Colorado.

The broad valley extending along the South Platte River Basin is called the Colorado Piedmont. Here the Tertiary cover of the High Plains has eroded away, exposing older sedimentary rocks (Fenneman 1931; Scott 1978, 1982). These deposits still exist in portions of
the northeastern part of the state and create what we recognize as the High Plains, “a nearly flat landscape interrupted occasionally by sandhills and eroded along stream courses to form canyons, cliffs, and escarpments” (Fitzgerald et al. 1994:3; Reher 1973, 1996; Wedel 1963, 1986).

These bluffs bordering the Piedmont and the High Plains are especially visible in Pawnee Buttes in Weld County and the Peetz Table Escarpment in Logan County. This south-facing escarpment represents the edge of the Colorado Piedmont where it meets the Tertiary mantle of the High Plains. The Donovan site is located on this geographical border.

The climate today is characterized by low precipitation, high winds, and low humidity (Fitzgerald, et al. 1994). Average annual summer temperatures range between 53° and 89° F (12° to 32° C), and average winter temperatures range from 10° to 45° F (-12° to 7° C) (United States Environmental Data Service [USED] 1982). Mean annual precipitation in Sterling, Colorado, between 1951 and 1980 was 15 inches (38 cm). The elevation at the Donovan site is approximately 4,370 ft (1332 m). The soils are classified as brown argids, clay-rich aridic soils with a diagnostic calcium carbonate horizon that form “under ephemeral grasses, forbs, and scattered cacti where the climate is cool and semiarid” (Erickson and Smith 1985:12). More specifically, the Dix-Eckley-Chappel soil unit characterizes the area that includes the Donovan site and is found in gently to moderately sloping upland ridges (Amen et al. 1977).

Northeastern Colorado is part of the plains grasslands ecosystem (Mutel and Emerick 1992; Weaver and Albertson 1956). The increased availability of water near bluffs and arroyos, such as Lewis Canyon, creates a riparian zone that contributes to a higher diversity of resources (Gray 1998). Botanically, this area is considered part of the South Platte drainage of the Eastern Slope of Colorado. Plant communities are similar to those of the northern Great Plains and
include short grass, shrubs, and forbs (Gray 1998; Weber and Wittmann 1996:xiii). Occasional bluffs, or rock outcrops, like those found in the Lewis Canyons or Pawnee Butte National Grasslands, allow plants such as cushion plants and dryland species to survive (Weber and Wittmann 1996:xv). Being less affected by agriculture, these areas still support native vegetation.

Dominant plants in the grasslands of Logan County that are characteristic of the shortgrass plains include blue gramma (*Bouteloua gracilis*), buffalo grass (*Buchloë dactyloides*), sage (*Artemisia* sp.), yucca (*Yucca glauca*), and prickly pear (*Opuntia polyacantha*) (Bach 1994; Fitzgerald, et al. 1994). In some parts of the grasslands, a mixed grass environment with increased soil moisture is created by the addition of western wheat grass (*Agropyron smithii*), needle-and-thread (*Stipa comata*), bluestems (*Andropogon* sp.), and dropseeds (*Sporobolus* sp.). Many juniper (*Juniperus communis*) and hackberry (*Celtis reticulata*) trees dot the landscape of the canyon itself, and thousands of hackberry seeds have been recovered from the archaeological deposits. The hackberry groves in Lewis Canyon are apparently an unusual outlier well to the west of the next closest stands, perhaps even a Pleistocene relict (Daniel Bach, personal communication 1994). At least thirty-eight edible, medicinal, and other useful plants grow near or at the Donovan site today, including skunkbrush sumac (*Rhus trilobata*), currants (*Ribes* spp.), chokecherry (*Prunus virginiana*), wild grapes (*Parthenocissus inserta* and *Vitis* sp.), prickly poppy (*Argemone polyanthemos*), wild plum (*Prunus americana*), rice grass (*Oryzopsis hymenoides*), wild onion (*Allium textile*), and wild rose (*Rosa woodsii*) (Bach 1994).

A diverse number of mammals, birds, fish, reptiles, and amphibians live or once lived in Logan County, a subset of which were procured by the prehistoric inhabitants at Donovan (Table 1). More than fifty indigenous mammal species from seven families are either there today or
were until recently (Fitzgerald, et al. 1994:1; United States Department of Energy, Environmental Assessment [USDOE/EA] 2005). The largest animal to inhabit northeastern Colorado from the Late Prehistoric to modern times was the American buffalo (*Bison bison*). Several species of deer (*Odocoileus* spp.), pronghorn (*Antilocapra americana*), and elk (*Cervus elaphus*) also ranged through the area. Carnivores, such as bears (*Ursus* sp.), mountain lions (*Felis concolor*), wolves (*Canis lupus*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), foxes (*Vulpes* spp.), raccoons (*Procyon lotor*), skunks (*Mephitis mephitis*), and ferrets (*Mustela* spp.) additionally inhabit the vicinity. Smaller mammals include cottontail rabbits (*Sylvilagus* spp.), jackrabbits (*Lepus* spp.) and bats (e.g. *Lasionycteris noctivagans*). At least sixteen rodent genera have also been identified, including squirrels (*Spermophilus* sp.), prairie dogs (*Cynomys ludovicianus*), gophers (e.g. *Thomomys talpoides*), mice (e.g. *Perognathus* spp., *Peromyscus* spp.), pack rats (*Neotoma cinerea*) and porcupines (*Erethizon dorsatum*).

**Table 1. Animal species of Logan County, Colorado.**

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Extant</th>
<th>Average Body Size (kg)</th>
<th>Present/Absent in Donovan Archaeofauna?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marsupialia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didelphidae</td>
<td>Virginia opossum</td>
<td><em>Didelphis virginiana</em></td>
<td>Yes</td>
<td>4.3</td>
<td>A</td>
</tr>
<tr>
<td><strong>Insectivora</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soricidae</td>
<td>Least shrew</td>
<td><em>Cryptotis parva</em></td>
<td>Yes</td>
<td>0.005</td>
<td>A</td>
</tr>
<tr>
<td>Talpidae</td>
<td>Eastern mole</td>
<td><em>Scalopus aquaticus</em></td>
<td>Yes</td>
<td>0.0765</td>
<td>A</td>
</tr>
<tr>
<td><strong>Chiroptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vespertilionidae</td>
<td>Western small-footed myotis</td>
<td><em>Myotis ciliolabrum</em></td>
<td>Yes</td>
<td>0.0045</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Red bat</td>
<td><em>Lasiurus borealis</em></td>
<td>Unk</td>
<td>0.01</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Hoary bat</td>
<td><em>Lasiurus cinereus</em></td>
<td>Yes</td>
<td>0.027</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Silver-haired bat</td>
<td><em>Lasionycteris noctivagans</em></td>
<td>Unk</td>
<td>0.0105</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Big brown bat</td>
<td><em>Eptesicus fuscus</em></td>
<td>Yes</td>
<td>0.02475</td>
<td>A</td>
</tr>
<tr>
<td><strong>Lagomorpha</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leporidae</td>
<td>Desert cottontail</td>
<td><em>Sylvilagus</em></td>
<td>Yes</td>
<td>1.1375</td>
<td>P</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Order/Family</td>
<td>Genus</td>
<td>Species</td>
<td>Status</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Sylvilagus audubonii</td>
<td>Eastern cottontail</td>
<td>Rodentia</td>
<td>Sylvilagus</td>
<td>floridanus</td>
<td>Yes</td>
</tr>
<tr>
<td>Lepus californicus</td>
<td>Black-tailed jackrabbit</td>
<td>Rodentia</td>
<td>Lepus</td>
<td>townsendii</td>
<td>Yes</td>
</tr>
<tr>
<td>Lepus townsendii</td>
<td>White-tailed jackrabbit</td>
<td>Rodentia</td>
<td>Lepus</td>
<td>Yes</td>
<td>4.25</td>
</tr>
<tr>
<td>Spermophilus spilosoma</td>
<td>Spotted ground squirrel</td>
<td>Rodentia</td>
<td>Spermophilus</td>
<td>tridecemlineatus</td>
<td>Yes</td>
</tr>
<tr>
<td>Spermophilus tridecemlineatus</td>
<td>Thirteen-lined ground squirrel</td>
<td>Rodentia</td>
<td>Spermophilus</td>
<td>Yes</td>
<td>0.134</td>
</tr>
<tr>
<td>Cynomys ludovicianus</td>
<td>Black-tailed prairie dog</td>
<td>Rodentia</td>
<td>Cynomys</td>
<td>Yes</td>
<td>0.898</td>
</tr>
<tr>
<td>Sciurus niger</td>
<td>Fox squirrel</td>
<td>Rodentia</td>
<td>Sciurus</td>
<td>Yes</td>
<td>0.935</td>
</tr>
<tr>
<td>Geomys bursarius</td>
<td>Plains pocket gopher</td>
<td>Rodentia</td>
<td>Geomys</td>
<td>Yes</td>
<td>0.2375</td>
</tr>
<tr>
<td>Thomomys talpoides</td>
<td>Northern pocket gopher</td>
<td>Rodentia</td>
<td>Thomomys</td>
<td>Yes</td>
<td>0.11</td>
</tr>
<tr>
<td>Perognathus flavescens</td>
<td>Plains pocket mouse</td>
<td>Rodentia</td>
<td>Perognathus</td>
<td>Yes</td>
<td>0.01</td>
</tr>
<tr>
<td>Perognathus flavus</td>
<td>Silky pocket mouse</td>
<td>Rodentia</td>
<td>Perognathus</td>
<td>Unk</td>
<td>0.008</td>
</tr>
<tr>
<td>Chaetodipus hispidus</td>
<td>Hispid pocket mouse</td>
<td>Rodentia</td>
<td>Chaetodipus</td>
<td>Yes</td>
<td>0.05</td>
</tr>
<tr>
<td>Dipodomys ordii</td>
<td>Ord’s kangaroo rat</td>
<td>Rodentia</td>
<td>Dipodomys</td>
<td>Yes</td>
<td>0.074</td>
</tr>
<tr>
<td>Castor canadensis</td>
<td>American beaver</td>
<td>Rodentia</td>
<td>Castor</td>
<td>Yes</td>
<td>20.5</td>
</tr>
<tr>
<td>Reithrodontomys megalotis</td>
<td>Western harvest mouse</td>
<td>Rodentia</td>
<td>Reithrodontomys</td>
<td>Unk</td>
<td>0.01375</td>
</tr>
<tr>
<td>Reithrodontomys montanus</td>
<td>Plains harvest mouse</td>
<td>Rodentia</td>
<td>Reithrodontomys</td>
<td>Yes</td>
<td>0.011</td>
</tr>
<tr>
<td>Peromyscus maniculatus</td>
<td>Deer mouse</td>
<td>Rodentia</td>
<td>Peromyscus</td>
<td>Yes</td>
<td>0.02175</td>
</tr>
<tr>
<td>Onychomys leucogaster</td>
<td>Northern grasshopper mouse</td>
<td>Rodentia</td>
<td>Onychomys</td>
<td>Yes</td>
<td>0.04</td>
</tr>
<tr>
<td>Neotoma cinerea</td>
<td>Bushy-tailed woodrat</td>
<td>Rodentia</td>
<td>Neotoma</td>
<td>Yes</td>
<td>0.338</td>
</tr>
<tr>
<td>Microtus ochrogaster</td>
<td>Prairie vole</td>
<td>Rodentia</td>
<td>Microtus</td>
<td>Yes</td>
<td>0.06</td>
</tr>
<tr>
<td>Microtus pennsylvanicus</td>
<td>Meadow vole</td>
<td>Rodentia</td>
<td>Microtus</td>
<td>Yes</td>
<td>0.04367</td>
</tr>
<tr>
<td>Ondatra zibethicus</td>
<td>Muskrat</td>
<td>Rodentia</td>
<td>Ondatra</td>
<td>Yes</td>
<td>0.6125</td>
</tr>
<tr>
<td>Erethizon dorsatum</td>
<td>Common porcupine</td>
<td>Rodentia</td>
<td>Erethizon</td>
<td>Yes</td>
<td>13.5</td>
</tr>
<tr>
<td>Canis latrans</td>
<td>Coyote</td>
<td>Carnivora</td>
<td>Canis</td>
<td>Yes</td>
<td>14.2</td>
</tr>
</tbody>
</table>

**Carnivora**

**Canidae**

**Carnivora**
Additionally, more than 270 bird species belonging to seventeen orders nest in or travel through the state (Gray 1998). Birds from at least ten of these orders may inhabit grasslands and riparian zones in northeastern Colorado. The highest number of species belongs to the order Passeriformes, which includes swallows, thrashers, sparrows, and finches. Of these, the more common include the northern mockingbird (*Mimus polyglottos*) and the American goldfinch (*Carduelis tristis*). Birds of prey such as the prairie falcon (*Falco mexicanus*) and the red-tailed...
hawk (*Buteo jamaicensis*), ground birds such as the lesser prairie chicken (*Tympanuchus pallidicinctus*), and owls such as the barn owl (*Tyto alba*) have additionally been observed.

Reptiles and amphibians are also plentiful. The highest diversity of amphibians and reptiles in Colorado live in the Great Plains physiographic region (Hammerson 1999). At least four species of turtles (e.g. box turtle (*Terrapene ornata*)), six species of lizards (e.g. skinks (*Eumeces* spp.)), and seven species of snakes (e.g. bullsnake (*Pituophis catenifer*), garter snake (*Thamnophis* sp.), and rattlesnake (*Crotalus viridis*) live in the vicinity. Amphibians are represented by six species of frogs and toads (e.g. *Bufo* spp., *Rana* spp.), and one salamander species (*Ambystoma tigrinum*) (Hammerson 1999).

**DONOVAN IN LOCAL TEMPORAL CONTEXT: THE LATE PREHISTORIC AND PROTOHISTORIC IN NORTHEASTERN COLORADO**

Lewis Canyon is located approximately 20 miles (32 km) north of the South Platte River, a major corridor for both prehistoric and historic transportation. Native North Americans have occupied this region for at least 10,000 years. Some of the better-known sites within a 40-mile (64-km) radius of the Donovan site include Jones-Miller (5YM8) (Stanford 1978), Frasca (5LO19) (Fulgham and Stanford 1982), the Sidney Burial (25CN55) (Carlson et al. 1999), and Dipper Gap (5LO101) (Metcalf 1974), all of which primarily contain Paleoindian (10,000 to 8,000 years ago) or Archaic deposits (8,000 to 1,800 years ago). Many of these sites are reported as butchering and processing stations (see also Morris 1990). The Flattop Quarry (5LO34) (Greiser 1983), an important lithic resource throughout the Plains and the dominant stone source found at the Donovan site, is located approximately 11 miles (18 km) west of the Donovan site. This resource plus the unique location on the scarp woodlands probably contributed to prehistoric occupation of the Donovan site. Paleoindian and Archaic artifacts are found in Lewis
Canyon and the surrounding areas, such as a Late Paleoindian projectile point found eroding from the main sand draw north of the site in 2001. However, Late Prehistoric sites dominate assemblages (Mike Toft, personal communication 1999).

The presence of pottery is the hallmark of the Late Prehistoric or Ceramic period, which generally dates from A.D. 150 to A.D. 1700 (Gilmore 1999). The period is often subdivided into Early (Plains Woodland), Middle (Upper Republican), and Late (Dismal River) (Butler 1988; Clark 1999; Gilmore 1999; Gunnerson 1987). Ceramic sites are plentiful in the area, although their descriptions are not. For his 1967 dissertation, J. J. Wood excavated sixteen sites in the Battle Canyon and Pawnee Creek localities located less than 30 miles (48 km) south and west of Donovan (Wood 1967). Sites such as Peavy Shelter (5LO1), Kasper (5LO4), Biggs (5WL27), and McEndafffer (5WL31) contain evidence of both Early and Middle Ceramic (Plains Woodland and Upper Republican) deposits and possess material similar to that recovered from Donovan and many hunter-gatherer sites from the High Plains and adjacent areas dating to the same time periods.

The Early and Middle Ceramic sites in northeastern Colorado are primarily interpreted as hunting camps, or locations where prehistoric High Plains hunter-gatherers camped and lived during seasonal occupations. Many of the ceramics that are found on the surface of sites in Logan County are Upper Republican or Middle Ceramic, cross-dated to between A.D. 1000 and A.D. 1300 or 1400. When archaeologists discuss these Upper Republican occupations in particular, they often speak of what they are not – not earthlodges, not farmers, – instead of what they are (Eighmy 1994; Ellwood 2002; Reher 1973; Roper 1990; Wood 1967; Wood 1971, 1990). However, the exact relationship between east and west involves more than the absence of certain features and the presence of others.
The transition between the Late Prehistoric and Protohistoric time periods is known locally as Late Ceramic or Dismal River. Many archaeologists believe that the Dismal River aspect is the material manifestation of western Plains Apache (Gunnerson 1960), and several sites of this complex are found in the area (Mike Toft, personal communication 1999). Native Protohistoric and Historic period archaeological sites are not well represented, and what is known is primarily based on historical literature and oral traditions (West 1998). The Plains Apache, Pawnee, Comanche, and Ute are all known to have inhabited the South Platte River Valley during the sixteenth and seventeenth centuries (Clark 1999; Mehls 1984).

During the eighteenth and nineteenth centuries, many different Native American groups were present in northeastern Colorado. Some occupied the land on a year-round basis, while others revisited on an annual basis for summer hunting on the plains. Still other groups preferred the more protected river valleys and canyons to provide shelter during winter. Between 1750 and 1800 the Kiowa, the Arapaho, and the Cheyenne achieved powerful positions in the area. After 1840, these groups, along with the Lakota, allied with one another against the Pawnee. Most of these peoples were newcomers themselves, mounted nomads using this area in new and unique ways as they jockeyed for position between themselves and with increasing numbers of European settlers (West 1998).

The site of the Summit Springs Battlefield is located approximately 30 miles (48 km) southeast of the Donovan site. This national monument is the best-documented historic Native American site in the vicinity, representing a military encounter between Cheyenne Dog Soldiers and their families and the Fifth U.S. Cavalry in July of 1869 (Afton et al. 1997; Reher et al. 2006; Weingardt 1978; Werner 1991). Despite these and other growing signs of conflict, thousands of Lakota remained camped along the South Platte through the mid 1870s (Conklin
1928; Wells 1976). In the summer of 1874 they left the Red Cloud Agency in Nebraska to hunt buffalo in Logan County (as cited in Conklin 1928:68). Lewis Canyon was specifically mentioned in stories told by Euroamerican pioneers (Conklin 1928:71), and was considered an Indian hideout through the 1880s.

ARCHAEOLOGICAL INVESTIGATIONS

History of Research

Lloyd Hobbes of Sterling, Colorado, first noticed charcoal, lithics, and bone eroding from the bank of one of the dry sand arroyos of Lewis Canyon after severe thunderstorms during the early 1980s. Above the sand draw was a small terrace or bench, measuring approximately 12 meters by 25 meters in size, which was preserved from erosion because the arroyo channel was deflected by a nearby cliff-like clay bedrock exposure. It was here that prehistoric people camped for many generations. With the initial help of the Colorado State Archaeologist Emerson Pearson and archaeologist Tom Fulgham, avocational archaeologists from the Denver and Sterling Chapters of the Colorado Archaeological Society consequently excavated the site (Tate 1982). Over the course of a few weekends each summer and fall between 1982 and 1985, they excavated at least 25 square meters of what became known as the Donovan site, so-named for the landowner.

The amateur group recorded general provenience information by horizontal unit (but apparently not by vertical level), and recovered artifacts using ¼” screening methods. In some areas, their excavations extended more than 2 meters below the modern ground surface. During this time, members of the Society recovered an almost complete Upper Republican ceramic vessel in the southern area of their excavation units (Ellwood 1995, 2002). They recorded almost 10,000 artifacts, including 9,000 unmodified flakes, 100 projectile points, several hundred
utilized flake tools and endscrapers, close to 100 pottery sherds, and immense quantities of bison bone (which were not counted or further analyzed). Formal tools, diagnostics, and unusual artifacts such as worked bone were retained and are now curated at the Overland Museum in Sterling, Colorado. Most of the faunal remains were collected, but later discarded. After the amateur excavations ended in the middle 1980s, the site areas close to the cut-bank were subjected to severe looting. A great deal of material was recovered during our substantial backdirt-screening project, most of which was from looting activities.

Mike Toft, an archaeologist from Sterling, Colorado, had been trying to attract professional interest in the sites in the Sterling area for years, and he approached the second author about the Donovan site in 1990. After a brief visit, it was clear that the site was unusually well-stratified and extremely relevant to ongoing research at the University of Wyoming High Plains Archaeology Project (HPA), based in Pine Bluffs, Wyoming, 75 miles (120 km) to the northwest. HPA crews initiated excavation at the site in 1992.

More specifically, the goal of these investigations was (and is) to determine the extent and age of the cultural deposits and to tie this site into High Plains Upper Republican frontier research extending north into Wyoming and western Nebraska (Reher 1986a, 1986b, 1987, 1988, 1989b, 1990, 1996; Scheiber and Reher 2000) at sites such as Gurney Peak (48LA305/306), Seven Mile Point (48LA304), and Pine Bluffs (48LA312). Excavations at the Donovan site continue as a long-term research project in Lewis Canyon (Reher, et al. 2001; Reher and Scheiber 1996; Reher, et al. 1994; Scheiber 2001). Eight summer field seasons have been conducted, usually lasting 30 work days and involving experienced HPA student employees and University of Wyoming field schools. At least 95 professional and student archaeologists have participated in fieldwork at the site. This paper focuses on the work conducted between 1992 and
1999. The Donovan site materials have also been used in various undergraduate and graduate classes at the University of Wyoming, University of California-Berkeley, University of California-Santa Cruz, and Indiana University, to the extent that the Donovan site bibliography now includes 40 student manuscripts and conference presentations, a few of which are cited in this article.

Excavation Methodology

Fieldwork at Donovan began by re-opening a 2-x-2-meter amateur unit (H24), known to have produced the densest concentration of materials. We quickly realized the potential of defining actual occupation levels by observing the exposed well-defined strata. Because of reasonably clear separations between occupational events, we chose to excavate in non-arbitrary “Cultural Levels,” determined initially by following strata from previously excavated adjoining units and in subsequent years through the assistance of computerized backplot profiles and our stratigraphic maps. Cultural Level designations were applied while in the field, starting with CL#1. Flagging tape was used to mark the location of the level every 50 to 100 cm along the profiles to monitor the exact location of all of the levels of any one area.

On two occasions a Cultural Level split into sublevels in certain parts of the deposits, forcing A and B designations. This was apparently due to low pockets caused by a small but rapid depositional event or by erosion along the margins of the low point, leading to separated thin levels. These separations and other factors indicate that some of the Cultural Levels may represent multiple occupational episodes, perhaps spread over a few weeks or few months of continuous occupation.

We have followed very intensive recording and mapping strategies in order to better understand horizontal spatial structure and to parse apart numerous vertical occupation surfaces.
and strata. These methods are fairly standard on the Northwestern Plains (e.g. Frison 1996; Todd et al. 2001). Within particular units, a Cultural Level was completely excavated, mapped, and photographed before we collected the artifacts. More than 16,000 artifacts have been mapped in situ using grid corner pines and lines, tape measures, plumb bobs, and optical leveling instruments. Because of the sheer number of artifacts and the high degree of bone fragmentation, artifact cut-off points of about 0.25 cm for lithics and 3.0 cm for bones were established for in-situ mapping to the nearest millimeter. In addition, long axis orientation, long axis inclination, and short axis inclination were collected for bones greater than 5 cm and for flakes greater than 2 cm, using a Brunton compass and pitch dial indicator. Large planview maps (1:10 scale) of each cultural level were drawn before removing the artifacts (Figure 3).

Almost all the matrix at the site was additionally waterscreened. Smaller items were processed through a nested water screen system, of ¼” and ⅛” mesh. The artifacts caught in the ¼” screen were collected in the field, and the non-cultural rocks were discarded. Everything else (i.e. anything less than ¼” and greater than ⅛”) was bagged and sent back to the laboratory at the University of Wyoming Department of Anthropology where very small artifacts were removed from the remaining matrix. Large quantities of microdebitage and bone fragments have been recovered from the small ⅛” mesh screen, as well as seeds and gastropod shells. Sediments from features and bulk samples were also collected.
Excavated Areas

HPA archaeologists excavated approximately 20 square meters, or less than 10% of the site, between 1992 and 1999 in three areas conveniently referred to as the South, Main, and North Block excavations (Figure 4). The amateur archaeologists from the Colorado Archaeological Society (CAS) previously excavated an additional 25 square meters. From our work, it appears that looters along the cutbank margins in the South and North Blocks removed an additional five or so square meters, although it was very difficult to separate possible looted areas from the backfilled CAS amateur units.
Figure 4. Planview of the Donovan site.

The Main Block seems to be the primary locus of activity and also represents the deepest deposits with more than two meters of deposition. Over half of the recovered artifacts were found in this area. Eight and a half 1-x-1-meter units have been professionally excavated here, (approximately 20 m$^3$).
In total, at least nineteen levels have been recorded, including all minor and localized truncations and splitting into sublevels by cultural and natural activities. Eleven of these levels in the lowermost meter of deposits indicate separate Upper Republican occupations, which are the focus of this article. Several hundred years after the Upper Republican groups abandoned the site, it was probably used by Dismal River hunting parties, as evidenced by butchered bone and triangular unnotched projectile points found approximately one meter below the modern ground surface. We know that Protohistoric and Historic Native peoples later visited the canyons, and a possible Protohistoric (Cheyenne or Arapaho?) level exists 50 cm below the surface. So far, no definite signs of human modification have been identified from the bison faunal remains recovered from this last level. However, the bones are fairly numerous and concentrated in one strata that seems likely to represent the margins of cultural activity. Of 10,296 objects recovered from the main block, 57% are butchered bone, 31% are flake debitage, 8% are lithic, bone, and shell tools and ornaments, and 3% are related to features and environmental samples.

Eight square meters were also excavated at the North Block, and an additional five square meters were excavated at the South Block. The data from these two areas supplement information from the Main Block in terms of site structure and prehistoric activity areas. Both the Southern and Northern areas demonstrate a more limited use by prehistoric occupants in terms of number of levels. The southern area is clearly a tapering of the same kind of activities that occurred at the Main Block. Nine levels were recorded, with the densest artifacts occurring during the middle of the Main Block sequence. Of 722 objects recovered from the south block, 62% are bone, 30% are flake debitage, 7% are tools and ornaments, and 1% are related to features and environmental samples. Although changes occurred through time at the site and
every level is somewhat different, the distribution of artifacts from the South Block is very similar to that seen in the Main Block, suggesting an extension of similar activities.

The North Block excavations represent more extensive use of the site north of the Main Block. Although at least seven levels have been identified, three during the middle of the Main Block sequence are particularly rich in artifact abundance. Of 5,455 objects recovered from the North Block, 36% are bone, 57% are flake debitage, 6% are tools and ornaments, and 2% are related to features and environmental samples. The apparent shift between the Main Block and the North Block in terms of ratio of debitage (31% to 57%) and of bone (57% to 36%) may indicate that different kinds of activities occurred in the two areas. The North Block area could have been the location of increased stone tool manufacture, secondary butchering before carcasses were brought to the Main Block to be processed, or refuse disposal.

DEPOSITIONAL HISTORY

Geomorphology and Stratigraphy

The high-resolution stratigraphy at the Donovan site (rendered in schematic fashion in Figure 5 and shown in Figure 6) is the result of repetitive alluvial sedimentation, loess accumulation, slope wash from the hillside on the west margin of the site, and soil formation. The local geomorphology in this small side branch of Lewis Canyon was active enough to accumulate the deposits which formed and covered the site, but not active enough to erode it away during subsequent erosional events. It appears that there was a bit of serendipity (as is often the case with well preserved sites) in which a bedrock exposure on the south end of the site continually yielded small quantities of claystone that helped to keep the arroyo channel diverted toward the east and slow its erosion along the edge of the terrace deposit. Some erosion did occur and is what eventually exposed the cultural levels and led to the site’s discovery. On the other
Figure 5. Donovan schematic profile columns. Some secondary cultural levels are not shown. Eleven Upper Republican cultural levels listed in text include CL 1 through CL 9, not including ephemeral CL 3C-E. Dating sequence based on radiocarbon dates for CL 1, CL CL 3B, CL 5, and CL9 and on archaeomagnetic dates for CL 1 and CL 6.
hand, the hillside along the west side of the site was of the right height and angle to continually contribute sediment onto the surface of the terrace.

Work at the site to date has included an overview of the geological strata by site geoarchaeologist Jim Miller (1992), and numerous episodes of intensive mapping by Reher using excavation surfaces and microstratigraphic profiles to establish what is essentially a three-dimensional reconstruction of depositional events and cultural occupations. A student project concentrated on using portions of those studies to approach an understanding of depositional rates at the site (Adams 1997; Adams, et al. 1997; c.f. Ferring 1986). A comprehensive treatment
of site geology is beyond the scope of this paper and will be reported in a future more specialized report.

Using profiles from the North and Main Block units, Miller (1992) summarized the site sequence with ten main depositional units (I-X, see Figure 5) along with a few additional subdivisions (i.e. IXa-c). The lower one-third of the site was dominated by alluvial deposits associated with the dry arroyo bed that still borders the site terrace, while the middle one-third of the deposit transitions from alluvial deposition to loess accumulations, along with some sheet flow from the hillside. The upper one-third is characterized by slope wash intervals, including generalized sheet flow as well as more active rill or small channel-like deposits, intermixed with loess accumulations. Small step-like slumping and related colluvial processes on the relatively steep slope probably also contributed to the upper deposits that cap the site terrace.

Miller also identified as many as 22 soil horizons superimposed on the strata, ranging from relatively thin but definite black organic bands (such as the zone under the current sod cap) to more faint incipient horizons. He confirmed these designations on the basis of macroscopic and microscopic examination of organic content and sediment structure, and characterized the soils as inceptisols with a basic A-C horizon structure.

Reher applied more detailed mapping procedures to the profile walls in all three site excavation areas. In the Main Block he defined as many as 18 main depositional events, which then could be subdivided into at least 46 microstratigraphic geological structures. Some of these were structurally identical with units identified by Miller. Often, however, an alluvial depositional event across the Main Block could be further subdivided into a sandy channel fill next to a small gravel bar, with adjacent over-the-bank deposits.
Continued work at the site also revealed additional small and localized soil horizons in which for example a sand bar was stable enough to develop vegetative cover for at least a few years, leaving a typical thin blackish-brown A horizon. While not really comparable to the main horizons that were discernable around all of the Main Block profiles, these small additions brought the total number of A horizons at the site to at least 27.

Sedimentation rates are highest in the earliest levels as would be expected in an alluvial channel setting. Most of the Upper Republican occupation accumulated on the over-bank terrace zone next to the channel and/or on top of older channel deposits after the actual active channel had shifted a short distance eastward (on several occasions during and after severe thunderstorms, excavation crews witnessed rather impressive flash flood events, which resulted in changes in channel geometry). As is implied above, the episodic floods and intervening stable years or decades that result in the stacked soil horizons are the reason that the site has such a well preserved, high resolution cultural sequence.

The middle and upper deposits at the site show more accumulation of loess with a much slower rate of deposition as well as slope wash episodes with a probable moderate rate of deposition. Additional work is needed, but the stratigraphic data suggest that the periods between cultural levels might have ranged from as little as four or five years, to as many as fifty or sixty years, across the 250 or 300 years represented in the Upper Republican sequence. While still somewhat ambivalent, basic depositional time estimates enhance information provided by the overlapping radiocarbon and archaeomagnetic dates. The formation of as many as 27 A horizons in the last 1,000 years, many of which correspond with cultural horizons, also makes this site unique and important for understanding Late Holocene geomorphic and climatic sequences.
Absolute Dates

One of the difficulties in defining and discussing this time period on the High Plains is a lack of good chronometric dates. This problem is coupled with the fact that the relatively brief time period involved is not conducive to refined control via radiocarbon dates. So far, seven dates have been obtained from Donovan site deposits, based on three different dating techniques and material classes (Figure 7; Table 2). Three conventional radiocarbon dates were obtained using charcoal from hearth features in the first and middle Upper Republican levels. Two accelerator mass spectrometry (AMS) dates were obtained from bison bone collagen from the first and last Upper Republican levels. Two additional dates come from archaeomagnetic samples from firehearths located in the middle and last levels (Eighmy 1996). All of these samples were taken from materials in the Main Block excavations.

Although the graphed intercepts overlap between the different levels, as shown in Figure 7, a clear trend exists from oldest to youngest levels. The first Upper Republican occupation probably occurred shortly after A.D. 1000. The last Upper Republican occupation probably dates to between A.D. 1240 and 1380, clustering around A.D. 1300. The undated Dismal River level likely dates to between A.D. 1625 and 1750, based on research in Nebraska and Kansas, and on another date from southeast Wyoming (Gunnerson 1960; Logan 1996; Reher 1989a).

This chronology indicates that Upper Republican occupations at the Donovan site are contemporaneous with hamlet occupations in central Nebraska and Kansas. This counters spatial expansion of Central Plains tradition populations proposed by Roper (1995) (prior to having the dates from the Donovan site), who suggested that the western High Plains were occupied up to several hundred years after the establishment of farming communities. At least some non-house, non-agricultural sites in the extreme western part of the study area were thus established as early
as agricultural farmsteads farther to the east. The Donovan dates overlap the timing of occupations at sites along the Solomon River in north-central Kansas (Blakeslee 1999) and the occupation of the Medicine Creek locality in south-central Nebraska (Kivett and Metcalf 1997). It also means that the people who repeatedly returned to Donovan abandoned the site around the same period as other Upper Republican people arguably left the Central Plains (Roper 1995).

Figure 7. Absolute dates from the Donovan site. CL 9 (right) is the oldest Upper Republican occupation. CL 1 (left) is the youngest Upper Republican occupation.

Table 2. Absolute dates from the Donovan site.

<table>
<thead>
<tr>
<th>Donovan Radiocarbon Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Number</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>SR-5463 CAMS-63097</td>
</tr>
<tr>
<td>Beta-76914</td>
</tr>
<tr>
<td>Lab Number</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Beta-76915</td>
</tr>
<tr>
<td>Beta-76916</td>
</tr>
<tr>
<td>SR-5464</td>
</tr>
<tr>
<td>CAMS-63095</td>
</tr>
</tbody>
</table>

**Donovan Archaeomagnetic Dates**

<table>
<thead>
<tr>
<th>Lab Number</th>
<th>Cultural Level</th>
<th>Age (A.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO204-2</td>
<td>CL1</td>
<td>1000-1075, 1165-1400*</td>
</tr>
<tr>
<td>SLO204-1</td>
<td>CL6</td>
<td>1050-1150</td>
</tr>
</tbody>
</table>

Stafford Research Laboratories, Inc., Lafayette, Colorado (SR lab numbers)
Beta Analytic Inc., Miami, Florida (Beta lab numbers)
Colorado State University Archaeometric Laboratory, Fort Collins, Colorado (archaeomagnetic dates)
Stable isotope values measured at the G.G. Hatch Stable Isotope Lab, Ottawa, Canada
1 Calibration results from CALIB 5.0, based on Stuiver, et al. (2005).

**LAB METHODOLOGY**

The process of cataloguing and collecting basic descriptive data for the artifacts after they were collected in the field was a time-intensive process. Cataloguing, sorting, computer data entry, measuring, and weighing occurred both at the Department of Anthropology at the University of Wyoming and (after 1996) at the Department of Anthropology at the University of California-Berkeley, as part of Scheiber’s dissertation work.

Each line of data (representing individual point-plotted artifacts and screen bags containing multiple items) received a unique catalog number. By 1999, we had catalogued over 16,000 items. Material from both ¼” and ⅛” screen bags was separated and catalogued according to material class, usually including flakes, bone, gastropod snails, and hackberries (mostly preserved in the upper levels). The screen bags often contain thousands of microdebitage flakes and tiny fragments of bones, and thus require hours of patient sorting by material class per bag. This component of the research is in-progress.

Additionally, all formal lithic tools, including utilized flakes, and all point-plotted bone have been measured in three dimensions to the nearest 0.01 mm using digital calipers. Estimating
the number of flakes per screen bag was attempted (by using number of flakes per gram weight constant) but ultimately abandoned in favor of counting each flake to obtain more accurate results. Bone fragments from the screen bags were weighed but not counted.

ARTIFACTS

Summary of All Artifacts

Numerous stone tools, small side-notched projectile points, ceramic sherds, bone beads and ornaments, and heavy densities of stone debitage and bone fragments comprise the archaeological assemblage from the Donovan site. The artifacts can be subdivided into several basic categories: butchered bone, lithic debitage, worked bone and shell tools and ornaments, stone tools, pottery, other artifacts such as ground stone, and samples from features and other environmental data (Table 3).

Table 3. Combined artifact counts from the Donovan site.

<table>
<thead>
<tr>
<th>Artifact Class</th>
<th>Main Units</th>
<th>South Units</th>
<th>North Units</th>
<th>All Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>%</td>
<td>Total</td>
<td>%</td>
</tr>
<tr>
<td>Butchered Bone</td>
<td>5886</td>
<td>57.2</td>
<td>447</td>
<td>61.9</td>
</tr>
<tr>
<td>Lithic Debitage</td>
<td>3227</td>
<td>31.4</td>
<td>214</td>
<td>29.6</td>
</tr>
<tr>
<td>Worked Bone and Shell</td>
<td>33</td>
<td>0.3</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Stone Tools</td>
<td>557</td>
<td>5.4</td>
<td>41</td>
<td>5.7</td>
</tr>
<tr>
<td>Pottery</td>
<td>136</td>
<td>1.3</td>
<td>10</td>
<td>1.4</td>
</tr>
<tr>
<td>Other</td>
<td>106</td>
<td>1.0</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Features/Environmental</td>
<td>351</td>
<td>3.4</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10296</td>
<td>100.0</td>
<td>722</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Of the 16,473 artifacts excavated from all three areas, half (50%) are butchered bone fragments, and more than one-third of the material is lithic debitage (40%). The remaining 10% are divided between stone tools, bone tools and ornaments, ceramic sherds, ground stone, hammerstones, and other artifacts (7%) and features and environmental samples such as
gastropods and hackberries (3%). Table 4 provides a more comprehensive list of artifacts present.

**Table 4. Summary of all recovered artifacts from the Donovan site.**

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>Main Total</th>
<th>South Total</th>
<th>North Total</th>
<th>All Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bone Tools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antler</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awl</td>
<td>7</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Bead</td>
<td>12</td>
<td>1</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Worked Bone</td>
<td>14</td>
<td>1</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>33</td>
<td>1</td>
<td>4</td>
<td>38</td>
</tr>
<tr>
<td><strong>Butchered Bone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burned Bone</td>
<td>306</td>
<td>29</td>
<td>163</td>
<td>498</td>
</tr>
<tr>
<td>Bone</td>
<td>5565*</td>
<td>416*</td>
<td>1782*</td>
<td>7763</td>
</tr>
<tr>
<td>Enamel</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5886</td>
<td>447</td>
<td>1947</td>
<td>8280</td>
</tr>
<tr>
<td><strong>Stone Tools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biface</td>
<td>27</td>
<td>3</td>
<td>26</td>
<td>56</td>
</tr>
<tr>
<td>Composite Tool</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Drill</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Endscraper</td>
<td>30</td>
<td>4</td>
<td>20</td>
<td>54</td>
</tr>
<tr>
<td>Graver</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Other Formal Tool</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Projectile Point</td>
<td>166</td>
<td>8</td>
<td>62</td>
<td>236</td>
</tr>
<tr>
<td>Side Scraper</td>
<td>2</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Utilized Flake</td>
<td>324</td>
<td>26</td>
<td>150</td>
<td>500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>557</td>
<td>41</td>
<td>265</td>
<td>863</td>
</tr>
<tr>
<td><strong>Lithic Debris</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debitage</td>
<td>22</td>
<td>1</td>
<td>33</td>
<td>56</td>
</tr>
<tr>
<td>Core</td>
<td>56</td>
<td>7</td>
<td>43</td>
<td>106</td>
</tr>
<tr>
<td>Flake</td>
<td>3149*</td>
<td>206*</td>
<td>3001*</td>
<td>6356</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3227</td>
<td>214</td>
<td>3077</td>
<td>6518</td>
</tr>
<tr>
<td><strong>Pottery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pottery</td>
<td>136</td>
<td>10</td>
<td>23</td>
<td>169</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>136</td>
<td>10</td>
<td>23</td>
<td>169</td>
</tr>
<tr>
<td><strong>Features/Environmental</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charcoal</td>
<td>86</td>
<td>6</td>
<td>58</td>
<td>150</td>
</tr>
<tr>
<td>Fire-Cracked Rock</td>
<td>15</td>
<td>1</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Feature Fill</td>
<td>14</td>
<td>1</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Gastropod**</td>
<td>135*</td>
<td>0*</td>
<td>31*</td>
<td>166</td>
</tr>
<tr>
<td>Hackberry**</td>
<td>101*</td>
<td>0*</td>
<td>10*</td>
<td>111</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>351</td>
<td>8</td>
<td>114</td>
<td>473</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground Stone</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Hammerstone</td>
<td>7</td>
<td></td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Ocher</td>
<td>11</td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Rock</td>
<td>Shaft Abrader</td>
<td>Unknown Artifact</td>
<td>Wood</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>---------------</td>
<td>------------------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>74</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>10</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Miscellaneous</th>
<th>Screen</th>
<th>47</th>
<th>22</th>
<th>11</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>47</td>
<td>22</td>
<td>11</td>
<td>80</td>
</tr>
</tbody>
</table>

** - bulk samples from screens not fully counted to number of cases
* - aggregated bulk samples counted as 1 case
Total includes 80 miscellaneous screen bags, not reflected in total for Table 3

Ceramics

Ceramic sherds, from vessels used for cooking and boiling, are the most diagnostic artifact recovered from Upper Republican sites. Ceramic sherds account for 169 (or 14% of formally-shaped artifacts, n=1202) recovered by the High Plains Archaeology project in all three areas. The amateurs additionally recovered one complete vessel, several partial vessels, and an unknown quantity of ceramic sherds. Ceramic densities are generally low throughout the site, less than one sherd per square meter on average. In one occupation in the Main Block (CL4), sherd densities were 13 per square meter, the highest of the site, due to a 109 sherd cluster likely representing the broken remnants of an entire pot.

Ceramic sherds and vessels recovered from eastern Upper Republican sites and those on the western High Plains are similar with respect to form, construction techniques, and styles, leading Wood (1971:53) to remark, “the material from the Upper Republican components [in northeastern Colorado] can scarcely be distinguished from related material in western Kansas and Nebraska.” He also mentions the similarity of design elements between vessels found in the High Plains sites and those from Medicine Creek in southwestern Nebraska. Further comparisons between ceramics from the High Plains and Central Plains reveals that variations in mean
number of design elements per rim and rim type (collared or flared) are not dependent on region of origin (Midgett and Reher 1996; Reher 1973).

Through neutron activation analysis, Cobry (1999; Cobry and Roper 2002) compared several clay sources and Upper Republican ceramics from both the High Plains and Medicine Creek area of the Central Plains. The vessel forms did not vary significantly from one area to the other. Although initial results suggested similarities between pottery from Medicine Creek (in the core area) and the lower Donovan levels (in the High Plains), further studies revealed less clear association between clays used to make the Donovan ceramics and any particular source materials (Donna Roper, personal communication 2007). What we do know is that ceramics from early, middle, and late occupations at the Donovan site were all made from different unknown clay sources. Additionally, some of the Upper Republican ceramics from farther north in the High Plains of southeast Wyoming (such as Seven Mile Point) demonstrate similarities to those at Donovan and Medicine Creek, but sites farthest north do not (i.e. the Gurney Peak Butte and Gurney Peak Bench sites) (Reher 1973).

Lithics

Formal lithic tools include projectile points, end scrapers, composite tools, drills, gravers, and side scrapers in addition to bifaces and point preforms (Table 5). The presence of thousands of pieces of lithic debitage at the site is probably due to a combination of late stage tool manufacturing, intensive sharpening, and the relative closeness of the nearby Flattop quarry. Researchers of the Donovan site lithics have focused on analyzing the large numbers of utilized blades, studying the side-notched triangular projectile points, counting and weighing microdebitage, and identifying lithic sources.
Table 5 shows how the relative ratio of specific lithic tools varies from level to level in a selection of four levels from the Main Block excavations. An absence of particular tool classes could likely be due to sampling bias. The most common lithic tools are utilized flakes (58%), projectile points (27%), endscrapers (6%), and bifaces (7%).

Table 5. Summary of lithic tool types from the Donovan site.

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Site Total</th>
<th>CL 9</th>
<th>CL 6</th>
<th>CL 4</th>
<th>CL 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biface</td>
<td>56 (6.5%)</td>
<td>9 (4.8%)</td>
<td>0 (0.0%)</td>
<td>6 (7.1%)</td>
<td>5 (10.9%)</td>
</tr>
<tr>
<td>Composite Tool</td>
<td>5 (0.6%)</td>
<td>1 (0.5%)</td>
<td>0 (0.0%)</td>
<td>1 (1.2%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Drill</td>
<td>2 (0.2%)</td>
<td>1 (0.5%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>1 (2.2%)</td>
</tr>
<tr>
<td>Endscraper</td>
<td>54 (6.3%)</td>
<td>15 (8.1%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>1 (2.2%)</td>
</tr>
<tr>
<td>Graver</td>
<td>2 (0.2%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>1 (2.2%)</td>
</tr>
<tr>
<td>Other Formal Tool</td>
<td>1 (0.1%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Projectile Point</td>
<td>236 (27.4%)</td>
<td>54 (29.0%)</td>
<td>16 (59.3%)</td>
<td>26 (30.6%)</td>
<td>12 (26.1%)</td>
</tr>
<tr>
<td>Side Scraper</td>
<td>7 (0.8%)</td>
<td>1 (0.5%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Utilized Flake</td>
<td>500 (57.9%)</td>
<td>105 (56.4%)</td>
<td>11 (40.7%)</td>
<td>52 (61.2%)</td>
<td>26 (56.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>863 (100.0%)</td>
<td>186 (100.0%)</td>
<td>27 (100.0%)</td>
<td>85 (100.0%)</td>
<td>46 (100.0%)</td>
</tr>
</tbody>
</table>

Site total includes all areas, all levels; totals from Cultural Levels (CL’s) represent the Main Block only. Cultural Level 9 is the oldest Upper Republican occupation, and Cultural Level 1 is the youngest Upper Republican occupation.

The quantity of common lithic tools also varies among levels (Figure 8). For example, utilized flake tools, which primarily represent skinning, cutting, and butchery of large animals, are present in all levels. Certain levels such as CL1, 3B, 4, 8, and 9 revealed an even higher number of these tools. Likewise, projectile points are found in almost every occupation at the site. These may represent spent points that were removed from animals during butchering, points broken in manufacture, or other discard. The occupations with more utilized flakes tend to have more projectile points as well. Endscrapers are tools used primarily for working and scraping hides. These are present in larger numbers in the lower levels at the site, and possibly suggest more intensive hide working in the earlier occupations (Scheiber 2005b). Displayed as a ratio of total common tools, utilized flakes usually represent 60% of these three artifact types, whereas
endscrapers and projectile points account for 20% to 40% (Figure 9). Table 6 provides quantitative data from these three common lithic tool types.

![Figure 8. Number of recovered endscrapers, projectile points, and utilized flake tools through time at the Donovan site.](image-url)
Figure 9. Ratio of endscrapers, projectile points, and utilized flake tools through time at the Donovan site.

The majority of the lithics at the Donovan site (98% average) are composed of Flattop chalcedony, which primarily comes from a prehistoric butte-top quarry (5LO34) located 11 miles (18 km) northwest of the site. Part of the White River Group Silicates from the Oligocene-aged Chadron formation (Miller 1991), it is major source of lavender and white chalcedony-chert. Although recognized in Paleoindian through Protohistoric assemblages throughout the Plains, analysis of the quarry itself still remains preliminary (Greiser 1983; Hoard et al. 1993; Hoard et al. 1992). Most archaeologists refer to the source as Flattop chert or Flattop chalcedony, although archaeologists in Nebraska sometimes call it Kimball Chalcedony or Purple and White Chalcedony (Ahler 1977).
Flattop chalcedony in particular is often mentioned as present in small amounts in eastern Upper Republican assemblages (Wedel 1986:111). Although Flattop chalcedony is present in minor quantities at several sites in the Medicine Creek area, a few sites in particular have higher percentages of this non-local stone (Roper 2002). Meanwhile, Flattop sources comprise very little of the lithic assemblage from the Waconda Lake area (Solomon River) (Blakeslee 1999), which is located only 50 miles (80 km) farther from Flattop Butte than Medicine Creek.

A small but definite amount of the Donovan lithic assemblage is composed of Smoky Hill jasper. Also known as Niobrara jasper, Graham jasper, Republican River jasper, and Niobrarite, Smoky Hill is a silicified chalk of the Niobrara group of the Cretaceous which can be found along numerous creek tributaries in northwestern Kansas and southcentral Nebraska (Holen 1991; Stein 2006; Wedel 1986). Most common colors are tan, brown, and yellow although white, dark green, and black are also found. Eastern Upper Republican lithic assemblages are predominantly made of the brown to yellow forms of this material (Wedel 1986). The source has been tentatively identified in limited but consistent quantities from the High Plains sites and has been used as a possible diagnostic of Upper Republican sites in the area. The percentage of non-local material at Donovan such as Smoky Hill jasper averages about 2% of the lithic assemblage (Bartholomew 1995). Interestingly, the last Upper Republican level (CL1) at the site reveals a much higher percentage of non-Flattop materials (6%), perhaps reflecting a continued relationship with people in the core eastern area.

Fauna

Unmodified faunal remains constitute the largest material class left behind by the Donovan occupants. An analysis of the faunal assemblage from the site is on-going, and only part of the fauna has been fully analyzed (Scheiber 2001, 2005b). Bone composes over half
(n=8,260) of the 16,000 artifacts that were mapped in-situ. This total does not include a count of bones in screen bags, which often contain hundreds if not thousands of fragments. Most of the material in these bags was weighed but not individually counted.

The majority of the bones from the site represent unusually well-preserved adult bison. Some large herbivore specimens could be elk, although none have been positively identified. The minimum number of individuals (MNI) by occupational level for bison is between one and six. This low number of animals suggests small-scale hunting and separate kill events by hunting parties, as opposed to large communal Late Prehistoric kill-sites on the Northwestern Plains such as Glenrock (Frison 1970), Wardell (Frison 1973), Big Goose Creek (Frison et al. 1978), Piney Creek (Frison 1967), and Vore (Reher and Frison 1980). In addition, the skeletal element profiles do not resemble a mass kill, but instead favor an interpretation that the bones were transported to this processing area (Scheiber 2001, 2005b).

The presence of small bone fragments, fragmented long bones, butchering tools, and features all indicate intensive bone processing at the site. The average bone fragment size is 5.3 cm (Scheiber 2005a). The size of the fragments compares favorably with intensive processing sites such as the Rush site in west-central Texas (Quigg 1997), the Sanders site in the Texas Panhandle (Quigg 1998), or the White Rock site in north-central Kansas (Logan 1998), where the majority of the bones are less than 3 cm in maximum dimension. The average maximum length of 5 cm for all measured bison bone elements from the Donovan site may be smaller than those measured from village sites from the Central Plains, which range between 7 and 9 cm (Widga 1998), indicating that bone was not as intensely pulverized for grease and/or marrow at eastern farming hamlets (see also Church and Lyman 2003). On the other hand, the density of bison bone found at Donovan clearly surpasses that found in the Central Plains (Bozell 1995;
Scheiber and McCabe 2003). The extremely high density of bison bone at Donovan in comparison to the Central Plains sites could be a result of increased bison exploitation on the High Plains, overemphasis on investigating house sites in the Central Plains which do not leave evidence of primary butchery and processing, seasonal variation, or taphonomic factors such as differences in sedimentation rates and preservation issues.

Although bison are the primary prey species, several others were procured and carried to the Donovan site. Twenty-nine taxa of other faunal remains have been identified (see Table 1). Non-bison remains represent approximately 10% of the total assemblage. Some of the non-bison fauna were intentionally butchered for food, tools, or ornaments, as evidenced by burning, cutmarks, and impact marks. Examples of these include deer, pronghorn, foxes, dogs, rabbits, birds, raccoons, and skunks. Other animals may have been culturally introduced or more likely were commensal animals that were part of the natural faunal communities in the site area. Some of these animals include mice, birds, snakes, and squirrels. The presence of these other, perhaps non-culturally introduced taxa, is significant because it provides a means of understanding the environmental landscape of High Plains Upper Republican sites.

Previous research on High Plains Upper Republican sites seldom focused on faunal remains. Early excavators often disposed of the bones after initial identification and failed to report the frequency of the elements and species of the bones that they did examine. Comparing presence and absence of species in site reports, Butler (1992; 1997) determined that the High Plains Upper Republican sites show a high degree of bison utilization, but also a more diverse economy of local resources including deer, rabbit, and pronghorn. Faunal analyses of the sites in the eastern Upper Republican area demonstrate that a wide diversity of species were collected and brought back to the village sites (Bozell 1991, 1995; Brown 1982; Falk 1969; Johnson 1972;
These Upper Republican groups have been characterized as broad-spectrum hunter-gatherers who also practiced horticulture, or as subsistence generalists who farmed and hunted in different areas depending on resource zones (Blakeslee 1999; Bozell 1991, 1995; Roper 1990). Blakeslee (1999) notes that the range of animal species found at Central Plains tradition sites is so broad that he instead constructs a list of species not found. Numerous site-based analyses attest to the wide diversity of animals at these sites (Bozell 1991; Brown 1982; Falk 1969; Koch 1995, 2004; Koch et al. 1999). While the diversity of animals at the Donovan site is not as high as in other sites (suggesting a more specialized rather than broad-spectrum diet), the range of species recovered is similar to those recovered from Upper Republican sites further east. Although the local availability of bison on the Central Plains is not exactly known, top-ranked (i.e. high return) species such as bison were certainly available on the High Plains to the west and undoubtedly accounts for some of the differences between areas.

**Worked Bone** Worked bone is defined as bone that has been shaped, grooved, or otherwise modified beyond animal disarticulation, butchering, or food processing for potential use as a tool or ornamentation. Thirty-eight pieces have been recovered, the majority (87%) from the Main Block. People were using bison scapulae as tools on the High Plains, as evidenced by material found in excavations at the Donovan site (i.e. polished proximal scapulae with broken off spines), but they were not made into formal hoes. Instead, they were shaped into multi-purpose “scoops.” Other worked bone found at the site includes awls, beads and bead by-products or hold-ons, polished ribs, a bracelet or bow guard, and an antler tine possibly used for flintknapping. The apparent lack of certain bison skeletal elements in the faunal assemblage such as scapula and metapodials that may have been later worked into useable tools and ornaments.
may indicate that these objects were transported from the site, although the effects of field butchering before transport to the Donovan site must still be considered (Scheiber 2001).

RELATIONSHIPS EAST-WEST

After taxonomic implications of which phase to assign the western sites, the central issue surrounding High Plains Upper Republican sites is understanding why these people were on the High Plains. Beginning in the 1930s, archaeologists recognized Central Plains tradition pottery in the western area and presumed that these sites represented hunting parties from the east, similar to the activities of several historic tribes (Bell and Cape 1936). Many early publications list these sites as evidence of long-distance hunting trips, “bases to which the game was brought, and where the women of the group dressed the hides, dried the meat, and possibly made it into pemmican” (Lehmer 1954:156). Because summer occupation appeared to be lacking at some house sites, Wood (1969) suggested that the Upper Republican people abandoned their hamlets for the High Plains during the summer. Others have stated that local resources were sufficient on the Central Plains for year-round residency and that the High Plains site assemblages were more extensive and incorporated too many local High Plains resources to be the result of hunting parties alone (Reher 1973, 1986a, 1986b, 1987, 1988, 1989b, 1990, 1996; Wedel 1970; Wood 1971, 1990). Therefore, they proposed that a local population, composed of either former migrants or unrelated neighbors, occupied the sites. The debate also has some more subtle implications. If High Plains people were not “real” Central Plains people, then instead they are presented as itinerant hunter-gatherers waiting for handouts from more powerful neighbors, rather than thriving communities.

If hunting parties created the sites on the High Plains, the recovered material should conform to the definition of a hunting camp. Significantly, Central Plains tradition hunting
camps have not been identified archaeologically, although we do have evidence of hunting camps from Protohistoric Pawnee (Lower Loup phase) archaeological sites in Kansas and Nebraska, as well as written descriptions of Pawnee hunting from the 1830s (Roper 1991, 1992, 1994). Based on these Protohistoric Pawnee sites, “hunting camps were transitory and yield utilitarian stone tools and ceramics, tipi floors, hearths, and copious amounts of buffalo bone” (Bozell and Ludwickson 1998b:476). Indeed, if this definition is used, then many Late Prehistoric hunter-gatherer sites on the western Plains qualify as hunting camps.

More specifically, Roper (1989; 1992) defines five hunting site types based on ethnographic data of the Pawnee. Most relevant for the High Plains are the hunting base camps and hunting base camps near kills. These sites were occupied for several days and were places where people intensively processed animal meat and hides. The kinds of activities that were represented at these sites include sleeping, eating, hide processing, tool kit maintenance, ceremonies, butchering, marrow extraction, hide scraping, and bone tool manufacturing. Drying the meat and hides reduced the weight of the animal products to be transported. Features from hearths, meat-drying racks, hide processing frames, and dwellings may all be present (Roper 1989:68). Objects relating to general utility, domestic equipment, weapons, ceremonial equipment, and abundant fragmentary faunal remains would also be expected. This list of activities and material correlates is highly informative when considering the Upper Republican occupation, although even this more detailed list describes many of the sites on the High Plains.

Comparing artifact assemblages and the distribution of High Plains Upper Republican sites, Central Plains Upper Republican house sites, and Protohistoric Pawnee (Lower Loup) hunting sites, Roper (1990) determined that High Plains sites demonstrated more limited activities than do hamlet/village sites, but were more diverse than Protohistoric hunting camps.
She concluded that either Upper Republican lifeways did not conform to Pawnee hunting models, or High Plains Upper Republican sites are not hunting camps. Instead, she contends that High Plains sites represented local non-horticultural populations of Upper Republican. Roper did not, however, conclude that people at the High Plains sites were unrelated to those in the Central Plains, or even that the High Plains ceramics were locally produced (e.g. Wandsnider 1999:15).

To compare the Donovan site assemblage to Central Plains hamlet sites and to Lower Loup phase hunting camps, the number of artifact classes and number of artifacts were tallied (see Roper 1990). The number of artifact classes may indicate the number and kind of activities that occurred at the site. A weak correlation exists between recovering more artifacts and observing more classes of artifacts. However, the number of functional classes of artifacts is consistently higher at hamlet sites and lower at Lower Loup hunting camps, with the High Plains Upper Republican sites, including the Donovan assemblage in the middle (Figure 10). What this means is that people were doing a wider variety of activities that required multiple tools and materials at the hamlet sites. Interestingly, after 25 years of further research, the High Plains sites continue to fall in the middle between hunting camps and hamlets. Non-farming people probably occupied these sites on a longer basis. Further information relating to seasonality of occupations, length of occupation, and the nature of multiple occupations will likely refine this model. For instance, the number of artifact classes for the aggregate Donovan site assemblage compares favorably to a hamlet site. It is only in examining each occupation separately that the diversity of activities is shown to be more limited, although sampling certainly contributes to artifact diversity as well. On the other hand, current research into extramural features and middens at hamlet sites has demonstrated a wider similarity to the western sites (Roper 2002) than previously imagined. The data from the Marvin Colson site (25FT158) (Roper 1996) are
primarily from midden deposits, and are not as diverse as any of the house sites. Perhaps the issue here is not the diversity of activities, but the biased nature of emphasis on house deposits in eastern excavations and the ephemeral nature of domestic architecture in western sites. Aside from functional differences, these sites could very well be occupied by the same people during different times of the year or by related people who left farming villages to take up permanent occupation in the High Plains.

Figure 10. Artifact diversity clusters from Central Plains Upper Republican sites, High Plains Upper Republican sites, and Lower Loup hunting camps. Non-Donovan data are from Roper (1990, 1996). Numbers refer to specific Donovan cultural levels (CL’s); “all” refers to all combined artifacts and classes from the Donovan site.
The Upper Republican portion of the Donovan site was occupied during the end of Neo-Atlantic (A.D. 700-1100) and the Pacific (A.D. 1100-1550) climatic episodes. In general, the Neo-Atlantic is associated with warm and moist conditions, while drier conditions characterize the Pacific (Wendland and Bryson 1974). Some have attributed the shrinking of Central Plains tradition sites to effects of the beginning of the drier Pacific Climatic episode (Bozell 1995). The effects of these climatic fluctuations on the Donovan site are unclear. One has to be cautious because of the difficulty in separating incidental local channel geometry from actual climatic effects. For example, active channel deposits dominate the lower part of the site deposit, but does that mean moist climatic episodes with more frequent flood events or a dry period with an unstable, more erodible landscape or just localized preservation of channel deposits that have always occurred in the canyon and that are in fact still active and forming even today?

However, it can be argued that the depositional rates and soil forming episodes might in fact exhibit different trends than seen in the generalized patterns discussed in the literature. More alluvial deposition and stable intervals with soil formation could indicate that the Donovan site area was more mesic compared to drier conditions farther to the east, although Blakeslee (1999) has emphasized the high degree of inter-site climatic variability on the Central Plains as well. Favorable climatic conditions at the Donovan site and other portions of the High Plains during drier periods to the east may have attracted garden farmers from the eastern hamlets. Connections between climate, grasslands, sediments, subsistence, and settlement patterns across the region need further study.

CONCLUSIONS

Because of its obvious ties to Central Plains tradition/Upper Republican archaeological sites in the Central Plains to the east, it is tempting to view the Donovan site in terms of what it is
not, instead of what it is. It is true that it is not a farming hamlet with associated lodge architecture and wide range of material culture. What Donovan instead reveals are connections to an otherwise poorly understood phenomena of the variability of Upper Republican lifeways while also providing an unprecedented stratigraphic sequence that traces change through time over close to 300 years. Data from this site can further address issues of spatial distributions and site structure, hearth-centered activity, lithic and ceramic technology, faunal butchery and processing, animal transport decisions, and geoarchaeology.

Although multiple activities undoubtedly occurred at the site, people appear to be focused primarily on butchering and processing bison for meat, marrow, and bone grease. Over and over, Donovan inhabitants brought back part of animals from nearby kill sites, subdivided portions, stripped and dried the meat, prepared the hides, and broke the bones into smaller pieces with the help of hammerstones and anvils. They extracted the marrow, smashing them even more so the fragments could be placed in ceramic vessels that were set in fires to boil. When the pot was full and the bone grease was skimmed from the top, the contents were dumped out and the process was repeated. The technique or process of marrow and bone grease extraction was well designed and patterned (Scheiber 2001). The materials that the people from all occupations used to successfully complete these tasks, the stone projectile points used to hunt animals, and the ceramic vessels used to process the carcasses into storable food remained the same over the course of several hundred years. The people worked within and around distinctive processing areas, even using the same location for placement of their hearths.

In comparison to previous efforts to quantify High Plains Upper Republican sites, we do not strictly advocate a hunting party hypothesis. We instead suggest that Upper Republican people moved onto the High Plains at the same time as villagers moved into their hamlets or
soon after on the drainages of the Republican River. The Donovan site was occupied by hunting parties, but probably by people who intended to transport animal products to relatively near-by base camps and not to Medicine Creek. What at first may have been hunting or scouting parties on seasonal rounds may have become actual migration and settlement in the west, with continued social ties with the east. This pattern has been suggested for the movement of villagers into southwestern Manitoba after A.D. 1200 (Hamilton and Nicholson 1999) where over the course of several hundred years some became resident hunter-gatherers.

A significant question in Plains archaeology has been where the bison represented at many Plains Villager sites were procured, whether locally, through long-distance hunting parties, or by trade (Bozell 1995). The high frequency of bison scapula hoes in Central Plains sites could be evidence for non-local procurement strategies, since the number of animals represented by scapula tools is much higher than other unmodified bison bone at various village sites.

The bison must have been hunted and processed somewhere away from the villages, but these other sites have generally not been found. Archaeologists have speculated for more than 70 years about the reasons for hunting bison on the High Plains, questioning why hunting parties would travel far out onto the Plains when bison were also presumably available in much of the substantial amount of intervening topography (Reher 1973; Wedel 1970). The lack of hunting campsites and even secondary processing sites closer to the farming hamlets, and solid evidence for these kinds of sites on the High Plains, suggest that there were at least some compelling reasons for traveling farther away to hunt bison. Perhaps the bison herds were larger or more predictable and the meat was of better quality on the High Plains; perhaps ecological conditions limited the number of bison nearer to the Central Plains village sites; perhaps hunting bison on the High Plains was a buffering strategy during the early stages of experimentation with
horticulture, such that some members of the group would stay in remote camps collecting a somewhat predictable resource; and alternatively, perhaps 150 miles (240 km) is a reasonable distance to travel, especially given that the same people may have traveled to Pueblo sites in the Southwest (or met with traders halfway) and certainly interacted with other eastern villages.

The material culture of the High Plains hunting camps and secondary processing sites is the same, if less diverse, than that of the Central Plains tradition village communities, and lithic and clay sources demonstrate interaction. Contact between the occupants of the High Plains sites and those of the Central Plains certainly occurred and there is no evidence to argue that residents in both kinds of sites were not 1) the same people at different times of the year, and 2) of similar ethnic affiliation. The leap between arguing that the High Plains sites were occupied by “Upper Republican-like” peoples and suggesting that the occupants of High Plains sites were Upper Republican people is a small one, and one that we are willing to make.
ACKNOWLEDGEMENTS

The authors especially would like to thank Mike Toft and Mike Dollard, of Sterling, Colorado, who recognized the importance of the Donovan site and encouraged the Wyoming archaeologists to come take a look. Permission to excavate the site was granted first by Tim Donovan and the Donovan family and more recently by Alan Nelson. Bob McKenzie kindly offered us the opportunity to camp at his ranch near Peetz, Colorado. Dozens of students, volunteers, and friends helped to excavate the site. The University of Wyoming Archaeological Field School and the High Plains Archaeology Project sponsored most of the excavations between 1992 and 1999. Students from the University of California-Santa Cruz and University of California-Berkeley additionally assisted with excavations in 1999. The laboratory analysis has been successful because of the assistance of countless students and volunteers at the University of Wyoming, UC-Berkeley, UC-Santa Cruz, and Indiana University. Funding was provided by the Stahl Endowment Fund of the Archaeological Research Facility, the Robert Lowie and Ronald Olson Funds of the Department of Anthropology, and the Vice Chancellor for Research, all of the University of California-Berkeley. Additional support was provided by the George C. Frison Institute for Archaeology at the University of Wyoming. Mike Toft provided funding as well as insight about the distribution and types of other archaeological sites in the area. Additional personal communication was offered by Dan Bach of High Plains Macrobotanical Services. The authors acknowledge the editorial assistance of Diane Gifford-Gonzalez, Margaret Conkey, Kent Lightfoot, Stacie King, Oskar Burger, and Judson Finley. We also recognize helpful comments made over the years by Donna Roper and Rob Bozell. Finally, we thank Brad Logan, Amy Koch, and Donna Roper for their reviews of this article.
REFERENCES CITED

Adams, Tony
1997 A Chronological Model of the Donovan Site Based on Depositional Rates. Unpublished manuscript on file, Department of Anthropology, University of Wyoming, Laramie.

Adams, Tony, Charles A. Reher, and James C. Miller

Afton, Jean, David Fridtjof Halaas, Andrew E. Masich, and Richard N. Ellis

Ahler, Stanley A.

Amen, A. E., D. L. Anderson, T. J. Hughes, and T. J. Weber
1977 Soil Survey of Logan County, Colorado. US Department of Agriculture, Soil Conservation Service, in cooperation with Colorado Agricultural Experiment Station.

Bach, Daniel R.

Bartholomew, Alan

Bell, Earl H., and Robert E. Cape
1936 The Rock Shelters of Western Nebraska. In Chapters in Nebraska Archaeology, edited by Earl H. Bell, pp. 357-399. vol. 1. The University of Nebraska, Lincoln.

Blakeslee, Donald J.

Bowman, Peter W.

Bozell, J. R., and J. Ludwickson


Bozell, John R.


Brown, Marie E.

Butler, William B.


Carlson, G. F., J. R. Bozell, T. L. Steinacher, M. B. Lovvorn, and G. W. Gill

Cassells, E. Steven

Champe, John L.
1946  Ash Hollow Cave: A Study of Stratigraphic Sequence in the Central Great Plains. University of Nebraska Studies No. 1.

Church, Robert R., and R. Lee Lyman
Clark, Bonnie  

Cobry, Anne M.  

Cobry, Anne M., and Donna C. Roper  

Conklin, Emma Burke  

Eighmy, Jeffrey  
1996  Archaeomagnetic Dates from the Donovan site (5LO204). Notes on file, Department of Anthropology, University of Wyoming, Laramie

Eighmy, Jeffrey L.  

Ellwood, Priscilla B.  


Erickson, Kenneth A., and Albert W. Smith  

Falk, Carl F.  

Fenneman, N. M.  
Ferring, C. Reid

Fitzgerald, James P., Carron A. Meaney, and David M. Armstrong

Frison, George C.

Fulgham, Thomas, and Dennis Stanford

Gilmore, Kevin P.

Gray, Mary Taylor

Greiser, Sally T.

Gunnerson, James H.


Hamilton, Scott and B. A. Nicholson

Hammerson, Geoffrey A.

Hoard, R.J., J.R. Bozell, S.R. Holen, M.D. Glascock, H. Neff, and J.M. Elam
Hoard, R.J., S. R. Holen, M.D. Glascock, H. Neff, and J.M. Elam

Holen, Steven R.

Irwin, C., and H. Irwin

Johnson, Paul C.
1972 *Mammalian Remains Associated with Nebraska Phase Earth Lodges in Mills County, Iowa*. Unpublished Master's Thesis, Department of Anthropology, University of Iowa.

Koch, Amy


Koch, Amy, Trisha Nelson, and John R. Bozell

Lehmer, D.J.

Logan, Brad


Ludwickson, J. and J. R. Bozell
Mehls, Steven F.

Metcalf, Michael D.

Midgett, Aaron, and Charles A. Reher

Miller, James C.

1992  *Geological Strata at the Donovan Site, 5LO204*. Notes on file, Department of Anthropology, University of Wyoming, Laramie.

Morris, Elizabeth A.

Mutel, Cornelia F., and John C. Emerick

Page, Michael K.

Quigg, J. Michael

Reher, Charles A.


Reher, Charles A., Carola Liebe-Harkort, and Ylva Telldahl

Reher, Charles A., and Laura L. Scheiber

Reher, Charles A., Laura L. Scheiber, Deborah J. Wyatt, James Miller, and Kathleen O. Maxfield
Reher, Charles A., Rick Weathermon, and Larry Finnell  

Roper, Donna C.  


Scheiber, Laura L.  


Scheiber, Laura L., and Amy C. McCabe

Scheiber, Laura L., and Charles A. Reher

Scott, G. R.


Stanford, Dennis J.

Steege, L. D.

Stein, C. Marvin

Steinacher, Terry L., and Gayle F. Carlson

Strong, William Duncan

Stuiver, Minze, Paula J. Reimer, and Ron W. Reimer
Tate, Bill

Todd, Lawrence C., D. C. Jones, Robert S. Walker, Paul Burnett, and Jeffrey Eighmy

Turnmire, Karen

US Department of Energy Environmental Assessment [USDOE/EA]
2005  Appendix B: Wildlife Known to Occur or Likely to Occur in Logan County, Colorado. In *Environmental Assessment Spring Canyon Wind Project, Logan County, Colorado, DOE/EA-1521*. Prepared by the US Department of Energy Western Area Power Administration, Rocky Mountain Region, Loveland, Colorado.

United States Environmental Data Service [USED]

Wandsnider, LuAnn

Watson, Danial R.

Weaver, J. E., and F. W. Albertson

Weber, William A., and Ronald C. Wittmann

Wedel, Waldo R.


1986  *Central Plains Prehistory: Holocene Environments and Culture Change in the Republican River Basin*. University of Nebraska Press, Lincoln.
Weingardt, Richard

Wells, Dale

Wendland, Wayne M., and Reid A. Bryson

Werner, Fred H.

West, Elliott

Widga, Christopher

Withers, A. M.

Wood, J.J.

Wood, W. Raymond

