THE SPRING CANYON SITE: PREHISTORIC OCCUPATION OF A HOGBACK WATER GAP IN THE FOOTHILLS OF LARIMER COUNTY, COLORADO

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ABSTRACT

The Spring Canyon site (5LR205) is a multicomponent prehistoric campsite located in a foothills valley within Fort Collins, Colorado. It is one of the largest, most diverse sites in the northern Colorado foothills, possessing over 1,700 artifacts spanning Folsom to Late Prehistoric times. This study is a synthesis of existing research at the site that combines several informal and formal investigations starting in the late 1930s. These investigations document the presence of a diverse array of chipped and ground stone tools, diagnostic projectile points, obsidian from the northern Plains and Southwest, ceramics, and buried artifacts and features. It is concluded that the Spring Canyon site served as an important residential base camp for much of prehistory, and that further excavation would likely reveal buried archaeological deposits. The case is made that the Spring Canyon site, though heavily impacted by historic practices, remains a valuable asset for its archaeological merit and its potential focus for public outreach.

INTRODUCTION

The Spring Canyon site (5LR205) is a multicomponent Native American campsite located in Larimer County, Colorado, along the physiographic and ecological boundary separating the foothills of the Front Range and the shortgrass steppe of the Colorado Piedmont. It is situated adjacent to a prominent "water gap" in the hogback foothills, one of many such features along the foothills west of Fort Collins (Figure 1). In the northern Colorado foothills, water gaps are places where north/south-trending hogback ridges are breached

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by east-flowing drainages, thus creating a "gap" in the ridge system. Water gaps were a focal point of prehistoric life due to their advantageous locations in the sheltered valleys of the Front Range foothills adjacent to reliable water. Furthermore, chipped and ground stone raw material was available within a day's travel of most water gaps in secondary cobble deposits and in bedrock sources in the foothills. As such, an abundant and diverse array of resources would have been available to those living near water gaps.

The Spring Canyon site has been known to archaeologists since at least the late 1930s from a series of surface collections made by both amateur and professional archaeologists over the last 75 years as well as limited testing for subsurface archaeological remains. Its assemblage is a temporally-mixed deposit of artifacts that were largely collected from a plowed field in one portion of the site. The assemblage has yielded a diverse array of projectile point styles spanning nearly the entire prehistoric sequence of the region, as well as additional chipped stone tools, obsidian from both Southwestern and northern Plains sources, and a small amount of Native American pottery. It also contains a large ground stone assemblage, including manos, metates, and a grooved abrader. Subsurface investigations have, as well, noted the presence of buried archaeological deposits.

The authors believe it is important to disseminate information regarding the Spring Canyon site due to the size and diversity of its assemblage. As one of the larger reoccupied prehistoric campsites in northern Colorado, the Spring Canyon site is important to understanding regional settlement systems. Toward this end, this article presents a synthesis of archaeological data collected from close to a century's worth of investigations into the site. The history of the area

FIGURE 1. Photograph of Spring Canyon site setting from just north of site, facing southwest.

surrounding the site is discussed first, followed by the history of investigations at the site itself and an overview of archaeology in the Larimer County foothills. An artifact analysis is then presented, including a summary of chipped and ground stone artifacts, obsidian sourcing, ceramics, and a description of the site's diagnostic projectile points. Finally, a summary of subsurface investigations is presented, as well as a concluding discussion of the significance of the Spring Canyon site.

SITE BACKGROUND

The Spring Canyon site area was used early in the Historic era by Euroamerican settlers, following many thousands of years of prehistoric use. The historic Cherokee and Overland trails passed through the immediate vicinity of the Spring Canyon site as early as 1850, with use of these trails continuing through the late 1860s (Dunning 1969; Erb et al. 1989; Marmor 1995:32–65; Whiteley 1999). With increasing permanent settlement to the Big Thompson and Cache la Poudre rivers in the late 1860s, the Northern Arapaho were removed from the Poudre Valley and sent to the Wind River Indian Reservation in Wyoming. Early settlers farmed the local area and worked at the stone quarries in the nearby town of Stout, a short distance west of the canyon. Since then, the Spring Canyon site has been the location of numerous other types of disturbances, including agricultural development, sandstone quarrying (see Figure 2), reservoir construction, and recreation.

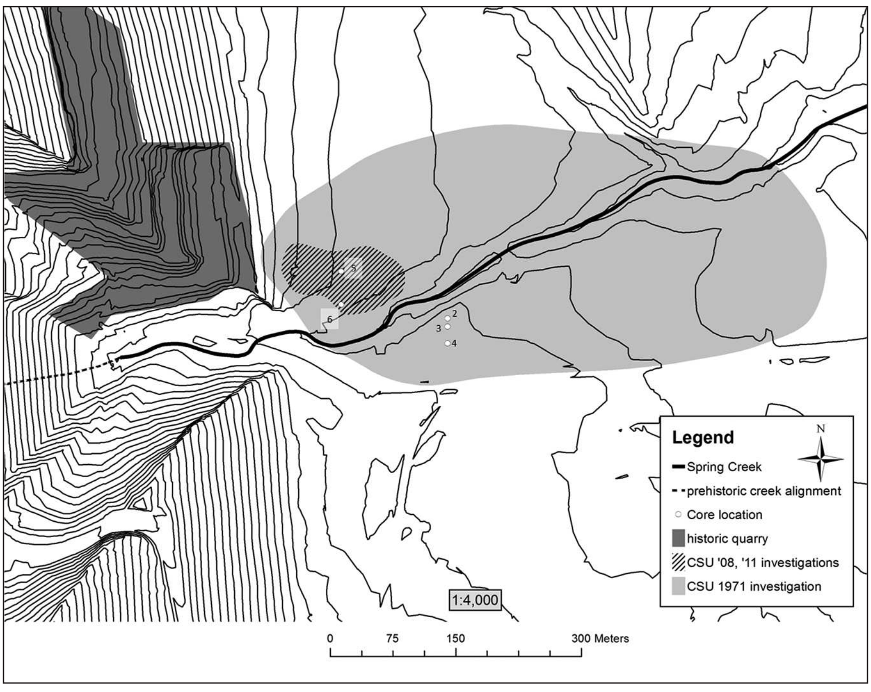

FIGURE 2. Map of Spring Canyon site depicting extent of prior investigations and locations of bucket auger cores.

Edison Lohr reported the Spring Canyon site to Joe Ben Wheat at the University of Colorado (CU) Museum (now the Museum of Natural History) in Boulder in the early 1950s (Wheat 1953), but Lohr had already recorded and collected the site at least three times between May 1938 and October 1939 (Lohr 1947). Wheat recorded the site as 5LR51 (Lohr's site #24), calling it a "typical water gap" campsite. Lohr (1947:77–80) mentions that at least part of the site was emerging in a plowed field, yielding chipped and ground stone artifacts, as well as pottery. Lohr excavated a small trench in the western portion of the site measuring 0.6 m wide by 2.3 m long, and to a depth of 0.4 m (2 ft x 7.5 ft x 16 in). He determined (in this portion of the site) that the deposits were shallowly buried 0–23 cm deep (0-9 in), with numerous fire-blackened stones, likely the remains of disturbed hearths.

Elizabeth Ann Morris began making inquiries into the local archaeology of Larimer County after being hired at Colorado State University (CSU) in 1970 (Coberly 1996). In the spring of 1971, Morris supervised surface collection and minimal subsurface testing at the Spring Canyon site after hearing of it from a CSU student (Young 1971). The extent of the site recorded by Morris's crew is depicted in Figure 2. Not knowing that Wheat had already recorded the site as 5LR51, Morris assigned it 5LR205 (Young 1971). The 5LR205 site number is used in this report, given that most work has been conducted under that number. Therefore, 5LR51 refers only to that site collection made by Lohr, which is housed at the CU Museum of Natural History.

Jason LaBelle of CSU renewed research at the Spring Canyon site in 2008. LaBelle first visited the site in 2007, to assess the potential for the site for additional research (LaBelle 2008). Several class visits and field exercises followed in 2008 (LaBelle 2008) and 2011. These efforts established a temporary mapping datum and focused on piece-plotting prehistoric flakes and tools, and mapping historic features. This was followed by a small auger test project (Pelton et al. 2012), to explore subsurface stratigraphy and the potential for buried cultural deposits, as discussed below. The site extent recorded by CSU's 2008 and 2011 surface mapping is depicted in Figure 2, as are the locations of the 2012 auger tests.

Archaeologists have conducted episodic archaeological fieldwork in the area surrounding the Spring Canyon site since the 1940s, but have discovered few sites that compare in size to the Spring Canyon site. The archaeological record of nearby Horsetooth Reservoir (Burgh 1947; Marmor 1995; Mutaw 2001; Mutaw et al. 1990, 1991; Painter 2008) and of other nearby hogback foothills valleys (Brunswig 1990; Kvamme 1979; Travis 1988) is typified by small scatters of chipped and ground stone artifacts possessing fewer than 10 total items. Nearly all sites possess fewer than 100 artifacts, and large sites such as the Spring Canyon site are rare.

The preceding discussion demonstrates three important points. First, one can confidently say that the prehistoric artifacts recovered by archaeologists from the Spring Canyon site are a small sample of what must have been (or still is) a very large archaeological site. There have now been about 160 years of historic activities in and around the Spring Canyon site, including use by early immigrants as a travel corridor, agricultural development, stone quarrying, reservoir construction, and modern recreation. With certainty, Native American artifacts have been actively sought and collected from the area, beginning with the earliest settlers to the valley (Hutchinson 1983). Despite extensive surface collecting by members of the general public, the Spring Canyon site has yielded an impressive array of artifacts available to archaeologists. Second, until now the archaeological materials from the site were located in no fewer than four distinct surface collections, each with varying degrees of provenience. One of the larger contributions of this project is bringing these materials together into a single study. Third, the Spring Canyon site is notable relative to other sites in the surrounding area for the quantity of artifacts in its assemblage. Very few archaeological sites in the hogback valleys of Larimer County possess assemblages as large as that from the Spring Canyon site. This suggests that the Spring Canyon site served as an important node in the local settlement system, likely for many thousands of years.

ARTIFACT ANALYSIS

The following is an overview of a portion of the Spring Canyon site artifacts from several surface collections by professional and avocational archaeologists. A more detailed analysis of these materials is found in Pelton et al. (2013). The assemblage consists of four collections: one from Lohr's (1947) initial investigation (housed at the CU Museum of Natural History); one from multiple surface collections by an amateur from the late 1960s to early 1970s that was donated to the CSU Department of Anthropology; one from Elizabeth Morris's 1971 investigation; and the cumulative work from CSU's 2008, 2011, and 2012 investigations. Most of this analysis is focused on the amateur collection, Morris's 1971 collection, and CSU's 2008, 2011, and 2012 collections.

Chipped Stone

A total of 1,616 chipped stone artifacts were sorted based upon technological and stylistic attributes (Table 1). The following discussion provides a brief summary of the types and frequencies of tools identified from the site. Chipped stone artifact frequencies by raw material category are presented in Table 1. More detailed analyses of these materials can be found in Pelton et al. (2013).

Debitage and Edge-modified Flakes

The chipped stone assemblage includes 1,048 flakes and pieces of angular debris and 363 edge-modified flakes. Flakes are non-modified items that retain common flake attributes (e.g., a bulb of percussion), pieces of angular debris are non-modified items that do not retain common flake attributes, and edge-modified flakes are items that possess some form of modification, either light retouch or macroscopically visible use-wear. The 1971 Morris collection of 566 items was employed as a sample of the total debitage assemblage in order to depict raw material use and metric attributes. For this sample, lithic material is comprised of translucent or semi-translucent chalcedony (n=192), orthoquartzite

TABLE 1. Frequency of chipped stone and selected other artifact types from a CSU student's multiple 1960s surface collections, CSU's 1971 investigation, and CSU's 2008 and 2011 investigations of the Spring Canyon site, all displayed by raw material.

Artifact	All Quartz	Quartzite	Chert	Petrified Chalcedony	Wood	Other	Total
Debitage*	22	171	61	125	13	12	405 (1048)
Edge-modified flakes*	4	58	27	66	5	1	161 (363)
Bifaces or biface fragments	4	16	6	14	3	1	44
All projectile points	**1**	**13**	**9**	**17**	**5**	**0**	**45**
diagnostic	1	8	4	9	3	0	25
non-diagnostic bases	0	1	1	2	0	0	4
midsections	0	2	1	4	1	0	8
tips	0	2	2	1	1	0	6
non-diagnostic complete	0	0	1	1	0	0	2
Preforms	0	1	0	1	1	0	3
Hafted knives	0	0	0	2	0	0	2
Bifacial cores/core fragments	1	16	6	3	4	0	30
All unifacial tools	**4**	**31**	**22**	**13**	**10**	**1**	**81**
unifacially flaked tool fragments	2	4	10	5	6	0	27
formal flake tools	0	0	1	1	2	0	4
flake scrapers	2	16	10	4	0	0	32
prismatic flake scrapers	0	10	0	3	1	1	15
notches/spokeshaves	0	0	1	0	1	0	2
choppers	0	1	0	0	0	0	1
Shells	–	–	–	–	–	–	1
Ceramic sherds	–	–	–	–	–	–	1
							1618

* Raw material frequencies are derived from the CSU 1971 surface collection. Raw material was not determined for every piece of debitage and edge-modified flake. Artifact totals for entire assemblage are indicated in parentheses at far right column.

(n=158), opaque chert (n=88), metaquartzite (n=71), quartz (n=26), petrified wood (n=18), and unknown raw materials (n=13). Of these, chalcedony and orthoquartzite are available locally. Non-modified debitage frequency exceeds edge-modified flake frequency for all raw material types. Debitage ranges from 5.2 to 48.6 mm (mean=19.5 +/- 7.6 mm), and edge-modified flakes range from 3.9 to 55.0 mm (mean=23.6 +/- 9.1 mm) in maximum length. The difference in mean maximum length between modified and non-modified debitage is significant (student's t-test, p = < 0.001), suggesting that larger, easier to handle flakes were commonly chosen for use as expedient tools.

Scrapers and Unifacial Tool Fragments

Two types of scrapers were identified in the assemblage: prismatic flake scrapers (n=15) and flake scrapers (n=32). Prismatic flake scrapers are unifacially retouched or visibly utilized on the distal and/or lateral margins, are prismatic in cross-section due to longitudinally oriented, dorsal flake scars, and are generally thicker and blockier than flake scrapers (Figure 3, G–N). Flake scrapers are distally and sometimes laterally retouched flakes that are generally thinner and more curved relative to prismatic flake scrapers (Figure 3, O–V). Twenty-seven unifacially flaked tool fragments too fragmentary to categorize were also identified.

Unhafted Bifaces

Three types of unhafted bifaces were identified: bifacial cores (n=30), bifaces/biface fragments (n=44), and projectile point preforms (n=3). Bifacial cores are relatively large, thick bifacial tools from which large flakes could be removed, but that may also have served as cutting or scraping tools themselves (Figure 3, W-BB). Most bifacial cores are derived from locally-available orthoquartzite (Table 1). Bifaces/biface fragments are relatively thin tools that may have been used for cutting or scraping, or as projectile point preforms. Most (n=42) are fragments, and some of these may be fragments of projectile points. Projectile point preforms are roughly triangle-shaped late stage bifaces that needed only be notched and sharpened in order to be turned into projectile points.

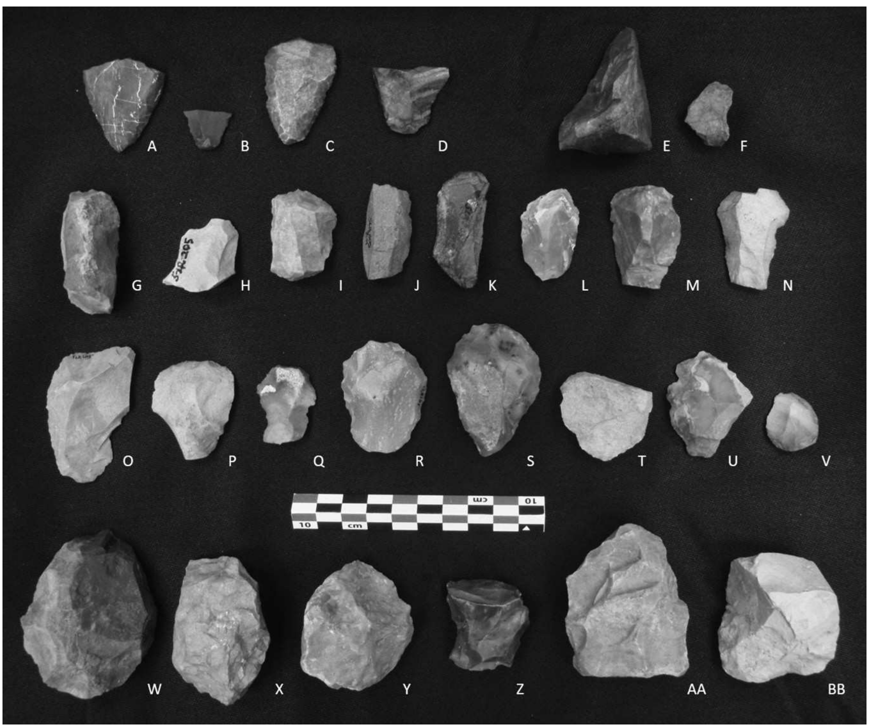

FIGURE 3. Photograph of representative tools described in typology. A–D, formal flake tools; E and F, notch and spokeshave; G–N, prismatic flake scrapers; O–V, flake scrapers; W–BB, bifacial cores.

Other Chipped Stone Tools (Formal Flake Tools, Notches, Choppers, Hafted Knives)

Other chipped stone tools include formal flake tools (n=4), notches (n=2), choppers (n=1), and hafted knives (n=2). Formal flake tools are items that seemed distinct from the rest of the tool assemblage during analysis on the basis of prepared and heavily ground striking platforms, manufacture from high quality, non-local raw material, and the presence of two large dorsal flake scars on each specimen, which suggests they were removed as part of a formal, repetitive core technology (Figure 3, A–D). In sum, they seem "nicer" than the other flake tools. Two of these items possess retouch on the lateral margin (Figure 3, A and C) and one on the distal margin (Figure 3C), and two fragments possess use-wear on the lateral margins (Figure 4, B and D). Notches are implements with a working edge that is crescent-shape and has been step-fractured due to use (Figure 3, E and F). The single chopper is a large (85.9 mm max length) cortical flake of quartzite, the distal end of which shows signs of use in the form of step fracturing and shallow notching. Hafted knives possess corner-notching and are generally wider and thicker than projectile points. Metric attributes for all notched bifaces, including notched projectile points, are presented in Table 2.

Projectile Points

Forty-four artifacts are projectile points or point fragments, and one is a Folsom channel flake, which is diagnostic of Folsom projectile point manufacture. Twenty of the 44 are projectile points or point fragments too fragmentary or morphologically ambiguous to assign to temporally diagnostic categories. Of these, four are basal fragments, eight are midsections, six are tips, and two are mostly complete projectile points that appear to have been discarded prior to completion. The remaining 24 projectile points (and single channel flake) possess diagnostic attributes such as distinctive hafting forms or flaking patterns. These artifacts span Folsom to Early Ceramic times (ca. 12,800-800 B.P.). Twenty-two belong to widely recognized typological groups in nine categories. The remaining three retain diagnostic attributes but do not belong to a recognized typological group. Given their importance in establishing the chronology of occupations at the site, these artifacts are detailed more fully in order of their inferred ages, from oldest to youngest. Attributes of lanceolate projectile points are presented in Table 3, and attributes of notched projectile points are presented in Table 2.

There are five diagnostic Paleoindian artifacts in the Spring Canyon assemblage (Figure 4). Two are Folsom artifacts: one nearly complete fluted point (Table 3; Figure 4A) and one channel flake (Table 3; Figure 4B) (cf., Gantt 2002; Kornfeld and Frison 2000; Surovell et al. 2001; Wilmsen and Roberts 1978). These artifacts date roughly to the Younger Dryas chronozone, between ca. 12,800 and 11,900 B.P. (Holliday 2000; LaBelle 2012).The channel flake resembles Phosphoria formation chert from north-central Wyoming, a sample of which is curated in the comparative raw material collection at the CSU Center for Mountain and Plains Archaeology. The presence of a channel

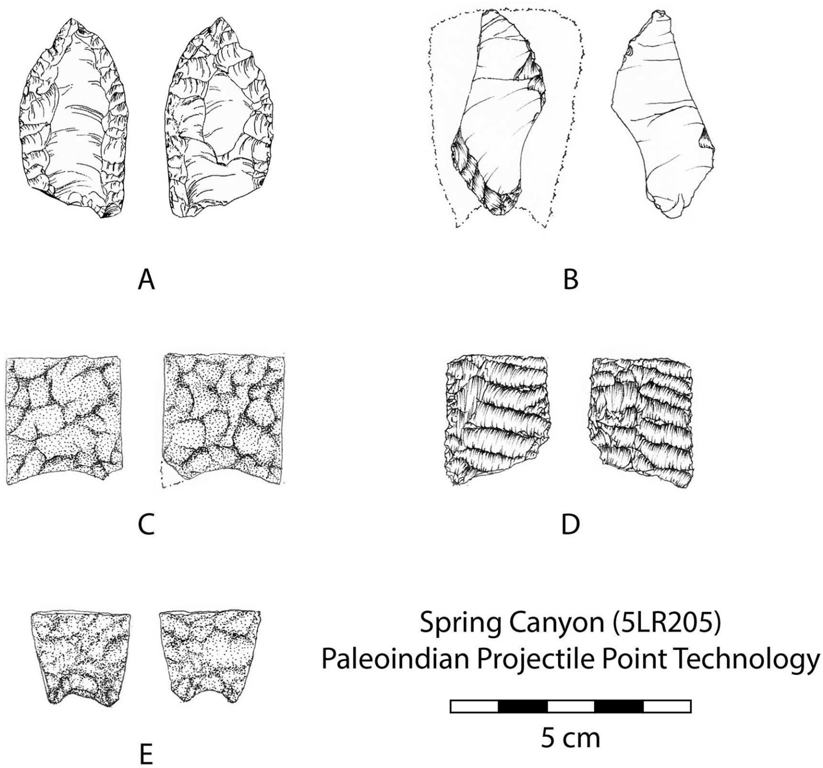

FIGURE 4. Illustrations of Paleoindian projectile points from the Spring Canyon site. (Illustration A by Eric Parrish; illustrations B through E by Tyson Arnold.)

flake suggests that Folsom point manufacture occurred at the Spring Canyon site.

Another Paleoindian artifact is a Plainview projectile point base, the attributes of which are summarized in Table 3 (Figure 4C) (cf. Hartwell 1995:Table 3; Johnson and Holliday 1980:93; Sellards et al. 1947:939, 942). In the most recent evaluation of Plainview temporal association, Holliday et al. (1999) assign a date range of ca. 12,500 to 10,700 B.P., perhaps extending toward 10,200 B.P. This span makes Plainview the longest-lasting projectile point form associated with the Paleoindian period, overlapping Folsom, Goshen, and Midland types (Sellet 2001). The last two Paleoindian artifacts can be attributed to the Late Paleoindian period, which dates to between ca. 10,200 and 9400 B.P. (Benedict 2005; Knudson and Kornfeld 2007). The first is a single Late Paleoindian Mountain Complex projectile point base (Table 3, Figure 4E) (cf. Benedict 1981; Greene 1967; Wheeler 1995). The second is a parallel-obliquely flaked midsection of a James Allen projectile point (Table 3; Figure 4D) (cf. Benedict 1981:Figure 67; Mulloy 1959; Pitblado 1999; Wiesend and Frison 1998).

Eight diagnostic Archaic artifacts occur in the assemblage (Figure 5, A-D). Four date to the Early Archaic and are diagnostic of the Mount Albion complex (Figure 5A) (Benedict 1978, 1996). These artifacts date to between

TABLE 2. Notched biface attributes from the Spring Canyon site.

Tool Type	Portion	Typology	Length (mm)	Shoulder Width (mm)	Neck Width (mm)	Base Width (mm)
pp	base	Mount Albion	22.9	19.7	15.9	17.6
pp	base and medial	Mount Albion	34.3	21.7	15.3	18.2
pp	complete	Mount Albion	28.9	15.4	9.6	11.8
reworked pp	nearly complete	Mount Albion	20.2	16.3	11.3	14.2
pp	missing tip	Hanna (McKean complex)	>26.4	18.9	12.3	13.8
pp	base and medial	No type	23.4	17.9	12.4	15.9
pp	missing tip and part of base	Yonkee	21.5	16.9	10.2	>11.5
pp	missing tip and part of base	Pelican Lake	>21.6	18.2	13.1	ukn
pp	missing one ear	Pelican Lake	28.3	>22.2	14.4	17.1
pp	base	No type	18.9	>19.7	10.5	12.8
pp	nearly complete	No type	23.7	>15	10.2	12.3
pp	base and medial	Late Prehistoric corner-notched	>28	15.7	8.3	>7.8
pp	missing tip and part of base	Late Prehistoric corner-notched	>22.8	16.2	7	ukn
pp	nearly complete	Late Prehistoric corner-notched	13.6	ukn	6.6	8.9
pp	missing tip and shoulders	Late Prehistoric corner-notched	>18.9	ukn	6.5	7.7
pp	nearly complete	Late Prehistoric corner-notched	24.6	ukn	6.1	7.4
pp	nearly complete	Late Prehistoric corner-notched	25.8	15	5.6	8.3
pp	complete	Late Prehistoric corner-notched	18.5	17.3	5.2	5.3
pp	complete	Late Prehistoric corner-notched	19.6	14.4	5.7	7.8
pp	nearly complete	Late Prehistoric corner-notched	>23.1	>15.5	7.8	>8.2
knife	nearly complete	hafted knife	56.5	39.4	17.6	23.3
knife	base	hafted knife	23	ukn	17.2	20.3

TABLE 3. Paleoindian artifact attributes from the Spring Canyon site.

Portion	Typology	Length (mm)	Max Width (mm)	Base Width (mm)	Max Thickness (mm)	Mass (g)
nearly complete	Folsom	42.4	16.9	4.7	2.9	2.6
complete	Folsom	41.1	22.8	same as max width	5.3	6.0
base	Late Paleoindian mountain complex	19.2	21.8	14.7	8.1	4.0
medial fragment	James Allen	27.0	21.9	n/a	4.5	4.1
base	Plainview	26.7	25.0	incomplete	7.3	6.7

*For the Folsom channel flake, this measurement refers to the platform.

Max Thickness (mm)	Mass (g)	Stem Type	Base Type	Raw Material	Color	Serrated?
5.8	3.6	expanding	convex	quartzite	gray	n
7.7	7.2	expanding	convex	quartz	white	n
3.4	1.5	expanding	convex	quartzite	gray with tan mottling	n
3.9	1.8	expanding	convex	quartzite	gray	n
4.9	2.6	expanding	concave	quartzite	gray and tan	n
5.9	3.7	expanding	straight	quartzite	gray and tan	n
5.2	2.1	expanding	concave	chalcedony	translucent white	n
4	1.7	expanding	straight	chalcedony	translucent white	n
5.1	3.3	expanding	slightly convex	chert	maroon	n
3.9	1.3	expanding	straight	chert	brown	n
4.2	1.6	expanding	convex	chalcedony	white	n
4.9	2.6	slightly expanding	convex	quartzite	gray with orange striations	n
4.9	1.6	expanding	straight	chert	orange	y
3.5	0.5	expanding	straight	chert	white	n
3.1	0.8	expanding	slightly notched	chert	orange	n
4.6	1.5	expanding	concave	chert	white	n
3.5	1.3	expanding	convex	chalcedony	white	n
3.4	0.9	very slightly expanding	convex	chert	orange	y
4.1	0.9	expanding	straight	chert	white	y
3.9	1.5	expanding	convex	chert	lavender and light orange	n
8.2	12.2	expanding	ukn	chalcedony	white	n
4.4	3.3	expanding	ukn	chalcedony	brown with black inclusions	n

Base Type	Cross-section	Raw Material	Color	Comment
ground and faceted	flat	phosphoria	red	Folsom channel flake
lanceolate, concave	bifacially fluted	chalcedony	brown, but patinated	lateral/basal grinding dull yellow
constricted/ concave	lenticular	quartzite	pink	lateral grinding
n/a	lenticular	petrified wood	orange and brown	parallel/oblique flaking
lanceolate, concave	lenticular	quartzite	beige	lateral and basal grinding

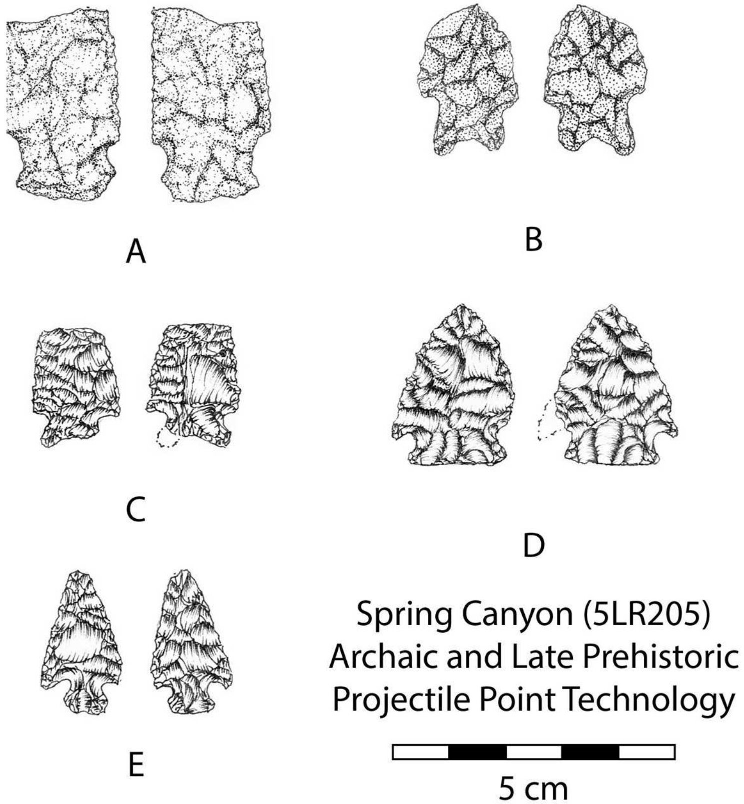

FIGURE 5. Ilustrations of Archaic and Late Prehistoric projectile points from the Spring Canyon site. (Illustrations by Tyson Arnold.)

ca. 6500 and 6000 B.P. (Benedict 1978; Olson 1978). A single Middle Archaic artifact is present, and diagnostic of the McKean complex. The McKean complex dates to between 6000 and 2800 B.P. and is comprised of four distinct projectile point types: Mallory, McKean lanceolate, Duncan, and Hanna (Davis and Keyser 1999; Gilmore 2012; Lobdell 1974; Wheeler 1954). The McKean complex point is classically "Hanna" in shape, exhibiting abrupt shoulders, a long neck, and concave base (Figure 5B). Also present are three Late Archaic projectile points, specifically one Yonkee and two Pelican Lake points (Figure 5C and D) (Frison 1991; Todd et al. 2001). Each dates between 3000 and 1800 B.P. (LaBelle and Pelton 2013; Todd et al. 2001).

The assemblage includes nine Late Prehistoric Plains corner-notched projectile points, each of which dates between ca. 1500 and 800 B.P. (Figure 5E) (Benedict 1975; Nelson 1971). Locally, these points are referred to as Hogback corner-notched points. Three possess diagnostic attributes but do not belong to a widely recognized typological group. In Pelton et al. (2013), these artifacts are referred to as "Unknown Archaic," "Spring Canyon I," and "Spring Canyon II," but the authors refrain from establishing new typological terms here. Future research may refine the ages of these artifacts.

Ground Stone Artifacts

The Spring Canyon site ground stone assemblage includes 90 manos, 60 metates, and a single grooved abrader, totaling 77 kg in mass. It is one of the largest ground stone assemblages in the Colorado Front Range. The specimens range in size from small fragmented pieces weighing only 30–40 g to complete specimens weighing in excess of 5 kg. The following is a brief summary of the ground stone assemblage beginning with the metates, followed by the manos and single grooved abrader, and concluding with a summary of mano morphology. A more thorough analysis of these materials can be found in Pelton et al. (2013).

No complete metates occur in the assemblage. The majority of the metates are fragments of flat grinding slabs (n=54), although six basin metate fragments are included. At least one of the basin metates probably represents what Adams (2002) refers to as a flat/concave metate, which is a flat metate whose surface has been worn into a concave shape through use. All of the metates from the site are made from thin slabs of tabular sandstone. Summary statistics for all metate fragments are presented in Table 4. Forty-seven fragments are ground on one side of the slab and 13 are ground on both sides. Twenty-six of the 60 fragments (43%) show evidence of exposure to fire.

Twenty-nine complete manos and 61 mano fragments are present in the assemblage. Twenty-six are circular, 59 are oblong, and six are too fragmented to permit discernment of shape. Manos are manufactured from granitic cobbles (n=46), metamorphic cobbles (n=16), diorite/andesite cobbles (n=13), and either fine-grained (n=11) or coarse-grained (n=4) sandstone cobbles. Summary attributes for all complete manos are presented in Table 5. Five mano fragments exhibit evidence of exposure to fire. One artifact is a sandstone grooved abrader, probably used in the manufacture of projectile shafts. The abrader is 12.2 cm long, 7.3 cm wide, and 4.2 cm thick. A single groove runs the length of one

TABLE 4. Summary statistics for all metate fragments from the Spring Canyon site (n = 60).

	Mean	Median	Standard Deviation	Range
Mass (g)	535.4	230.3	864.5	28.3–5113.6
Length (cm)	9.7	9.0	5.6	3.4–29.8
Width (cm)	7.6	6.4	4.5	25–22.4
Thickness (cm)	2.8	2.6	1.3	0.7–7.8

TABLE 5. Summary statistics for all complete manos from the Spring Canyon site (n = 29).

	Mean	Median	Standard Deviation	Range
Mass (g)	775.6	738.6	336.1	305.0–1420.5
Length (cm)	12.7	12.3	2.5	8.7–17.7
Width (cm)	8.3	8.1	1.7	5.7–12.4
Thickness (cm)	4.4	4.2	1.1	2.7–6.9

surface. The length of the groove is 10.0 cm and it is 1.1 cm wide. Given the width of the groove, this artifact likely served as a straightening or smoothing device for manufacturing arrow shafts, and it is therefore technologically diagnostic of the bow and arrow (ca. post-A.D. 500).

The manos exhibit a total of 168 utilized surfaces. Utilized surfaces were identified on the faces and edges of cobbles, but cobble ends were excluded from the analysis although some may have been battered. One hundred six surfaces are associated with face-grinding and 62 are associated with edge-grinding. Face grinding is present on 75 manos, with 31 ground on both faces; edge grinding is present on 51 manos, with 12 ground on both edges. Thirteen manos possess some combination of face and edge grinding. Notably, there seems to be a relationship between edge grinding and the use of fine-grained diorite/andesite cobbles that is probably related to the use of these items as hide-processing implements (Adams 1988, 1989; Owens 2006).

Other Distinct Items: Ceramics and Obsidian

The Spring Canyon site has yielded few prehistoric ceramic sherds to date. The 1971 Morris collection includes a single, small non-diagnostic sherd. Recent field investigations failed to reveal additional pottery, but the site is heavily vegetated and present ground visibility is poor. A limited amount of pottery is present in the Lohr (1947) collection at the CU Museum, as the 5LR51 site card lists 10 sherds in that collection. The pottery in the 1971 Morris collection is similar to other cord-marked sherds found in Larimer County, such as from 5LR155 (Travis 1988), the Harvester and Weinmeister sites (Anderson 2012), and the newly discovered Fossil Creek site (LaBelle 2015). The extant Spring Canyon pottery is likely Early Ceramic in age (Gilmore 1999).

Five samples were analyzed by M. Steven Shackley with the Geoarchaeological XRF Laboratory in Albuquerque, New Mexico. Shackley was able to provide source provenience for the items using ED-XRF (energy dispersive x-ray fluorescence) analysis. Five different source locales were identified for the obsidian (Shackley 2012, 2013), a surprisingly diverse result given the small sample size. Three of the artifacts are from obsidian sources in Idaho and Wyoming. Idaho sources include Fish Creek/Partridge Creek and Malad. An additional piece was sourced to Teton Pass, a relatively short distance across the mountains from the Fish Creek source. Two specimens are from New Mexico sources, centered west-northwest of Santa Fe: one piece from the Cerro Toledo Rhyolite source and one from El Rechuelos.

SUMMARY OF SUBSURFACE INVESTIGATIONS

Initial testing indicates that subsurface archaeological remains are present at the Spring Canyon site. In addition to Lohr's (1947) testing, Morris's students excavated a test unit in 1971, digging in natural levels during their initial investigation of the site (Young 1971). The first level was 0–23 cm deep, the second 23–48 cm, the third 48–71 cm, and the fourth 71–89 cm. This investigation produced prehistoric cultural remains from every level, but only a single small fragment of a grinding slab was recovered from the lowest level. The location of the test pit is unknown. However, the presence of historic remains in the first level of the pit, at a depth comparable to that of remains from recent auger testing (Pelton et al. 2012), suggests that it was excavated in the vicinity of the prehistoric scatter recorded by CSU during 2008 and 2011 (LaBelle 2008; Pelton et al. 2013). In this portion of the site, a historic trash scatter likely related to a house foundation on the west side of the site is mixed with a prehistoric scatter in shallowly buried deposits.

Five bucket auger tests (numbered 2–6) were completed by CSU during the spring of 2012 in order to test the potential for buried archaeological deposits (see Figure 2 for test locations). Three tests were placed south of Spring Creek and two on the north side within the extent of CSU's recent surface investigations. Tests 3–6 reached sufficient depth to provide a good understanding of the site's geologic deposits. Test 4 was excavated to the full extent of the 2.5 m auger attachment, and Tests 3, 5, and 6 reached bedrock or alluvial cobbles too large for the 4-in auger bucket to accommodate. Test 2 was completed only to a depth of 107 cm before an obstruction halted progress. Considering that nearby auger tests reached much greater depths, this obstruction seemed geologically out of place, and may have been a large artifact such as a piece of ground stone or a hearth stone.

Buried archaeological deposits from multiple cores were identified on both sides of Spring Creek. Tests 2 and 4 each yielded a single flake at depths between 20 and 40 cm, confirming that the Spring Canyon site continues to the south side of Spring Creek and is buried beneath at least 20 cm of sediment. Two flakes, flecks of charcoal, and a fragment of mammalian tooth enamel were recovered from Test 6 at a depth of 70 to 80 cm. No cultural remains were recovered from Test 5, which was placed in the densest portion of the surface scatter recorded by CSU in 2008 and 2011. For the most part, stratigraphic transitions defined for each core are diffuse, defined primarily by gradual shifts in clay content and/or color. However, a buried paleosol was discovered in Tests 3 and 4, indicated as an abrupt stratigraphic contact to dark, organic-rich soil between 245 and 250 cm. Details regarding auger testing of the Spring Canyon site can be found in Pelton et al. (2012, 2013).

Auger Test 5 indicates that the shallowest stratigraphy at the Spring Canyon site (75 cm) is located in the densest concentration of surface archaeological remains and within a historic plowed field. It may be suggested that the majority of remains included in this analysis were collected from this portion of the site. In this area, many thousands of years of prehistoric remains were shallowly buried and brought to the surface as a result of historic plowing, thereby explaining the mixed nature of the assemblage. However, buried deposits still exist in less disturbed portions of the site, 20-40 cm deep on the south side of Spring Creek and 70 to 80 cm deep on the north side of Spring Creek and south of the known surface scatter. Undoubtedly, the initial auger tests missed many more buried archaeological components. It is recommended that future work at the site be directed toward finding and determining the ages of the buried archaeological components.

CONCLUSION

The Spring Canyon site contains one of the largest, most diverse known archaeological assemblages in the foothills of the Colorado Front Range. It not only includes a large number of artifacts when compared to other sites in the region, but also possesses a diversity of tool types and projectile point styles spanning Folsom to Late Prehistoric times. These artifacts have been recovered from a mixed surface assemblage that emerged from a plowed field over a period of more than 75 years. The analyses presented in this paper provide a "snapshot" of an assemblage from a large Colorado Front Range foothills campsite and a glimpse of what may still lie buried beneath the surface.

A diversity of subsistence and production activities occurred at the Spring Canyon site. These activities include hide processing with scrapers and edge-ground cobbles, the production of projectile shafts with spokeshaves and shaft abraders, seed grinding with manos and grinding slabs, primary reduction of lithic materials from large bifacial cores, hunting with projectile points, preparing food with rock-filled hearths and ceramics, and a variety of other tasks performed with modified flake tools. In sum, the Spring Canyon site served as a large, residential base camp from which prehistoric foragers staged numerous tasks and maintained contact with distant people to the north and south. Although these interpretations are hampered by the mixed nature of the assemblage, the Spring Canyon site has great potential for possessing a buried stratigraphic record at least 2.5 m deep. Clarifying when these various activities occurred should be a focus of further research at the site.

Finally, the authors hope the Spring Canyon site can be used to initiate conversations with the public in Fort Collins and Larimer County. The site, located within the city and protected on undeveloped city property, is an ideal candidate to serve as a focus of public education programs. This foothills water gap has been a focal point for millennia, and should continue to serve as a place of reflection for the residents of northern Colorado.

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REFERENCES CITED

Adams, Jenny L.

1988 Use-Wear Analyses on Manos and Hide-Processing Stones. *Journal of Field Archaeology* 15(3):307–315.

1989 Experimental Replication of the Use of Ground Stone Tools. *Kiva* 54(3): 261–271.

2002 *Ground Stone Analysis: A Technological Approach.* University of Utah Press, Salt Lake City.

Anderson, Jessica E.

2012 Archaeological Investigations of the River Bluffs Open Space, Windsor, Colorado: A Case Study in Cooperation between Artifact Collectors, the Public, and Archaeologists. Unpublished Master's thesis, Department of Anthropology, Colorado State University, Fort Collins.

Benedict, James B.

1975 The Murray Site: A Late Prehistoric Game Drive System in the Colorado Rocky Mountains. *Plains Anthropologist* 20:161–174.

1978 The Mount Albion Complex: Review and Summary. In *The Mount Albion Complex: A Study of Prehistoric Man and the Altithermal*, by James B. Benedict and Byron L. Olson, pp. 118–137. Center for Mountain Archeology, Research Report No. 1. Ward, Colorado.

1981 *The Fourth of July Valley: Glacial Geology and Archeology of the Timberline Ecotone*. Center for Mountain Archeology Research Report No. 2. Ward, Colorado.

2005 Rethinking the Fourth of July Valley Site: A Study in Glacial and Periglacial Geoarchaeology. *Geoarchaeology* 20:797–836.

Brunswig, Robert H., Jr.

1990 Excavations at Echo Cave: An Initial Report on UNC Archaeological Research in the Northern Colorado Foothills. *Southwestern Lore* 56(4):20–36.

Burgh, Robert F.

1947 *Preliminary Report on Archeological and Paleontological Remains in Reservoir Areas of the Colorado-Big Thompson Project, Northern Colorado.* Smithsonian Institution, River Basin Survey, University of Colorado Museum, Boulder.

Coberly, Russell W.

1996 Recollections of Early Anthropology at Colorado State University and Reflections on Anthropology. Unpublished manuscript on file, Department of Anthropology, Colorado State University, Fort Collins.

Davis, Carl M., and James D. Keyser

1999 McKean Complex Projectile Point Typology and Function in the Pine Parkslands. *Plains Anthropologist* 44(169):251–270.

Dunning, Harold Marion

1969 *The Overland Trail North.* Johnson Publishing Company, Boulder, Colorado.

Erb, Louise Bruning, Ann Bruning Brown, and Gilberta Bruning Hughes

1989 *The Bridger Pass Overland Trail 1862–1869 through Colorado and Wyoming and Cross Roads at the Rawlins-Baggs Stage Road in Wyoming.* ERBGEM Publishing Company, Littleton, Colorado.

Frison, George C.

1991 *Prehistoric Hunters of the High Plains.* 2nd ed. Academic Press, San Diego.

Gantt, Erik M.

2002 The Claude C. and A. Lynn Coffin Lindenmeier Collection: An Innovative Method for Analysis of Privately Held Artifact Collections and New Information on a Folsom Campsite in Northern Colorado. Unpublished Master's thesis, Department of Anthropology, Colorado State University, Fort Collins.

Gilmore, Kevin P.

1999 The Late Prehistoric Stage. In *Colorado Prehistory: A Context for the Platte River Basin*, edited by Kevin P. Gilmore, Marcia Tate, Mark L. Chenault, Bonnie Clark, Terri McBride, and Margeret Wood, pp. 175–308. Colorado Council of Professional Archaeologists, Denver.

2012 Footprints in the Mud: A Holocene Drought Record from a Pocket Fen and Implications for Middle Archaic Cultural Ecology on the Great Plains. In Footprints in the Snow: Papers in Honor of James B. Benedict, edited by Jason M. LaBelle, E. Steve Cassells, and Michael D. Metcalf. *Southwestern Lore* 78(1):58–67.

Greene, Ann M.

1967 *The Betty Greene Site: A Late Paleoindian Site in Eastern Wyoming*. Unpublished Master's thesis, Department of Anthropology, University of Pennsylvania, Philadelphia.

Hartwell, Williams T.

1995 The Ryan's Site Cache: Comparisons to Plainview. *Plains Anthropologist* 40(152):165–184.

Holliday, Vance T.

2000 Folsom Drought and Episodic Drying on the Southern High Plains from 10,900–10,200 14C yr BP. *Quaternary Research* 51:1–12.

Holliday, Vance T., Eileen Johnson, and Thomas W. Stafford, Jr.

1999 AMS Radiocarbon Dating of the Type Plainview and Firstview (Paleoindian) Assemblages: The Agony and the Ecstasy. *American Antiquity* 64(3):444–454.

Hutchinson, Lisa

1983 *Lory State Park: A Look into the Past*. Report on file, Lory State Park, Bellvue, Colorado.

Johnson, Eileen, and Vance T. Holliday

1980 A Plainview Kill/Butchering Locale on the Llano Estacado-The Lubbock Lake Site. *Plains Anthropologist* 25(88):89–111.

Knudson, Ruthann, and Marcel Kornfeld

2007 A New Date for the James Allen Site, Laramie Basin, Wyoming. *Current Research in the Pleistocene* 24:112–114.

Kornfeld, Marcel, and George C. Frison

2000 Paleoindian Occupation of the High Country: The Case from Middle Park, Colorado. *Plains Anthropologist* 45(172):129–153.

Kvamme, Kenneth L.

1979 Settlement Variability on the High Plains of Northeastern Colorado: The South Platte River. *Southwestern Lore* 45(4):18–28.

LaBelle, Jason M.

2008 *Preliminary Report Regarding the Archaeological Potential of the Spring Canyon (5LR205) Site*, *Pineridge Natural Area*, *Fort Collins*, *Colorado*. Laboratory of Public Archaeology, Colorado State University.

2009 Shiny Black Rocks: Exploring the Role of Obsidian in Interregional Contact within the South Platte Basin. Paper presented at the Colorado Council of Professional Archaeologists Annual Meeting, Alamosa, Colorado, April 2009.

2012 Hunter-gatherer Adaptations of the Central Plains and Rocky Mountains of Western North America. In *Hunter-Gatherer Behavior: Human Response during the Younger Dryas*, edited by M. I. Eren, pp. 139–164. Left Coast Press, Walnut Creek, California.

2015 Shovel Testing the Fossil Creek Site (5LR13041): An Early Ceramic Period Native American Campsite in Larimer County, Colorado. Report prepared for the Natural Areas Program, City of Fort Collins, Colorado. Center for Mountain and Plains Archaeology Report 2015–03, Colorado State University, Fort Collins.

LaBelle, Jason M., and Spencer R. Pelton

2013 Communal Hunting Along the Continental Divide of Northern Colorado: Results from the Olson Game Drive (5BL147), USA. *Quaternary International* 297(2013):45–63.

Lobdell, John E.
1974 The Scoggin Site: A Study in McKean Typology. *Plains Anthropologist* 19(64): 123–128.

Lohr, Edison P.
1947 Indian Camp Sites from Northern Colorado (Larimer County). Unpublished report on file, University of Colorado Museum of Natural History, Boulder.

Marmor, Jason
1995 *An Historical and Archaeological Survey of the Overland/Cherokee Trails through the Fort Collins Urban Growth Area, Larimer County, Colorado*. Report on file, City of Fort Collins Planning Department, Fort Collins, Colorado.

Mulloy, William T.
1959 The James Allen Type Site, near Laramie, Wyoming. *American Antiquity* 25(1):112–116.

Mutaw, Robert J.
2001 *Horsetooth Reservoir Pool Area Final Cultural Resources Inventory, Larimer County, Colorado*. URS Greiner Woodward Clyde Federal Services. Report on file, USDI Bureau of Reclamation, Great Plains Region, Billings, Montana, and USDI Bureau of Reclamation, Technical Services Center, Denver, Colorado.

Mutaw, Robert J., R. Laurie Simmons, and Christine Whitacre
1990 *Horsetooth Reservoir North Shoreline Cultural Resources Inventory, Larimer County, Colorado*. Powers Elevation Co., Inc. Report on file, USDI Bureau of Reclamation, Great Plains Region, Billings, Montana.
1991 *Horsetooth Reservoir South Shoreline Cultural Resources Inventory, Larimer County, Colorado*. Powers Elevation Co., Inc. Report on file, USDI Bureau of Reclamation, Great Plains Region, Billings, Montana.

Nelson, Charles E.
1971 The George W. Lindsay Ranch Site, 5JF11. *Southwestern Lore* 37(1):1–14.

Olson, Byron L.
1978 Excavations at Site 5BL70. In *The Mount Albion Complex: A Study of Prehistoric Man and the Altithermal*, pp. 76–117. Center for Mountain Archeology, Research Report No. 1. Ward, Colorado.

Owens, Mark
2006 Edge-Ground Cobble Tools of the Piñon Canyon Maneuver Site, Southeast Colorado. *Southwestern Lore* 72(3):1–27.

Painter, Mary W.
2008 *A Class III Inventory of the Proposed Dixon Creek to Horseshoe Transmission Line in Larimer County, Colorado*. Report submitted to EDAW, Inc. by Centennial Archaeology, Inc., Fort Collins, Colorado.

Pelton, Spencer R., Chris Johnston, and Ben Perlmutter
2012 Geoarchaeological Investigation of the Spring Canyon Site (5LR205). Technical report prepared for the City of Fort Collins. Manuscript on file, Center for Mountain and Plains Archaeology, Colorado State University, Fort Collins.

Pelton, Spencer R., Jason M. LaBelle, Chris Davis, and Cherise Bunn
2013 The Spring Canyon Site, a Large Campsite at the Base of the Foothills of Larimer County, CO. Manuscript on file, Center for Mountain and Plains Archaeology, Colorado State University, Fort Collins.

Pitblado, Bonnie Lynn
1999 Late Paleoindian Occupation of the Southern Rocky Mountains: Projectile Points and Land Use in the High Country. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Sellards, E. H., Glen L. Evans, and Grayson E. Meade
1947 Fossil Bison and Associated Artifacts from Plainview, Texas. *Bulletin of the Geological Society of America* 58:927–964.

Sellet, Frederic
2001 A Changing Perspective on Paleoindian Chronology and Typology: A View from the Northwestern Plains. *Arctic Anthropology* 38(2):48–63.
Shackley, M. Steven
2012 An Energy-Dispersive X-Ray Fluorescence Analysis of Obsidian Artifacts from Archaeological Sites in Larimer and Jefferson Counties, Colorado. Letter Report, 3 March 2012. On file, Center for Mountain and Plains Archaeology, Colorado State University, Fort Collins.
2013 An Energy-Dispersive X-Ray Fluorescence Analysis of Obsidian Artifacts from Archaeological Sites in Boulder and Larimer Counties, Colorado. Letter Report, 28 January 2013. On file, Center for Mountain and Plains Archaeology, Colorado State University, Fort Collins.
Surovell, T. A., N. M. Waguespack, M. Kornfeld, and G. C. Frison
2001 Barger Gulch, Locality B: A Folsom site in Middle Park, Colorado. *Current Research in the Pleistocene* 18:58–60.
Todd, Lawrence C., David C. Jones, Robert S. Walker, Paul C. Burnett, and Jeffrey Eighmy
2001 Late Archaic Bison Hunters in Northern Colorado. *Plains Anthropologist* 46(176):125–147.
Travis, Lauri
1988 An Archaeological Survey in the Plains-Foothills Ecotone, Northern Colorado. *Plains Anthropologist* 33(120):171–186.
Wheat, Joe Ben
1953 Colorado Archaeological Site Form for 5LR51. On file, Colorado Office of Archaeology and Historic Preservation, History Colorado, Denver.
Wheeler, Richard P.
1954 Two New Projectile Point Types: Duncan and Hanna Points. *Plains Anthropologist* 1:7–14.
1995 Archaeological Investigations at Three Reservoir Areas in South Dakota and Wyoming, Part 1, Angostura Reservoir. Reprints in *Anthropology* 46. J and L Reprint Co., Lincoln, Nebraska.
Whiteley, Lee
1999 *The Cherokee Trail: Bent's Old Fort to Fort Bridger*. Johnson Printing, Boulder, Colorado.
Wiesend, Christine M., and George C. Frison
1998 Parallel-Obliquely Flaked Projectile Points from the Phillips-Williams Fork Reservoir Site (5GA1955) in Middle Park, Colorado. *Southwestern Lore* 64(1): 8–23
Wilmsen, Edwin N., and Frank H. H. Roberts, Jr.
1978 *Lindenmeier 1934–1974: Concluding Report on Investigations*. Smithsonian Contributions to Anthropology 24. Washington, D.C.
Young, John
1971 Colorado Archaeological Site Form for 5LR205. On file, Colorado Office of Archaeology and Historic Preservation, History Colorado, Denver.