Plains Anthropologist

ISSN: 0032-0447 (Print) 2052-546X (Online) Journal homepage: https://www.tandfonline.com/loi/ypan20

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To cite this article: Cody Newton (2016) The Lykins Valley site (5LR263): An early nineteenth century indigenous occupation at the western edge of the Central Plains, Plains Anthropologist, 61:237, 50-75, DOI: 10.1179/2052546X15Y.0000000009

To link to this article: https://doi.org/10.1179/2052546X15Y.0000000009

Published online: 20 May 2016.

PLAINS ANTHROPOLOGIST, Vol. 61 No. 237, February, 2016, 50–75

REPORT

The Lykins Valley site (5LR263): An early nineteenth century indigenous occupation at the western edge of the Central Plains

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The postcontact period on the western edge of the Central Plains was a dynamic period of technological and territorial change for Plains Indian groups that began with the acquisition of European-derived goods and equines often long before actual physical contacts with Europeans or Euroamericans. These highly mobile and adaptable groups often maintained many traditional precontact subsistence and technological practices despite the procurement of these European-derived materials and animals. Understanding the changes wrought by the introduction of European technologies and contact with European groups, along with the persistence of precontact praxis has proven elusive in the area due to an overall lack of evidence, both archaeological and historical. The Lykins Valley site (5LR263) is a buried early nineteenth century, Native occupied campsite that provides a window into this interesting and little-known period of Plains Indian history. The following analysis of the faunal remains, lithic artifacts, and trade goods from the Lykins Valley site affords important data adding to the regional postcontact history.

KEYWORDS postcontact, Central Plains, trade goods, Plains Indian, horse, fur trade

 DOI 10.1179/2052546X15Y.0000000009

Introduction

The postcontact archaeology at the Lykins Valley site (5LR263) provides a rare window into the early nineteenth century Plains Indian culture and subsistence by demonstrating both syncretic responses to European-derived technologies and trade items, as well as the maintenance of certain precontact technological systems. The postcontact period is characterized by both dynamic change and cultural resilience in response to Euroamerican[1] expansionism as well as the acquisition of European-derived technologies and materials (Cobb 2003; Mitchell and Scheiber 2010; Rogers 1990; Rogers and Wilson 1993). Unfortunately, it is the adoption of European technologies and material culture that is largely prominent in the narrative of this period, as European-derived artifacts are easy to identify archaeologically. The maintenance of precontact culture and subsistence aspects, along with the development of syncretic or 'middle ground' societies and economies has, until recently, been underreported or ignored (Lightfoot 2005; White 1991; Wolf 1982). However, the innovative and elastic responses of Plains Indian groups to the influx of Euroamerican and foreign materials or goods did include continuity as well as change. Archaeological sites in the region that archive this period of Great Plains Native history are rarely identified, which is partially due to the relatively short period that this era lasted (Landals 2004:232–35).

The historical context of the Lykins Valley site is one of dynamic change in the western margin of the Central Plains. The site appears occupied during the Fur Trade era (1807 to 1840) of the region following the acquisition of the region as part of the Louisiana Purchase of 1803 (Wishart 1992). Indigenous communities met the opening of the western Great Plains and adjacent Rocky Mountains to Euroamerican extractive enterprise with mixed reactions. However, as the Lykins Valley site demonstrates, Native societies were involved with the new economy and introduced trade items as active, influential participants.

Understanding the degree by which North American indigenous cultures were impacted by contact with previously unknown materials and peoples has catalyzed a useful debate about what specifically constitutes change and continuity in Native systems. This debate has exposed the difficulties in understanding postcontact change, particularly in regards to material goods that oftentimes have very nuanced cultural histories (Silliman 2009; Tveskov 2007). Use of chipped stone tools and butchering processes which can be linked to Native practices serve as the primary criteria for interpreting the Lykins Valley site as a Native American occupation. However, at least in a qualitative sense, the continued use of traditional technologies and practices, such as chipped stone tools and precontact butchering practices at sites with European-derived trade goods and introduced livestock, constitutes postcontact Native cultural continuity despite the lack of a precise metric for measuring such change.

The Lykins Valley site is located in northern Larimer County in north central Colorado (Figure 1). The Great Plains end abruptly about 6 km east of the site against a

[1]All non-Native Americans referenced in general terms will be referred to as Euroamerican – in the sense that these persons were European, or of European descent, and, during the postulated occupation of 5LR263, were in a region that was a United States territory.

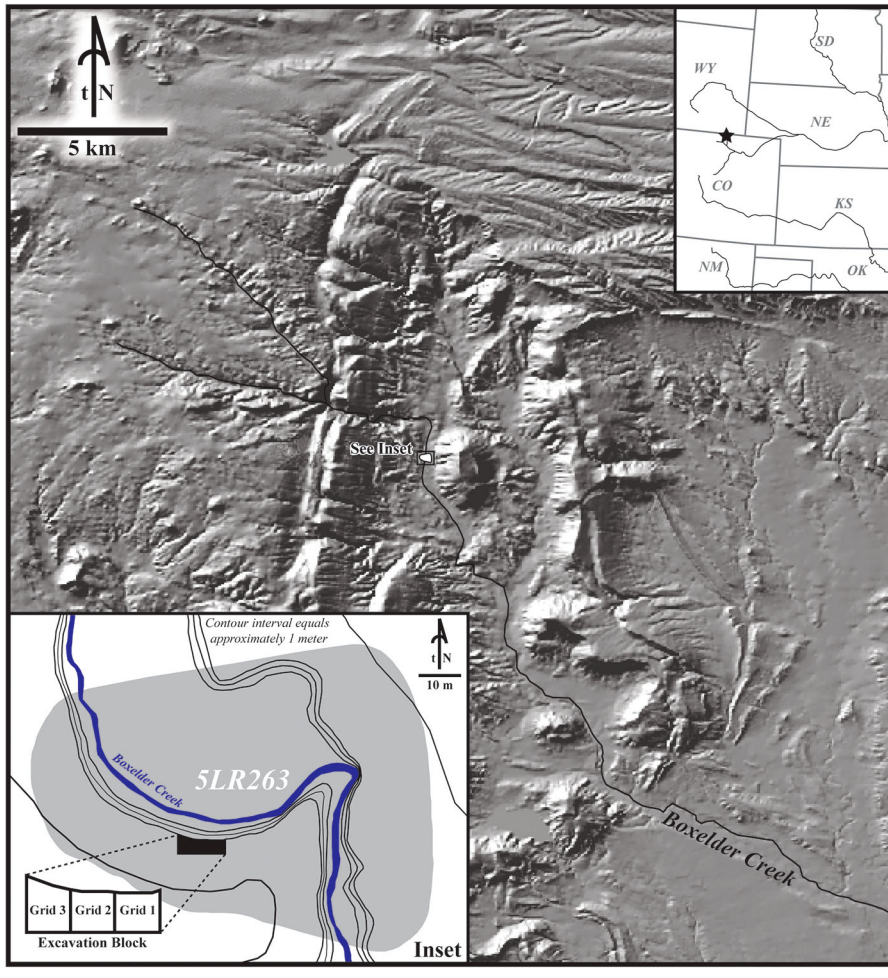

FIGURE 1 Digital elevation map of Lykins Valley site area local topography with site plan map inset.

high hogback. These plains are part of the Colorado Piedmont region of the Great Plains, an area formed by eroded Tertiary deposits, which covers much of eastern Colorado (Trimble 1980). Five kilometers north of the site is the beginning of a west to east trending upland scarp, which separates the Colorado Piedmont from the High Plains (Trimble 1980). Immediately west of the site are the eastern slopes of the Laramie Mountains. This plains-footlhills ecotone supports high biological diversity while a dramatically different environmental setting is encountered a few kilometers in either direction of the site. The plains-foothills ecotone would have protected the site occupants from experiencing weather extremes, common in the mountains and plains especially during the cold season (Travis 1988:171). The location of mounted Plains groups in this ecotone, especially during the cold season as argued below, was a product of the shelter and resources that these regions offered (Wedel 1963:9).

The Lykins Valley site is located in alluvial deposits of the first terrace above the current channel of Boxelder Creek (Figure 1). The site was discovered during a 1972 to 1973 survey of the Boxelder Creek drainage undertaken by archaeologists from Colorado State University (Morris et al. 1975). A resurvey of the site surface in 1974 revealed European-derived trade good artifacts in one area, where a block excavation was dug later that spring (Ohr et al. 1979). Along with the surface finds, trade items were found in the top two excavated levels of the block. The excavations also produced lithic and faunal artifacts including in situ horse bone and obsidian flakes.

Based on the stratigraphy and artifact content, the excavators suggested that in addition to the surface trade goods, two stratigraphic units contained postcontact occupations. However, several aspects of the assemblage and archaeological context have led the author to reinterpret the two postcontact stratigraphic units as representing a single occupation (Newton 2008:22–26). This determination is based on the stratigraphic proximity of the units, homogeneity of the overall trade good assemblage, taphonomic aspects (e.g., weathering) of the faunal assemblage, conjoined and refit artifacts between the levels, and statistically contemporaneous radiocarbon dates. Furthermore, a planview map of the excavation block collapsing the two stratigraphic units onto a single occupation layer shows very little spatial overlap between the two units, representative of a single, likely seasonal occupation on what was a sloping surface (Newton 2010:73). The artifacts and ecofacts analyzed here include only those unambiguous postcontact trade items from the surface and the absolute dated postcontact stratigraphic units.

Analysis of faunal assemblage

Analysis of the postcontact faunal assemblage at 5LR263 suggests that the site occupants were using at least three different pronghorn-sized or larger taxa (excluding horse) as a food resource with an MNI (minimum number of individuals) of seven (Table 1). Bison (*Bison bison*), mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) skeletal elements represent the main prey species procured for consumption by the occupants of the site. Horse (*Equus caballus*) remains (represented by a distal metapodial fragment and distal scapula fragment) were identified as well, but they are largely excluded from the consumption analysis given the small number of specimens in the assemblage (Table 2). Although there is limited evidence of horse consumption following the introduction of European horse stock (cf., Johnson 1987), the archaeological and historical evidence suggesting that horses were consumed on the same scale as other plains ungulates is sparse. Archaeological evidence indicates that Plains Indian groups treated these animals differently than game animals (Newton 2008:46).

Skeletal element representation and minimal animal units (MAU) show that all skeletal portions (i.e., axial, appendicular [for undifferentiated forelimb or hind limb specimens], forelimb, hind limb, cranial) are represented in the larger mule deer and bison assemblages. The low MAU values mirror the low MNIs, but, again demonstrate that the assemblage represents the remains of relatively complete

TABLE 1

ANIMAL SPECIES REPRESENTED IN THE LYKINS VALLEY SITE FAUNAL ASSEMBLAGE

Scientific name	Common name	NISP*	NOST†	%NISP	MNI‡
Bison bison	Bison	281	415	69.7	3
Odocoileus/Antilocapra	Deer/pronghorn	39	70	9.7	1
Odocoileus hemionus	Mule deer	31	31	7.7	3
Antilocapra Americana	Pronghorn	5	5	1.2	1
Equus caballus	Horse	2	2	0.5	1
Mammalia	Unknown mammal	41	997	10.2	1
Rodentia	Unknown rodent	4	7	1.0	1
Aves	Unknown bird	0	6	0.0	1
	Total	403	1,533	100.0	

*Number of identified specimens (see Lyman 1994).
†Total number of specimens (see Byerly and Meltzer 2005).
‡Minimum number of individuals (see Lyman 1994).

animals (Table 2). The elemental frequencies and statistical analysis indicate that the skeletal elements brought to the site represent complete carcasses, supporting equestrian transport of relatively complete animals.

Using the Shannon evenness index (see Faith and Gordon 2007 for formula) to quantitatively assess the different transport strategies as defined by Binford (1978) supports whole carcass transport given that the value for bison ($E = 0.915$) falls between the bulk transport value ($E = 0.980$) and the unbiased transport value ($E = 0.842$; values from Faith and Gordon 2007:875). The combined mule deer/pronghorn value ($E = 0.883$) is closest to the unbiased transport strategy. In both cases, the evenness measure indicates a strategy that would support the use of equestrian means of carcass transport.

Using a contingency table statistic (G-score), quantitative analysis of the skeletal portions of bison, deer/pronghorn, and complete ungulate skeleton indicates a significant difference in distribution of portions ($G = 18.917$, $df = 8$, $p = 0.015$). However, a Freeman–Tukey deviate analysis, which identifies cell values that are significantly larger or smaller than what would be expected by the null hypothesis, indicates that like the general ungulate skeleton, bison portion is evenly represented (at $\alpha = 0.05$), and the combined deer/pronghorn are underrepresented axially, but overrepresented cranially and in the hindlimb elements.

Of the 1,533 specimens from the postcontact assemblage, 1,317 (85.9 percent) exhibit green bone fractures. Fragments that are less than 5 cm in length with green bone breakage compose 50.5 percent of the total assemblage. This degree of fragmentation could point to processing intensity of the ungulate assemblage. Additionally, 68 impact cones and 124 impact flakes were recorded, but cutmarks or chopmarks were limited to six specimens. The impacts and breakage evidence demonstrates that butchering occurred on-site and suggests marrow and possibly bone grease extraction.

TABLE 2

IDENTIFIED SKELETAL ELEMENTS IN LYKINS VALLEY SITE UNGULATE FAUNA

Common name	Skeletal element	NISP*	MNE†	MAU†	%MAU
Bison	Cranium – CR	12	2	2.00	100.0
	Mandible – MR	12	3	1.50	75.0
	Maxillary molar – MMX	1	1	0.17	8.3
	Maxillary premolar – PMX	1	1	0.17	8.3
	Incisor – IC	6	1	0.17	8.3
	Cervical vertebra – CE	1	1	0.20	10.0
	Thoracic vertebra – TH	2	2	0.14	7.1
	Lumbar vertebra – LM	4	2	0.40	20.0
	Rib – RB	125	3	0.11	5.4
	Scapula – SC	4	1	0.50	25.0
	Humerus – HM	18	1	0.50	25.0
	Radius – RD	6	1	0.50	25.0
	Ulna – UL	3	2	1.00	50.0
	Metacarpal – MC	3	1	0.50	25.0
	Intermediate carpal – CPI	1	1	0.50	25.0
	Radial carpal – CPR	1	1	0.50	25.0
	Fused 2nd & 3rd carpal – CPS	1	1	0.50	25.0
	4th carpal – CPF	1	1	0.50	25.0
	Femur – FM	16	2	1.00	50.0
	Patella – PT	1	1	0.50	25.0
	Tibia – TA	24	3	1.50	75.0
	Lateral malleolus – LTM	2	2	1.00	50.0
	Metatarsal – MT	2	1	0.50	25.0
	Os coxae – IM	3	1	1.00	50.0
	1st phalanx – PHF	2	2	0.25	12.5
	2nd phalanx – PHS	1	1	0.13	6.3
	3rd phalanx – PHT	6	4	0.50	25.0
	Proximal sesamoid – SEP	1	1	0.06	3.1
	Distal sesamoid – SED	1	1	0.13	6.3
Deer/pronghorn	Molar – MUN	1	1	0.08	16.7
	Lumbar vertebra – LM	1	1	0.20	40.0
	Rib – RB	17	2	0.07	14.3
	Carpal – CP	1	1	0.10	20.0
	Tibia – TA	2	1	0.50	100.0
	Fused central and 4th tarsal – TRC	3	1	0.50	100.0
	Metatarsal – MT	2	1	0.50	100.0

Continued

TABLE 2

CONTINUED

Common name	Skeletal element	NISP*	MNE†	MAU‡	%MAU
	1st phalanx – PHF	1	1	0.13	25.0
Mule deer	Cranium – CR	5	2	2.00	100.0
	Mandible – MR	5	3	1.50	75.0
	Antler – ANT	3	3	1.50	75.0
	Incisor – IC	1	1	0.17	8.3
	Costal cartilage – CS	3	2	0.07	3.6
	Humerus – HM	2	1	0.50	25.0
	Radius – RD	1	1	0.50	25.0
	Metacarpal – MC	1	1	0.50	25.0
	Tibia – TA	7	3	1.50	75.0
	Calcaneus – CL	1	1	0.50	25.0
	Metatarsal – MT	1	1	0.50	25.0
	Metapodial – MP	1	1	0.25	12.5
Pronghorn	Humerus – HM	1	1	0.50	100.0
	Tibia – TA	1	1	0.50	100.0
	Calcaneus – CL	1	1	0.50	100.0
	1st phalanx – PHF	2	2	0.25	50.0
Horse	Scapula – SC	1	1	0.50	100.0
	Metapodial – MP	1	1	0.50	100.0

*Number of identified specimens (see Lyman 1994).
†Minimum number of elements (see Lyman 1994).
‡Minimum animal units (see Lyman 1994).

Basing age on first molar eruption two juvenile bison mandibles, represent animals less than 6 months old at the time of death. Comparison with modern specimens indicates that these animals were 4–5 months old at the time of their demise. Using late April to early May as a generally accepted calving period (Cooper 2008:103), this places the time of death from August to October. The faunal assemblage also contains a mule deer frontal cranial bone with the small pedicle of an immature animal less than 3 years of age. The disintegrating ring of bone on the pedicle indicates that the animal was getting close to shedding its antler. Mule deer generally shed their antlers in January, so this places the time of death slightly before that time. Using bison and mule deer evidence as approximations indicates that the site was occupied at least from late summer into the winter.

The presence of at least one, possibly two horses (based on $\delta^{13}C$ difference between the two elements) at the site is evidence that horses were a part of the post-contact occupation at 5LR263 (Table 3). The ^{13}C isotopic ratios of the two horse elements when compared to a larger sample of ^{13}C isotopic values from horse and bison bone throughout the Great Plains suggests that the horse scapula is from an

TABLE 3

RADIOCARBON ASSAYS AND ISOTOPIC DATA FROM THE LYKINS VALLEY SITE

Sample	Level	Depth (cm)	Description	Material	Reference	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	BP
UGa – 816	1	0–5	Thermal feature	Charcoal	Ohr et al. (1979)			250 ± 85
Beta – 220556	1		Horse metapodial	Collagen	Newton (2008)	–11.9		170 ± 40
UGa – 813	2	5–10	Thermal feature	Charcoal	Ohr et al. (1979)			210 ± 95
Beta – 220557	2		Horse scapula	Collagen	Newton (2008)	–16.9	7.1	150 ± 40
Beta – 220558	2		Bison mandible	Collagen	Newton (2008)	–8.7		240 ± 40

animal which has foraged in the site area, whereas the metapodial is indicative of an animal that foraged much further north (Newton 2010:76–77).

The two bison calves (about 90 kg each), at least one mature bison (about 591 kg), three mule deer (about 95 kg each) and one pronghorn (about 58 kg) would have conservatively provided about 668 kg of meat (meat weight = $\Sigma MNI_s(0.60)$ (live weight), White 1953). The amount of usable meat, based on the MNI, may not have supported the caloric needs of a large group through the winter, but could very well have been consumed by a small group throughout the postulated occupation period and certainly when the marrow and bone grease are added to the totals. The meat alone would have provided five people 1.8 kg (4 lb) of meat a day for 74 days.

The faunal analysis indicates that the occupants at 5LR263 were processing and utilizing animals to fully extract the available nutrients. The evidence supports a scenario in which a small group of people wintered in Lykins Valley and was at least partially sustained by meat, marrow and likely organs from at least seven animals that were brought into the site. The use of the horse may have eased some of the previous pedestrian logistical constraints, but overall the signature of the processing and utilization of the animals is reminiscent of prehistoric use based on the degree of fragmentation and evidence of widespread marrow extraction.

Analysis of lithic assemblage

Perhaps the most compelling evidence for the persistence of Native precontact technologies at the Lykins Valley site can be found in the lithic artifacts. Aside from obsidian flakes (discussed below), the vast majority and potentially all of the lithic material in the Lykins Valley assemblage is derived from local (<10 km) sources. The local source areas include primary sources (Beausoleil 1996; Coffin 1951; Self 1950) and secondary sources, both of which are within 10 km of the site. The Dakota and Morrison formations are within 2 km of the site (Courtright and Braddock 1989) and there are small cobbles of toolstone available in the immediate site area, especially along the Boxelder Creek thalweg.

The vast majority of the debitage ($n = 613$) is composed of flaking debris, and small tertiary flakes (≤1 cm maximum dimension; 81.2 percent) dominate the

debitage assemblage. Based on Andrefsky (2007:393–94) the assemblage represents of a full reduction sequence, most similar to flake production profiles. The small tertiary flakes in the assemblage are likely the byproducts of two activities: the late-stage production of stone into tools, and resharpening events. Both late-stage tool manufacture (e.g., pressure flaking for edge shaping) and the maintenance of existing tools can produce nearly identical flakes. The length of the occupation would have necessitated many episodes of tool manufacture, retouch, and resharpening, reflected in the high frequency of small tertiary flakes.

Abundant secondary sources in proximity to the site would have provided ample opportunities to acquire raw materials. Along with a lack of evidence for formal (versus flake) tool production, this use of available materials could point to a small foraging radius which supports a possible winter camp scenario where mobility would have generally decreased due to weather. A more expedient strategy of raw material acquisition and tool manufacture and use implies a group that was settled down for the winter and buttresses the inference from faunal evidence of highly processed animal remains and seasonality. Increased evidence of expediency, as noted elsewhere on the Plains in post-horse contexts, could have been the result of the adoption of the horse and consequent increased transportation capabilities (Hudson 1993:275). Another aspect of this occupation that indicates a persistence in precontact materials use is the presence of non-local materials that indicate ties to other regions.

Three pieces of obsidian from the postcontacts levels were sourced to the Jemez Mountains in northcentral New Mexico, specifically the El Rechuelos Rhyolite (Jason LaBelle, personal communication 2006), from Polvadera Peak (Baugh and Nelson 1987:317–18). El Rechuelos and other New Mexico obsidian sources are common in late period and postcontact contexts throughout the Southwest and Southern Plains (Baugh and Nelson 1987; Shackley 2005). The location of the Lykins Valley site is at the northern range of obsidian from the Southwest and the occurrence of El Rechuelos obsidian indicates trading or ties with groups in the Santa Fe area.

Along with the flaking debris, the chipped stone assemblage includes a small sample of stone tools (Figure 2). Five endscrapers recovered from the site cannot be statistically differentiated (using *t*-tests at $\alpha = 0.05$) bases on length, width and thickness from a sample of unusually large postcontact endscrapers from the Little Deer Site ($n = 27$; 43CU10) in Oklahoma (Hofman 1978). Elsewhere, based on postcontact Wichita assemblages, the increase in overall endscraper size is a technological shift postulated to eliminate hafting, consequently lessening tool manufacture costs significantly in response to increased hide preparation for European trade (Odell 1999:419; Vehik et al. 2010:159–62).

The two arrow points recovered from the postcontact component of the site are typologically similar to points found in late contexts elsewhere. A tri-notched arrow point was recovered from the subsurface along with another point of the same type. The latter is currently missing from collection, but the type can be identified from an existing photograph. Points of this type were recovered from Plains Village sites and Dismal River surface sites (Strong 1935:88–90), as well as elsewhere on the Northern Plains (Kehoe 1966:832–34). Such points were also

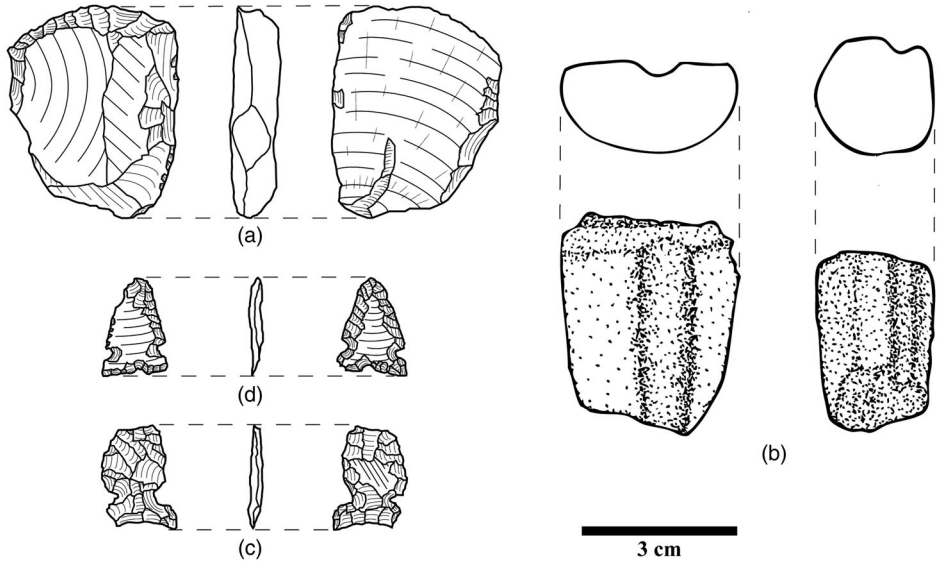

FIGURE 2 Endscraper (a), grooved abraders (b), and arrowpoints (c and d) from Lykins Valley site.

recovered on the Northwestern Plains in association with glass trade beads (Frison 1991:122–23), metal fragments, and horse bone at an eighteenth century campsite (Buff 1983:16), and in a bison bonebed that post-dates the fifteenth century (Frison 1970; Newton 2011:59).

The persistence of bow and arrow technology into the post-gun era is not unexpected. Early trade muskets were of poor quality and Native Americans were generally unable to obtain enough gunpowder and lead to use them for hunting. Even with adequate supplies, the bow and arrow was a much better weapon for horseback hunting than the musket, which Native Americans rarely used before 1860 (Ray 1998). Two fragments of U-shaped groove abraders also attest to the persistence of arrow manufacture despite evidence of firearms (see below). The U-shaped groove widths of the two specimens (6.93 mm and 8.85 mm) indicate that the grooves are within the range of arrow shaft diameter values from a sample of North American ethnographic and archaeological specimens (Thomas 1978).

When compared to the overall lithic assemblage debitage, especially the small tertiary flakes, the limited amount of tools at Lykins Valley suggests that the site was a small camp where limited tool production took place, and that more technologically invested complex tools were brought to the site from elsewhere and curated to prolong use. These attributes, along with acquisition of trade items, may indicate that site occupants were less reliant on lithic technology than a precontact group. However, the presence of formal tools, such as arrow points and endscrapers, suggest that lithic tools were still economically important. The presence of abrading stones and endscrapers attests to activities other than flintknapping were taking place at the site, again pointing to a relatively longer occupation.

The tool classes missing from the site, such as bifacial knives and drills, could simply represent off-site use or discard, but the abundance of butchered faunal remains mitigates against this explanation, and could support the use of edged metal tools. The latter assertion can be tested through future microscopic examination of the cutmarks noted in the faunal analysis (Pollio 2009). Additionally, there is mention of a metal artifact in the report that was described as a possible knife fragment (Ohr et al. 1979:30), but was unfortunately not found in the extant collection.

European-derived trade goods

Artifacts of European or Euroamerican manufacture recovered from the Lykins Valley site, along with aboriginal incorporation of these items and technologies, perhaps provide the most prominent evidence of the first-order (i.e., after contact) timing of the occupation. The trade good assemblage includes a single gunflint, 458 glass beads, brass kettle parts, a tinkler cone, a fragmented clay pipe and metal fragments (Figure 3). The horse remains, mentioned earlier, are included in this discussion as an introduced European-derived species. These items provide ample evidence of contact with European culture and the incorporation of the new technologies into native systems.

The single gunflint recovered at the site is a flake gunflint of English origin. The dimensions of this gunflint suggest that it was manufactured for a trade musket (Hamilton and Emery 1988:21) and the toolstone is a dark gray chert that

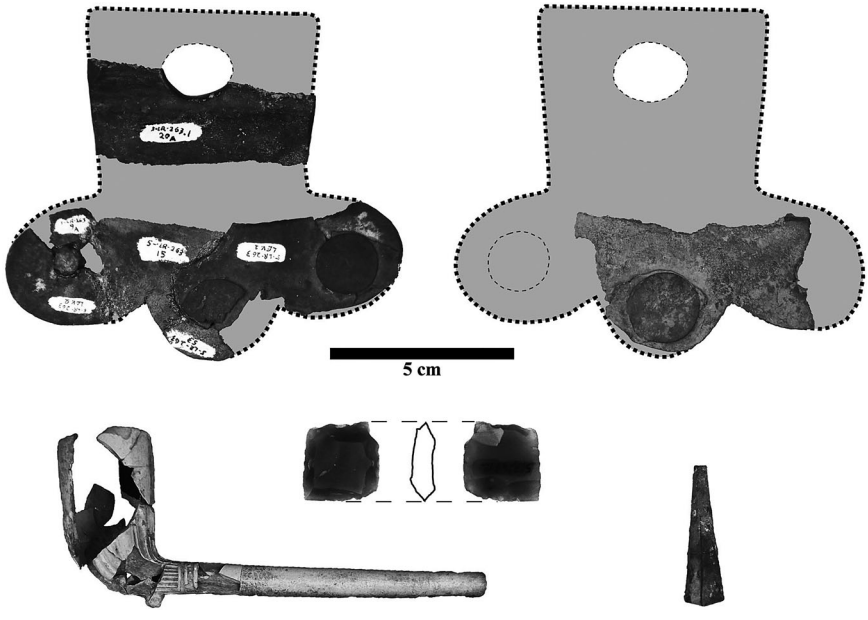

FIGURE 3 European-derived trade goods from the Lykins Valley site. Top row – kettle fragments, bottom row (left to right) – clay pipe, gunflint, tinkler cone.

matches descriptions of English flint (Hamilton and Emery 1988:13) that is macroscopically similar to Brandon flint. The manufacture of this type of English gunflint involves placing long flint blades onto a chisel edge and then striking with a chisel edged hammer to detach the gunflint (Witthoft 1966:36). The striking of the flint in this manner left the gunflint end with a partial positive bulb of percussion known as a 'demicone.' Since this manufacturing technique was not developed by the British until after 1780 (Witthoft 1966:36), the presence of this type of gunflint at the site provides an absolute last date for the occupation of 5LR263. For example, Fort Michilimackinac, located on the Straits of Mackinac, which was abandoned by the British in 1781, contains no English flake gunflints of this type (Hamilton and Emery 1988:244).

The kettle fragments recovered from the site appear to be from British or French sources. There are nine fragments of cast brass, some with brass rivets and sheet brass still attached, that form portions of at least two kettle lugs (or bail ears) and probably represents a single vessel. The kettle lugs match specimens recovered from the Trudeau Site (occupied from 1731 to 1764) in central Louisiana (Brain 1979:164–65) and the Gilbert Site in northeastern Texas (occupied from about 1740 to 1770; Jelks 1966:105–07). Based on a complete kettle recovered from the Little Rock Falls of the Granite River on the Minnesota/Ontario border, the Lykins Valley site kettle(s) had a 30.5 cm opening and held about 11.4 l (Wheeler et al. 1975:63–64). The presence of kettles of this type at the Trudeau and Gilbert sites suggests that they are of French origin. Association of this kettle type at Little Rock Falls with English artifacts (Wheeler et al. 1975:63–64) and the documented use of French-made kettles by both the English and the French at Fort Michilimackinac (1715 to 1781) demonstrate a multinational usage (Stone 1974:175). Continued research into published reports of excavated postcontact archaeological assemblages from the Great Plains and adjacent Rocky Mountain regions has failed to produce kettle specimens of this type.

Nineteen clay pipe fragments were found during the excavations, all of which refit to form a single incomplete specimen. The pipe is made from kaolinite or white ball clay and its stylistic elements and morphometry are nearly identical to CP Half Rib pipes, that Pfeiffer (2006:121–22) analyzed from Fort Union (1829 to 1867) located at the confluence of the Missouri and Yellowstone rivers. However, the Lykins Valley pipe lacks some of the stylistic elements, including lettering (i.e., CP) and raised lines, described by Pfeiffer for the Fort Union specimens and, given the current condition of the specimen, it is uncertain whether these elements were ever present. The Lykins Valley site specimen matches specimens illustrated by Articus (1997:10–13), some of which carry the CP moniker that has been linked to German pipe manufacturer Johann Carl Christoph Pabst who made pipes between 1814 and 1880 (Micheal Pfeiffer, personal communication 2014; Sudbury 2009). Pipes generally matching the shape and stylistic elements of this type are reported from four sites: Fort Michilimackinac (Peterson 1963:3); Like-a-Fishhook Village, a fortified location on the Missouri River in North Dakota, occupied in the mid- to late-nineteenth century by the Hidatsa, Mandan and Arikara (Smith 1972:78); Fort Laramie (1834 to 1849), located on the North Platte River (Wilson 1971); and Bent's Old Fort (1834 to 1849), located on the Arkansas River (Moore 1973). The Lykens Valley

pipe suggests a link to a fur trade post. Though pipes are rarely found at Native American sites in the region, clay pipe fragments of a similar type were recovered from a Native camp in the Little Snake River drainage of Wyoming (Newton 2012), and pipe fragments have been recovered at eighteenth and nineteenth century Indian villages in the Mississippi River drainage (Good 1972; Wagner 2001).

The 458 complete and partial glass beads recovered from the site include both those manufactured by drawing and by winding (see Billeck 2010; DeVore 1992; Kidd and Kidd 1970). Based on the classification system developed by Kidd and Kidd (1970), the drawn beads are composed of white, blue, and black type IIa, a blue type IIIf, and the wound beads are composed of a white and green type WIc (Table 4). As an assemblage from an open camp, the number of beads recovered at the Lykins Valley site is quite large compared to other regionally known non-burial or non-trade fort assemblages (von Wedell 2011). However, the total Type IIa bead assemblage, if gathered onto a square of cloth in an attached position, would only fill an area of 13.21 cm^2 (3.64 by 3.64 cm), indicating that these beads represent the loss or discard of a single decorated item.

Glass beads from the postcontact and historic periods are found throughout the Great Plains, as the trade of and use by Plains Indian groups was widespread. In her analysis of Pitchfork Rockshelter (48PA42), a burial from northwestern Wyoming, Scheiber (1994) uses characteristics of the type IIa bead assemblage (n = 1034), including the limited assortment of colors, a wide range of variation in the measurements of outer diameter, and inner diameter and length to assess a date range of 1800 to 1840 for the beads, and a date of about 1810 for a burial. The Lykins Valley type IIa assemblage cannot be statistically differentiated (using t tests) from the Pitchfork assemblage based on comparison of outer diameter, inner diameter, and length (Table 5). Based on relative frequencies, both assemblages are most populated by white beads, followed by blue, and then black; the Pitchfork Rockshelter assemblage also contains a minor amount (8 percent) of red-on-white compound drawn beads (Scheiber 1994:37). The presence of red-on-white compound drawn beads conflicts with the 1810 burial date, however, as this bead

TABLE 4

GLASS BEAD FREQUENCIES

Complete	Incomplete	Total
431	27	458
Type	Color	Number
IIa	White	239
	Blue	211
	Black	4
WIc	White	2
	Green	1
IIIf	Blue	1

TABLE 5

SUMMARY STATISTICS FOR TYPE IIA BEADS FROM THE LYKINS VALLEY SITE

Dimension	*n*	*M*	Median	Mode	*s*	s^2	Minimum	Maximum	Range
Outer diameter	427	2.68	2.61	2.76	0.42	0.17	1.27	4.10	2.83
Length	427	1.94	1.90	1.82	0.41	0.17	0.96	3.45	2.49

type does not appear in well-dated contexts on the Plains until the late 1830s (Billeck 2008). The lack of this type of bead in the Lykins Valley site assemblage implies acquisition prior to the late 1830s.

Published date ranges from 46 sites containing beads found on the Northern and Southern Plains (Billeck 2010; Brain 1979; Carlson 1979; Davis 1973; Harris and Harris 1967; Ross 2000) provide comparative ranges against which the matching bead types from the Lykins Valley assemblage can be compared (Table 6). The date ranges from Great Plains sites where IIIf type beads were found provide a maximum range of 1777 to 1867, but other than the Hill Site of Nebraska (dated between 1777 and 1815), this bead type is not found in pre-1820s contexts in the region and is a common nineteenth century bead. The application of regression formulas, derived primarily from glass torus-shaped bead diameter change through time, indicates that the bead sample from the Lykins Valley site dates to 1828 (von Wedell 2011:Table 6.1). In summary, the combined temporal data, statistical analysis, and assemblage characteristics on the Lykens beads from known dated sites indicate the beads can be comfortably placed within a core date range of 1815 to 1840.

TABLE 6

TEMPORAL DATA FROM PLAINS SITES WITH LYKINS VALLEY SITE BEAD TYPES

Type	Size*	Color	Northern Plains		*M*‡	Southern Plains
			Begin†	End		Earliest date**
IIa	Very small	White	1777	1885	1831	1767 to 1820
		Blue	1777	1838	1808	1780 to 1820
	Small	White	1650	1895	1815	1700 to 1740
		Blue	1650	1895	1815	1700 to 1740
		Black	1650	1895	1815	1700 to 1740
	Medium	White	1777	1857	1824	
IIIf	Medium	Blue	1777	1867	1822	1780 to 1820
WIc	Medium	White	1777	1867	1822	

*Outside diameter size classes from Kidd and Kidd (1970:66): very small = < 2 mm, small = 2–4 mm, medium = 4–6 mm.

†Temporal range values from Billeck (2010), Carlson (1979), Davis (1973), Ross (2000), but substituted a date range of 1834 to 1849 for Fort Laramie as this was when it was strictly a trading establishment and 1895 was used as a cut-off date for Sitting Crow Mounds to replace the 1890s date in order to calculate the mean.

‡Mean determined from the average date of occupation from each site where the bead type is present and rounded to the nearest whole year.

**Values from Harris and Harris (1967).

The items of European manufacture recovered at the Lykins Valley site not only provide information on the timing of the occupation, but also that the varied sources of manufacture for these items can help to understand the larger economic and social processes influencing the inhabitants of the Lykins Valley site. The gunflint is from an English source; the clay pipe appears to have been manufactured in Germany; and the kettle was likely manufactured by the French, but could have been a trade item possessed by either the French or English. Beginning in the late seventeenth century, the English and French traded and explored west into the Great Plains as they expanded out from the Great Lakes and to posts along the Mississippi River, and by late eighteenth century were an established presence in the Plains (Nasatir 2002; Ray 1998; Rogers 1990; Wood and Thiessen 1985). The Spanish had an even longer history in the region, having begun exploration of the Plains in the sixteenth century, establishing permanent settlements by the early seventeenth century (Webber 1992).

The gunflint indicates that the site was not occupied until after A.D. 1780. Further evidence from the bead assemblage, based on IIIf temporal data, indicates that these items were likely acquired after 1815 but before 1840, based on the lack of red-on-white compound drawn or cornelian beads. The bead dates indicate that this trade took place after French trade was effectively terminated in the region following the Louisiana Purchase of 1803. Trade with Euroamericans or the English is compatible with the date range as well as the British goods in the assemblage. Spanish traders were an active presence in the region prior to Mexican Independence (1821), and trade goods acquired from many different European sources could have passed through Spanish hands as well. The occurrence of this particular suite of trade items at the Lykins Valley site indicates its occupants had obtained highly valued trade items, such as trade muskets as made evident by the gunflint and the kettle(s) that strongly suggest connections to the north and east with the English or Euroamericans.

Spatial and temporal analysis

The mapped faunal sample is statistically different from the total faunal assemblage, based on expected frequencies within each skeletal portion ($\chi^2 = 43.02$, $df = 4$, $p < 0.005$). This is probably due to a bias towards larger-sized specimens in both in situ recovery and mapping protocols (if any). Analysis indicates that the mapped bone sample is not significantly different in the distribution between skeletal portions ($G = 30.488$, $df = 20$, $p = 0.062$), but there is a significant difference in the distribution of skeletal portions by grid ($G = 30.591$, $df = 8$, $p < 0.001$). Deviate analysis has forelimb and appendicular portions significantly over-represented in Grids 2 and 3. This may denote higher utility skeletal portions being processed and/or consumed around the central hearth. The overrepresentation of cranial elements in Grid 1 suggests that this lower utility carcass portion was less intensively processed and/or consumed in the areas immediately around the hearths and more readily discarded in the forward toss zone.

The spatial patterning of the mapped postcontact artifacts in the excavation block of the Lykins Valley site provides evidence of patterning (Figure 4). Analysis of this

patterning demonstrates that plotted artifacts are suggestive both qualitatively and statistically of a single annual occupation event. The trade goods (designated European in Figure 5) and faunal artifacts visibly appear as delineated clusters. A lack of evidence for architectural or habitation features in this small excavated block suggests that this was an outside hearth area, which appears very similar to the outside hearth model of Binford (1978:345–55). If in fact an outside hearth, it appears that the northern portion of this area was lost to erosion. Using modern regional climatological characteristics as an analog with the prevailing north to northwest wind, the faunal concentration could represent a forward toss zone if associated with the hearth in Grid 2, with the concentration of European trade goods representative of a drop or loss zone nearer the sitting or occupied area at the edge of the hearth.

Glass beads and the single tinkler cone comprise 87.7 percent ($n = 50$) of the 57 total plotted European goods. A G-score (a contingency table statistic similar to chi-square, Meltzer et al. 2006:163) analysis of the mapped artifacts by grid shows that significant differences exist in the frequencies of artifact types ($G = 66.876$, $df = 4$, $p < 0.001$). Freeman–Tukey deviate analysis (which identifies values that are significantly larger or smaller than expected) shows that bone and lithics are over-represented in Grid 1, whereas European items are over-represented in Grids 2 and 3. Under-representation of bone in Grid 2 and European items in Grid 1, support the interpretation that a discard area for bone and large debitage may be present in Grid 1 south of the hearths. The European items were probably lost rather

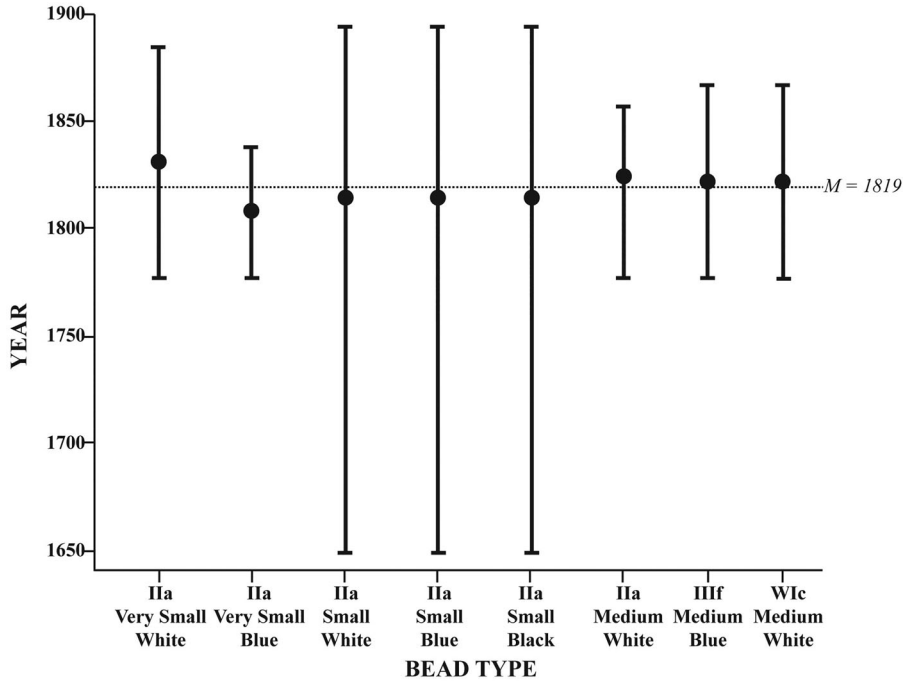

FIGURE 4 Plot of date ranges presented in Table 5.

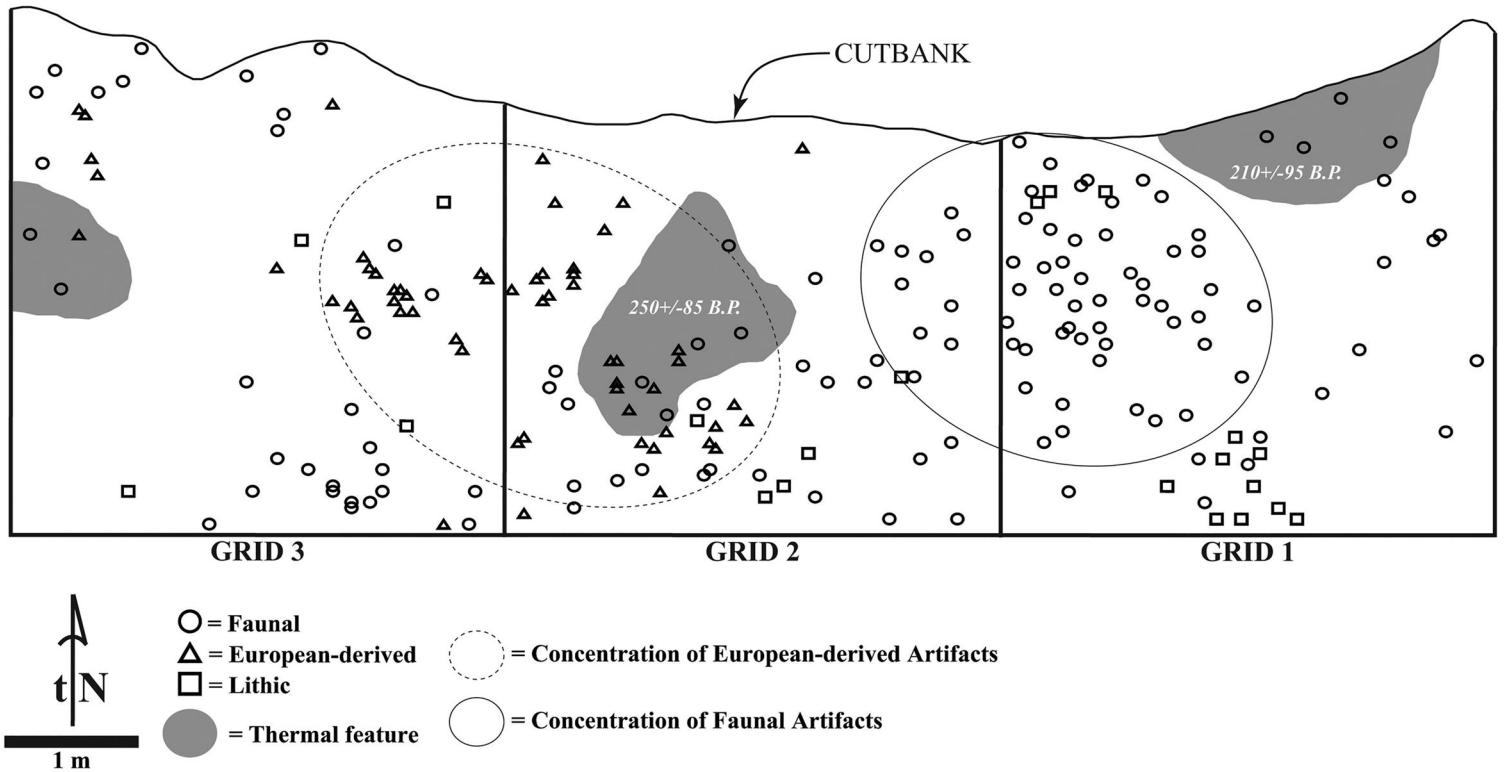

FIGURE 5 Planview map of excavation block at Lykins Valley site.

than actively discarded, the concentration of which, mainly on the north and northwestern sides of the hearths, is a good indication that this location was preferable to take advantage of the prevailing wind.

Following the onset of the sixteenth century, absolute dating via radiocarbon assay lacks precision due to fluctuations in the atmospheric carbon resulting in plateaus and reversals in the calibration curve (cf., Mitchell 2007:159). However, radiocarbon dating can be useful in certain contexts, especially in determining occupational or material contemporaneity, and resolving questions of potential contamination of site fauna by modern intrusive animal bone. Used in conjunction with site or regional specific temporal constraints (e.g., an absolute last date or Native group removal date), the probability curves affirm the temporal range provided by the items of European manufacture. Rather than ignore or refuse to radiocarbon date materials from postcontact sites, the inclusion of this data can provide another important line of evidence in quantifying the occupational history of these locales.

Radiocarbon dating of materials and features from the postcontact components of the Lykins Valley site provides additional data to place the site in a temporal context (see Table 3). The five dates are statistically contemporaneous ($\chi^2 = 3.347$, $p < 0.05$). When the date ranges are constrained by the absolute last date of 1780 and the date of 1868 when the last Native group (the Arapaho) left the area (Burris 2006:39), the calibrated probabilities of the radiocarbon dates provided are further refined (using Oxcal 4.0, Bronk 2001). As indicated, the average dates fall within a decade of the beginning of the nineteenth century (Table 7 and Figure 6). These dates are modeled probabilities and the central tendency suggests dates earlier than indicated by the artifact analysis. However, these modeled ranges overlap the temporal range provided by the artifacts. The ranges provided by the trade items, along with the radiometric data, suggest that the site was occupied in the first half of the nineteenth century, probably between 1815 and 1840.

TABLE 7

MODELED DATE PROBABILITIES

^{14}C date	Calibrated 2σ (95.4%) range			μ	σ	m
	From	To	Percent			
150 ± 40	1777	1846	95.4	1802	17	1800
170 ± 40	1777	1826	93.7	1799	15	1798
	1835	1844	1.7			
210 ± 95	1777	1840	95.4	1799	16	1796
240 ± 40	1777	1807	95.4	1793	9	1793
250 ± 85	1777	1826	95.0	1797	15	1795
	1838	1841	0.4			
Combined	1778	1806	95.4	1792	10	1792

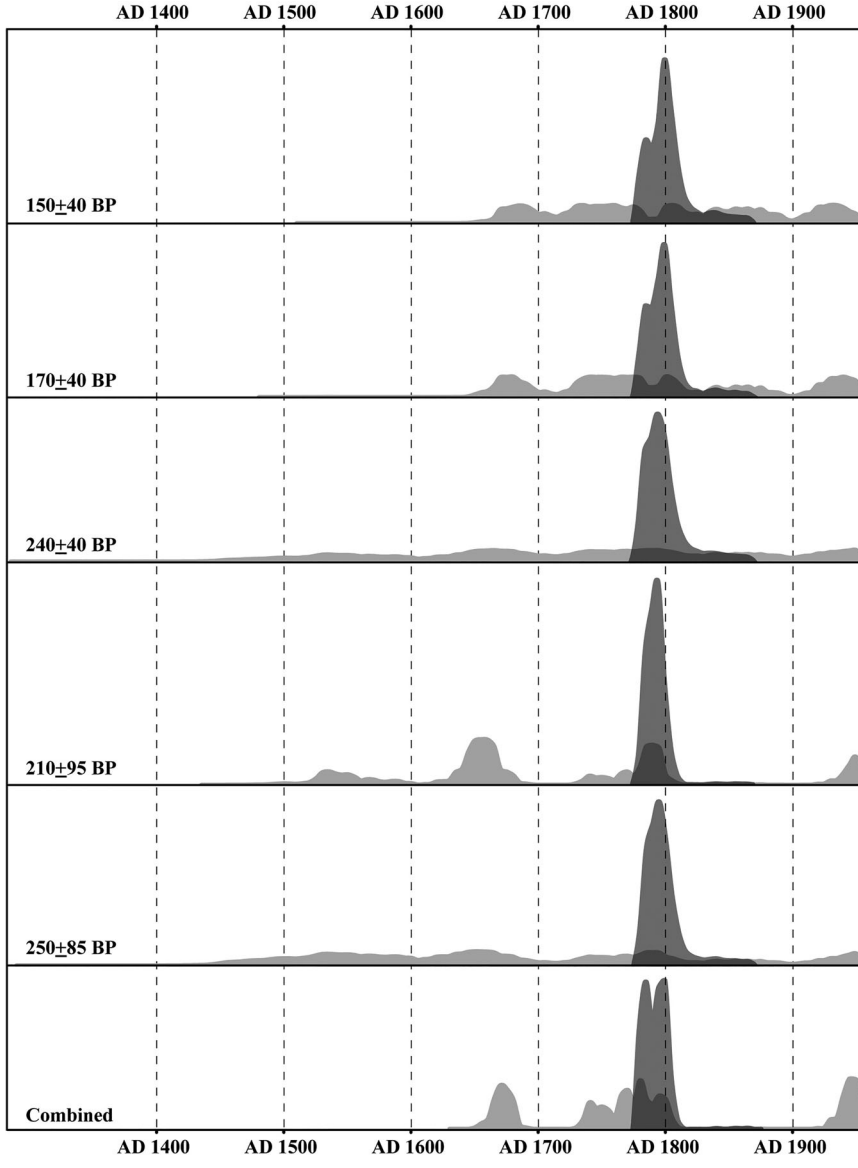

FIGURE 6 Calibrated two sigma calendar date probabilities (light gray) from the Lykins Valley site with modeled date probability (dark gray).

Discussion and conclusions

The Louisiana Purchase, which transferred possession of the Louisiana Territory to the United States, ushered in the era of Euroamerican exploration most prominently expressed in the western Central Plains by the expeditions of Zebulon Pike in 1806 and Stephen Long in 1820 (Goodman and Lawson 1995; Jackson 1966). These government sponsored expeditions increased Euroamerican knowledge of the area and

its indigenous inhabitants. Following acquisition of this land by the United States, the expulsion of the Spanish from New Mexico in 1821 opened the Great Plains to settlement and a fur and robe trade that marks the second quarter of the nineteenth century.

The Fur Trade Era (1807 to 1840) of the Missouri River drainage and Rocky Mountains was a time of increased and structured trade, often resulting in the establishment of permanent trading posts to facilitate this exchange largely in the mid- to late-1830s (Wishart 1992). This resulted in a huge influx of trade items over the previous postcontact era and a greatly increased availability through the numerous trading loci. Lacking beads dating later than the late 1830s and despite its small size, the Lykins Valley site trade good assemblage is diverse and has evidence of highly valued trade items which could be consistent with a Fur Trade Era occupation. Conversely, a lack of artifacts directly associated with trapping combined with the chipped stone assemblage and butchery practices demonstrates a significant indigenous cultural retention at the site, making it reasonable to conclude that Lykins Valley was occupied by a Plains Indian group.

Plains Indian groups during the postcontact period shifted territories as a result of many processes, including: disease, depopulation, encroachment of Euroamericans, and inter-tribal conflict. Because of the group movements and population shifts, there are many different indigenous groups known to have been in proximity to Lykins Valley that could have occupied the site. For example, traders Jules De Mun and August Chouteau were responsible for a rendezvous at the mouth of Cherry Creek on the South Platte that included Kiowa, Plains Apache, Arapaho, and Cheyenne in 1816 (James 1905:282; Marshall 1928:172–75). The Arapaho, in particular, used the Cache la Poudre Valley as a hunting ground historically, and often camped on Boxelder Creek (Watrous 1976 [1911]:15). The Arapaho, along with the Cheyenne, are the most associated with this region after the beginning of the nineteenth century. However, the Comanche, Pawnee, Lakota, Shoshone, and Ute are documented in the area, at least nominally, by the middle part of the nineteenth century (Newton 2008:130–31).

The characteristics of the postcontact assemblage at the Lykins Valley site indicate that the site was occupied by a group with at least indirect trade contact with Euroamerican groups and ties to the south as suggested by the obsidian. The group largely maintained a traditional subsistence while incorporating these European-derived goods and technologies. Analysis of the spatial data from the excavation block suggests an outside hearth-centered activity area, and the patterning of the artifacts likely reflects both discard and drop zones which conform to the prevailing wind direction. The faunal analysis indicates that at least seven animals were brought to the site between the late summer or fall into mid-winter. Other than one adult bison, these animals weighed less than 100 kg and could have been transported to the site as complete carcasses via horseback. The use of horses is also suggested by the transport analysis, which indicates a bulk or unconstrained strategy. Once at camp, the carcasses were intensively processed as evidenced by the high degree of bone fragmentation and presence of many impact flakes and impact cones. An overall lack of carnivore modification might result from the site

occupants exhausting all available bone nutrients or staying in proximity to the scrap bones and therefore limiting carnivore access.

The lithic assemblage has characteristics that also suggest an overwintering camp scenario. Specifically the assemblage is dominated by local material and tool maintenance or late-stage finishing debitage. A low proportion of formal tools suggests that the site occupants used previously manufactured tools and, although local material dominates the debitage, none of the formal tools appear to be made of locally available toolstone. The only definite exotic material found at the site was obsidian sourced to the Jemez Mountains in the Santa Fe region in northern New Mexico. The obsidian, whether acquired by trade or direct procurement demonstrates a link to the Southwest or even a Southern Plains group. The arrowpoints and grooved abraders are evidence of the persistence and importance of bow and arrow technology.

The gunflint, kettle, and pipe, likely of German, English, and/or French origin, establish trade or ties to the east and north. The typology of the gunflint indicates that it, and likely the rest of these items, was acquired sometime after 1780, whereas other characteristics of the trade good assemblage (e.g., bead sizes and colors) suggest they were acquired before 1840. The horse bone found in the assemblage denotes an equestrian people, which by the turn of the late eighteenth century is certainly to be expected in the region.

The historic accounts of European intrusion into the western Great Plains region are scanty at best. The documented accounts from the sixteenth through eighteenth centuries provide no evidence of Europeans impinging on the Lykins Valley region (Newton 2008). However, in the early nineteenth century, the area became a focus for exploration by the United States, and the subsequent Fur Trade Era saw an influx of European/Euroamerican trappers and traders. The 1830s witnessed the establishment of permanent trading posts in the region.

Native group affiliation for the site is hard to determine. Many groups are documented in the area throughout the late eighteenth and early nineteenth centuries. French and British trade goods, as well as the isotopic signature of the horse metapodial, suggest a more northern oriented trading group, perhaps the Arapaho or a northern contingent of the Cheyenne. Nearby Southern Plains influenced rock art (James Keyser, personal communication 2007; Steward 1992) and the obsidian source analysis are somewhat incongruous with the east to northeast trade good influence. Given the nebulous tribal territories, as well as the incursive nature of inter-tribal raiding and warfare, it is reasonable to expect contact, trade, or ties both north and south of Lykins Valley during this time. Cheyenne and Comanche had numerous interactions both to the south and northeast, as they appear to have been crucial players in the late eighteenth to early nineteenth century trade in the western Central and Southern Plains (Hämäläinen 1998; Jablow 1950). If the group at Lykins Valley was either Comanche or Cheyenne, the site occupation occurred during a time when these groups were probably at or near their economic apogee as far as controlling trade and equestrian might. Based on the postulated occupational timing, historically known territories and trade networks, trade goods, exotic material sources, and ancillary rock art data, the Cheyenne and

their close allies the Arapaho, as well as the Comanche, would appear to be the most likely occupants at the Lykins Valley site.

Found in a well-sheltered, hidden valley with ample water and ungulate forage, the site location demonstrates an intimate understanding of the local geography. The site occupants could have counted on access to deer, pronghorn, and bison, as well as forage and water for horses throughout the winter in a location proximal to the plains yet concealed from enemy horse raiders to the east. Lykins Valley throughout the eighteenth and early nineteenth century was in the hinterlands of a disputed territory where Spanish, French, and later Euromericans vied for control in a manner that, based on a lack of historic documentation, left Lykins Valley virtually untouched and unknown. The Lykins Valley site was occupied during a time when large portions of the western Plains were still largely unseen by Europeans and its archaeology documents a portion of Native history outside of the extant written record. The postcontact occupation chronicled in the archaeology at the Lykins Valley site is unique to the western Central Plains. Occupied in the early nineteenth century by an equestrian Plains Indian group whose material culture included both precontact and European-derived items, the site provides a window into an important, yet little known, time of Plains Indian history.

Acknowledgements

I would like to thank Jason LaBelle, whose input and encouragement are the impetus behind this work. Discussions and comments by Jared Orsi, Charles Reher, and Lawrence Todd have proved extremely informative. Mary Jo Newton provided much needed proofreading and editing. Many thanks to the two anonymous reviewers whose comments and critiques were well founded and informative. Any mistakes or shortcomings are my fault alone.

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