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DATING THE BEAR GULCH AND ATHERTON CANYON ROCK ART SITES, CENTRAL MONTANA

JAMES D. KEYSER, JOHN GREER, CARL DAVIS,
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AND GEORGE POETSCHAT

INTRODUCTION

The Bear Gulch (24FR2) and Atherton Canyon (24FR3) rock art site complexes,¹ are located in the foothills of the Little Snowy Mountains in central Montana. These sites were first recognized in the archaeological literature in 1960 when Ken Secrist published a short article describing some of the images he had observed during the previous two years (Secrist 1960). Both sites continued to be mentioned in the literature over the next 40 years (e.g., Conner 1962; Conner and Conner 1971; Loendorf 1990), due largely to the efforts of Stu Conner, but no in-depth study of either site was done, nor were detailed analytical efforts undertaken for the thousands of images.

The situation changed in 1999 when John and Mavis Greer visited the sites, recognized their considerable potential for yielding data about Montana rock art (Greer and Greer 2008), and began intensively photographing site images and presenting conference papers about various motifs found there—especially the numerous shield bearing warriors (Greer and Greer 2000, 2002). In 2000, the Greers introduced Jim Keyser to the sites and together they planned a multi-year

research project of recording and study. Thus, in 2005, we spent two weeks at Bear Gulch (and one afternoon at Atherton Canyon) and returned in 2007 for a ten-day period to finish recording at Atherton Canyon, conduct test excavation at Bear Gulch, and resolve recording-interpretation problems at Bear Gulch. As part of both projects, we obtained samples for radiocarbon dating of pigment and associated archaeological materials. We also discovered many items in the art itself that can be relatively securely dated based on known dates for their introduction and/or abandonment in the Plains archaeological record. This paper summarizes the current chronological information for both site complexes.

Bear Gulch (Fig. 1) has been known to the Lundin family for more than 90 years, when the grandparents of the current landowner, Macie Lundin Ahlgren, settled there in 1919. Rock art at nearby Atherton Canyon (Fig. 2) was noted by locals at about the same time. The sites occupy two steep-sided canyons, eroded by streams into a high limestone plateau that forms the north slope of the Little Snowy Mountains southeast of Lewistown. Both Bear and Atherton Creeks are headwater tributaries of the South Fork of McDonald Creek,

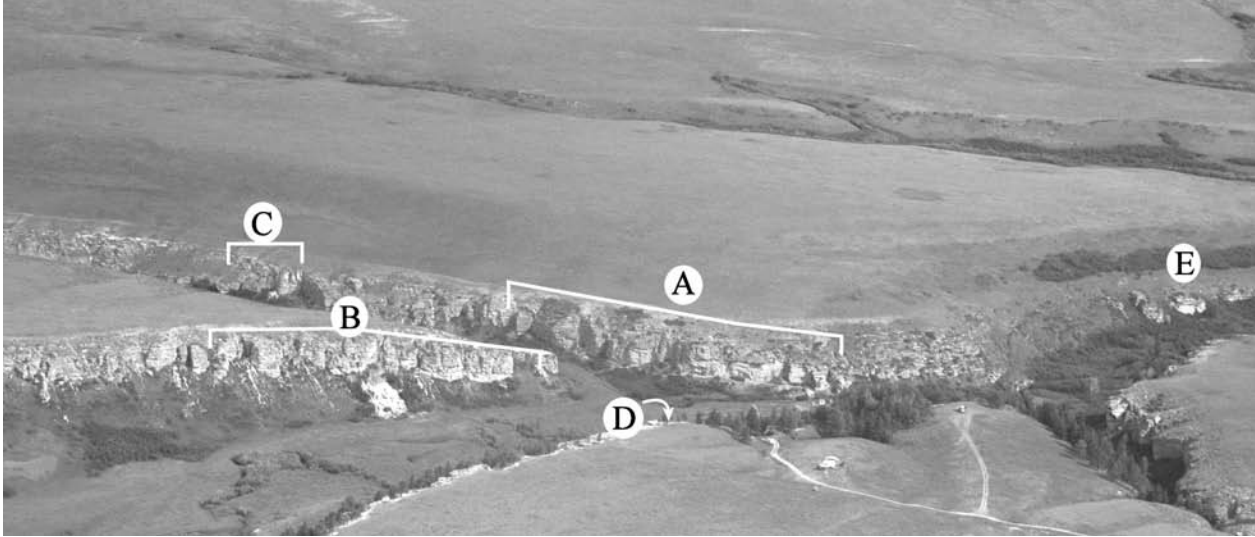


Figure 1: Aerial View of the Bear Gulch Site, Showing the 5 Locations with Rock Art. View Looking North.

a major stream flowing east through the town of Grass Range and ultimately to the Musselshell River. The South Fork McDonald Creek valley is a high, sheltered valley typical of parklands in the Rocky Mountain outliers that stretch from southern Alberta across central Montana and Wyoming and eastward to the Black Hills of South Dakota.

The Rock Art

Rock art at both site complexes consists of pictographs and a profusion of finely scratched petroglyphs, all drawn on vertical cliff surfaces and occasional horizontal shelves or the undersides of small projecting ledges. The fine-line engraved petroglyphs outnumber pictographs more than three to one at both sites. Only a few older petroglyphs are pecked. Most pictographs are drawn with red ochre and charcoal; only a few figures of liquid white, red, and yellow paint are present.

Over 3,200 figures have been recorded at Bear Gulch and Atherton Canyon. Most numerous are small engraved figures made by scratching the rock surface with a sharp tool, probably small chunks of chert that occur naturally in the limestone or broken chert flakes from flintknapping. The few older petroglyphs, predating the main corpus, are fully pecked (Poetschat et al. 2008:18).

Most pigmented figures are made by drawing directly on the stone surface using dry lumps of pigment—here termed *crayon* application as opposed to *liquid pigment* application where paint is applied with fingers or brushes. Red, orange, pink, and yellow ochre is plentiful in the characteristic central Montana limestone, and it is likely that dry crayon application was done with naturally-occurring pieces of ochre. Without chemical analysis, it is not known if processed crayons made from powdered ochre mixed with binders and/or extenders were used.

Most red and black pigment appears to have been applied dry, but for a small but significant number of images, these dry crayon lines were further modified by spreading or smudging the pigment with a finger or other object such as a small hide pad. In some cases, this may have involved wetting the object used to smear or smudge the paint or dampening the pigment itself, either by wetting the crayon or rubbing liquid directly on the drawn line. Such treatment produces the appearance of broader-line finger painting but without the “evenness of application” characteristic of actual finger paintings. This technique was often used to emphasize or differentiate various component fields of shield heraldry (Fig. 3).

Other paint appears to have been applied wet, either as a liquid or a paste. This was apparently made of powdered pigment (ochre, charcoal, or

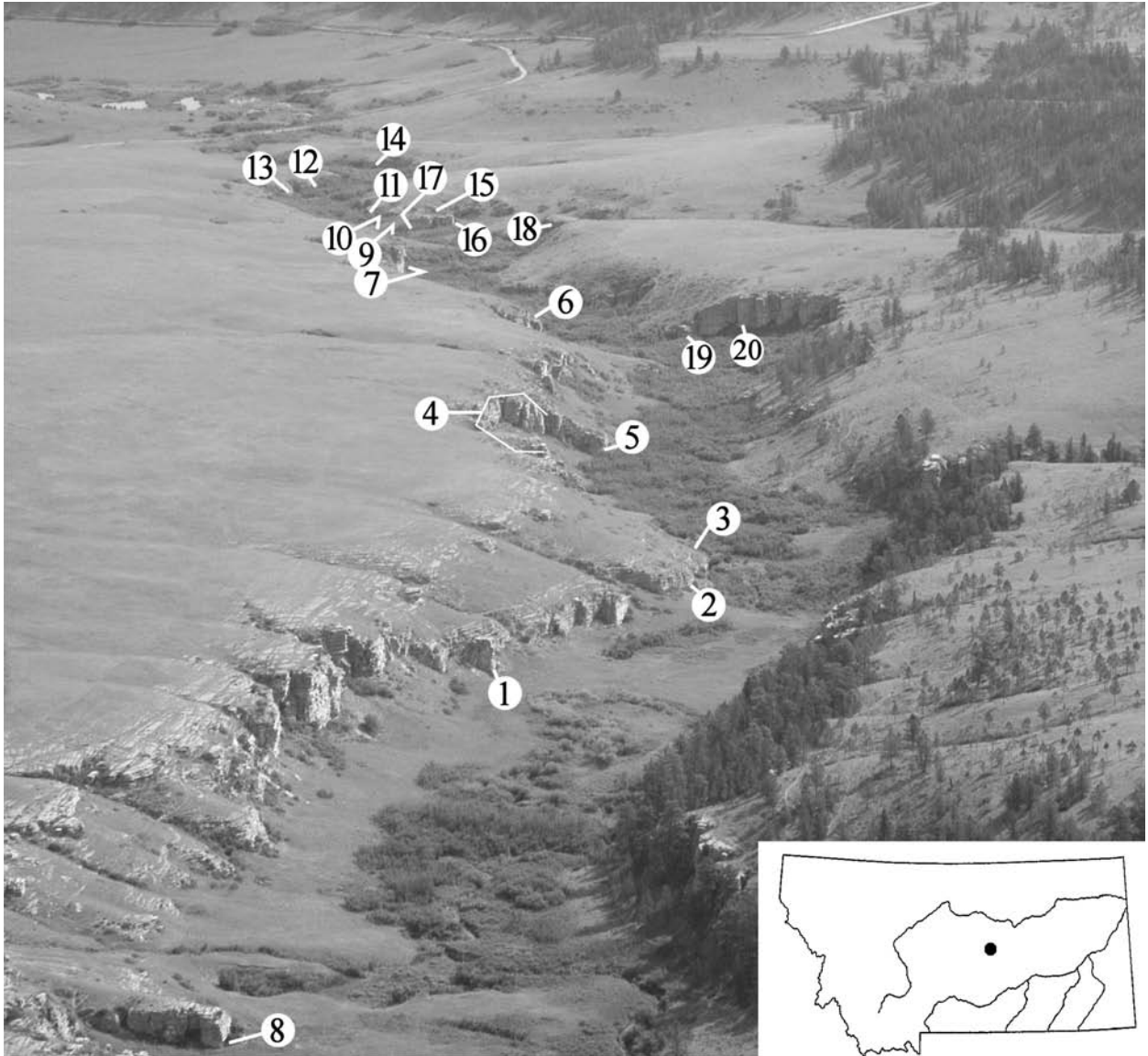


Figure 2: Aerial View of the Atherton Canyon Site, Showing the 20 Loci with Rock Art. View Looking Northeast. Note Clustering of Loci 7 and 9-18 at Lower End of Canyon. Inset Shows General Location of Bear Gulch and Atherton Canyon Sites in Montana.

other) mixed with some sort of wetting agent or binder. Dozens of substances, including saliva, water, urine, blood, egg white or yolk, fish eggs, rendered animal fat, and extracts from trees or plants have been noted in the ethnographic literature and used successfully in experimental efforts. An extender may also be combined with the pigment, but is not required. Red is the most common liquid pigment.

Fine-line figures of liquid paint, which show even application and distinct line edges, are assumed

to have been painted with a small brush of animal hair, frayed twig, or bone. Most wider lines were probably applied with a finger that was rubbed over the lines more than once to smooth the pigment. Broad-line, white painted images at Atherton Canyon show feathering at their ends and edges, indicating application by a brush. Finger painted images could have employed pigment in either liquid or paste form.

Individual panels at two Atherton Canyon loci and one Bear Gulch area show broad areas of wall

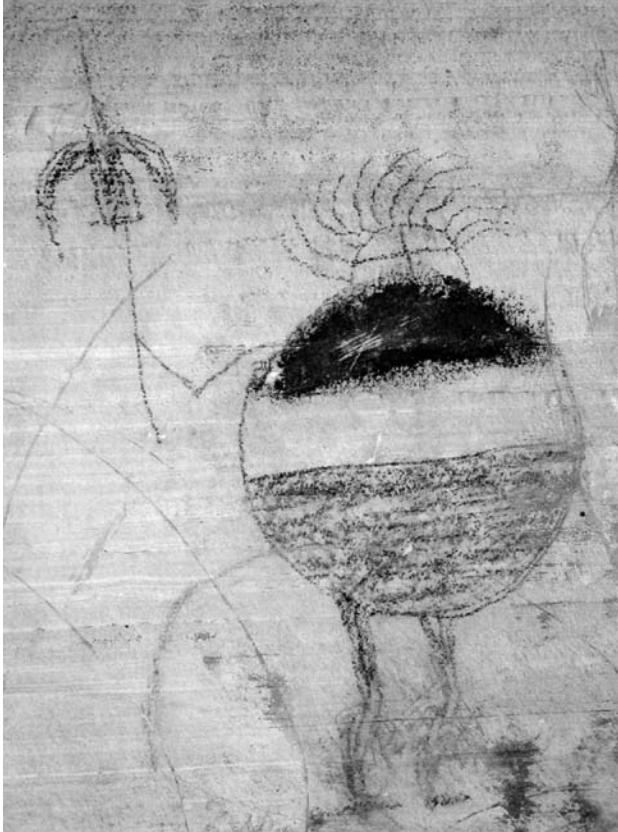


Figure 3: This Two-tone, Red-Painted, Shield Bearing Warrior Clearly Shows the Different Ways That Raw Pigment Was Applied With a Crayon (Or Raw Lump of Pigment) at These Sites. The Head, Arm, Spear Shaft, and Shield Outline Were Applied as Single Line with the Small Point of a Crayon. The Bottom Third of the Shield and the Large Projectile Point Were Filled by Using a Broader Edge of the Crayon. The Upper Third of the Shield Was First Filled in the Same Way as Lower Third But Then the Pigment Was Smearred with Finger or Soft Pad of Hide or Fur. Figure is Approximately 14 cm Tall from Feet to Top of Roach Headdress.

painting where extensive surfaces are completely painted red. One Atherton Canyon wall painting also has two partial red hand prints on this red background. Both hand prints are initially difficult to recognize, but darker pigment smudges show the palm and some fingers of each one. These may have been intentional hand prints, but their form and placement more strongly suggest that they are accidental images created where the artist paused while smearing liquid red pigment onto the cliff face with his hand. Similar wall painting

occurs at some central Montana sites where liquid red paint was applied by hand or with brushes or hide pads across a broad area of wall to provide a kind of canvas (Greer and Greer 1994). In this region, such wall painting is characteristic of the Foothills Abstract Tradition (Greer 1995:177-178; Greer and Greer 1994, 1996:46; Keyser 2004a:53; Keyser and Klassen 2001:161).

The dominant motif at both sites is the shield bearing warrior, with 1,025 recorded. They are often pictured with weapons, headdresses, and a variety of other accoutrements. Fewer than 50 V-neck humans are also present, including examples at both sites (Keyser 2006). There are also more than 150 other human figures of various kinds that are neither shield bearers nor V-neck humans. Animals are by comparison rare, with approximately 170 identified at the two sites, many of which occur as elements of shield heraldry or warriors' animal skin medicine bundles (Keyser 2004b, 2008b). Species include bears, various birds, bison, elk, deer, bighorn sheep, pronghorn antelope, moose, skunk, turtle, otter or weasel, snake, frog, fox, wolf, hare, salamander, and horse.

The Bear Gulch Project

For the multi-year project, Keyser and the Greers served as co-principal investigators; each with separate tasks. Recognition of rock art loci and panels was a team effort. Recording was under the organization and daily direction of Keyser, with George Poetschat as field supervisor and general organizer of field and laboratory data. Keyser directed rock art laboratory processing and analysis. Mavis Greer served as project liaison with landowner Macie Lundin Ahlgren and assisted with rock art identification, ground-penetrating radar (GPR) work, and test excavation. John Greer conducted survey, GPS recording, and digital photography at both sites.

In 2005, the Greers removed a sample of wood from a large stick that had been jammed into a crack next to an extensive rock art panel at Bear Gulch and submitted that sample for radiocarbon dating. Test excavation and subsequent analysis of recovered cultural materials at Bear Gulch was under the direction of Carl Davis. Collection of datable samples from charcoal rock art images was done by Sara Scott and Marvin Rowe.

Nearly forty volunteers, split almost evenly between the Oregon and Montana Archaeological Societies, participated in fieldwork, laboratory processing, and analysis. More than 3,200 rock art images were recorded and classified, and nearly eight cubic meters of deposit were excavated at Bear Gulch. To date, numerous papers have been published on the research (Davis 2008; Fossati et al. 2010; Greer and Greer 2008; Greer and Keyser 2008; Kaiser and Keyser 2008; Kaiser et al. 2010; Keyser 2004b, 2006, 2007a, 2008a, 2008b, 2009, 2011; Keyser and Kaiser 2010; Poetschat and Keyser 2009; Poetschat et al. 2008; Ray 2007, 2008; Ripps and Keyser 2008).

THE AGE OF THE SITES

Throughout the world a key question for rock art, like any archeological material, is its age, for dating determines the cultural context of the imagery that is necessary to integrate it into local cultural history and address broader issues of cultural process and change. Direct absolute dating of most rock art has proved difficult (and, in fact, impossible for many images) and the few methods are applicable only to select pictographs and petroglyphs (Chaffee et al. 1994; Dorn 2001; Rowe 2001). Thus, less precise methods of indirect—and often only relative—dating are usually necessary (Keyser 2001).

An important research component of the 2007 fieldwork was to gather data to assist in determining the age of the rock art at Bear Gulch and Atherton Canyon to place it within a broadly acceptable Northwestern Plains cultural chronology. For this project, we used several methods to assess the age of the rock art images: three applications of absolute radiocarbon dating of the images and associated archaeological materials, and three relative dating methods for the images themselves.

Absolute Dating of Charcoal Pictographs

The major problem with directly dating most rock art figures is that radiocarbon analysis requires an organic binder or other additive in the paint mixture, and such organic components are not found in dry crayon ochre applications. Likewise, such binders are rarely recognizable in liquid red or white paint in central Montana. At Bear Gulch

and Atherton Canyon, liquid or paste paint is much less common than dry applied pigments, and no organic binders are obvious in any of the red or white images, thus severely limiting opportunities for direct AMS radiocarbon dating of most painted rock art. Of interest though, are the few black, charcoal crayon figures drawn with fully burned sticks or pieces of wood, because the pigment is entirely organic.

Three charcoal figures, selected for their pigment thickness, were sampled: two at Bear Gulch and one at Atherton Canyon. The Bear Gulch images were a skunk and a small, rectilinear geometric figure. These are in adjacent site loci separated by about two meters, and each is in a relatively hidden position low on the cliff face. The Atherton Canyon figure is a large shield bearing warrior painted high on the wall in a large, shallow rockshelter.

Charcoal samples were collected by scraping a solid area about the size of a quarter with a surgical scalpel. Samples were processed to extract elemental carbon by Marvin Rowe in his laboratory in Qatar at a satellite campus of Texas A&M University. They were first chemically pre-treated in a sodium hydroxide solution to purify the organic carbon, and carbon extraction was done using oxygen plasma separation (Rowe 2001). Standard AMS dates were then obtained by the Lawrence Livermore National Laboratory (Table 1).

The sample from the Bear Gulch skunk yielded an AMS uncorrected radiocarbon age of 1615 ± 35 years B.P. (CAMS-133583), with a calibrated range of A.D. 335-540 (at the two-sigma, 95% probability level). The sample from the geometric figure yielded an AMS uncorrected radiocarbon age of 900 ± 35 B.P. (CAMS-133584), with a two-sigma calibrated range of A.D. 1040-1215.

The large solid black shield figure in Atherton Canyon yielded an uncorrected radiocarbon age of 650 ± 35 years B.P. (CAMS-133585), with a two-sigma calibrated range of A.D. 1280-1395.

All three of these AMS dates fall within the Late Prehistoric Period, albeit slightly earlier than we first expected based on our initial recording and assessment of the more than 3,000 images at both sites. The 650 year age difference between the two Bear Gulch images in the same part of the site implies that these figures were not part of

Table 1. Radiocarbon Dates from Bear Gulch and Atherton Canyon

Sample Number	Obtained From	Radiocarbon Years BP	Corrected 2 Sigma Calendar Date
Bear Gulch			
CAMS-133583	Charcoal Pictograph	1615 \pm 35	A.D. 335- 540
CAMS-133584	Charcoal Pictograph	900 \pm 35	A.D. 1040-1215
Beta-214805	Wooden Stake in Panel	250 \pm 40	A.D. 1520-1580* A.D. 1630-1680# A.D. 1770-1800* A.D. 1940-1950*
Beta-237823	Bison Bone Collagen	30 \pm 40	A.D. 1700-1720# A.D. 1820-1840*
Beta-237824	Bison Bone Collagen	110 \pm 40	A.D. 1670-1780# A.D. 1800-1950**
Beta-237825	Bison Bone Collagen	490 \pm 40	A.D. 1400-1450
Beta-237826	Charred Organic Matter	630 \pm 40	A.D. 1270-1400
Atherton Canyon			
CAMS-133585	Charcoal Pictograph	650 \pm 35	A.D. 1280-1395

* Date rejected, see text

Date accepted, see text

** Range of date partially acceptable, see text

the same use episode, as we originally thought. Possibly this difference is due to dating error, but we have no reason to think this is likely. Otherwise, it may stem from the use of recycled charcoal from an earlier time period, or the “old wood” problem, which has recently received attention (Rowe 2009:1730) because radiocarbon dates the death of the plant; and thus, charcoal used as pigment could have come from burning a long dead piece of wood. However, it seems to us just as likely that the skunk was drawn at an earlier date, and the geometric figure was drawn centuries later in the same technique—possibly because a later artist noted the earlier charcoal figures here.

Absolute Dating of Wood Associated with the Rock Art

In July 2005, a small piece of pine measuring about 20 cm long, 5 cm wide, and 3.5 cm thick was found jammed into a crack in the pictograph-covered cliff face about two meters above the

present ground surface. The wooden stake was not part of a tree growing next to the cliff nor was it the result of animal or water transport. Instead, it appeared roughly shaped and had clearly been intentionally forced into the crack, likely as part of a cultural construction. It may be a remnant of scaffolding erected to allow access to the upper parts of the painted cliff face or part of some sort of shelter for the area below. Red crayon figures are scattered over the adjacent rock faces; some quite near the wooden piece.

A small sample of the wood was collected from the stake, and identified as pine (*Pinus* sp.), which is common throughout this area. The sample yielded an AMS uncorrected radiocarbon age of 250 \pm 40 B.P. (Beta-214805), with calibrated two-sigma ranges of A.D. 1520-1580, 1630-1680, 1770-1800, and 1940-1950 (Table 1). The first two dates, falling in the Late Prehistoric and Protohistoric Periods, are consistent with estimated ages of the Bear Gulch rock art. The Historic Period date of

A.D. 1770-1800 is unlikely, due to the scarcity of horses (only a single set of horse tracks found in a distant part of the site) and absence of guns drawn at the site. Furthermore, all other Historic Period Northwestern Plains rock art sites that contain predominantly Ceremonial and/or Biographic Tradition art have horses and guns as the main subject matter (Conner 1980; Keyser 1977a, 1984; Keyser and Poetschat 2009). The date of A.D. 1940-1950 can be ruled out because the landowner reported that no wooden structure was in place at the site at that time. Although neither of the earlier dates can be ruled out, the *best fit*—considering both the date's interaction with the radiocarbon curve and other evidence from the rock art at Bear Gulch—is the date of A.D. 1630-1680.

Absolute Dating of Bear Gulch Cultural Deposits

For many years, the Lundin family has collected bone and lithic material in the Bear Creek valley, either from plowed creek-bottom meadows or from the creek cutbanks below the rock art bluffs. In 2007, we conducted small-scale testing of these valley-bottom deposits to determine the occupational chronology and recover cultural materials that might be linked to the rock art, such as pieces of red ochre, paint palettes, engraving tools, or metal artifacts (Davis 2008).

Our initial attempt to use ground penetrating radar to identify cultural features (e.g., Poetschat et al. 2008:17) was largely unsuccessful, due to shallow rocky lenses buried under the present surface. Nevertheless, three valley-bottom areas, labeled Grids 1 through 3, were selected for small-scale test excavation based on the general geomorphology of the valley bottom and the presence of bone noted in previously disturbed areas (Fig. 4).

Excavation in each area produced an abundance of intensively processed animal bone, including bison and medium-sized ungulates, presumably deer, pronghorn antelope, or elk (several elements of which have been previously collected by the Lundin family from the creek cutbank). A few well-worn, bifacially-reduced chert pieces and utilized flakes were recovered, but no temporally diagnostic tool was found and there was surprisingly little chipped stone debitage. The lithic assemblage is

dominated by local chert, at least one source of which is less than a mile from the site.

A badly deteriorated metal object was found, but its origin and function are unknown. It resembles a cotter key, and despite its co-occurrence with lithic artifacts and bone, we speculate that it is connected with the use of this area as a wagon road creek crossing in early historic times. Several small pieces of red ochre, which is common in the geological deposit around Bear Gulch, appear to be abraded. Whether this is natural or cultural modification is uncertain, but these bits of ochre verify the presence of raw pigments in the general site area.

Four AMS radiocarbon dates were obtained from occupation layers containing bone and other cultural debris (Table 1). Three collagen dates were obtained from large bison bone fragments, and the fourth was obtained from unidentified charred organic material in a bone-rock-charcoal feature in the deep Grid 2 excavation unit adjacent to the Bear Creek channel.

From Grid 1, the most extensively tested area at Bear Gulch, a collagen sample from bison bone buried in the surface-to-10 cm excavation level yielded an uncorrected AMS radiocarbon age of 30 ± 40 B.P. (Beta-237823). Although this date (Table 1) appears to be essentially modern, at a two-sigma calibration range it spans both the A.D. 1700-1720 and 1820-1840 time periods when bison would have been present in this area. Thus, it must date to one of these times. The absence of horses and guns in the Bear Gulch rock art suggests that the A.D. 1700-1720 date is more likely (given the prevalence of these images in other Plains rock art drawn after A.D. 1800), but possibly people living in the valley after A.D. 1820 simply made no rock art at the site.

From Grid 2, next to the creek (60-70 cm below surface) a collagen sample from bison bone found in a small feature yielded an AMS uncorrected conventional radiocarbon age of 110 ± 40 B.P. (Beta-237824), with calibrated ranges of A.D. 1670-1780 and 1800-1950 (Table 1). Certainly this bone must also date between A.D. 1670-1780 or A.D. 1800-1886, when bison were present in this area of central Montana. Because the large bison bone, located 70 cm below surface (b.s.) and near the bottom of the known cultural deposit, was selected to date the oldest occupation exposed

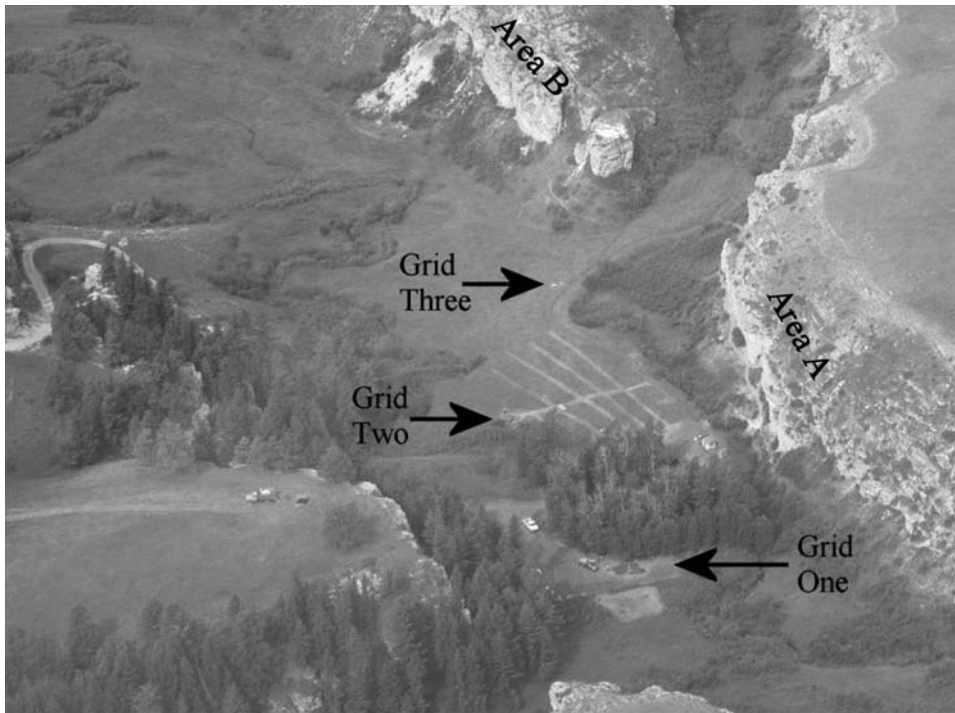


Figure 4: Aerial View of Bear Creek Valley Bottom Showing Location of Test Excavations in Grids 1, 2, and 3, and Rock Art Areas A and B. Mowed Straight Lines to Right of Grid Two Are Test Paths to Facilitate Ground Penetrating Radar Study.

in the cutbank, its stratigraphic position suggests that A.D. 1670-1780 is the most likely range for this part of the cultural deposit.

A third collagen sample from bison bone was collected from Grid 3, on the colluvial fan at the mouth of the small tributary canyon that separates rock art Areas A and B. This bone, found 20-30 cm b.s., yielded an AMS uncorrected conventional radiocarbon age of 490 ± 40 B.P. (Beta-237825), with a calibrated two-sigma range of A.D. 1400-1450 (Table 1). The bone sample was associated with three articulated bison vertebrae, other bone fragments, and lithic debitage lying on a recognizable cultural occupation surface.

In Grid 2, we uncovered a mat of charred organic material apparently associated with the bone-rock-charcoal feature that yielded the bone collagen date of 110 ± 40 B.P. A sample of this charred material yielded an AMS uncorrected conventional radiocarbon age of 630 ± 40 B.P. (Beta-237826), with a calibrated range of A.D. 1270-1400 (Table 1). The differences in age between these two samples (A.D. 1670-1780 and 1270-1400) cannot

be easily explained. Stratigraphy in this area is complicated by the presence of overbank sediments resulting from periodic seasonal and beaver-caused flooding of Bear Creek. Such sediments, deposited behind the numerous beaver dams, would have been quickly and easily reworked by the meandering Bear Creek when dams infilled or were breached and as beavers reestablished themselves up and down stream. This process is readily observable today in both Bear Gulch and Atherton Canyon.

Thus, the spatial association of bone, rock, and charcoal may be the result of geofluvial processes rather than being a single intentionally-constructed cultural feature. It is thus possible that the two samples do represent two separate uses of the site, despite their spatial association. We feel that the bone collagen date of A.D. 1670-1780 most likely dates the bone layer at 70 cm b.s. The earlier date of A.D. 1270-1400 on charred organics may represent a valid indication of an earlier site use that has been associated with the later date by erosion and infilling of beaver dam sediments.

Whether the cultural deposits at Bear Gulch, as presently understood, are linked chronologically or functionally to the production of rock art at Bear Gulch was not clearly demonstrated by our testing. However, the overlap between the radiocarbon dates obtained from the cultural deposits at Bear Gulch and the inferred stylistic age of the abundant Ceremonial Tradition rock art seems more than mere coincidence. We speculate that the Bear Gulch cultural deposits were the product of both the artisans themselves (individual warriors and warrior groups) and nomadic hunting-gathering

bands operating in central Montana, to which some of these warriors undoubtedly belonged. The relatively scant and diffuse (albeit intensively processed) bone seems consistent with local, short-term, task-specific subsistence (Davis 2008:31-32).

At their two-sigma ranges, the radiocarbon ages of the cultural deposits indicate two broad periods of occupation, one occurring between about A.D. 1200 and 1450 and a later period extending from the Protohistoric Period into the Historic Period between A.D. 1670 and 1886. The relationship between the earlier dated period and the Bear Gulch rock art is enigmatic, since we have rock art images at the site that predate this period, and there are other finger painted images at the site that might be from this time period, based on analysis of superimposition and weathering. However, the only dated image so far known from this time period at either site is the charcoal shield bearing warrior at Atherton Canyon. Likewise, there are pecked and painted images at Atherton Canyon that are almost certainly older than about A.D. 1200. In this regard, the absence of even earlier Late Prehistoric and even Archaic period cultural deposits is noteworthy, since the rock art suggests at least nominal use of these canyons during those time frames. A more extensive testing program is necessary to fully understand the complete chronology of occupation at Bear Gulch and Atherton Canyon.

The latter period of occupation, extending from Protohistoric times into the Historic Period (A.D. 1670-1886), correlates with the major period of rock art production at Bear Gulch and Atherton Canyon, as supported by the corpus of rock art data described below. However, other considerations including the absence of horses and guns in the rock art, the radiocarbon date for the wooden stake, and the absence of metal tools in the excavated cultural deposits, all suggest that this occupation occurred at the early end of this time period within the Protohistoric era.

Atherton Canyon also contains Late Prehistoric Period cultural materials in a multiple-component bison jump kill deposit situated just in front of one major rock art locus. Although no radiocarbon dates are available from this kill site, uncontrolled excavation in the 1950s and 1960s recovered a collection of side-notched projectile points and a stone pipe. These artifacts have been identified as

dating to the Late Prehistoric Period by Stu Conner, who knew one of the collectors and examined the collection in detail. Organized research at this site will be necessary to obtain a date for its use and thus determine how it may relate to the rock art.

Relative Dating of Images

Of the more than 3,200 images at Bear Gulch and Atherton Canyon, most are fine-line engravings or red ochre, dry crayon drawings. Direct absolute dating of the art at these sites is restricted to the three charcoal images discussed previously. However, additional relative dating of broad classes of images can be accomplished by analysis of superposition, relative weathering, and depiction of objects with known dates of introduction or abandonment in this area of the Plains.

Superposition Sequences

Superimposition of images is frequent at both sites, most notably involving fine-line engraved shield bearing warriors overlying painted figures, some of which are directly conjoined overlays with the engraved figures drawn precisely on top of the underlying painted lines (Kaiser and Keyser 2008: 46-50; Poetschat and Keyser 2009:192). Other notable superposition includes fine-line engraved shield bearing warrior figures on top of an earlier birthing scene drawn with red ochre crayon (Kaiser and Keyser 2008:54) and a combat scene between V-neck warriors scratched directly over a large red painted shield bearing warrior (Kaiser and Keyser 2008:51).

One complex panel at Atherton Canyon locus 7—a four-episode superimposition sequence—shows early animals painted with liquid white paint (Episode 1) and then overlaid in order by charcoal crayon drawings of humans and arrows (Episode 2), a fine-line red linear quadruped and miscellaneous red crayon lines (Episode 3), and scratched V-neck human figures (fourth and final episode on this surface). Another Atherton Canyon panel at adjacent Locus 10 also has white liquid pigment painted atop a red wall painting and superimposed by later scratched and crayon drawn figures, but this superimposition sequence has not yet been studied in detail.

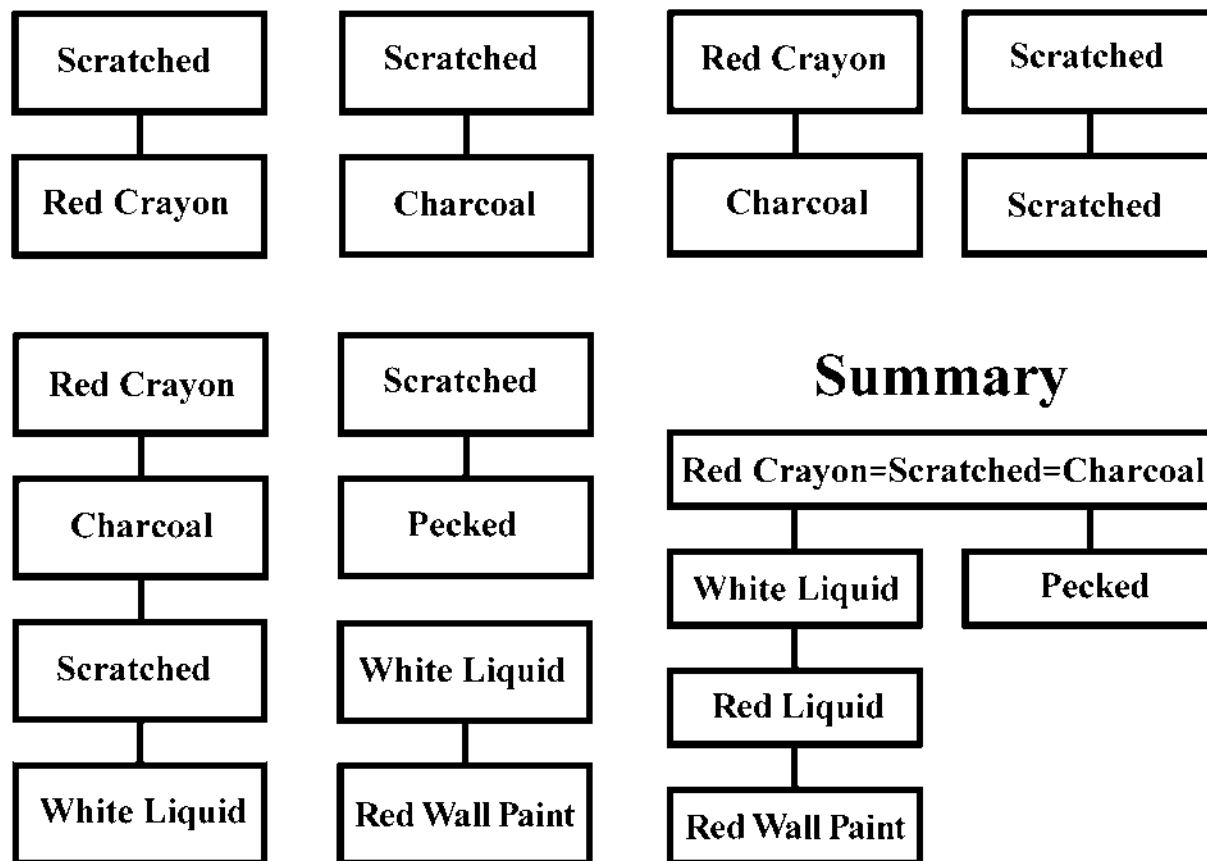
Although superimposition of these three later techniques (fine-line engraving, and both black and red dry crayon) is clearly distinguishable in

many instances at both sites, a simplified Harris Lattice analysis (e.g., Loubser 1997) shows that these three application methods occur in an *anti-symmetric relationship* in both canyons. This documents an inconsistent superposition order in which each method appears both *superimposed by* and *superimposed over* both other colors or methods. While all three of these later techniques were used somewhat contemporaneously from the Late Prehistoric to the Historic Periods, preliminary analysis of superimpositions at both Bear Gulch and Atherton Canyon provides a generalized chronological pattern of application for both sites (Fig. 5).

Earliest in the complex superimposition sequences involving painted and scratched images is the use of red liquid paint. On four Atherton Canyon panels and one at Bear Gulch, this is a red wall

painting, and three of these are superimposed by other later scratched and painted images. Other red finger paint, applied as either liquid or paste, is also early—possibly as early as the wall painting. Although most are rather poorly preserved, these early finger paintings show a number of specific images including an early vertical series arrangement, some crude shield bearing warriors, other stick-figure humans, and animals with simple block bodies. One badly eroded Atherton Canyon locus consists of a panel of red painted stick figure humans and a frog with scratched geometric designs superimposed much later. The relationship of white liquid pigment to red finger painting at this site is currently unknown, but the white is superimposed on a red wall painting and superimposed by fine-line engraving and black and red crayon drawings at Atherton Canyon. Otherwise, the two application techniques do not

Figure 5: Harris Diagram Showing the Superimpositions Noted at Bear Gulch and Atherton Canyon. The Summary at Lower Right Suggests That Red Crayon, Scratched, and Charcoal Drawings Are the Latest Techniques Used at Both Sites and Were Approximately Contemporary.



co-occur on any panel at either site, but white paint clearly predates the other techniques. Elsewhere in central Montana, white liquid paint has been recorded over dark red liquid pigment during some of the earliest painting episodes (Greer 1995:255-256).

The three oldest painting techniques at the site—red wall painting, white liquid paint, and red finger painting—are followed by the three most common techniques, all found in an asymmetric relationship. Most numerous are fine-line engraved figures, including shield bearing warriors, V-neck and other humans, and animals. In addition, there are thousands of apparently random scratches often done as long, curved or short, straight lines scrawled across panels. The second most numerous images are fine-line red figures drawn with either dry red crayon (with all variations listed above) or fine brushes. These include many shield bearing warriors and a few animals (including one pronghorn antelope with identifying horns and neck patches). Dry charcoal crayon figures comprise the third and least abundant category and include a few shield bearing warriors, animals, V-neck humans, and geometric abstracts.

Fine-line red painting and fine engraving techniques were used to draw horses, horse hoofprints, and guns. Most of this late red pigment appears to be wetted crayon or liquid paint applied with a fine brush or frayed stick. One Atherton Canyon panel, apparently dating to the terminal Late Prehistoric Period shows figures of foxes, turtles, and a V-neck human that are painted with what appears to be liquid red pigment applied either by a brush or finger.

Although there is a degree of contemporaneity between all three of these methods, most of the engraved figures appear to postdate both the use of liquid paint and most of the crayon applications, indicating that fine-line engraving (and also random scratching) became more common through time. At these sites, hundreds of engraved/scratched figures overlie fine-line red drawings, but there are fewer than 20 instances where fine-line red drawings are superimposed on earlier fine-line engraved figures. Finally, fine-line engraving or scratching becomes more common in the Historic Period, with five of the seven clearly historic images being engraved—all three horses, one of two guns, and one of two sets of horse tracks. The relative increase in popularity of fine-line engraving

or scratching into Historic times is common across the Northwestern Plains (Fredlund 1990; Keyser 1977a, 2007b; Keyser and Klassen 2001; Keyser and Poetschat 2005), especially at site complexes such as Writing-on-Stone and Verdigris Coulee (Keyser 1977a, 1977b).

Engraved or scratched figures in red crayon and charcoal crayon account for more than 99 percent of the representational imagery and 95 percent of all images. They appear to date exclusively to the Late Prehistoric, Protohistoric, and Historic Periods. The earlier pecked abstract figures at two Atherton Canyon loci likely date to the Late Archaic or earlier (Keyser and Klassen 2001:145). This sequence is consistent with previously suggested rock art chronologies for the Northwestern Plains (Greer 1995:291-301; Keyser 1977a, 2004a; Keyser and Klassen 2001). The red wall painting also appears to date sometime within a span from the Late Archaic to the early part of the Late Prehistoric Period (Greer 1995; Keyser and Klassen 2001:163-165).

Shield bearing warriors, V-neck and rectangular-body humans, and simple animals appear more or less contemporary at these sites, and probably extend from the Late Prehistoric into the earliest decades of the Historic Period. At Bear Gulch and Atherton Canyon, neither shield bearing warriors nor V-neck humans are associated with obvious Historic Period objects, such as a gun or horse, even though such associations are known at other Northwestern Plains sites (Keyser 1977a, 1984; Keyser and Klassen 2001).

Three superimpositions in Bear Gulch Area C (Fig. 6) provide significant information for dating Bear Gulch style shield bearing warriors. In all cases, tall V-neck humans are scratched over large Bear Gulch style shield bearing warriors. One scene (Fig. 6a) shows two scratched V-neck warriors engaged in combat with the smaller, simpler figure pierced by a spear while the other, larger figure holds a long lance, and arrows lie at his feet. This scene shows the taller warrior dispatching his enemy in the face of a fusillade of fire from significant opposition. The other two superimpositions show two V-neck warriors scratched over a simple painted Bear Gulch style shield figure (Fig. 6c) and a single V-neck warrior superimposed on a pair of directly conjoined Bear Gulch style shield figures (Fig. 6b).

Original
Painting

Superimposed
Scratched Images

Present
Composite

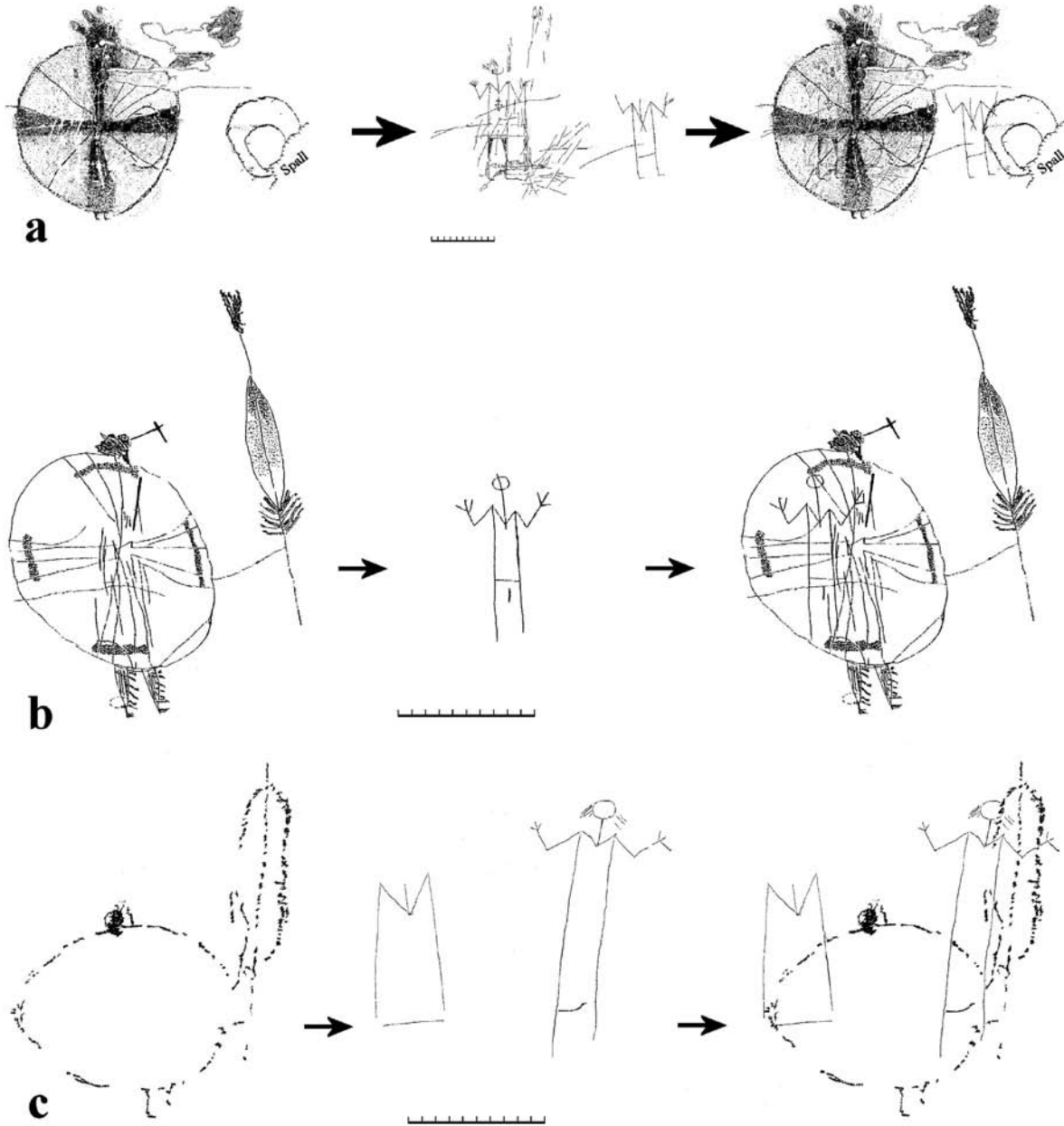


Figure 6: Superimposition of V-neck Figures Over Bear Gulch Style Shield Bearing Warriors in Area C at Bear Gulch. V-neck Figures in a and c Show Combat Scenes. Scale Bars Represent 10 cm.



Figure 7: Pecked Abstract Tradition Images at Locus 10 at Atherton Canyon. Note The Extensive Spalling That Has Removed Much of The Pecking. The Inset at Left Shows The Superimposition Relationship Between The Three Types of Petroglyphs on This Panel.

In addition to these three superimpositions, four other scenes in Area C at Bear Gulch involve similarly tall, thin V-neck figures either engaged in combat or representing tallies of counted coups. All are drawn in a very early narrative style that clearly dates to the Protohistoric Period, based on the absence of guns and horses coupled with the use of several well-known narrative Biographic art conventions (Keyser 2006:69-70). The fact that three of these scenes clearly overlie Bear Gulch style shield bearing warriors, indicates that the Bear Gulch style shield bearers are earlier, dating either in the early Protohistoric Period, or more likely to the last years of the Late Prehistoric Period. Coupled with the fact that several Bear Gulch style shield figures in Area C are still in quite good condition, despite the degradation of the cliff surface that is particularly notable on several panels in this area, these superimposed Protohistoric Period figures suggest that the Bear Gulch style figures are unlikely to be significantly earlier than about the last one or two centuries of the Late Prehistoric Period—A.D. 1450-1650.

Weathering

In addition to simple superimposition of application techniques found at both sites, two Atherton Canyon panels contain simple, highly weathered, pecked petroglyphs consisting of dots and lines

(Fig. 7). One of these pecked figures is overlaid by later scratches. The early pecked figures are more heavily weathered than other images on the two panels, and also more eroded than any other rock art at either site. Though eroded, and thus difficult to distinguish precisely what original form was intended, these pecked lines and dots conform to the typical simple designs of the Pecked Abstract Tradition, dating to late Archaic or early Late Prehistoric Periods in this part of the Plains (Keyser and Klassen 2001:144-145; Sundstrom 1993).

On numerous panels at both sites, finely engraved or scratched figures and fine-line red and black crayon drawings of Late Prehistoric Period age now exist on very thin, delicate “skins” that form as a weathering rind on the surface of the Bear Gulch Limestone substrate. In several places these skins are blistering and peeling, causing significant damage and loss of figures, particularly in large areas of scratched imagery (e.g., Kaiser and Keyser 2008:51, Figure 9B; Keyser 2007a:67, Fig. 8).

The superimposition of early pecked images on one panel by much fresher-appearing finely engraved lines and scratches, strongly suggests that broad-line pecking predates fine engraving by a long period—at least several hundred years and possibly as much as two thousand years, based on

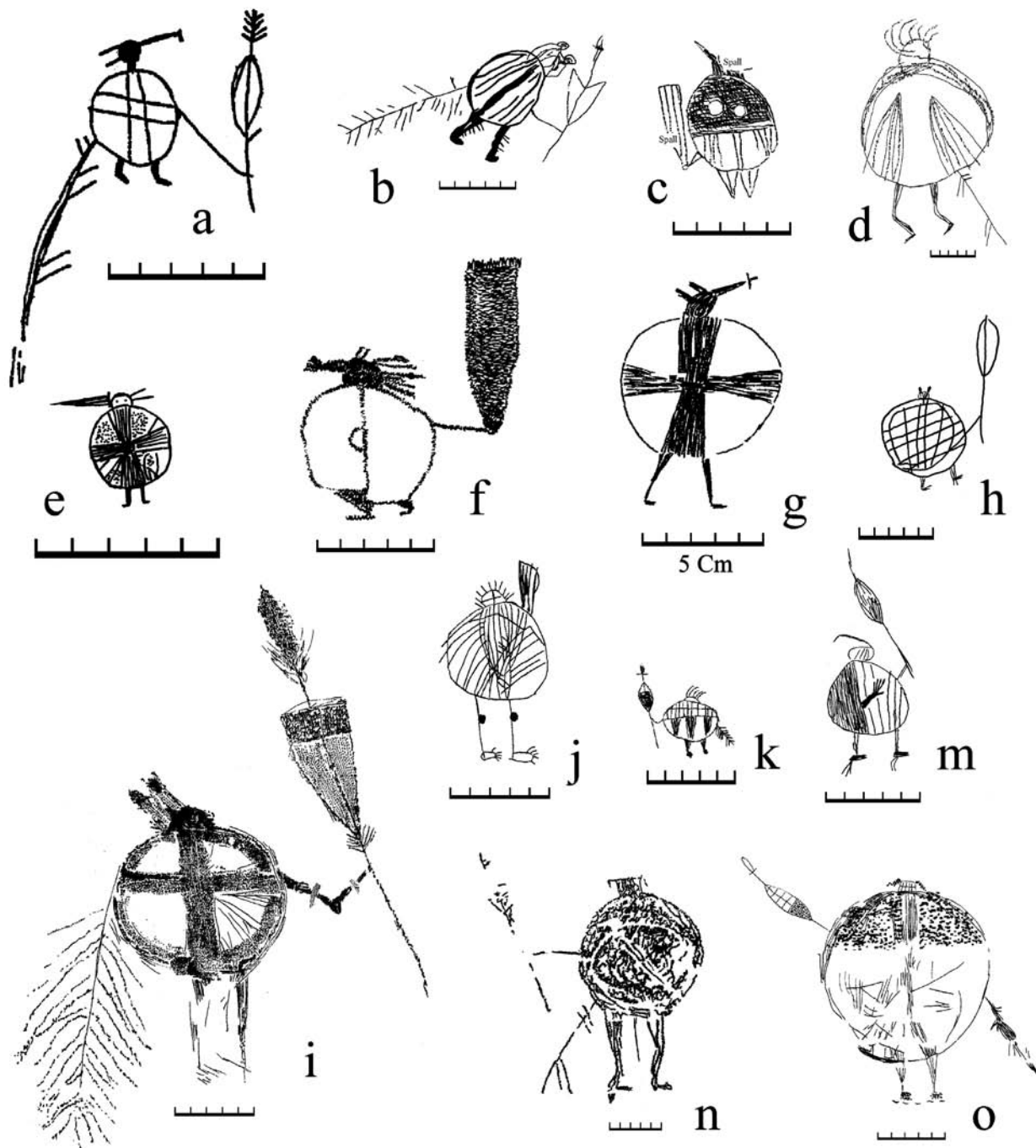


Figure 8: Shield Bearing Warriors from Bear Gulch and Atherton Canyon. a, d, f-n from Bear Gulch; b, c, e, o from Atherton Canyon. All Examples Except j are Bear Gulch Style Figures. Note the Bear Paw Moccasins Worn by Figure 8j. Scale Bars Are 5 cm.

the general chronology developed for this tradition in other areas of the Northwestern Plains (Keyser 2004a:52; Keyser and Klassen 2001:144-145; Sundstrom 2004:75). Although there is no evidence for early engraved figures at either site, any such finely scratched figures contemporaneous with the bold pecked figures would have been completely obliterated by millennia of weathering. Thus, the two examples of extremely weathered pecked imagery at Atherton Canyon (one of which also includes later superimposed scratches) suggest that only a small part of the early pecked art in this canyon has survived, and any other kinds of associated art would certainly have eroded away long ago.

Datable Objects in the Art

Plains rock art has one of the world's greatest concentrations and most varied assemblages of datable subject matter (Keyser 2001:120-123). Thus, relative dates for pictographs and petroglyphs at Bear Gulch and Atherton Canyon often can be assigned based on datable items portrayed in the art. Four classes of such items include full-body shields, horses and horse tracks, guns, and metal projectile points.

Full-body Shields

Large full-body shields are carried and displayed by more than 1,000 shield bearing warriors (Fig. 8), with hundreds each at both Bear Gulch and Atherton Canyon (Keyser 2006, 2007a; Poetschat and Keyser 2009; Poetschat et al. 2008; Ray 2008). The shields, often emblazoned with complex heraldic designs, cover the warrior at least from the knees to the neck and shoulders. As such, the actual shields would have been 3-4 feet (90-120 cm) in diameter. Shields this large are reported ethnohistorically to have been used by pedestrian warriors in pre-horse days (Secoy 1992:34-35), and in some cases, two people would seek protection behind such a shield. The assignment of large shields to pre-horse warfare seems logical, given the difficulty of carrying such large items on horseback. Shields used with the horse are shown in Indian drawings to be much smaller, usually about 18-24 inches (45-60 cm) across (Keyser 1977a:20, 22, 68, 1984:47, 2007b:12-16, 2010; Keyser and Klassen 2001:232, 248-252; Keyser et al. 2008), which is consistent with those preserved in ethnographic collections (Maurer 1992:112-115, 120-121, 125-126, 141; Taylor 2001:89-90, 97).

Thus, scholars routinely refer to shields of full-body size as *pedestrian shields* and significantly smaller ones as *equestrian shields* (e.g., Dempsey 1976; Maurer 1992:27).

Although a few pedestrian warriors of some tribes maintained larger, nearly full-body sized shields into early historic times as they came into contact with the more recently mounted warriors (Catlin 1973:Figures 172, 280; Taylor 2001:86-87; Thomas and Ronnefeldt 1976:172, 212-213, 217), other contemporary illustrations by Catlin (1973:Figures 54, 73, 76) and Bodmer (Thomas and Ronnefeldt 1976:67) show smaller shields used by both mounted and pedestrian warriors, indicating that large shields were rapidly being replaced by the early 1800s. Taylor (2001:87) argues that such large shields were retained into the early decades of the Historic Period only by the more sedentary Missouri River village tribes, while more equestrian nomadic tribes to the west quickly adopted the smaller size shields.

Even if large shields survived into the fully equestrian Historic Period among some tribes; in fact, no drawings of horses or guns are associated with any of the 1,025 shield bearing warriors at Bear Gulch or Atherton Canyon. This strongly supports the inference that the large full-body shields here were used by pedestrian warriors during the terminal Late Prehistoric and Protohistoric Periods, before introduction of the horse and likely during the first decades of such contact. This is consistent with the identification of the Late Prehistoric Period as witnessing the beginning of formalized intertribal conflict (Scheiber 2008:34-35). Combined with the presence of only two smaller, equestrian period shields at Atherton Canyon (neither of which is carried by a shield bearing warrior), the prevalence of large full body shields is strong evidence that most of the figures painted and carved at both sites predate the introduction of the horse (between A.D. 1720-1735, see below) in this area of the Northwestern Plains.

Horses and Horse Tracks

Three horses are scratched at Atherton Canyon, and single sets of horse tracks are also found at this site and at Bear Gulch. Two horses at Atherton Canyon locus 18 are shown with large, greatly emphasized ball feet and simple, small, non-descript riders (Fig. 9a, b). The other isolated animal in Atherton Canyon is crudely scratched

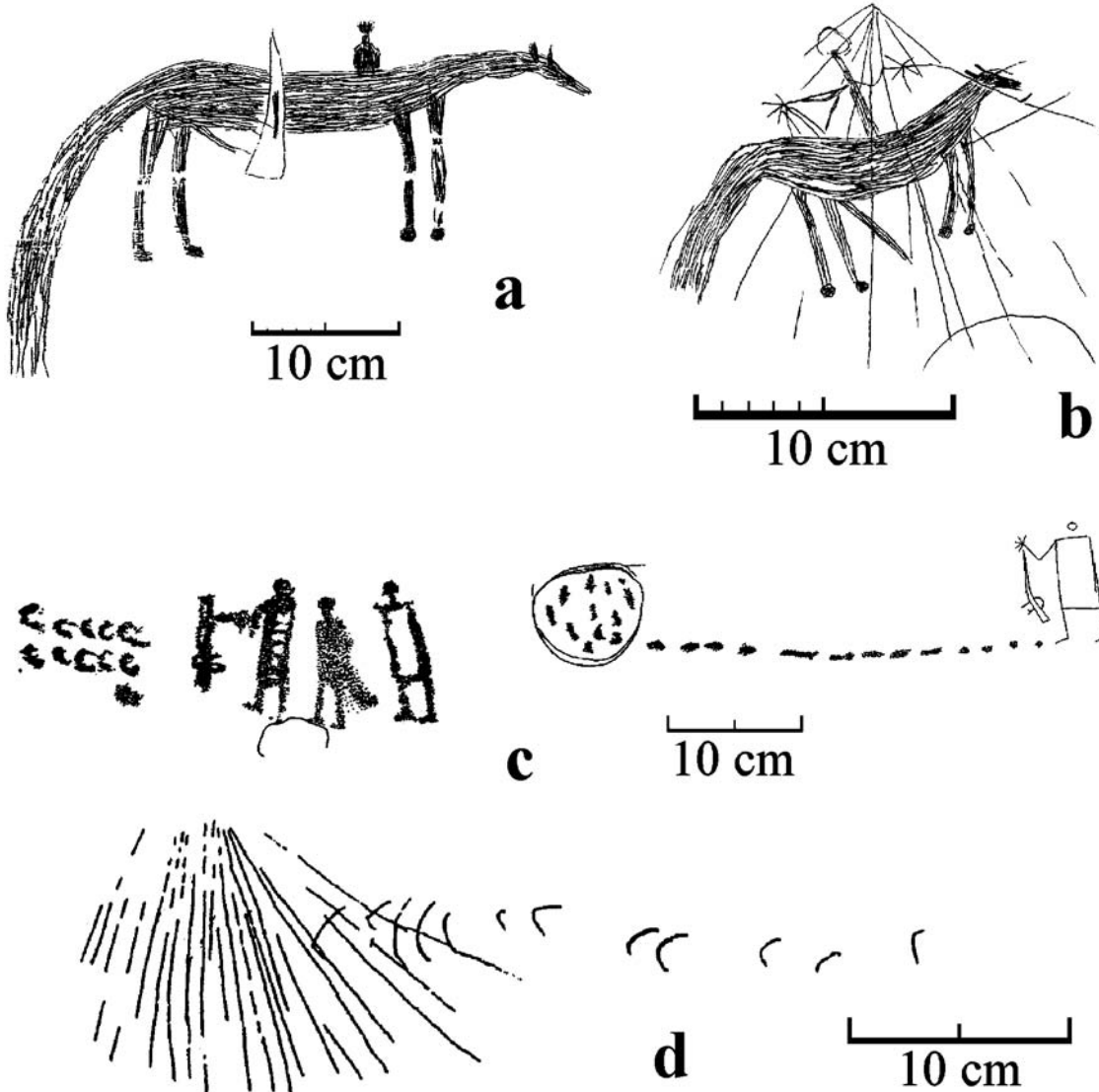


Figure 9: Historic Period Horse and Gun Images from Atherton Canyon (a-c) and Bear Gulch (d). Note That Gunman and Fortification Circle at the Right and Center in c Form A Composition That Was Scratched after the Other Figures Were Painted.

and may postdate Indian use of the area. Neither mounted horse is a *mature style* animal (e.g., Keyser 1977a), commonly illustrated across the Plains in the Historic Period between about 1775 and 1860 (Keyser 1977a, 2008c; Keyser and Poetschat 2005). Instead, the distinctive ball feet, similar to those of the Atherton Canyon horses, usually indicate stylistically early animals thought to date before 1800 (Keyser 2008c; Keyser and Klassen 2001:19). The third, presumably more recent, horse has no otherwise distinguishing characteristics.

A set of horse tracks is drawn at each site (Figure 9c, d). At Bear Gulch, a line of a dozen crudely scratched, C-shaped hoofprints leads to a conical war lodge or tipi (Keyser 2006:59). This composition is a characteristic narrative coup count scene showing a warrior's brave deed in riding up to and touching an enemy-occupied structure. Such coups were considered particularly daring (Dempsey 2007:404) and were illustrated by warriors from various Plains tribes (Keyser and Poetschat 2005:88-89). Two very similar hoofprint and tipi compositions (Fig. 10) are drawn

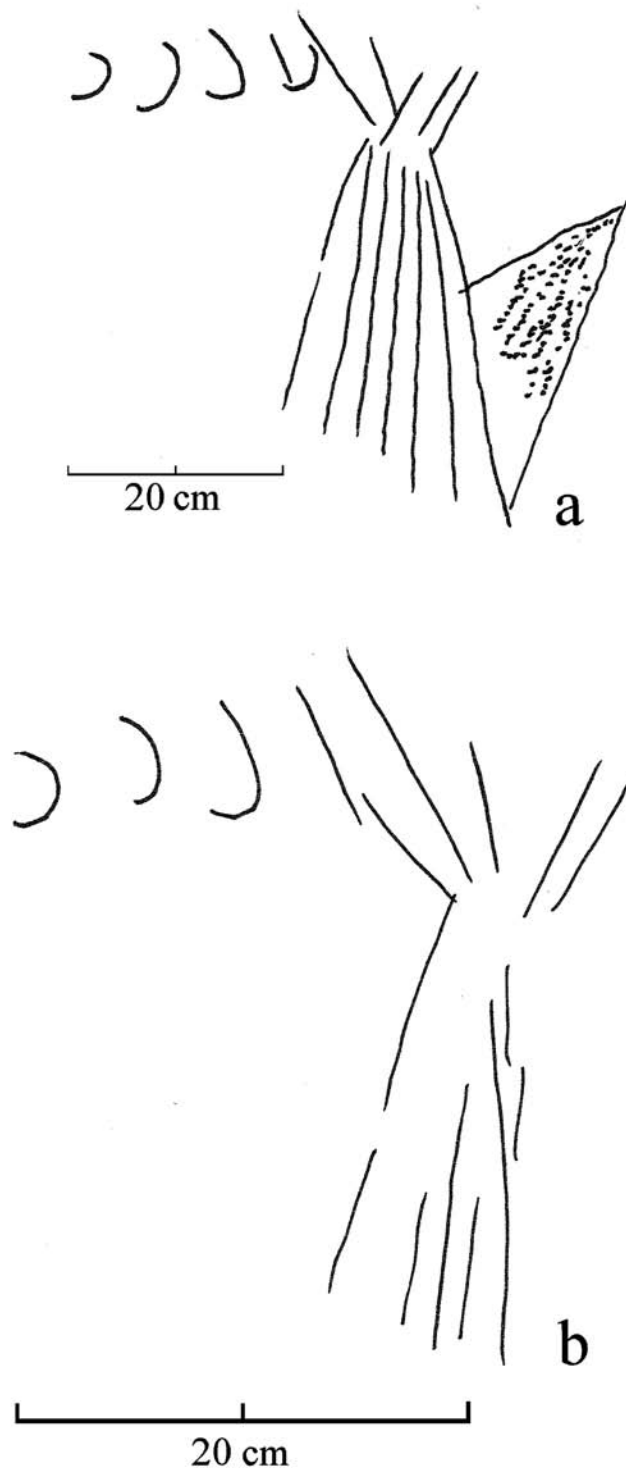


Figure 10: Horse Hoofprints Approaching Tips or Pole Lodges at the Canyon Creek Site (24YL1203) in the Yellowstone Valley about 150 Km South of Bear Gulch (Adapted from Fredlund 1990).

at the Canyon Creek site (24YL1203), just 90 miles (150 km) south of Bear Gulch (Fredlund 1990:40-42).

In Atherton Canyon, there is a small painted scene (Fig. 9c) of fine-line red figures drawn with either a soft crayon or a fine brush. A set of ten C-shaped horse tracks, arranged in two horizontal rows of five each, is positioned just in front of three pedestrian warriors, one of whom holds a flintlock gun out in front of himself (Keyser 2004a:42-43; Poetschat et al. 2008:16). A line of thirteen short dashes, indicating human footprints used to represent the trail of the three warriors, leads up to a circular cluster of eleven additional human footprints located just behind the three men. Within the structure of Plains Biographic narrative art, these footprints indicate the path of the three men to a bivouac area where they paused or camped (e.g., Keyser 1987), and then successfully stole ten horses. Such raiding parties were common throughout the Historic Period, and Plains Biographic art is replete with scenes documenting similar actions, often showing the tracks of both the raiders and the stolen horses (Maurer 1992:208-209, 242-243; McCleary 2008:256, 259).

The three Atherton Canyon horses and the groups of horse tracks at each site indicate that a few images were drawn after the introduction of the horse into central Montana. Although we do not have exact dates for the first horses at Bear Gulch, the best ethnohistoric reconstructions (e.g., Ewers 1955:15-18; Secoy 1992:105) indicate that the animals arrived in the area between A.D. 1720 and 1735, and the drawings of horses and their tracks must date after this time. Stylistically, the two Atherton Canyon horses with ball feet resemble others dated for a variety of reasons to the period before 1800 (Keyser and Klassen 2001:19). In Northern Plains rock art, the use of C-shaped horse tracks to represent the animal or to indicate an animal's hooves appears to be later than the ball feet convention (Keyser and Klassen 2001:19), and thus the set of horse tracks associated with the gun appears to date later than the other horses, almost certainly between A.D. 1775 and 1875.

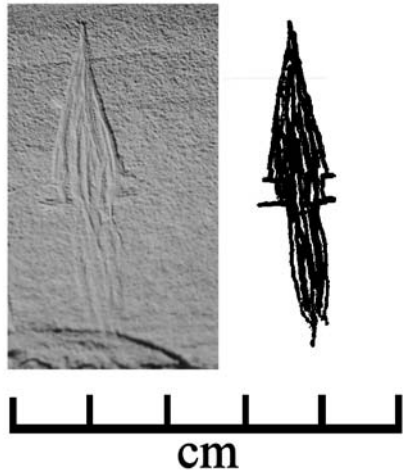


Figure 11: Scratched Projectile Point at Atherton Canyon Shows Unmistakable Characteristics of a Metal Projectile Point. Scale Bar Is for Both Photograph And Tracing.

Flintlock Guns

Gun imagery is notable for its absence at Bear Gulch and rarity at Atherton Canyon, where the only guns are two flintlocks drawn on one panel (Fig. 9c). The earlier of these is a pictograph gun held by its muzzle in a vertical position out in front of the lead warrior of a group of three raiders composed in a narrative scene described above. At the right end—or beginning—of the left-extending line of thirteen red-painted human footprints, a different artist scratched a rectangular-body warrior who also holds a flintlock vertically out in front of his body in a posture mimicking that of the painted warrior to the left. The feet of this more recently engraved warrior align exactly with the painted footprints, indicating that the alignment also represents his tracks. This second artist also encircled the painted footprint cluster with a scratched line to show a fortification and indicate that the warrior engaged a group of fortified enemies at that location. The same width, depth, and character of line for the scratches composing the fortification circle and the warrior—the only other scratched figure on this panel—indicate that both scratched images were done at the same time, by the same artist, with the same tool. The fact that the scratched fortification encircles the footprint cluster demonstrates that the petroglyph composition postdates the painted figures.

The introduction of guns into this part of the Northwestern Plains lagged behind other metal tools for a variety of reasons including the desire of eastern natives to control the gun trade, the Spanish prohibition of trading firearms to Indians, and the need for a sophisticated support system that could provide adequate quantities of powder and balls to make guns really useful. Thus, although a few guns entered the trade system in the Hudson's Bay/ Great Lakes region in the 1600s, they were rare compared to knives, axes, metal points, and other weaponry (for example, in 1684, when 8000 knives but only 300 flintlock muskets were documented in Hudson's Bay Company trade, [Kenyon 2008]). In any case, however, it is fairly well established that the first guns entered central Montana between A.D. 1750 and 1790 (Secoy 1992:105-106). Thus, the two scenes containing guns can be reliably dated after A.D. 1750. The scratched gun-carrying warrior postdates the original painted horse and gun scene and likely dates sometime in the 1800s. Compositions with similar figures were painted on Northwestern Plains robes throughout the 1800s and into the early 1900s (Bouma and Keyser 2004:10-12; Dempsey 2007:40, 48-49, 115, Plates 1, 2, 4; Horse Capture et al. 1993:101; Keyser and Klassen 2001:259, 270).

Metal Projectile Points

A freestanding metal projectile point is drawn in fine detail near a shield bearing warrior on one Atherton Canyon panel (Fig. 11). This is clearly a metal point, since there are no similarly-shaped chipped stone projectile points on the Plains. The finely engraved point is less than five cm long and has a relatively large triangular blade with a long, T-shaped tang whose transverse crosspiece has square ends forming protruding barbs positioned just below the blade and creating shallow, squared side notches. This form is typical for the metal bayonet type DAG lance point² or knife.

Such metal bayonet DAG type points were first brought into North America by French and British traders in the 1600s and early 1700s and became common on the Plains in the 1800s (Baldwin 1997:42-49; Taylor 2001:48-50). Similar kinds of bayonet knives were in common use in Europe since the 1600s (Peterson 2001:52-57) and locally-made versions were easily and routinely manufactured by blacksmiths (Taylor 2001:50-51, see note 30) working from the mid-1600s in French fur trade and mission settlements across eastern

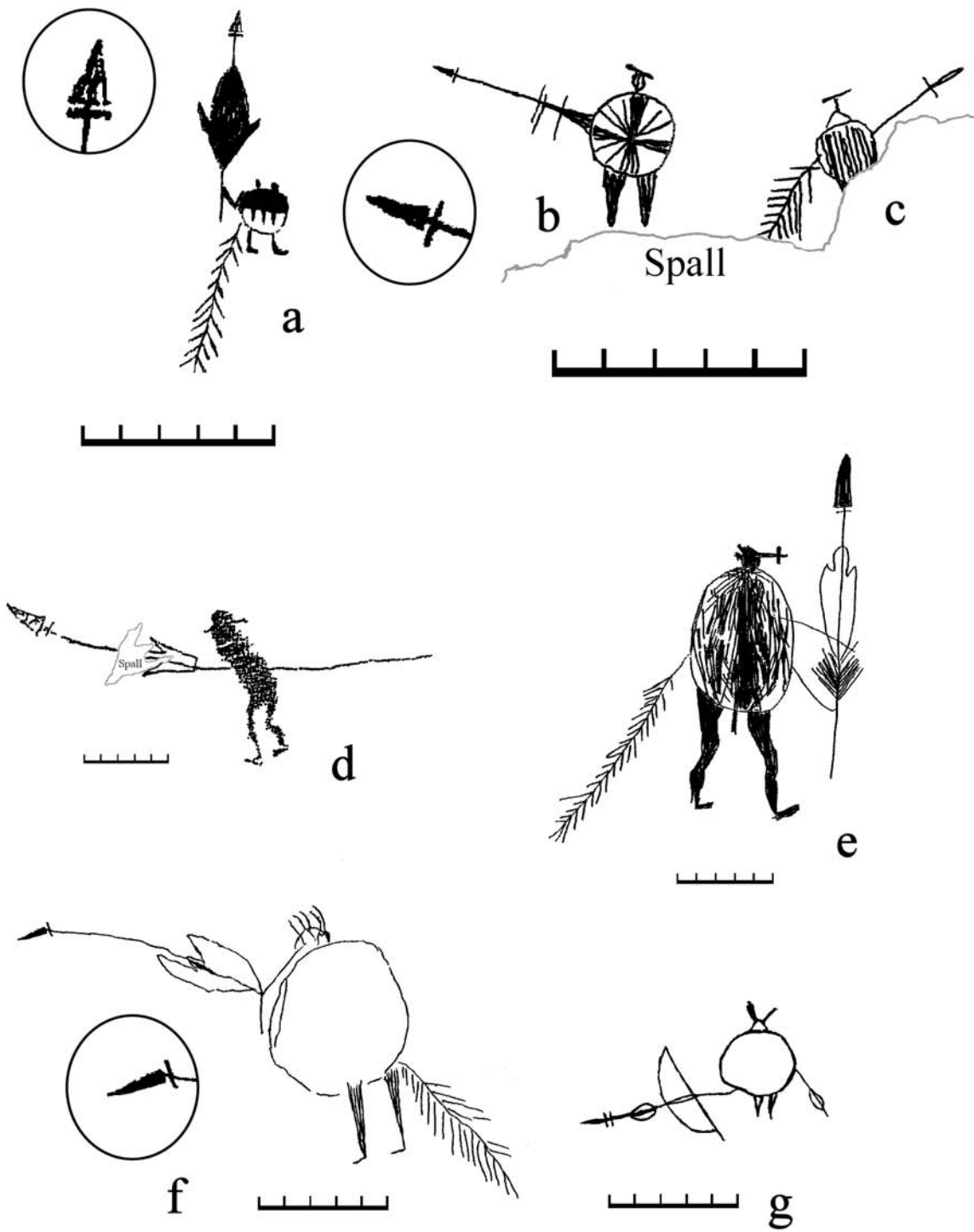


Figure 12: Warriors Whose Weapons Have Metal Points. a-f, Bear Gulch; g, Atherton Canyon. Scale Bars Are 5 cm.

Canada. Several such hand-forged bayonet type DAG blades are illustrated in Baldwin (1997:42, 45, 49).

In addition to the freestanding metal projectile point, more than 90 lances and three bow-spears (one drawn four times) at these sites have distinctive triangular or lanceolate points (e.g., Fig. 8i). All but one of these weapons are associated with shield bearing warriors carrying large, full-body pedestrian shields.

By using a set of standardized measurements and comparing these weapons to those drawn in both later ledger drawings and Euro-American artists' portraits of warriors, it has been shown that nearly 60 percent of the lance points at Bear Gulch and Atherton Canyon were intended to illustrate blades between 6 and 16 inches (15-40 cm) long in real life (Keyser and Kaiser 2010). Even acknowledging the artistic convention of exaggerating weapon size to emphasize their power (Keyser and Kaiser 2010), points this large fit almost exactly the range of 6-12 inches noted for iron lance points used by the Blackfeet (Ewers 1955:201). Even the somewhat larger points that are portrayed as significantly oversized—apparently measuring as much as 20 to 24 inches (50-60 cm) long—may be more realistic than their first impression, since Baldwin (1997:42, 45) illustrates some actual hand-forged lance points that exceed 18 inches in length.

Given the intensive and violent hand-to-hand warfare indicated by clubs and maces carried by nearly 20 percent of the shield bearing warriors at these two sites, and the ethnohistorically noted emphasis on using such clubs to disarm an enemy (Ewers 1955:202), stone points of this length would have been too fragile for effective use in such close-quarter combat.³ Coupling this with the difficulty of manufacturing and maintaining such long stone blades, we feel that these illustrated points must have been made primarily of metal (Keyser and Kaiser 2010). Strongly supporting their identification as metal points is the fact that about 35 percent of these large lance points and a few illustrated arrow points have either a transverse cross piece forming laterally protruding barbs (Fig. 12) like those on the freestanding metal projectile point, or quillon barbs (Fig. 13) that also were used to illustrate metal points.

Besides lance points, three illustrations of a single bow-spear have a large point with a quillon guard on one basal corner as though the point was made from a large knife blade or reworked sword blade (Fig. 13). The use of knives and sword blades for such weapons was common during the later Historic Period (cf. Taylor 2001:35).

Large metal lance points were used during the Protohistoric and Historic Periods on the Northwestern Plains, although archaeological finds of any protohistoric metal tools, including projectile

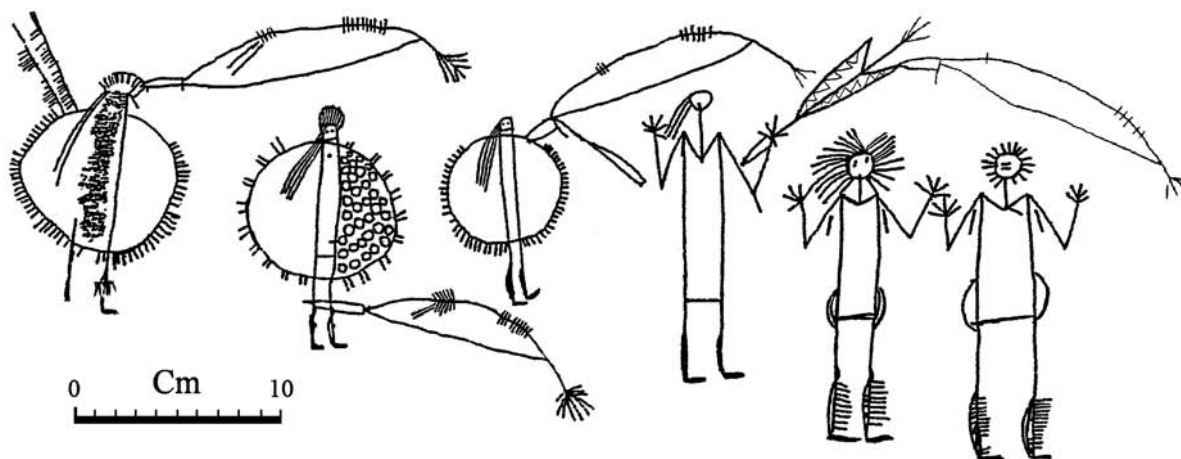


Figure 13: Partial Coup Count Lineup in Area C at Bear Gulch. Note Large Full Body Size Shields Associated with Bow-spears' Long Knife-shaped Metal Points Showing A Quillon Barb. The Two Humans at Right Are Women, As Identified by Hips, Breasts, and Hairstyle.

points, are relatively rare (Pyszczyk 1997; Eckles et al. 1994). Actual finds of historic metal lance points are surprisingly uncommon, however, even for Middle Missouri villages where the ethnohistoric record documents that many were used and the early artists Catlin, Bodmer, and Kurz commonly pictured such points in their artwork (cf. Thomas and Ronnefeldt 1976:67, 217, 219). Noted Middle Missouri archeologist, Ray Wood, once remarked (personal communication 2006) that during his long career he had seen only two such large metal spear points recovered archaeologically, both from burials. He suggested that such artifacts would have been intensively curated and likely would not be recovered from typical archaeological contexts.

Fortunately, historic and ethnohistoric records provide considerable information about the prevalence of these artifacts in the fur trade. To the east and northeast, French and British traders and missionaries provided large knives and lance points for Indian trade since the early 1600s (Keyser and Kaiser 2010); while to the south, the Spanish colonizers of New Mexico and surrounding areas were similarly providing metal items since A.D. 1540 (Calloway 2003:146-160). An example of such materials reaching the Northern Plains is an early burial of a horse butchered with metal tools that was found in southwestern Wyoming and dated about A.D. 1650-1680 (Eckles et al. 1994). This trade in metal items slightly preceded the Pueblo Revolt of A.D. 1680, which precipitated trafficking of horses northward into southwestern Wyoming's Green River Basin. From this area, horses and other trade goods spread rapidly across Wyoming and Montana and as far north as southern Alberta and Saskatchewan (Calloway 2003:165-211).

Several ethnohistoric sources document the presence of trade goods on the Northern Plains during the Protohistoric Period. By the mid-1600s, Sioux on the Northeastern Plains were obtaining metal weapons from the north and east from French and Algonkian contacts (Calloway 2003:240-241; Lehmer 1971:166). During the last half of the 17th century, Blackfeet and other Northern Plains groups were regularly acquiring quantities of metal weapons through Cree and Assiniboine middlemen, first from the French and, after 1675, from the Hudson's Bay Company (Calloway 2003:298-299; Lehmer 1971:167).

A few key ethnohistoric sources demonstrate that these European trade items made their way west decades ahead of the first actual European traders through the extensive and efficient continental trade networks that had already existed for at least two millennia (e.g., Conner and Hunt 1997; Jaynes 1997). For instance, in 1738, French fur trader and explorer Pierre Gaultier de Varennes, sieur de La Vérendrye, arrived at the Mandan villages of North Dakota from present-day Winnipeg, Manitoba, and found the Indians there already possessed large quantities of trade goods. His Assiniboine guides indicated they had been carrying such items to the Mandans for a considerable time (Lehmer 1971:167). A map from 20 years before La Vérendrye shows a second trade route running west from the Mississippi River south of present-day LaCrosse, Wisconsin, to the confluence of the Big Sioux and Missouri Rivers near present Sioux Falls, South Dakota (Lehmer 1971:168). Thus, trade was clearly so well established with Plains tribes by the beginning of the 1700s that European goods must have been common in the region throughout at least the last half of the 1600s.

Among the widely distributed and greatly sought after trade items were metal weapons and tools, including several kinds of knives, sword blades, and arrowheads. The quantities of such implements brought to North America for the early fur trade is impressive. For instance, in 1684 alone, the Hudson's Bay Company shipped 3,000 jackknives and 5,000 butcher knives to Albany Post on James Bay (Kenyon 2008). With similar quantities shipped by French and British companies year after year throughout the 17th century, it is clear that metal blades adequate for making spear points were one of the most common items traded onto the Northern Plains. Similar quantities of imported knives continued for more than a century. Between 1720 and 1750, the Hudson's Bay Company was still trading more than 1,350 knives per year in the Saskatchewan District alone. This translates to one knife per Plains lodge per year (Pyszczyk 1997:52)! In addition to French and English trade items, horseshoe nails, crossbow bolt points, knives, and sword blades were also entering the trade network from Spanish sources as early as the years between A.D. 1540 and 1635. Archaeological evidence shows that such items entered the Southern Plains, and some almost certainly made their way north into Montana (cf. Frison 1991:122-125).

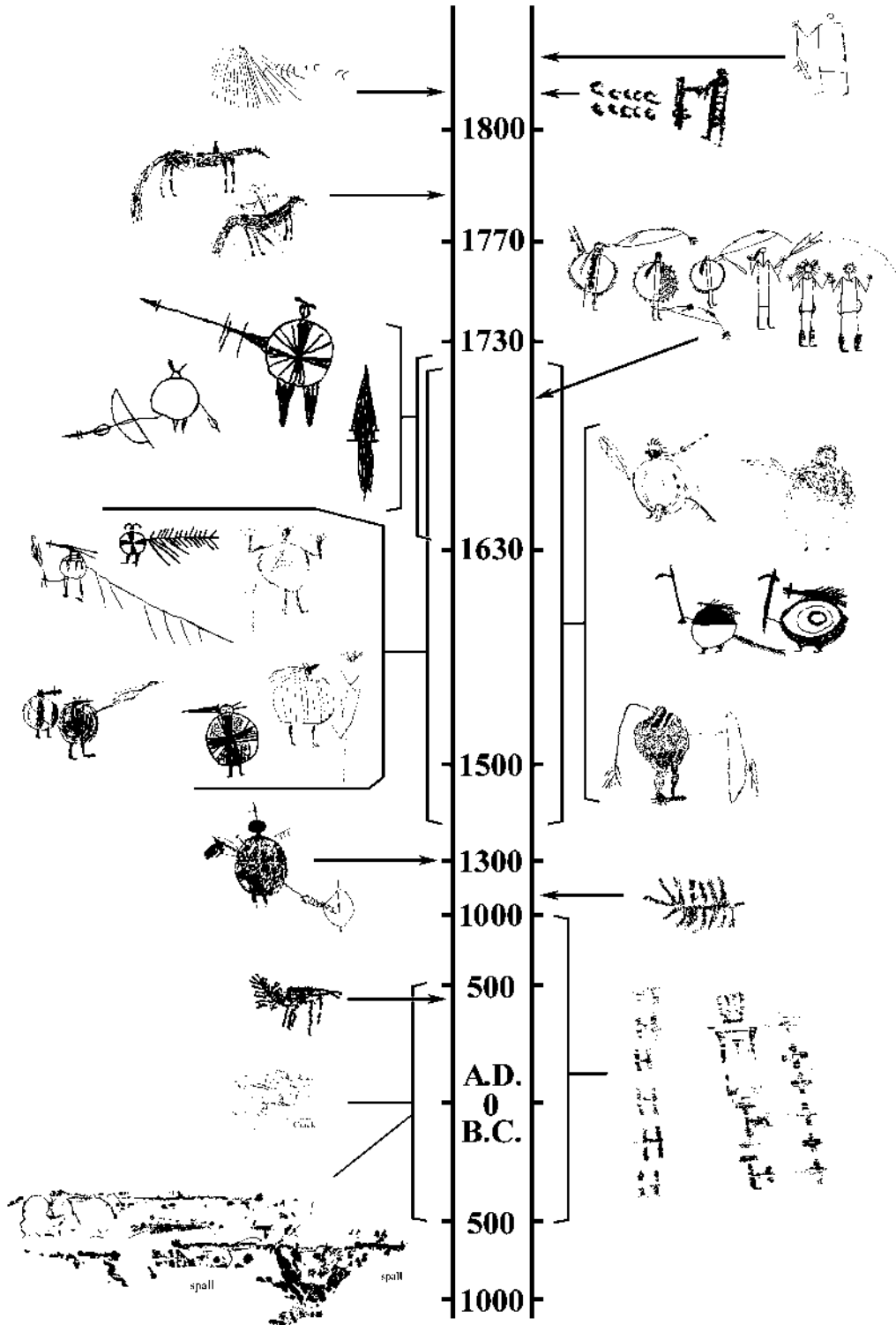


Figure 14: Preliminary Chronological Sequence for Imagery at Bear Gulch and Atherton Canyon. Note Predominance of Images after Approximately A.D. 1500.

One particular ethnohistoric source clearly indicates that warriors across the Northern Plains were using metal projectile points during the pre-horse Protohistoric Period. In 1787, Sahnkomauppee, an aged Cree warrior of more than 75 years, told fur trader David Thompson of a battle he had participated in some 60 years before, about 1725. He recalled coming to help the Blackfeet in their wars against the Snake Indians (possibly Shoshone) in central Alberta at a time before horses and guns had reached the region. He recounted: “Our weapons was [sic] a lance, *mostly pointed with iron*, some few of stone, a bow and quiver of ... about fifty arrows, of which *ten had iron points*, the others were headed with stone ... they [the Snakes] sat down on the ground and placed their large shields before them, which covered them: We did the same, but our shields were not so many, and some of our shields had to shelter two men” (Secoy 1992:34-35, italics ours).

Thus, archaeological, historical, and ethnohistorical evidence indicates a well-established Northwestern Plains trade in metal knives, sword blades, and arrowheads by the first decades of the 1700s, and significant trade must have occurred for at least 50 years before that. The rock art record at Bear Gulch and Atherton Canyon illustrates some of the earliest such items to reach the Northwestern Plains, and indicates that many of these metal blades were quickly converted to lance points and arrowheads. That these are associated almost exclusively with Pedestrian period full-body shields indicates they were drawn from about A.D. 1650 to 1730.

SUMMARY AND CONCLUSIONS

Various data sets document extensive use of Bear Gulch and Atherton Canyon during the Late Prehistoric, Protohistoric, and Historic Periods. Atherton Canyon also apparently saw limited use during the Late Archaic period (Fig. 14). The archaeological deposits investigated in Bear Gulch in 2007 yielded radiocarbon dates spanning about 500 years from approximately A.D. 1300 to 1800. These dates fall into two groups, one between about A.D. 1300-1450 during the Late Prehistoric Period and a second in the Protohistoric Period from the mid-1600s to the mid-1700s. A date from a piece of wood associated with one rock art panel also falls into this Protohistoric group.

While the cultural deposits at Bear Gulch provided no direct link to the rock art there, all of the dated archaeological materials are quite late in the Northwestern Plains occupation sequence and radiocarbon dates on bone, charcoal, and wood samples generally support the dates derived independently from absolute and relative dating of the rock art images themselves. This correspondence closely fits our initial hypothesis that the shallowly-buried Bear Gulch occupations should date from the Late Prehistoric and/or Protohistoric Periods.

For Atherton Canyon, the situation is even less well understood, but Stu Conner’s memory of the projectile points recovered by artifact collectors more than 40 years ago from a bison jump kill site in the canyon suggests that the bison kill had at least one Late Prehistoric Period component. The close spatial association of this kill site with the only two rock art loci to show large extensive areas of red wall painting is consistent with the presence of similar rock art found at other Late Prehistoric Period kill sites to the north in Alberta (Keyser and Klassen 2001:159-161; Klassen 2003:166-167).

Thus, while we do not yet have any direct link between the rock art and occupation debris or bison kill remains at either site, the striking correspondence of dates independently derived from these two data sets suggests that their spatial association is more than merely coincidence. At this point, we suggest that the cultural debris excavated from Bear Gulch was left there during short-term, task-specific uses of the site — consistent with specialized use of Bear Gulch by some of the artists carving and painting the rock art. Ascertaining the relationship of the bison kill in Atherton Canyon with the adjacent rock art will require further excavation at the site conducted under controlled professional methods.

The AMS radiocarbon dates on Bear Gulch rock art images are generally earlier than expected, but we made no attempt to date any red-painted images, some of which likely date to the initial Late Prehistoric Period and possibly even the Late Archaic Period. Thus, the two dates on charcoal drawings in one area of Bear Gulch—A.D. 355-540 and 1040-1215—if not subject to “old wood” contamination (discussed previously), suggest that they are between 300 and 1,000 years earlier than the stylized shield bearing warriors so characteristic of the site. Furthermore, the approximate 680-

year difference between these dates—from technologically and visually similar images found less than two meters apart—suggests that artists may have drawn charcoal rock art at Bear Gulch over a considerable span during the early centuries of the Late Prehistoric Period, but that evidence survives only in areas A and D of the site on about 30 small panels containing fewer than 60 figures. Possibly the open setting of most Bear Gulch panels contributed to degradation of other charcoal figures from this period. This suggestion is supported by the relatively well protected location of most Bear Gulch and Atherton Canyon panels containing charcoal drawings, which are usually under slightly overhanging blocks of the cliff, in the rockshelter at Atherton Canyon, or on the ceilings of small niches. Alternatively, it is possible that one or the other of these dates is in error, and the paucity of charcoal drawings is simply due to a very limited artistic expression at this site.

The date of A.D. 1280 to 1395 on the Atherton Canyon charcoal shield figure is also of interest. This warrior has none of the accoutrements, weapons, or shield heraldry characteristic of the hundreds of Bear Gulch style shield figures found at both sites, and thus has always appeared to us to be somewhat earlier than the terminal Late Prehistoric/Protohistoric date that we had tentatively assigned to Bear Gulch style warriors. In fact, the date of about A.D. 1300 falls in between the A.D. 1000 to 1300 time period assigned to the Castle Gardens style shield figures (Francis and Loendorf 2002; Loendorf 1990) and the range of A.D. 1500 to 1730 for the Bear Gulch style figures.⁴

Various Bear Gulch and Atherton Canyon images allow us to substantially refine the relative rock art chronology and reliably indicate the extent of use of these site complexes. The two panels of Pecked Abstract Tradition art at Atherton Canyon indicate at least limited use of the site during the Archaic period, sometime between 500 B.C. and A.D. 500 (Keyser 2004a; Keyser and Klassen 2001; Sundstrom 2004:75). This inference is also supported by the extensive weathering of these panels and the polissoires⁵ and scratches superimposed on one panel (Poetschat et al. 2008:18). Whether this rock art episode was, in fact, limited to only these two panels, or whether other pecked abstract art that was originally made elsewhere at the site has been subsequently lost to erosion, cannot be determined. However, the

highly eroded nature of the surviving examples leaves open the possibility that other panels at these or other loci were used during the Archaic Period for which evidence has not survived. The absence of Pecked Abstract art at Bear Gulch suggests that that site was not used during this early period.

Superimposition and weathering indicate that some of the liquid red painted images at both Bear Gulch and Atherton Canyon date to a period spanning the late Archaic and into the first half of the Late Prehistoric Period—about A.D. 1 to 1000. At Bear Gulch, these images include finger painted animals and humans, some of which are very simple shield bearing warriors and large simple geometric figures of crosses and rectangles. At Atherton Canyon, these liquid red images are large, heavily eroded figures that appear to show humans and a frog (Poetschat and Keyser 2009), red wall paintings, and likely the single, isolated Vertical Series panel. Probably approximately contemporaneous are the white liquid, brush painted figures found in two complex multiple-episode superimposition sequences at Atherton Canyon. Finally, the dated charcoal figures at Bear Gulch appear to have been drawn during the last centuries of this time span.

Most of the rock art at both sites, however, was made during the last few centuries of the Late Prehistoric Period and throughout the Protohistoric Period. The earliest figure we can confidently assign to this period is the early dated charcoal shield bearing warrior at Atherton Canyon locus 7, but some charcoal drawings of V-neck warriors in the same rockshelter⁶ are probably of similar age. Sometime between A.D. 1400 and 1600 artists began drawing the distinctive Bear Gulch style shield bearing warriors at both sites. The characteristic full body shields indicate they were drawn in pedestrian times prior to the introduction of the horse. Of the more than 960 such figures, most do not have lances tipped with metal points, but instead are armed with bows and arrows, large clubs, and spike maces. Such weaponry is characteristic of terminal Late Prehistoric Period shield figures across the Northwestern Plains from southern Alberta to central Wyoming. Nearly identical weaponry is common for shield figures from this period at Writing-On-Stone, Pictograph Cave, North Cave Hills, and Red Canyon (Keyser 1977a; Keyser and Klassen 2001).

Animals of various species and a few rectangular body humans were also carved in the last centuries of the Late Prehistoric Period. Many of these were apparently done by the same artists that drew the Bear Gulch style shield bearing warriors, and one distinctive style, named the Miniature Figure style, shows several scenes of tiny dancing human figures and bow-wielding hunters pursuing and shooting a variety of game animals. Bears are also common in this style. V-neck humans at both sites were apparently drawn by different artists than those responsible for Bear Gulch style rock art. Some V-neck figures are clearly of Late Prehistoric Period age, while others combine full body shields and weapons with metal points, which serves to date them to the Protohistoric Period just prior to the introduction of the horse (Keyser 2010a). Some of these V-neck figures have been identified as belonging to a Blackfeet art style (Keyser 2006:71, 2008a:71, 2011).

Sometime apparently relatively late in the Late Prehistoric Period, two Atherton Canyon panels were painted with vision quest compositions showing individual humans juxtaposed with animals. One shows an otter associated with a rectangular body human and the other has foxes, turtles, and a horned serpent juxtaposed around a V-neck human. The freshness of the paint and style of humans and animals in both compositions indicate a Late Prehistoric Period age.

The arrival of the first European trade goods between about A.D. 1620 and 1650 heralded the beginning of the Protohistoric Period, and artists at Bear Gulch and Atherton Canyon incorporated these new items into their work. Some of the earliest metal projectile points on the Northwestern Plains may be illustrated at these sites, both as a freestanding example of a bayonet type DAG point and several examples of obviously metal points on both lances and arrows used by Bear Gulch style shield bearing warriors. Coupled with the absence of horses and guns associated with these shield figures, these metal implements demonstrate that Bear Gulch style shield bearing warriors continued to be drawn from the Late Prehistoric Period into the first century of the Protohistoric Period, between approximately A.D. 1630 and 1730.

Other figures were also drawn during the Protohistoric Period. A series of early narrative compositions at Bear Gulch Area C (mentioned previously, also Keyser 2006) and a single

composition at Atherton Canyon show the use of early metal tools and artistic conventions of the developing narrative Biographic style, effectively dating them to this same 100 year period. Metal tools include a large knife used to kill a warrior wearing bear paw moccasins at Atherton Canyon (Poetschat and Keyser 2009) and the lance point shown on four different drawings of the same bow-spear involved in a tally of counted coups at Bear Gulch (Keyser 2006:64, 2008a). These scenes must postdate A.D. 1630. In combination with several standardized narrative conventions (including the capture hand, women's hair, and the fusillade of fire) the absence of horses and guns dates these compositions before about A.D. 1730-1750 (Keyser 2006).

The rare guns, horses, and horse tracks drawn at these sites indicate that only a little of the rock art dates to the Historic Period. Certainly the three Atherton Canyon horses, single sets of horse tracks at both sites, and two guns drawn on one Atherton Canyon panel demonstrate that some artists recorded events at these sites in the Historic Period. Two of the horse images, however, are relatively crudely-drawn animals with outsized, ball feet, attributes that indicate they were drawn early in the stylistic sequence of Plains horse representations (Keyser 2008c; Keyser and Klassen 2001:19; Keyser et al. 2005). These figures almost certainly date before A.D. 1775. On the other hand, C-shaped horse tracks drawn on a single panel at each site (Keyser 2006:59; Poetschat et al. 2008:16) probably date after A.D. 1800. The painted composition containing horse tracks at Atherton Canyon also includes a gun, which undoubtedly dates after about A.D. 1775. The second gun in the superimposed scratched scene probably was drawn after A.D. 1800.

In summary, Bear Gulch and Atherton Canyon were intensively used in the latter centuries of the Late Prehistoric Period and throughout the Protohistoric Period. The presence of more than 1,000 shield bearing warriors, most of which were carved and painted during a period of 350 years or less, documents that these two canyons were the focal point for young warriors drawing and redrawing their self portraits as they earned status within their group. During this same period, other artists—almost certainly including at least a few women—drew dancing figures, hunting actions, and a birthing scene. During the last decades of the Protohistoric Period different artists — drawing

different styles of shield bearing and V-neck warriors—began more intensive documentation of their specific war honors in the earliest known narrative Biographic compositions in the time before horses and guns. Archaeological test excavation further demonstrates that these Late Prehistoric and Protohistoric Period individuals and groups left an extensive but diffuse archaeological deposit in the Bear Creek valley bottom, and we suspect they may also have been responsible for at least part of the bison kill midden in Atherton Canyon.

Finally, a few artists stopped at these sites during the Historic Period to add an occasional Biographic narrative that illustrated the newly acquired horses and guns which heralded the last century of traditional nomadic Plains Indian culture. The paucity of these latest images, however, is a clear indication that Bear Gulch and Atherton Canyon had already seen their greatest use prior to the coming of the first Europeans.

END NOTES

¹ Due to historical circumstances influencing the recording and reporting of both Atherton Canyon and Bear Gulch, images from widely scattered loci at both sites have been published (e.g., Conner and Conner 1971:27; Keyser 2004a:42-43; Keyser and Klassen 2001:193, 293; Secrist 1960; Sundstrom 1987) as representing only two sites, each designated by a single Smithsonian site number. Rather than introduce new site numbers to the various component loci at either Bear Gulch or Atherton Canyon (which contain, respectively, five and more than a dozen spatially segregated concentrations of rock art) and then be faced with the nearly impossible task of showing which images originally reported from one particular site were now recorded as part of a differently numbered site, we opted to maintain these two designations and subdivide each site into component parts. This allows the thousands of images to be effectively catalogued, classified, and compared to one another and those from other sites. This is not dissimilar to several other notable Plains rock art sites, probably the best example of which is DgOv-2 at Writing-On-Stone, which stretches nearly 500 meters along a major cliff face and consists of nearly 30 loci, many of which might otherwise be designated as separate sites (Keyser 1977b). Thus, for our research, we have retained the original site designations of 24FR2 and 24FR3,

but subdivided each of these into component parts so that Bear Gulch is separated into five areas (A-E), each of which has from 1 to 21 loci that contain from 1 to more than 50 separately designated rock art panels. Atherton Canyon is separated only into 20 loci, each of which has from 1 to more than 40 panels of pictographs and/or petroglyphs (Poetschat et al. 2008:11-12; Poetschat and Keyser 2009).

² DAG is an early British corruption of the French word *dague* meaning dagger.

³ In this regard, we are well aware of the use of long stone spear points by Paleo-Indian bison hunters, but we note that the Paleo-Indian weapon system for close quarter hunting was apparently one where each hunter carried several socketed foreshafts, each tipped with a long stone point, that could be “reloaded” onto a spear when one point broke or remained lodged in the quarry animal (Frison 1991: 168-169). Among the spear-wielding shield bearing warriors at these two sites, there is no example of a shield bearing warrior holding extra foreshafts or carrying a bag that might have held these.

⁴ Recent research, not yet fully reported, suggests that the early dates originally associated with Castle Gardens style images at Valley of the Shields are contaminated by old charcoal, and newer, more reliable dates suggest an age of about A.D. 1500 (Loendorf 2009) for this style. If this is the case, this Atherton Canyon shield figure would also predate the Castle Gardens Style.

⁵ Polissoir: A block of coarse stone, sometimes as an earthfast boulder or natural outcrop, used for grinding and polishing stone axes in the final stages of production. The highly polished V-section grooves in which stone axe blades were finished.

These are a special kind of tool groove, essentially, although at Bear Gulch and Atherton Canyon they may have been made for other purposes--they are almost certainly not for finishing ground stone axes at these sites--instead, Keyser believes they were probably taking “magic” dust away from the already decorated panels. We didn’t want to call them tool grooves, given what the common understanding of that term is for Plains rock art study, and that these are highly polished, which typical tool grooves are not.

⁶ The location of these charcoal figures in a shallow rockshelter (Poetschat and Keyser 2009:187) has probably been key in their preservation.

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