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AN ARCHAEOLOGICAL ASSESSMENT OF THE GUNSIGHT PASS SITE: 5GA4251
ARCHAEOASTRONOMY AND LANDSCAPE ARCHAEOLOGY
IN MIDDLE PARK, GRAND COUNTY, COLORADO. Revised 06/15/2017.

Completed for
The Colorado Historical Society
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ABSTRACT

The Gunsight Pass Site (5GA4251) is in the Middle Park region of the Southern Rocky Mountains physiographic province, Grand County, Colorado. It is situated atop a prominent north-south trending ridge, southeast of Gunsight Pass, at an average elevation of 8500 feet. The site was first identified in July 2011, as an open architectural and open lithic scatter consisting of multiple surficial and half-buried rock alignments.

The purpose of the archaeological assessment was to provide a detailed recording of the stone features and determine whether they represent domiciles or ceremonial features associated with vision quests, or possible astronomical alignments. Additionally, orientations toward potential sacred landscapes such as Whitely Peak, Wolford Mountain, or the Sulphur Gulch area were examined. Another significant goal of the assessment was to provide data on the site for its consideration as a Traditional Cultural Property (TCP) relevant to historic Ute, Arapahoe, and eastern Shoshoni tribes.

Detailed recording in the fall of 2012 identified a total of 34 features, composed of 33 prehistoric archaeological and architectural stone features, and one modern memorial feature. These cobble alignments included: five egg-shaped alignments; three oval shaped alignments; three circlar to oval shaped alignments; four L-shaped alignments; one J-shaped alignment; two lens shaped alignments; one square with a cairn and a linear extension; three eccentric curvilinear alignments; one paired upright slab/rock alignment; two small prayer circles, three stone cairns; one linear alignment; and two thermal features. Only one feature is identified as a possible Protohistoric Era domicile based on its size and association with two external thermal features.

A data set of alignments for Feature 13 was generated. The hypothesized astronomical alignments for spring equinox and summer solstice sunrises and sunsets were observationally verified using horizon topography. However, fall equinox sunset verification was delayed until September 23, 2015 due to inclement weather.

Additionally, azimuths derived from map data indicate cobble alignments relative to horizon topography and potential equinox and/ or solstice sunrises/ sunsets are present on 16 other features, but remain unverified. Orientations toward sacred landscapes and sites with known vision quest features such as Wolford Mountain, Whitely Peak, Little Wolford Mountain. and Sulphur Gulch were also verified.

A preliminary alignment predictive model produced repetitive matches within ± 1° at 10 features (3, 4B, 5, 6, 7, 10, 11, 13, 18, and 31); cardinal and inter-cardinal matches within ± 1° occurred at 14 features (3, 4A, 4B, 5, 7, 8A, 9, 10, 13, 14, 15, 18, 22, and 23). Possible lunar alignments occur at nine features (3, 5, 6, 7, 13, 31, 14, 18, and 22). Azimuths related to the sacred cardinal directions are the most prevalent, while intercardinal azimuths are represented by the long axis of nine oval and egg-shaped features. Six have a northwest/ southeast orientation and three have a northeast/ southwest orientation.

A possible Cottonwood Triangular projectile point fragment indicates a Late Formative to Protohistoric Era. An obsidian flake from Feature 13 indicated the geochemical source as Cerro del Medio, New Mexico.

The site is considered eligible to the National Register of Historic Places under criteria C and D, eligible to the State Register of Historic Places under criteria C, D, and E, and should be designated as a Traditional Cultural Property under multiple criteria as outlined by Gulliford (2000).

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ACKNOWLEDGMENTS

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Fieldwork was conducted by personnel and research associates of DARG. Brian O'Neil served as Project Director and was assisted in the field by Cheryl Harrison and Travis Archuleta. Nicole Darnell, GIS specialist, produced and fine-tuned the site map. Cheryl Harrison produced the individual feature maps and other graphics, flew us around Middle Park in Terrain Navigator Pro for potential geographical azimuth intercepts, did research on historic trails, and maintained the data base for all the azimuths. Holly Shelton wrote Appendix D on the trowel testing results, and performed the computer digitalization and enhancements of the feature photographs and horizon profiles. The XRF study for the obsidian source was performed by Northwest Research Obsidian Studies Laboratory in Corvallis, Oregon.

We would also like to thank Staff Archaeologist Bill Wyatt, Associate Field Manager Susan Cassel, and Field Manager David Stout of the BLM - KFO for their interest, aid, and professional support of this project.

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INTRODUCTION

The Gunsight Pass Site (5GA4251) is under the administration of the Bureau of Land Management (BLM), Kremmling Field Office (KFO), and the supervision of Mr. Bill Wyatt, staff archaeologist. The initial discovery and reconnaissance of the site occurred during an archaeological survey and assessment of grazing impacts on a lease allotment in July 2011. At that time, seven rock alignment/architectural features were identified; three of which were photographically recorded. As the probability for intact cultural deposits was good, the site was assessed as potentially field eligible to the National Register of Historic Places and the State Register of Historic Places (cf. O'Neil, 2011b).

Thus, Mr. Wyatt scheduled additional inventory in 2012 on the adjacent grazing lease. This work was performed June 2012 and resulted in the identification of 29 features. These features consist of surficial and half buried rock alignments including small stone circles less than or greater than 50cm in diameter; medium sized stone circles; between 50 - 100cm; large stone circles greater than or equal to1.5m in diameter; oval to U-shaped alignments; four-sided polygons; L-shaped alignments; arc shaped alignments; paired upright slab/ rock alignments; linear alignments; and collapsed stone cairns (cf. O'Neil, 2012).

During June 2012 GPS mapping data was collected from 14 of the stone features before it became evident that additional time and funding would be necessary to adequately and intensively record the site to the level which it deserved. Toward that end, Western Colorado Archaeological Consultants, in concert with Dominquez Archaeological Research Group (DARG) applied to the State Historical Fund (SHF), History Colorado, the Colorado Historical Society (CHS), for a grant to complete the detailed recording of the site. DARG received written notification of SHF approval for the assessment grant in late August, and a fully executed contract (2013-AS-003) in late October 2012. In late September, to test the hypothesis that Feature 13 on 5GA4251 was indeed oriented toward the equinox sunrise, Project Director Brian O'Neil and Cheryl Harrison seized the opportunity and voluntarily visited the site recording the autumnal equinox sunrise from Feature 13. The fieldwork was conducted between November 5 - 9, 2012, by DARG archaeologists Brian O'Neil, M.A. (Project Director), Cheryl A. Harrison, and Travis Archuleta under ARPA Permit, C-67009. The site was revisited again by Brian O'Neil, Cheryl Harrison, and Holly Shelton on June 21, 2013 to document the summer solstice sunrise/ set cobble alignments at Feature 13. On September 23, 2015 instruments were set up along cobble set 4 [34, 11/12, 9,1, and 37] at 270˚ the hypothesized fall equinox sunset. Visual observation indicated first solar disk on the horizon at 269º, mid-solar diameter at 270˚, and full set (last glimmer) at 271º.

The Gunsight Pass Site (5GA4251) is located atop a prominent north-south trending interfluvial ridge, southeast of Gunsight Pass, at an elevation of 8500 - 8520 feet. On a clear day, distant horizon lines for parts of the Rabbit Ears Range, the Gore Range, and the Front Range, are visible from the site. Within the immediate Middle Park vicinity, Wolford Mountain, Little Wolford Mountain and Junction Butte are visible to the south and south-southwest, Grouse Mountain to the southeast, Coal Mountain to the north, and Whitely Peak

to the northwest. Gunsight Pass provides an easily traversable pedestrian corridor between Troublesome Creek on the east and Antelope Creek and Muddy Creek on the west. The topographic map of the general project area is illustrated in Figure 1.

EFFECTIVE ENVIRONMENT

The geologic environment of Gunsight Pass Site is primarily Quaternary alluvial deposits (Tweto, 1979) with shallow Holocene loess deposits on portions of the ridge crest, and along the eastern site boundary. The soils are classified as Tine Cobbly Sandy Loam on 3-15% slopes. This is a deep, well-drained soil formed in alluvial outwash. Permeability is rapid, surface runoff is slow, and the water erosion hazard is considered moderate. In general, content of rock fragments ranges from 20-80%, and are predominately less that 15cm in diameter. The A1 horizon (0-23cm) is pale brown, very cobbly, gravelly loamy sand. It has a very weak thin platy structure parting to moderate fine granular, is soft, very friable, non-calcareous, and mildly alkaline (USDA SCS, 1983:41, 81). Surface observations suggest an average of 5% cobbles and 15% gravels. Where exposed, the observable AC horizon (23 to 153+ cm) is brown, an extremely cobbly gravelly-sand, with an angular to sub angular blocky structure parting to moderately granular, slightly hard, very friable, non-calcareous, and mildly alkaline. Limited surface observations suggest an average of 15% cobbles and 35% gravels.

Vegetation is composed of low sagebrush with occasional rabbit brush and snakeweed, mutton grass, gramma grass, and forbs such as yarrow and globe mallow. Ground visibility is highly variable, ranging from 5-80%, depending on vegetative cover. The prevailing westerly winds have deflated portions of the ground surface along the western half of the site (Plates 1 and 2).

The area is winter range for mule deer and elk. Other wildlife includes sage grouse, jackrabbit, and cottontail. Bison are known to have been present prehistorically and into the protohistoric/historic periods.

General Middle Park Environment

Middle Park is within the upper Colorado River basin within the Middle Park subsection of the Southern Rocky Mountain physiographic province. Middle Park was once along the western edge of the old Frontrangia in late Paleozoic times. This area was later covered by Cretaceous sediments about 10,000 feet thick. Uplift of the mountain ranges began in the Late Cretaceous resulting in the eroding earlier sediments and exposure of the Precambrian core. Renewed uplift and flank faulting occurred during the late Cenozoic. Glacial and stream erosion since have left extensive exposures of the Precambrian basement rock (Young and Young, 1977:69). In Quaternary time, the action of streams, glaciers, and wind left extensive pediments composed of redeposited cobbles and sediments. Some of which are present in the project area. Geologic formations near the site consist primarily of

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Figure 1. Compilation of U.S.G.S. 7'5 topographic quadrangles Gunsight, Peakview Mountain, and Corral Peaks, with local names near 5GA4251.

Plate 1. Site Overview looking North-Northeast.

Plate 2. Site overview looking South-Southwest.

the Tertiary Troublesome Formation, the source of Kremmling chert; and Quaternary pediment and terrace deposits. Jurassic and Cretaceous sediments are present in the highlands surrounding the valleys include the Dakota, Morrison, and Entrada Formations, along with their various interbedded shale formations (Tweto 1979). See Appendix A for a more detail geologic description. and Entrada Formations, along with their various interbedded shale formations (Tweto 1979).

Climatically, Middle Park is considered to have a cool semiarid climate where temperatures can drop from -17° to -50° Fahrenheit during the winter with summer temperatures reaching into the 90s. Middle Park has an average of 100 frost-free days and annual precipitation varies from 9 to 12 inches. The surrounding higher elevations are characterized as cooler and moister. Annually, the high mountain temperatures average from 5° to 10° cooler with precipitation as much as 10 inches greater than lower elevations (USDA/SCS, 1983). Overall, elevation in Middle Park ranges from 7320 to 9000 feet.

Vegetation along river and stream bottoms consists of cultivated hay and alfalfa. The alluvial terraces, colluvial benches, and alluvial fans contain saltbush and sagebrush/grass communities that intertwine into pinyon-juniper forest, with juniper being predominate at the lower elevations. The surrounding higher elevations exhibit extensive patchwork forestation of Aspen, Douglas Fir, and Engelmann Spruce. Such vegetation communities support a variety of wildlife species, including mule deer, elk, moose, coyote, black bear, rabbits, beavers, and various rodents. Mountain lion, bobcat, fox, skunk, badger, and weasel are also likely inhabitants, as were once bison and big horn sheep. Bird species observed include jays, raven, red-shafted flicker, red-tailed hawk, owl, a variety of water fowl, and eagles.

The topography of Middle Park area is highly variable and includes both mountains and broad valleys surrounded by ridges, land slide deposits, coalesced alluvial fans, pediments, and Colorado River terrace remnants. Many of these topographic features are dissected by small intermittent and permanent drainages. Troublesome Creek and Antelope Creek, the closest permanent water sources to the site, drain into the Colorado River.

Paleoclimate

Reconstruction of paleo-environmental conditions is essential to the understanding of population movement and cultural change during prehistoric times. Changing environmental conditions altered the exploitative potential of an area and put stress upon aboriginal cultures by requiring adjustments in their subsistence patterns. To interpret whatever changes are seen in the archaeological record, an account of fluctuations in past climatic conditions must be available or inferences must be made from studies in surrounding areas. Generally, only gross climatic trends have been established for western North America.

Paleo-environmental data for the Southern Rocky Mountains is minimal and highly complex due to high variability in the topography. The most current data for the Northern

Colorado River Basin, as derived from several modeling techniques, has been summarized in considerable detail by Reed and Metcalf (1999:22-32). A generalized summary of their presentation is provided here.

The overall trends for the Early Holocene was cool and moist, followed by a general warming by around 9,500 Before Present (BP). Conditions were moister than today until around 7,300BP when the proxy records indicate a divergence between north and south, roughly along the Colorado River. South of the Colorado River records indicate warm moist conditions until 6,000BP, while north of the Colorado River a definite deterioration occurred as evidenced by major erosion and incision of the Yampa River and its tributaries around 7,300BP. Moister conditions return north of the Colorado River around 6,400BP, possibly extending to 5,800BP, when another period of less effective moisture occurred. North of the Colorado River, both hill slope and eolian sediments were available for deposition until about 4,600BP. Except for a few minor exceptions, there appears to be no broad periods of stabilization or paleosol formation during this period.

It should be noted that over the western portion of the continental United States, the timing and degree of maximum drought varies between geographic areas, but the interval between 9,000 and 6,000 years ago is usually the warmest and driest period in the record. It is not until after 9,000 years ago that the Southern Rocky Mountains, including most of the Colorado River Basin, begins to differ from the Middle Rockies and Great Basin records. Whereas other studies, especially in the Great Basin, show a period of maximum drought sometime between 9,000 and 6,000 years ago. The Southern Rockies and the Colorado mountains do not show clear evidence of an actual drought. The most significant factor, as far as prehistoric settlement and demographic issues are concerned, is that an Altithermal over most of the Northern Colorado River Basin did not occur; in contrast to the model proposed by Antevs' (1948; 1955) for the Great Basin.

In a recent synthesis of multiple studies, Miller (2005) concludes that separate lines of evidence indicate a temperature controlled climatic amelioration ranged over a broad area from Canada into the Southern Rocky Mountains and bordering areas, beginning at about 6,500 Radiocarbon Years Before Present (RCYBP). Drainages began to incise former alluvial plains, lake levels rose, glaciers advanced, frost heaving occurred, dunes ceased migration, and phytogenic eolian deposits developed, indicating cooler/moister conditions which caused an associated shift in vegetal communities. These conditions occurred until about 3,500 RCYBP.

Reed and Metcalf (1999) report that recent studies of ice, ocean cores, and cores from the larger continental lakes indicate cycles of climatic change that operate on a 1,000 to 2,000 year cycle and that the transition between cycles is abrupt, often on the order of a decade or two. The cycle is initiated by a rapid rise in temperature followed by a gradual return to moderate conditions over the course of about 1,000 years. The cycle ends with a rapid return to very cold temperatures just prior to the start of the abrupt warming that starts the next cycle. The degree of the temperature shifts may have ranged between 9˚to 14˚F during the Pleistocene and then moderated to a range of between 2˚ to 5˚F in the Holocene.

These abrupt shifts could occur within the life span of an individual, thus occurring in a stepwise fashion rather than gradually. To date, nine cycles have been identified in the last 14,000 years.

For the later Holocene, indications vary per the area and the resolution of the data. In a study by Fall (1997), the climate was slightly cooler and less moist between 4,000 and 2,000BP, after which essentially modern conditions are present. Other records indicate conflicting and variable data after 4,600BP. However, north of the Colorado River there appears to be a period of somewhat greater effective moisture from around 4,600BP to as late as about 1,500BP with periods of drought around 3,500BP and again just after 2,700BP. Other brief periods of stability are observable at about 2,200BP and between 1,800 to 1,500BP. However, some records show deterioration again after 1,000BP, as well as a period of higher effective moisture after 600BP.

More fine grained analysis relative to Middle Park comes from analysis done at the Yarmony Pit House site, Wolford Mountain Dam and Reservoir Project, Little Wolford Mountain study areas. Paleoindian occupation studies within Middle Park have been conducted by the University of Wyoming in recent years (Kornfeld and Frison 2000) and several of their sites are within a 35km square area designated as the Little Wolford Mountain study area. This area stretches from Little Wolford Mountain in the south to Gunsight Pass in the north. The current paleo environmental evidence indicates that at about 10,400BP, Middle Park consisted of much larger stands of conifers with expanded aspen groves at lower elevations. Areas of sagebrush and grasslands occurred in the lowest elevations near the Colorado River. The data also suggest that Middle Park was not subject to the early Holocene drying found to the south and may have had a much shorter period of mid-Holocene drying due to its elevation (Kornfeld et al. 1999; Cummings and Moutoux 1998; Meyer et al, 2010; Reider, 1998). This data substantiates the observations made above by Reed and Metcalf (1999).

In the data from the analysis at the Yarmony Pit House site (Metcalf and Black, 1991), the paleo climatic model and biotic proxy data imply that summers from about 8,000 - 10,000 years ago were warm and wet, but that the winters were correspondingly colder. The differential between summer and winter extremes decreased toward the middle Holocene about 5,800BP when the lower limit of the montane forest may have shifted downward 100 to 200 meters and the mean annual temperature and precipitation were higher than they are today. By about 5,000BP the northern boundary of the southern monsoon moved southward and the Colorado summers became cooler and drier, with a greater proportion of the mean annual precipitation coming in the form of winter snowfall. This cooler climate in the middle and late Holocene caused the upper timberline to shift downward and the elevation of the lower timberline to move upward in response to reduced summer precipitation. This squeezing of ecozones relative to localized changes in temperature and precipitation continues into the present.

The data from the Wolford Mountain Dam and Reservoir Project (Tucker and Tate et al. 2000) generally conforms to the above presentations with additional data developed by

Miller (1995) based upon strata identified during the excavations at 5GA1598, 5GA1599, 5GA1602, 5GA1604, and 5GA1609. All of these sites are located on Pleistocene terraces along Muddy Creek. The periods of occupation on these sites occur during cool climates. Near glacial climates appear to have been present to as late as 7,500BP. followed by a shift to long term drought conditions which lasted to about 6,000BP. After that, glacial climates were again present from about 6,000BP to sometime after 5,200BP. Another drought period occurred from 5,200BP to as late as 2,600BP. Moderate climate conditions were prevalent between 2,600 and 800BP and between 500 and 200BP. The droughts between 800 and 500BP and after 200BP were less significant than earlier ones.

CULTURAL HISTORY AND PREVIOUS WORK

PREHISTORIC BACKGROUND

As part of the Colorado Historical Society's (CHS) RP-3 effort, a prehistoric overview of the general Middle Park region is provided in *Colorado Prehistory: A Context for the Northern Colorado Plateau* (Reed and Metcalf 1999). Briefly, this document states that evidence exists for human occupation in the northern Colorado mountains from the Paleoindian through Historic Periods, a time span of more than 12,000 years. The region may not have been occupied extensively or intensively during all time periods since aboriginal populations fluctuate principally in response to changing environmental conditions. Despite the fluctuations in populations and usage of any one area, the aboriginal inhabitants of the Southern Rocky Mountain region, including Middle Park, have generally pursued an archaic subsistence pattern consisting of broad spectrum hunting and gathering and seasonal transhumance. More specific detailed information regarding Middle Park may be found in the *Class I Cultural Resource Overview of Bureau of Land Management, Kremmling Field Office, Central Colorado* (Reed et.al. 2008). Additionally, other useful broad based references are *Intermountain Archaeology* (Madsen and Metcalf 2000) and *Colorado Archaeology* (Black and Metcalf ed. 2012), both of which contain several articles applicable to Middle Park.

An overview of the historical archaeology for Colorado is provided in Church (et.al 2007), and a history of the sub-region is provided by Mehls (1984) who has presented several socioeconomic themes for the Mountains, as well as in the early BLM/KFO Class I Report (Schubert 1981). Mehls' themes include: High Country Farming, Recreation and Tourism: Roots and Development, Ranching, and Federal Activity and Conservation.

A general aboriginal culture history potentially applicable for Middle Park, as developed by Reed and Metcalf (1999:6) is presented below followed by a brief summary of each era.

Paleoindian Era		11,500 - 6,400 BC
	Clovis Tradition	11,500 - 10,500BC
	Goshen Tradition	11,000 - 10,700BC
	Folsom Tradition	10,800 - 9,500BC
	Foothill-Mountain Tradition	9,500 - 6,400BC
Archaic Era		6,400 - 400BC
	Pioneer Period	6,400 - 4,500BC
	Settlement Period	4,500 - 2,500BC
	Transitional Period	2,500 - 1,000BC
	Terminal Period	1,000 - 400BC
Formative Era		400BC - AD1300
	Anasazi Tradition	AD900 - 1100
	Fremont Tradition	AD200 -1500
	Gateway Tradition	400BC - AD1300
	Aspen Tradition	AD1 - 1300
Protohistoric Era		AD1300 - 1881 A.D.
	Canella Phase	AD1100 - 1650
	Antero Phase	AD1650 - 1881

Paleoindian Era (ca. 11,500 - 6,400BC)

Human occupation of the upper Northern Colorado River Basin appears to have begun with the Paleoindian Era. No evidence of a Pre-Clovis occupation has yet been found. Within the study area, the Paleoindian era is represented by four traditions that can be distinguished based on projectile point styles and possibly by subsistence strategies (Reed and Metcalf 1999).

The *Clovis Tradition* (ca. 13,400 - 12,500BP) is characterized by very large, fluted, lanceolate projectile points, sometimes found in association with mammoth or another Pleistocene megafauna remains. At present, there is no association of Clovis points with mammoth or another Pleistocene megafauna in the upper Colorado River Basin. However, discoveries of now-extinct forms of Pleistocene megafauna have been made in the larger region, with many of these discoveries occurring near major rivers and streams, suggesting that riverine environments were well suited for megafauna at the end of the Pleistocene.

The *Goshen Tradition* (ca. 13,000 - 12,700BP) appears to be contemporaneous with Clovis Tradition components. It is characterized by large, unfluted, lanceolate projectile points that exhibit basal thinning. Although similar in outline to Clovis points, Goshen points are very like Plainview points from the later Plano Period. The Goshen tradition appears to have also emphasized big game hunting. In the Middle Park study area five sites and one isolated find have produced Goshen points. These are Upper Twin Mountain (5GA1513); Lower Twin Mountain (5GA186); Barger Gulch (5GA195, localities A and D), Hay Springs (5GA638); the Phillips-Williams Fork Reservoir (5GA1955); and an isolated find from the Missouri Ditch. The most significant of these is the Upper Twin Mountain site

where excavations performed by the University of Wyoming uncovered a *Bison antiquus* bone bed with an associated Goshen point. Radiocarbon dating of the bone produced dates of 10,240±70 RCYBP (CAMS-16081) and 10,470±50 RCYBP (CAMS26782). Based upon individual teeth, wear groups, and tooth eruption, a minimum of 15 individual bison are represented. Tooth eruption and wear patterns indicates that the animals died in late fall or early winter, between early November and mid-January. Human activities appear to suggest the removal of highly valued meat cuts and modification of the bone exemplified by impact fractures, indicating extensive marrow removal. Based upon these factors and the nearly exclusive use of local raw materials, Kornfeld and Frison (2000) postulate a year-round occupation in Middle Park, with an exploitation strategy closer to an Archaic rather than a Plains Paleoindian pattern.

The *Folsom Tradition* (ca. 12,800 - 11,500BP) is characterized by smaller finely crafted, fluted, lanceolate projectile points and the continued emphasis on the hunting of now extinct species of bison. The best-known localities from Middle Park are the 16 Folsom sites recorded by Naze (1986; these include only his definite and probable sites in Middle Park), as well as the testing done by Naze (1994) at the Crying Woman site (5GA1208). Additional confirmation of five of these sites has been conducted by the University of Wyoming and include the Lower Twin Mountain (5GA186); Jerry Craig (5GA639); Barger Gulch (5GA195 localities A, B, and C); Hay Springs (5GA638); Phillips Folsom site; and Ute Pass (Kornfeld and Frison 2000; Surovell et.al. 2003).

Kornfeld (2012) proposes that Middle Park was occupied by a Paleoindian macro band (~175-500 people) who occupied Middle Park as permanent residents following a seasonal elevation transhumance pattern within the Middle Park catchment area. The theoretical underpinning is based upon high altitude human biocultural adaptations. These include dealing with hypoxia, maintenance of core body temperature, and balancing residential and logistical mobility relative to resource abundance and variety within a 10 20km logistical exploitation territory.

The *Plano Tradition* (ca. 11,500 - 7,500BP) followed the Folsom Tradition on the Great Plains and continued the focus on bison hunting. However, work by Frison (1992) in Wyoming and by Pitblado (1994) in Colorado indicate there are two distinct but coterminous adaptations occupying differing environmental situations during the late Paleoindian Era. One cultural unit, the classic Plano Tradition, occupied the open plains and large intermontane basins, while the other, the Foothill-Mountains Tradition complex, occupied more rugged higher elevations at the margins of the plains.

The classic Plano Tradition includes projectile points from the Cody Complex, James Allen, Plainview, Agate Basin, and Hell Gap (Reed and Metcalf 1999). The classic Plano Tradition focused on bison which were often procured on communal hunts, while the Foothills-Mountain Tradition procured deer, elk, bighorn sheep and pronghorn antelope, and possibly practiced a more intensive exploitation of floral foodstuffs. The Foothills Mountain Tradition projectile points are unfluted, lanceolate points that tend to have restricted stems and indented bases. They include Pryor Stemmed, Lovell Constricted, Lusk, and Pine

Springs points and are more likely to have been made from local quartzite. They may also display greater regional variability indicating more localized specialization.

Work by the University of Wyoming (Kornfeld and Frison 2000), Naze (1994), and Benedict (1985) also indicate a strong trend toward the classic Plano Tradition with such points as Cody Complex, Hell Gap, and James Allen within Middle Park. Cody Complex points have been recovered at Jerry Craig (5GA639), Barger Gulch (5GA195, locality A), Caribou Lake (5GA22), and Hay Springs (5GA638). Hell Gap or Western Stemmed points have been found in the Barger Gulch site (5GA195, Locality A) while James Allen points have been recovered from the Phillips-Williams Fork Reservoir (5GA1955), Crying Woman (5GA1208), and at 5GA1384.

Archaic Era (ca. 6,400 - 400BC)

The Archaic Era encompasses a relatively long period of time that recent research indicates was inherently less stable than the traditional interpretation would indicate. The expanding paleo climatic data base, coupled with the observable frequency and nature of adaptive shifts evident in the archaeological record, indicate that periodic and probably abrupt changes occurred. As mentioned previously, Madsen et al. (2000) have proposed that as many as nine millennial-scale shifts in paleoclimate may have caused abrupt adaptive shifts in subsistence patterns in the cultures of the region. In that the general lifeway was less mobile and became more focused on the use of local resources on a scheduled seasonal basis. From a technological perspective, there is a transition from the use of lanceolate projectile points to the use of notched and stemmed varieties, which show a high degree of variability in the forms used with the dart and atlatl. Grinding stones are also more commonly found in Archaic Era sites than those of the Paleoindian Era, indicating a growing reliance on processed vegetal resources. Unlike the preceding Paleoindian Era, there are numerous sites which contribute to our understanding of the Archaic Era. Consequently, it is impractical to single out more than a few key sites for review.

Reed and Metcalf (1999) reviewed several regional Archaic Era cultural chronologies and have subsequently divided the Archaic Era of the Northern Colorado River Basin into a four-part chronological scheme composed of the Pioneer, Settled, Transitional, and Terminal periods.

The *Pioneer Period* (8,350 - 6,450BP) witnessed the end of fully nomadic Paleoindian adaptations and ushered in the arrival of full-time occupants who established seasonal settlement systems in all the major river basins, albeit with some apparent variability in these patterns. Some evidence of wattle and daub architecture appears during this period, with the best example in the eastern Middle Park area at the Windy Gap sites (Wheeler and Martin 1984). The use of pit structures appears in the southern Middle Park area at Yarmony House with corrected dates of around 7140±127BP, 7114±174BP, and 7114±113BP for House 1, and 6909±117BP for House 2 (Metcalf and Black 1991:59).

The *Settled Period* (6,450 - 4,450BP) shows a fluorescence of many locally oriented occupations. This period is characterized by the large numbers of better defined processing features which include shallow to deep prepared basins, rock and fire-cracked rock filled features, and rock or slab-lined features. Most are fire pits of one sort or another, but some probably functioned for storage. In a few cases, the abandoned pits were used for human burial. Cultural evidence indicates a central-place foraging strategy centered on predictable winter habitation areas. The use of pit and/or basin habitation structures also becomes established during this time. The climate study by Miller (2005) supports these premises.

The *Transitional Period* (4,450 - 2,950BP) has a degree of continuity with the preceding period but can also be characterized by increasing variability in material culture, perhaps with less sedentism in the settlement patterns and with a possible increase in a more seasonal use of the higher elevations.

The *Terminal Period* (2,950 - 2,350BP) is a time of apparent stress on the various settlement systems and saw experiments with various intensifications in subsistence, including the faint beginnings of a shift to use of the bow and arrow, early experiments with the growing of corn at lower elevations, and an increasing shift toward seed processing and other lower rate-of-return foods.

The applicability of this chronological framework to the Middle Park study area is in its infancy and placement of any given site into this framework, based upon survey generated data, is problematical. One reasons being the lack of a good chronometrically defined projectile point sequence for Middle Park.

Reed and Metcalf (1999: 83-86) note that Archaic projectile point styles are characterized by diversity. This variability occurs within broad categories including lanceolate, stemmed, side-notched, and corner-notched forms ranging from medium to large sized atlatl dart points and hafted knives. Within each broad category are numerous variations in form. Though various chronotypes have been recognized (cf. Holmer 1978 & 1986; Frison 1978 & 1991) from adjacent regions, their applicability to Middle Park is an open question beyond a general reference through cross-dating. Since there is presently no well dated projectile point chronology for Middle Park, the ability to accurately place a site within one of the four periods of the Archaic Era outlined above rests upon the presence of radiocarbon data.

Formative Era (ca 400BC - AD1300)

The non-horticultural inhabitants of the Northern Colorado River Basin Formative Era have been taxonomically identified as the Aspen Tradition (Reed and Metcalf 1999). This Tradition is a new construct and provides a reference for hunting and gathering groups contemporaneous with the horticulturalists. Certain technological and subsistence innovations can be used to differentiate them from the Archaic Era and post-Formative Era

groups. This period can also be characterized as the Late Prehistoric Period (ca AD 200 - 1600) identified by Frison (1978; 1991).

The *Aspen Tradition* is marked by a series of changes from the Archaic Period. Some diagnostic traits include the grafting on of cultigens into the subsistence base, a shift to the use of the bow and arrow, the sporadic adoption of ceramics, and a gradual broadening or intensification of the hunted and gathered subsistence base. There is also an apparent shift in group mobility patterns. All of these changes become apparent between 500BC and AD1. The 400BC beginning date is arbitrary as is the ending date of AD1300, but corresponds generally to the end of the Formative Era as traditionally defined for the horticultural-based traditions.

Archaeological evidence suggests that the Northern Colorado River Basin was subject to the same symptoms of economic or population stress experienced in other areas of Colorado. The number of radiocarbon dates increases dramatically and there is also an increase in the use of prepared fire pits. Reed and Metcalf (1999) suggest that the data base should be reexamined from a perspective that focuses attention on variability in subsistence systems. They feel that the traditional traits used to order the data, i.e. projectile points, pottery styles, and house types, appear to have little utility. However, variability in point styles decreases as bow-and-arrow use becomes widespread, with the forms centering first around small, corner-notched points until about AD1000, when a shift occurred to side notched forms. These forms are present with only minor differences across much of the western United States. Ceramics are mostly absent, but when they do occur, the sherds are usually inconsistently tempered generic gray wares. External trade and alliances are also probably part of the picture, based upon the distributions of obsidian, real occurrences of ceramic trade wares, and the geographic extension of rock art motifs.

At the end of the Aspen Tradition there is a discernable decline in the number of radiocarbon dates and apparent shift in pit feature use, the disappearance of generic gray wares, and the replacement of small, corner-notched arrow points by side-notched points.

The frequency of radiocarbon dates from the higher elevations is relatively consistent with the earlier periods, though there may be a shift in use patterns from a year-around pattern to a warm-season pattern. The radiocarbon frequency peaks about AD700, after which there is a rapid decline bottoming out about AD1300. General regional cooling with higher effective moisture at the lower elevations may be a factor in this pattern. Lower elevation dates peak between about AD900 and 1100, but are steady at high elevations. The drought in the late AD1100's appears to support a bump in the frequency of high elevation radiocarbon dates followed by a near crash during the late AD1300's mirroring a higher frequency of radiocarbon dates at lower elevations.

Reed and Metcalf (1999) examined the relationship between radiocarbon dates and pit features for the Archaic and Aspen Traditions. Using eight feature types they found that all but the rock-lined features show some increase in use. While the increased use of rock filled basins is the most dramatic. Simple basin hearths also showed an increase in processing,

either stone boiling or roasting (Troyer 2012). Functional and content analysis of the feature types appears to provide the strongest potential for testing models of shifting mobility and subsistence. Unfortunately, Reed and Metcalf (1999:82) do not clearly define the differences between the various pit features, even though more than 50 descriptive labels were "forced" into seven categories. Though most of the differences between the pit features descriptive categories are self-evident, what differentiates a "simple hearth" from a "basin hearth" is unclear.

The presence of shallow pit, brush, and rock habitation structures is postulated based upon work done in Utah, Wyoming, and at lower elevations on the Colorado Plateau. Stiger (2001) suggests the use of these houses to the lower elevations after 1000BC marks a shift of winter residential patterns. Other structures suspected to have been used during the Aspen tradition include tipis and wickiups and other informal brush or rock structures.

Presently, the data base is skewed toward the lower elevations along major river drainages, with very little excavation data from higher elevation sites. Excavation data relevant to Middle Park comes from: Benedicts' (1985) work at Arapaho Pass and Caribou Lake; Liestmans' (1984) work at the Pontiac Pit site; Metcalfs' (et.al. 1991) work at 5GA1144 and 5GA1172; O'Neils' (2002) work at 5GA2524; and Tucker and Tates' (et.al. 2000) work on the Wolford Mountain Dam and Reservoir Project at sites 5GA1598, 5GA1599, 5GA1602, 5GA1604, and 5GA1609. The utilization of these upland environments may provide a good contrast to the lowland data regarding subsistence data.

Protohistoric Era (ca. AD1300 - 1881)

The Protohistoric Era refers to the aboriginal occupation between the end of the Formative Era and the final expulsion of the Ute to reservations in AD1881. Protohistoric Era peoples were highly mobile hunters and gatherers who constructed wickiups for shelter, manufactured brown ware ceramics, and utilized the bow and arrow tipped with Desert Side-notched and Cottonwood Triangular projectile points. They employed more of a "forager" strategy with high residential mobility, rather than a "collector" strategy, following a seasonal movement across annual territories as various food resources came into fruition.

Winters were spent at lower elevations, probably in deer and elk winter ranges, where trees were available for fuel and shelter and the snow depths were manageable. Populations were relatively dispersed during the winter. With the arrival of spring, lowland riparian habitats along major rivers were exploited. As temperatures rose and snow melted, groups would disperse to the high country, timing their ascent to efficiently exploit maturing food resources. Since summers were times of plenty, populations could frequently aggregate for ceremonial activities, trade, or communal hunts. Occupation of the highlands continued into the fall, until snows began to drive game animals back to the lower elevations. During the fall, berries, nuts, and other late maturing resources were exploited, and along with animal products were probably prepared for winter storage.

Eastern Ute contact with the Spanish commenced in the early 1600s, and by about 1650 the Ute had obtained horses and adapted to an equestrian lifeway. This adaptation expanded their annual territories and increased cultural contacts with other groups, particularly inhabitants of the Great Plains, Pueblos, and Spanish to the south. Later Protohistoric Era components often contain small quantities of EuroAmerican artifacts obtained in trade. Historic records indicate that the Ute were the primary occupants of the Northern Colorado River Basin during the late eighteenth century, though the Shoshone may have occupied the area north of the Yampa River. The Comanche likely inhabited portions of the Great Basin and the Southern Rocky Mountains prior to their migration to the Southern Plains (Cassells 1997).

Protohistoric Era sites are uniquely suited for providing insight into intrasite patterning of activity areas at earlier open artifact scatters, especially if ephemeral brush structures are present. Since such structures tend to disappear without a trace with the passage of time, and it is likely that most of the early hunting and gathering campsites once had ephemeral brush structures. Protohistoric Era sites with brush structures can often provide insight into the relationships between artifact patterns and feature distributions related to these structures. Thus, they can aid in the interpretation of sites where such structures have disappeared (cf. O'Neil et.al. 2004; DARG 2005 - 2011).

Given the present state of the Protohistoric data base, the archaeological record is best divided into pre and post contact periods, as Buckles (1971) and O'Neil (1993) have done. These two units reflect important differences in both aboriginal lifeways and the material constituents of archaeological sites. However, Reed and Metcalf (1999) propose that the Protohistoric period be divided into the Canella and Antero phases.

The *Canella Phase* begins at about AD1100 when Uncompahgre Brown Ware appears along with Desert Side-notched and Cottonwood Triangular arrow points. Wickiups and other brush structures were the probable habitation structures. Toward the end of the Canella Phase, European trade goods may appear in limited quantities.

The *Antero Phase* dates from about AD1650 to 1881 and represents a shift to a fully equestrian lifestyle with the addition of EuroAmerican trade goods such as glass beads, metal cone tinklers, gun cartridges, tin cans, and horse bits. Desert Side-notched and Cottonwood Triangular projectile points continue in use, but were increasingly replaced by metal projectile points and firearms. Uncompahgre Brown Ware also continued to be manufactured. However, Greubal (2001) has observed that Antero Phase components look very similar to Canella Phase components in archaeological contexts because the Antero Phase was defined primarily on the basis of historical, not archaeological, data.

Differentiation between Ute and Shoshone peoples is also difficult. Both share many elements of material culture. Both groups manufactured Desert Side-notched and Cottonwood Triangular projectile points, Shoshonean knives, and both groups lived in wickiups. Both also made brown ware ceramics, though the Shoshone pottery, known as Intermountain Ware, is somewhat different from the Ute pottery or Uncompahgre Brown

Ware. Intermountain Ware vessels commonly have a flat base with vessel walls flaring progressively above the base (Frison 1991; Larson and Kornfeld 1994). The Ute pottery, also known as Uncompahgre Brown Ware, usually is a wide mouthed jar with either a rounded or a conical pointed base with wide, low shoulders, a slightly constricted neck and a slightly everted rim. There are generally two types: plain and fingernail impressed. Some stick impressed sherds have also been documented. The plain type tends to have the rounded bottom and the fingernail impressed tends to have the conical bottom. Steatite vessels, also with flat bases were carved by the Shoshone, but not by the Ute.

The archaeological data base of excavated or tested sites currently provides only a few examples of Protohistoric occupation relative to Middle Park. These include sites 5GA22 (Benedict 1985; 1989), 5GA1172 (Metcalf et.al. 1991), 5GA1208 (Naze 1994), and 5GA2912 (O'Neil 2003).

HISTORIC BACKGROUND

Historic records indicate occupation or use by Euro-American explorers, trappers, settlers, miners, farmers, and ranchers. Much of the following is summarized from Reed et al. (2008), Conner et al. (2012), and the historical context for Colorado (Church et al. 2007). The most important historic aspects about aboriginal occupation and trails follows.

Historic Aboriginals, Explores, and Traders

Human activity has been present since prehistoric times and has been largely transitory and seasonal. Nonetheless, use of the area by prehistoric peoples is evident; game is still plentiful and good fishing abounds. Plants and animals were harvested by native populations for their own use and also, in the case of yampa (*Perideridia gairdneri*) in trade for materials not found locally. While there is some disagreement regarding which Indian groups frequented Colorado, the dominant group were the Utes (Nunt'z). Shoshone, Gros Ventre, Sioux, Cheyenne, Arapaho, and Comanche were also known to have visited certain portions of the region at one time or another (Farnham 1841; Fremont 1887).

Various Indian groups had access to Middle Park during the historic period through the Red Desert, Laramie Plains, North Park, and South Parks across mountain passes. However, the presence of Ute Indians is well documented. "*The Ute formerly occupied the entire central and western portion of Colorado*" (Swanton 1953:372) while the Bannock and Shoshone roamed over the extreme northwestern corner of the state (ibid.:370).

According to Athearn (1976:3), the Ute were the largest group in western Colorado. The Arapaho in North and Middle Parks were in conflict with them over hunting rights. Several battles occurred in the Steamboat Springs region. The Ute *Yahmonite* described a battle ca.1815 in the area now occupied by the hot springs pool. Large numbers of arrowheads were found just west of town, indicating a similar fight took place there. "*The Arapaho Indians were the traditional enemies of the Yampatika Utes*" (Powell 1972).

Shoshone who frequented Brown's Park in the winter were Wind River Shoshone, who are similar to Ute linguistically, and there was rarely trouble between them (Farnham 1841). "*The Ute shared with the Shoshone the reputation of being the strongest and most warlike of the Plateau people*" (Swanton 1953:375).

J. W. Powell, relying on a study of Shoshone linguistics published in 1891, noted that the Washaki occupied southwest Wyoming. Nearly the entire mountainous part of Colorado was held by the several bands of Ute while the east and southeast were held respectively by Arapaho, Cheyenne, and Kiowa. To the southeast Ute country included the northern drainage of the San Juan river extending a short distance into New Mexico. The Comanche division of the Numic linguistic family extended farther east than any other. According to Crow tradition, the Comanche formerly lived northward in the Snake River region.

Powell (1961) noted that the Ute were organized into small bands–Uintah, Wimonuntic, Mowatavi-Watsiu, Mowatri, Kopata, and others, with Uintah predominating. Emmitt (1954) states that the White River Utes called themselves Nupartka. By the 1680s the Ute had secured horses from the Spanish in New Mexico and ranged from Salt Lake City to Pikes Peak and from Taos to the Green River. They used the river valleys for shelter in the winter and summered in high mountain parks. They were not hostile to whites at first contact, though by the late 17th and 18th centuries they were continually at war with Arapaho, Comanche, and other plains tribes (Athearn 1976:6).

Travel through the territory was certainly more interesting when the Indians moved freely. The early trappers met the danger as best they could, often marrying Indian women, hoping for some measure of security in that arrangement. Apparently, Shoshone and Crow women were much sought after by the trappers, though Indian groups varied a great deal in the kinds of arrangements required to secure a bride – from simple purchase to the necessity for adoption into the culture. Shoshone women could be purchased with ponies and trade goods, and trappers often had their pick of the women due to the great wealth of the Anglo (Farnham 1841).

The various tribes of the region warred extensively and enthusiastically with each other and presented a threat to the first explorers. John C. Fremont, in writing about the Little Snake River Valley relates that: "*The country we are now entering is constantly infested by war parties of the Sioux and other Indians, and is considered among the most dangerous war grounds in the Rocky Mountains; parties of whites having been repeatedly defeated on this river*" (Fremont 1970). He encountered evidence of numerous tribes, among them Ute, Shoshone, Crow, Sioux, Cheyenne, Arapaho, and Gros Ventre (also known as Minataree or Hidatsa). A small howitzer served Fremont's party as silent protection against the Indians; apparently keeping it prominently displayed was sufficient to dissuade hostile actions (Fremont 1887:383-410).

E. Willard Smith saw Shoshone and Sioux Indians and writes of the danger they posed to his party. He left Brown's Park in the dead of winter due to the rumor of impending Indian trouble. On his return, he encountered a band of Ute: "*On 26th Jan we met a party of 20*

Eutaw Indians who had been out hunting buffalos. These Indians are the best marksmen in the mountains and armed with good rifles." (Smith 1955:180).

The Farnham party, while never engaged in a fight, had been fearful of Indian trouble since entering South Park. Farnham stated that Utaws [sic], Cheyenne, Shoshone, Arapaho, Blackfeet, Crow, and Sioux all hunted and fought in South Park. Farnham's party was careful to keep to the timbered ridges and out of sight as best they could after encountering plenty of fresh sign in South Park and the Gore Range. Farnham's fears were not relieved when his party met a group of French trappers who'd been attacked by Sioux on the way from Brown's Park. Farnham himself, however, reached the park without incident, relieved to be with the traders and friendly Shoshone after many a nervous night in hostile country (Farnham 1841).

Indian fights were not common during the trapping era, although the Ute were feared by many of the early explorers, surviving accounts which mention specific hostile bands do not mention fights with the Ute.

Although largely undocumented, the Colorado and North Platte rivers and their tributaries were likely explored by individuals and groups involved in the fur and hide trade during the 1820s and 1830s. While most of the known early trapping focused on the lower Colorado River and Green River in Utah, in the 1830s, the upper Colorado, Eagle River, Crystal River, and Gunnison River were trapped by Peg-Leg Smith, Mark Head, and Jim Bridger. There are no known trading posts within Middle Park, but Fort Roubidoux near present-day Delta and Fort Davy Crocket in Browns Park were relatively nearby and served as bases from which trappers ventured.

John Wesley Powell spent a fair amount of time in Ute country. He wintered on the White River in 1868-1869, exploring the Green, White and Grand (Colorado) Rivers on horseback prior to his river trip. There were Utes with him that winter, at an area later known as Powell's Park. Powell does not mention being afraid of the Ute; in fact he seemed rather charmed by them, describing their dress, customs, hunting techniques, and as much of their ethnology and linguistics as he was able to learn in a short time. He was particularly enchanted by Ute mythology and sorcery:

> "*Each little tribe has its Shaman, or medicine man, who is historian, priest, and doctor. The lore of this Shaman is composed of mythic tales of ancient animals. The Indians are very skillful actors, and they represent the parts of beasts or reptiles, wearing masks and imitating the ancient zoic gods. In temples walled with gloom of night and illumed by torch fires the people gather about their Shaman, who tells and acts the stories of creation recorded in their traditional bible. When fever prostrates one of the tribe the Shaman gathers the actors about the stricken man, and with weird dancing, wild ululation, and ecstatic exhortation, the evil spirit is driven from the body. Then they have their ceremonies to pray for forest fruits, for abundant game, for successful hunting, and for prosperity in war*" (Powell 1961:65).

Not everyone felt quite as good about the Ute as Powell. Governor Pitkin described the size of the reservation and the vast riches of the country in his message to the legislature for 1879: "*No portion of the state is better adapted for agriculture and grazing purposes than many portions of this reservation*" (Vickers 1881:34), although Hayden, Powell, Fremont, and others had bemoaned the country's desolation. In commenting about Ute character, Pitkin continues: "*From some personal knowledge of the subject, I believe that one able bodied white settler would cultivate more land than a whole tribe of Utes*" (ibid. :35).

W.B. Vickers (1881), Pitkin's secretary, wrote an article entitled "Lo, The Poor Indian" which became widely circulated and was published in several sources. He paints a grim picture of coexistence:

> '*Though not particularly quarrelsome or dangerous, the Utes are extremely disagreeable neighbors. Even if they would be content to live on their princely reservation, it would not be so bad, but they have a disgusting habit of ranging all over the state, stealing horses, killing off the game, and carelessly firing the forests in the dry summer season, whereby thousands of acres of fine timber are totally ruined.*'

Obviously sentiments like these did not bode well for continued Ute presence in Colorado. The white citizens of Colorado were being incited to remove the Indians, in order for men like Pitkin could profit. The animosity against the Utes accelerated to such an extent that the Utes rose up against Agent Meeker and a detachment of cavalry was sent to subdue them. A fact gathering Peace Commission was held in December of 1879, three months following the uprising, and though only one Ute (Douglas a.k.a. Quinkent) was sent to prison for his part in the affair, the remainder of the Uncompahgre and White River Utes were removed to Utah in 1881. They were escorted by a detachment of United States cavalry, the soldiers of Empire Builders flying the banner of Manifest Destiny. A portion of the Southern Ute remained on a small reservation in southern Colorado; however, except for these few Indians, the native people who had lived and hunted in the state were officially removed from its borders by 1881, only 23 years from the beginning of the gold rush.

Military Exploration/Transportation

The men of the Dominguez-Escalante Expedition, who were attempting to find a route from Santa Fe to California, were the first nonnatives in Colorado. They took a circuitous route over the Grand Mesa, crossing the Colorado River near Una Bridge on September 7, 1776. From there they continued westward to Roan Creek and ventured northwest into Douglas Creek and onward into Utah. A portion of John C. Fremont's expedition to California in 1845, followed the Eagle River to its confluence with the Colorado River. At that point the route turned northwest and crossed the Flat Tops to reach the White River following it out of Colorado. In 1868, John Wesley Powell explored the Colorado River from its headwaters in Middle Park to the confluence of the Green River in Utah. In 1873, the Hayden Expedition surveyed much of the Colorado River.

Initial travel into and through the area was via Native American trails which likely originated as wildlife trails, having been used throughout time to get from one destination to another. Fur trappers and traders of the early 1800s also frequented these trails which were latter mapped by the Hayden Expedition in 1873. The most well-known is the Ute Trail across the Flattop Mountains with access points from Dotsero and Sweetwater Lake. The prospect of rich mining resources, numerous roads were constructed over these trails many of which are used today.

FILES SEARCH

Records searches of the were made through the OAHP Compass Database and the BLM/KFO in June of 2012. A total of seven archaeological surveys have been conducted near 5GA4251, the Gunsight Pass site. These surveys include: GA.LM.R65 (Chandler 1994); GA.LM.R178 (Kvamme 1979); GA.LM.R235 (Greenburg et.al.); GA.LM.R249 (Wyatt 2010); GA.LM.R259 (O'Neil 2011); GA.LM.R263 (O'Neil 2012); and MC.LM.R342 (O'Neil 2003). Block surveys GA.LM.R259 and GA.LM.R263 are located to the south and immediately surrounding the site. Additionally, seven sites 5GA186, 5GA2919, 5GA4089, 5GA4249, 5GA4250, 5GA4283, and 5GA4284, plus isolated finds 5GA4252 - 5GA4257 and 5GA4285 - 5GA4287 are within a two-mile radius. Only three sites have relative or chronometric dates and they are limited to the Paleoindian Era (5GA186 - Folsom). No Archaic Era sites have been identified within this radius, but it is highly probable that they are present. The Formative Era/Aspen Tradition or Late Prehistoric Period are represented by 5GA2919 and 5GA4283. Altogether, the files search data indicated a moderate to high potential for cultural resources in the area.

An early Class II predictive model developed for Middle Park by Fitting (et.al. 1978) suggested that cultural properties are most numerous in the drainage valleys near a water course and less numerous in the upland sagebrush areas. The more recent *Class I Cultural Resources Overview for the Kremmling Field Office* (Reed, et.al. 2008) incorporates the accumulated survey data for an additional 30 years. Coupled with an additional layer of data on modern deer and elk summer and winter ranges, it created generalized GIS maps of high, medium, and low-density probability areas for cultural resources in Middle Park and North Park, as well as for other areas within the KFO boundaries. The Gunsight Pass site falls within the high sensitivity zone.

Historic maps from the Fremont and Hayden expeditions and GLO records document early trails and are accessible for study, but the lack of trail construction makes them difficult to document in the field. Archaeologically recognizable trail elements can include: stone cairns, rock art panels, entrenchment, and a linear spread of artifacts. "Trails", two-tracks, and "jeep trails" as indicated on USGS quadrangle maps are also potential indicators of prehistoric trails.

Probably the most important evidence of trails and their use are the density and distribution of sites and their types. Linear spreads of prehistoric cultural have been

identified using the overwhelming amount of data in the archaeological record for Colorado, which are manifest in the documentation of individual sites and isolated finds completed as part of the Section 106 process (BLM and OAHP). From those records, it is apparent that lower density occurs in areas of fewer resources, which are suspected "transit sections" of the trails, and a higher density of sites occur in "destination localities," which provide vital resources of shelter and water. Where broad concentrations of such resources are present, the density of sites similarly spreads.

STATEMENT OF OBJECTIVES

The principle objectives of the Gunsight Pass (5GA4251) archaeological assessment were: 1) a detailed recording of the archaeological and architectural stone features identified; 2) initial determinations as to whether the features represented domiciles, or ceremonial structures; 3) identify potential astronomical alignments with the surrounding horizon lines; 4) observations concerning orientations toward potential sacred landscape features such as Whitely Peak, Wolford Mountain, or the Sulphur Gulch area; and 5) to assess the site as a Traditional Cultural Property (TCP) relevant to historic Ute, Arapahoe, and eastern Shoshoni tribes. Further considerations included the previous NRHP/ SRHP site evaluations and the recommendations to mitigate observed adverse effects.

METHODS

Since the site had previously been identified during a Class III survey and a temporary datum established (O'Neil 2012) the primary focus was on detailed mapping and photographing of individual features and their related artifact assemblages. Artifacts and features were mapped using a 2008 Trimble Geo X-H GPS unit with a pole mounted antenna. Readings were taken using NAD 1983. Extended reading times at each point produce an accuracy of ±20cm.

The focus of the assessment was Feature 13 which was suspected to have astronomical alignments. It was mapped using a tape measure and an Ushikata S-25 transit. Basic azimuths were based upon true north (TN) utilizing the Gunsight Pass (1980), USGS 1:24000 scale quadrangle map with a magnetic declination of 13° east of TN, and a grid north (GPS) of 0°51', west of TN, from the center. Since the site is located about 1.4 miles northwest of the center of the quadrangle map, this was deemed to be accurate enough for the present scope of work.

One of the problems encountered during the initial recording was a lack of clarity in the feature photographs. This was due to two factors: the low angle of the oblique photographs; and the often-heavy lichen growth on the cobbles, causing them to blend into the background. To alleviate the low oblique angle problem, a six-foot aluminum step ladder was used to increase the photo height and thus produce a more or less overhead view of the

feature. The camouflage problem solution was to highlight the cobbles. This was accomplished by spray painting 3.5 x 5inch white cloth soil sample bags with florescent orange or blue paint on one side. Thus, providing three colors – white, blue and orange. A four-mil plastic zip-lock bag was then filled with ¼ cup of sand and inserted into the cloth bags. This provided enough weight to keep the bags in place during strong winds and allowed flexibility of bags so they could be draped over the cobbles at any angle necessary to enhanced visibility.

The advantages to this method is that no damage or change occurred to the natural growth pattern(s) of the lichen covered cobble surfaces, either through the introduction of intrusive organic nutrients (such as the use of a flour paste) or negative growth impacts (from the use of a water solvent paint), thus preserving the potential for future lichenometric dating. Additionally, the painted bags were incorporated into the mapping process to identify cobble positional relationships relative to the primary outlines–possible secondary arrangements, and cobbles with indeterminate relationships. Once the bags were in place, the photographs were taken and the mapping commenced, with the color of each of the bags was entered into the Trimble data base.

Some of the problems encountered included: determination of whether some of the cobbles were a result of cultural placement or natural deposition; disturbance and/ or displacement by grazing animals; frost heave; and/or later cultural modifications. To answer those questions would require excavations which were beyond the project scope. Consequently, the goal was not necessarily to make accurate direct observations of all potential astronomical alignment(s), but to assess the potentials which could be derived from map data and from transit and compass readings. For a hypothesized alignment to be accepted, it had to meet three criteria:

1) identification and location of an observation point(s);
2) the presence (at minimum) of at least three or more reference points within the alignment; and
3) identification of the potential target point(s) of observation.

Initial viewing points (observation points) included cobbles just outside of the peripheral outline or cobbles within the peripheral outline connecting cobbles within the interior and on the opposite peripheral outline. Once this criterion was met, an observation of the relationship(s) to the surrounding terrain was made; and a hypothesis was formed as to whether the alignment represented geographical to geographical (fixed) and/or geographical to celestial (changeable) points. Observation points and determination of the three or more points of reference were usually made by sighting across the features over a minimal distance of 1.5m. In many cases, four to eight points of reference were made within an alignment. Special attention was paid to paired or triad groups of cobbles.

Under naked eye conditions, geographical to geographical observations are stable, though they may contain a slight range in azimuth variation due to distance (target size) and atmospheric conditions (visibility). Thus, they may represent a navigational function rather

than a celestial or calendrical function. However, naked eye geographical to celestial observations, there are factors which can affect the margin for error. These include: the precession of the equinoxes; the deviation of the observed skyline from the astronomical horizon; atmospheric refraction; atmospheric extinction; and barometric and elevation variations (Aveni 1972:532).

For this facet of the project, we assumed simple line-of-sight alignments as having a potential mapping error of ±20cm at the observation point(s), and ±2° of arc to the potential target point(s). We also assumed a maximum unobstructed long range observational distance of ≤20 miles, and utilized Terrain Navigator Pro to check for potential geographical to geographical azimuth intercepts, and determined probable visibility from the feature according to the program's elevation azimuth profile.

Our working assumption was that 5GA4251 is probably less than 1,000 years old and that any shift due to the *precession of the equinoxes* would be negligible. A quick perusal of Aveni (1972) gave us the basic solar rise/ set azimuths to look for. This was then modified by using the site's latitude/longitude and accessing the U.S. Naval Observatory, Astronomical Applications Department data base (http://aa.usno.navy.mil/cgibin/aa_altazw.pl) to determine the winter/summer solstice and the equinox rise/set times and azimuths for 2012 and 2013. This allowed us to make some basic determinations between potential geographical to geographical vs. solar alignments. No direct attempt was made to identify the rise/set of the lunar cycle(s), or the rise/set of the bright 'fixed' stars and/or constellations, though there is some evidence to suggest that these may be present.

Back in the lab, the Trimble data set was down loaded into ArcView and run to create a master site map and individual feature maps. Determinations of azimuth orientations on site features (other than Feature 13) were generated from the feature maps using a straight edge placed along the alignment of the mapped cobble centers, and measured using a protractor in a declination corrected map format, based upon the UTM grid system. As noted before, the UTM has a grid north position of 0°51' west of TN (1980). Any fractional azimuth orientations were rounded up to the nearest full degree to minimize the potential error. Maximum feature lengths, widths, and area were also generated from the features maps. For non-rectilinear features (egg-shapes and oval-shapes), the area was calculated using the formula for an ellipse (L x W x 0.785). Finally, the feature photographs were enhanced for brightness, contrast, and color, using Adobe Photoshop Elements 7, to emphasize the cobble marker bags/ cobbles.

Field notes and photographic negatives are currently on file at Dominquez Archaeological Research Group. Collected artifacts will be curated at the Museum of Western Colorado.

TRAILS

This study employs an archaeological perspective examining how the prehistoric and historic Native Americans modified and utilized the natural environment with an emphasis on possible travel routes–from one area to another. When viewed in that light, the landscape itself becomes a cultural artifact. The interaction of human groups with their environment builds both real and imagined landscapes by everyday use and ceremonial activities. The development of a landscape is controlled by environmental factors including topography and water resources, and cultural factors such as the subsistence, mobility, kinship, and technology of a group. The literature of landscape archaeology is voluminous (e.g., Criado and Parcero 1997; Ashmore and Knapp 1999; Campana and Frankovich 2001; Bevan and Conolly 2004).

Routes of movement – paths and/ or trails – are omnipresent in an aboriginal archaeological landscape. Paths are primarily of logistical functionality and are best characterized as local – serving everyday use. Their primary function was to provide access to required daily resources such as water or community activity areas and facilities. Archaeologically, the recognition of paths is difficult because, they are without much physical modification or permanence. Trails, on the other hand, are regional, long distanced, and marked by repeated use. Animals are often credited with creating many of the routes used by prehistoric people based on their choice for crossing broad terrain with the least effort, and even after humans appropriated such trails, wild animals continued to help keep them open.

The importance of trails depends on the mobility of a society. They are characteristically used for trade between resource differentiated regions, for seasonal movements, inter-group ceremonies, and sacred journeys. Aboriginal hunter-gatherers for example have extensive seasonal movements following changing food resources, but their choice of foot or horse affected the ways and modifications of the routes used. Important contrasts can be drawn between those created by aboriginal foot traffic and those utilized by horse traffic–especially in mountainous regions.

Probably the most important evidence of trails and their use are the density and distribution of sites and their types. Linear spreads of prehistoric cultural manifestations have been identified using the overwhelming amount of data in the archaeological record for Colorado, which is evident in the documentation of individual sites and isolated finds completed as part of the Section 106 process. From those records, it is apparent that lower site density occurs in areas of fewer resources, which are suspected “transit sections” of the trails, and a higher density of sites in what the authors are terming “destination localities,” which provide vital resources of shelter and water. Where broad concentrations of such resources are present, the density of sites spreads similarly.

With historical maps (e.g. the Hayden surveys and GLO records), trails are accessible for detailed study, but the lack of construction often makes them difficult to document in the field. Archaeologically recognizable trail elements include: stone cairns, rock art panels,

entrenchment, and a linear spread of artifacts. "Trails," two-tracks, and "jeep trails" as indicated on USGS quadrangle maps are also potential indicators of prehistoric trails.

RESULTS

The assessment grant from the SHF provided funding that allowed for a detailed investigative recording and evaluation of the site; and determination of possible feature function, i.e. whether the features represented domiciles, ceremonial features for vision quests, or potential astronomical alignments to the surrounding horizon lines; as well as possible sacred landscape orientations toward Whitely Peak, Wolford Mountain, and Sulphur Gulch.

Equinoxes and solstices in the solar cycle are relatively straight forward for prehistoric people observation, as the sun rises and sets along the eastern or western horizon. Simple cobble alignments are quick and easy to set up and could be refined over time for accuracy or apparent solar changes. Applying simple line-of-sight linear alignments which met our criteria – multiple cobble alignments are proposed for each feature which may indicate cardinal, solar, or geo-navigational points of reference.

From the site map (Figure 2) it is clear that the stone features are clearly clustered into five localities (A through E) from south to north. Each locality map was scaled to provide the best level for feature analysis and possible relationships. Each feature is presented by locality. The site has 34 features, consisting of 31 prehistoric cobble rings, two prehistoric thermal features, and one modern feature may be a very recent pet burial or other memorial, as it appeared sometime between June 29 and September 21, 2012. The Office of Archaeology and Historic Preservation site form is in Appendix C.

LOCALITY A is composed of Features 1, 2, and 3 (Figure 3). Several inter-feature and intra-feature relationships are possible between these features and others in Locality B.

Feature 1 is a small cluster of 15-20 cobbles in an area 60 x 150cm (Plate 3). It is located approximately 92m south-southwest (199°) of Feature 3. Bill Wyatt, archaeologist for the BLM/KFO, offered a possible interpretation of this feature. He suggested that it may represent a small prayer circle with a collapsed cairn/shrine. It may also be a sighting point related to both Features 2 and 3.

Feature 2 is a small cluster of six cobbles covering an area 35 x 40cm and is about 17m east-southeast (120°) of Feature 3 (Plate 4). A possible interpretation offered by Bill Wyatt archaeologist, for the BLM/KFO suggested it may represent a collapsed prayer cairn/ shrine. Probable inter-feature relationship with Feature 3.

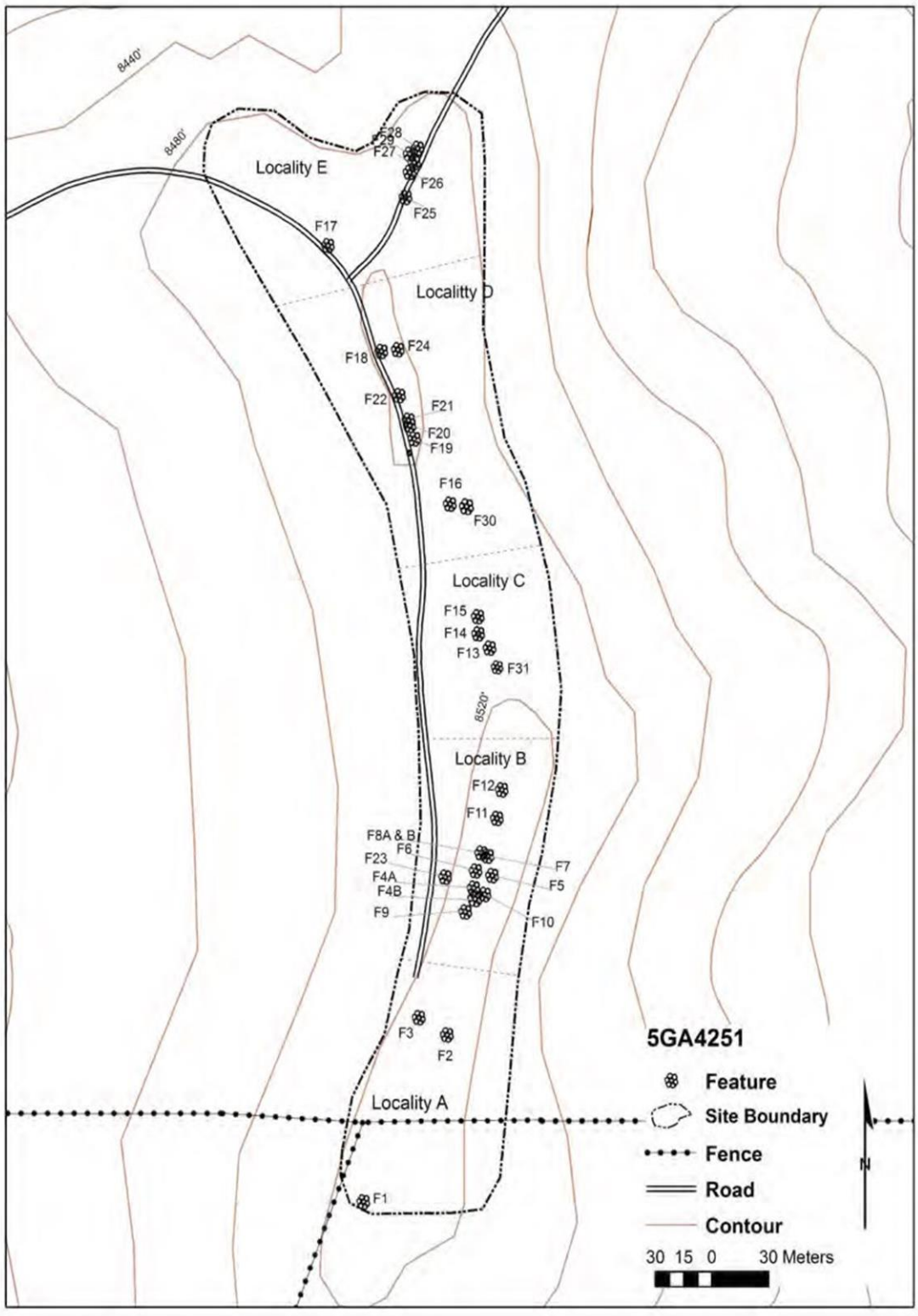


Figure 2. 5GA4251 site map.

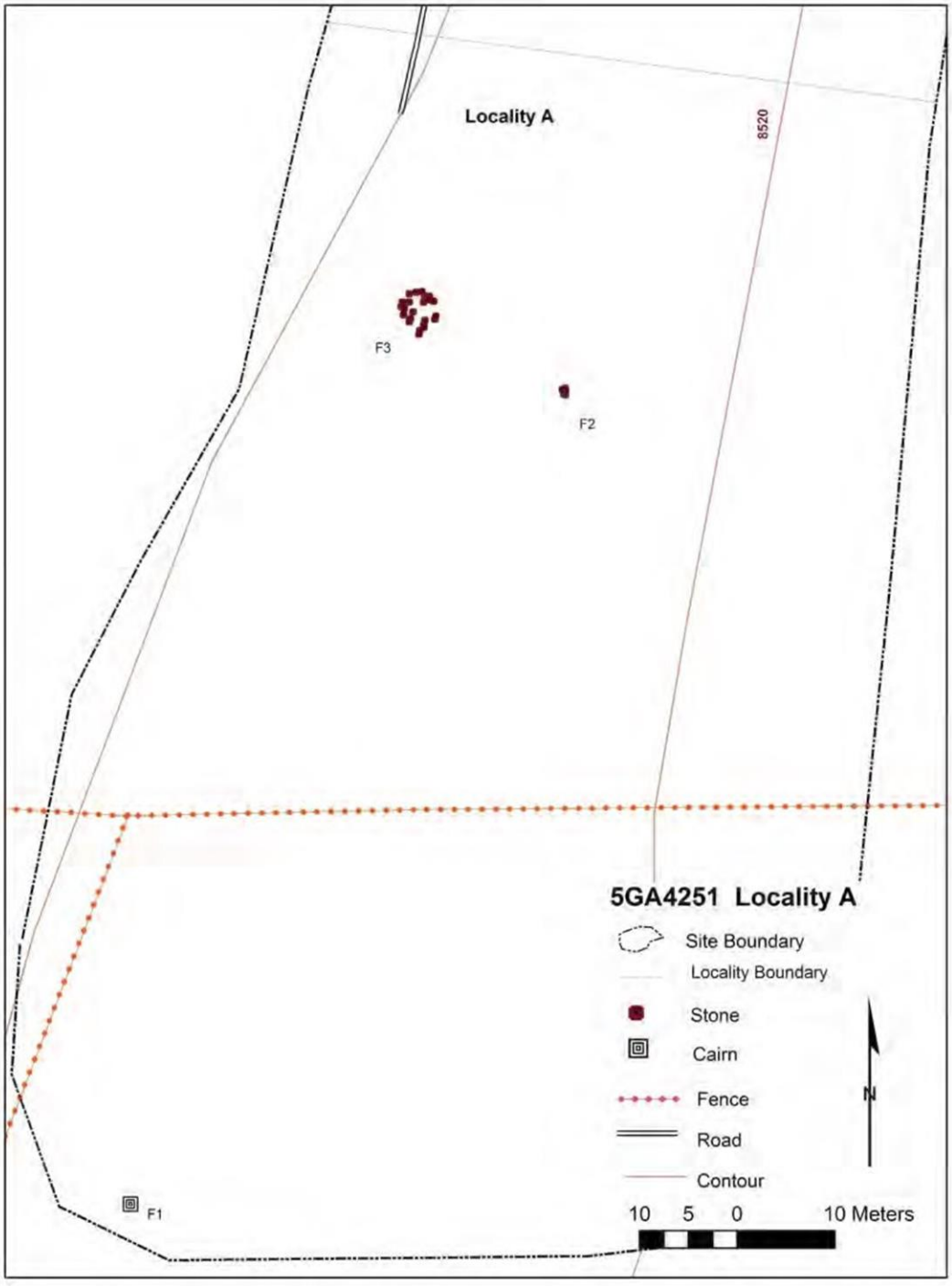


Figure 3. Plan map of Locality A.

Plate 3. Feature 1, rock cairn looking south-southeast.

Plate 4. Feature 2, looking south-southeast.

Feature 3 is an egg-shaped alignment comprised of 25 cobbles (Figure 4; Plate 5) encompassing an area of 8.41m^2. The peripheral outline consists of 15 cobbles while the interior outline contains two sets of paired rocks [A and B] internal to the northeast peripheral wall. Along the south-southwest peripheral outline, there is a probable door opening, or observation portal, approximately 1.4m wide. It is defined by two cobbles [1 and 2] along the western side, while cobbles 13, 14, and 15 define the eastern side. To the south of, but within the framed opening of the doorway/ portal, are two more aligned cobbles [G and H]. Additionally, there appears to be a classic isosceles triangle composed of cobble set D, E, and F within the northwestern quadrant with two equal sides and two equal angles of 70°. This triangular rock arrangement is also present in Features 10, 15, and 20. The feature's long axis is oriented roughly northwest-southeast (316°/136°) and is 3.72m long. The cross axis, measured from the long axis mid-point, is oriented roughly southwest-northeast (226°/46°) and is approximately 2.88m long. Utilizing the framed doorway/ observation portal and applying simple line-of-sight for linear cobble alignments that met our criteria – several multiple cobble alignments are hypothesized involving possible cardinal, inter-cardinal, solar, geo-navigational, and/ or other inter-feature alignments.

Alignment 1A appears to be geo-navigational composed of the doorway/ observation portal mid-point (MP) aligned with cobble E and pair A. It produces a foresight of 199° tying it to Feature 1 and possibly pointing to Little Wolford Mountain and the east side of site 5GA3644–which has two U-shaped rock structures. The back azimuth of 19° was inconclusive for known visual reference point(s).

Alignment 1B also appears to be geo-navigational with possible inter-site references. This alignment of four cobbles [8, F, 2, and 1] along the western side of the doorway, produced a foresight azimuth of 202° possibly linking it to Little Wolford Mountain, and to the west side of site 5GA3644 and a potential relationship with its cobble Feature 3. It also points toward the top of San Toy Mountain and the western peak of Sheephorn Mountain. The back azimuth of 22° was inconclusive.

Alignment 1C also appears to be geo-navigational with possible inter-site references. The alignment is composed of five cobbles [9, B, 13, 14, and 15] which forms the eastern side of the doorway and produces a foresight azimuth of 191° linking it to the eastern flank of Little Wolford Mountain and possibly to site 5GA2173–which may have up to 20 cobble features. However, this site is not visible from 5GA4251. The back azimuth of 11° was inconclusive.

Alignment 2 appears to have a possible solstice relationship as well as to Feature 2. This alignment [D, MP, and Feature 2] follows the long axis orientation of Feature 3 and includes cobble D, the MP between cobbles 11 and 12. It produced azimuths of 120°and 300°. Depending upon whether the observation point is D or Feature 2 this alignment may point to either a summer solstice sunset, or a winter solstice sunrise. It may also indicate a lunar minimum.

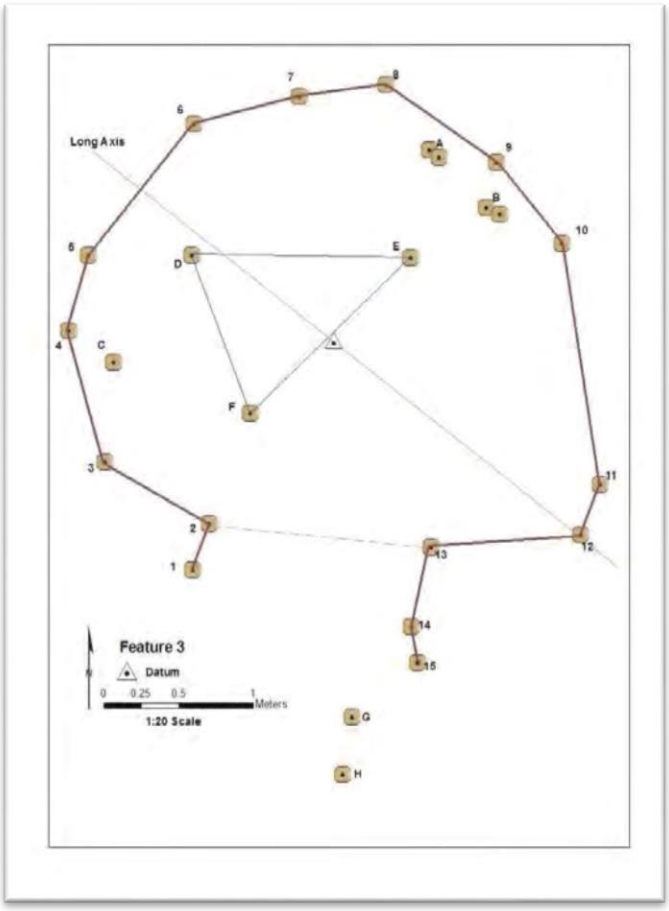


Figure 4. Plan map of Feature 3.

Plate 5. Overview of Feature 3 looking north.

Alignment 3 appears to have cardinal and equinox significance. It is composed of four cobbles [5, D, E, and 10] which produced azimuths of 90°and 270°linking it to a vernal/ autumnal equinox sunrise/ sunset.

Alignment 4 appears to be a north-south cardinal alignment of three cobbles [6, D, and 1] with azimuths of 360°and 180°. Line-of-sight 360° was inconclusive for a visual reference point. However, that azimuth does point toward the Pinnacles–rock outcrops on the interfluvial divide between Troublesome Creek and Antelope Creek, about 3 miles north (see Figure 1). The 180°azimuth points toward the highest point on Larson Ridge, at a modern surveyor's benchmark at an elevation of 9,065 feet.

Alignment 5 appears to be an inter-cardinal alignment of three cobbles [F, E, and 9] which produced azimuths of 45°and 225°. The 45°line-of-sight intersects a saddle on the northeast horizon line. The line-of-sight at 225° is inconclusive.

Alignment 6 is a geo-navigational and possible inter-site alignment composed of three cobbles [D, F, and G] with azimuths of 158° and 338°. Line-of-sight 158° points toward the southern end of the East Sulphur Gulch ridge and 5GA4211. It also passes near 5GA4210. Site 5GA4211 is a low stacked rock wall oriented northwest/ southeast originally evaluated as a possible hunting blind of historic or modern origin, due to the absence of lichens on the rocks. However, 5GA4210 is a large U-shaped stacked rock wall, open to the northeast originally evaluated as a prehistoric vision quest considered a traditional cultural property (O'Neil, 2011a). The 338° azimuth intersects the top of White Slide Mountain and may be a geographic/ navigational reference point as there is a distinctive pillar nearby.

Alignment 7 is a geo-navigational alignment of four cobbles [A, E, G, and H] with azimuths of 188° and 8°. The visual line-of-sight perspective for 188° crosses the upper western flank of Junction Butte. There is an unconfirmed report of stone circles near this location (pc. Liewer 2013). Until this can be confirmed this alignment is considered repetitive, but inconclusive. The back-sight of 8° was also inconclusive.

LOCALITY B is composed of a complex assemblage of 12 features including Features 4A, 4B, 5, 6, 7, 8A, 8B, 9, 10, 11, 12, and 23 (Figure 5). Applying simple line-of-sight linear alignments which met our criteria–multiple cobble alignments are proposed for each feature which may indicate cardinal, solar, geo-navigational, and/or other alignments.

Feature 4A is roughly a three-sided polygonal arrangement comprised of 54 cobbles (Figure 6; Plate 5). The feature is 3.5m long x 2.7m wide encompassing an area of 9.45m^2. The three sides are clearly articulated sharing intersection points. The northwestern side is composed of 10 - 12 cobbles and measures 3.07m long and 0.37m wide. It is considered the feature's long axis with a lens shaped cobble arrangement near its northeastern end. The northeastern side is composed of seven cobbles and is 2.62m long and 0.25m wide. The

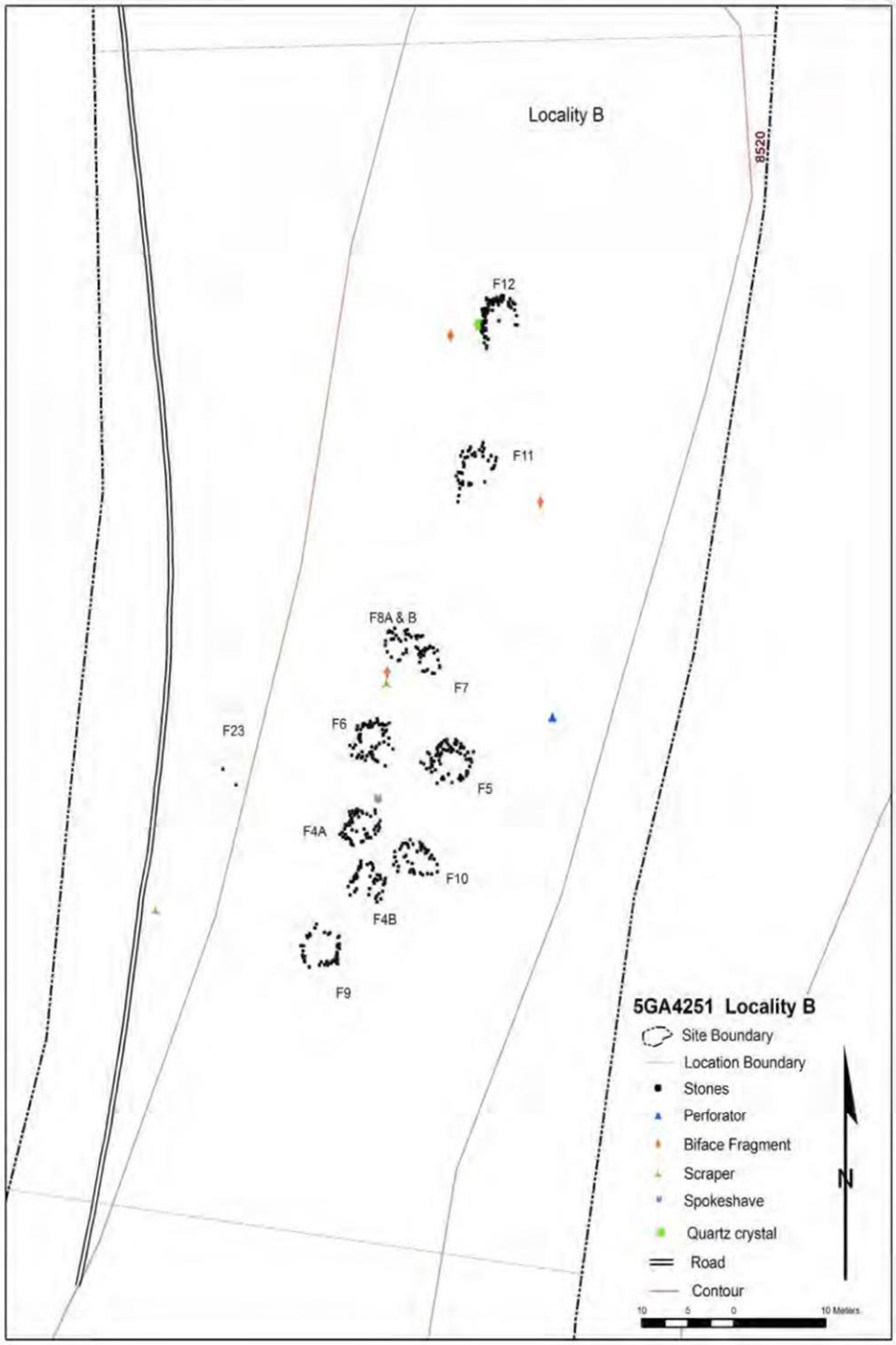


Figure 5. Plan map of Locality B.

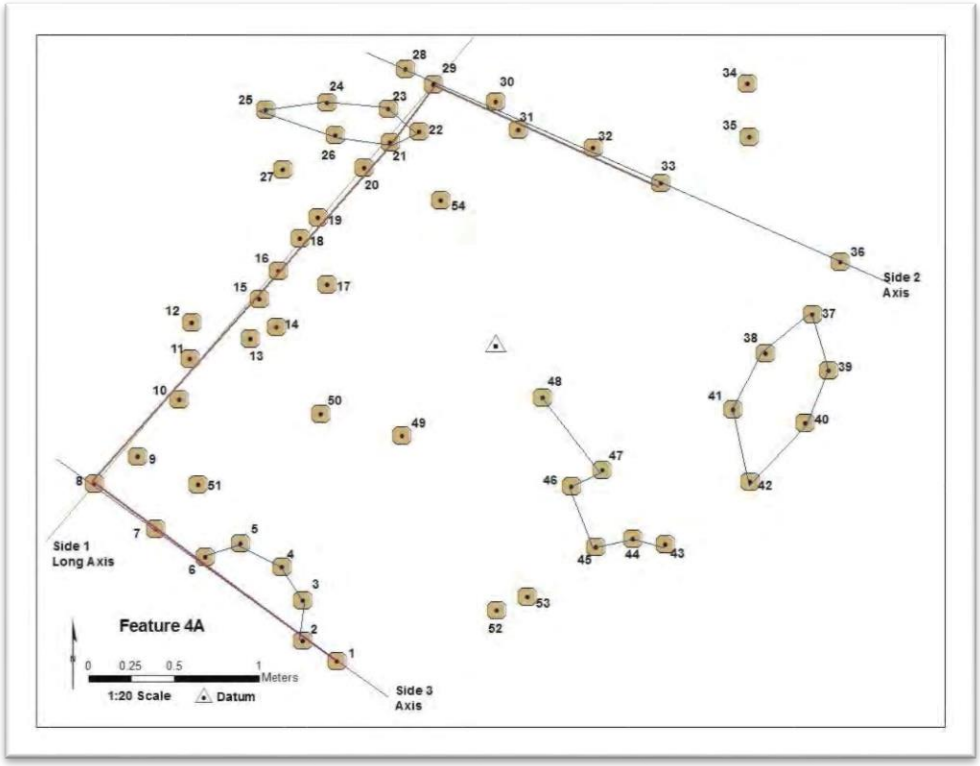


Figure 6. Plan map of Feature 4A.

Plate 6. Feature 4A looking northwest.

southwestern side is composed of five cobbles and measures 1.77m long x 0.20m wide with an arc of five cobbles near its southeastern end. The southeast side is not articulated, having no cobbles in common with itself or the other two sides. The distance between the northeastern and southwestern alignments is 3.50m. However, the southeast side is unique with two cobble arrangements. One is lens shaped and composed of six cobbles [37-42] and the other is a dipper shaped handle comprised of six cobbles [43-48]. It is possible, that these cobble arrays represent stellar constellations.

Alignment 1 is a geo-navigational alignment of 11 cobbles [8, 9, 10, 11, 15, 16, 18, 19, 20, 21, and 29]. It produced azimuths of 41°and 221°. The 41° azimuth points toward Haystack Mountain at 11 miles and an elevation of 11,495 feet. The 221° azimuth was inconclusive.

Alignment 2 is also a geo-navigational alignment composed of six cobbles [28, 29, 30, 31, 32, 33, and 36] and produced azimuths of 114°and 294°. The 114° azimuth points to Grouse Mountain at 9 miles and an elevation of 10,862 feet. It might also be a winter solstice sunrise predictor. The azimuth of 294° was inconclusive for a visual reference point.

Alignment 3 is a solstice and geo-navigational alignment comprised of five cobbles [8. 7, 6, 2, and 1] and produced azimuths of 126°and 306°. The 126° azimuth intersects with the top of Slide Mountain at seven miles and an elevation of 9,840 feet. It may be related to winter solstice sunrise. The 306° azimuth passes through The Gunsight and intersects the top of an unnamed mountain peak south-southeast of Lake Agnes at a distance of 19 miles and an elevation of 9,274 feet in the vicinity of the Windy Ridge Quarry complex (5GA872). It may also be related to a summer solstice sunset.

Alignment 4 is a geo-navigational alignment of five cobbles [1, 46, 47, 38, and 37] and produced azimuths of 54°and 234°. The 54° azimuth intersects the top of an unnamed peak north of Grimes Peak at a distance of four miles and an elevation of 10,200 feet. It also intersects the southern slope of Haystack Mountain at a distance of 14 miles and an elevation of 11,080 feet. The 234° azimuth points toward Gore Pass and may be associated with the winter solstice sunset.

Alignment 5 is a cardinal and equinox indicator composed of two east-west alignments of four cobbles each [8, 51, 46, and 42] and [26, 22, 31, and 35] with azimuths of 90°and 270°. The 90° azimuth intersects the southern peak of three peaks – the Triad Peaks (see Figure 1) on the eastern horizon line at four miles. This likely represent an equinox sunrise marker, uncorrected for altitude. It also intersects with Corral Peak at a distance of 9.5 miles and an altitude of 11,000 feet. The 270° azimuth points toward South Gunsight at 1 mile and Tyler Mountain at a distance of 10 miles and an elevation of 9,280 feet. However, Tyler Mountain is below the western horizon and cannot be used as an equinox sunset marker.

Alignments 6A and 6B are cardinal alignments composed of two sets of north-south cobble alignments. *Alignment 6A* is composed of three cobbles [34, 35, and 42] with azimuths of 360°and 180°. The 360° azimuth points toward two distinct pillars – the

Pinnacles (See Figure 1) as named by the authors – on the interfluvial divide between Troublesome Creek and Antelope Creek, about three miles north. The 180° azimuth intersects Lawson Ridge at 15 miles and an elevation of 9,060 but is ca. 30m east of the highest point on Larson Ridge and is therefore inconclusive as visual reference. *Alignment 6B* consists of five cobbles [2, 3, 14, 16, and 25] with azimuths of 356°and 176°. The 356° azimuth points toward the flank of the westernmost Pinnacle mentioned in 6A. The 176° azimuth leads to a pass on the southeast end of Larson Ridge which may indicate a prehistoric/ historic trail system from the Blue River/ Harsha Gulch area, to the heads of Elliott Creek and Reeder Creek, and onto the Williams Fork River. However, this is unconfirmed.

Alignment 7 is a geo-navigational alignment composed of three cobbles [24, 26, and 49] which produced azimuths of 347°and 167°. The 347° azimuth intersects the top of Coal Mountain at four miles and an elevation of 9,540 feet. The 167° azimuth was inconclusive.

Feature 4B is a three-sided arrangement of 42 cobbles which is open to the north-northeast (Figure 7). It is 3.8m long x 3.4m wide encompassing 12.92m^2. The three sides are clearly articulated sharing common cobbles at their intersection points. Side 1, the northwest side is a tight linear cluster of 14 cobbles that is 2.61m long x 0.30m wide and is oriented roughly north-northeast to south-southwest. The southwest side, Side 2, is a widely spaced linear arrangement of four cobbles 3.80m long x 0.15m wide with an axis oriented roughly west-northwest to east-southeast. Side 3, the southeast side is a linear arrangement of six cobbles 2.10m long x 0.15m wide and is oriented roughly north-northeast to south-southwest. Between the northwest side and the southeast side there are an additional 18 cobbles, which are enigmatic. Five of these cobbles [16 - 20] may be arranged to form an arc shape, like the one in Feature 4A. Another arrangement of six cobbles [21 - 26] forms a tear-drop shape to the southeast. A third configuration of five cobbles [25 - 29] can be linked to form a dipper and handle. If these three cobble configurations [16 - 29] are linked together a possible bird shape (crane) appears. Whether these are actual relationships, or imaginary is undetermined. No photographs of the feature were taken. In the southeast corner, a fourth configuration of six cobbles [31 - 36] also forms a tear-drop shape.

Alignments 1A and 1B consisting of two components may have geo-navigational importance. *Alignment 1A* is the linear alignment along the northwest side. It is composed of 14 cobbles [4 - 15, 41, and 42] and produced azimuths of 32° and 212°. The 32° azimuth intersects with Sheep Mountain at nine miles and an elevation of 11,280 feet. The 212° azimuth intersects the top of Twin Mountain and with the western flank of Wolford Mountain at 6.5 miles and an elevation of 8400 feet. *Alignment 1B* is located west of the southeast side of the feature. It is composed of four cobbles [22, 26, 27, and 29] and produced the same azimuths and results as Alignment 1A.

Alignment 2 is considered a north-south cardinal and geo-navigational alignment comprised of four cobbles [17, 21, 29, and 30] which produced azimuths of 3°and 183°. The

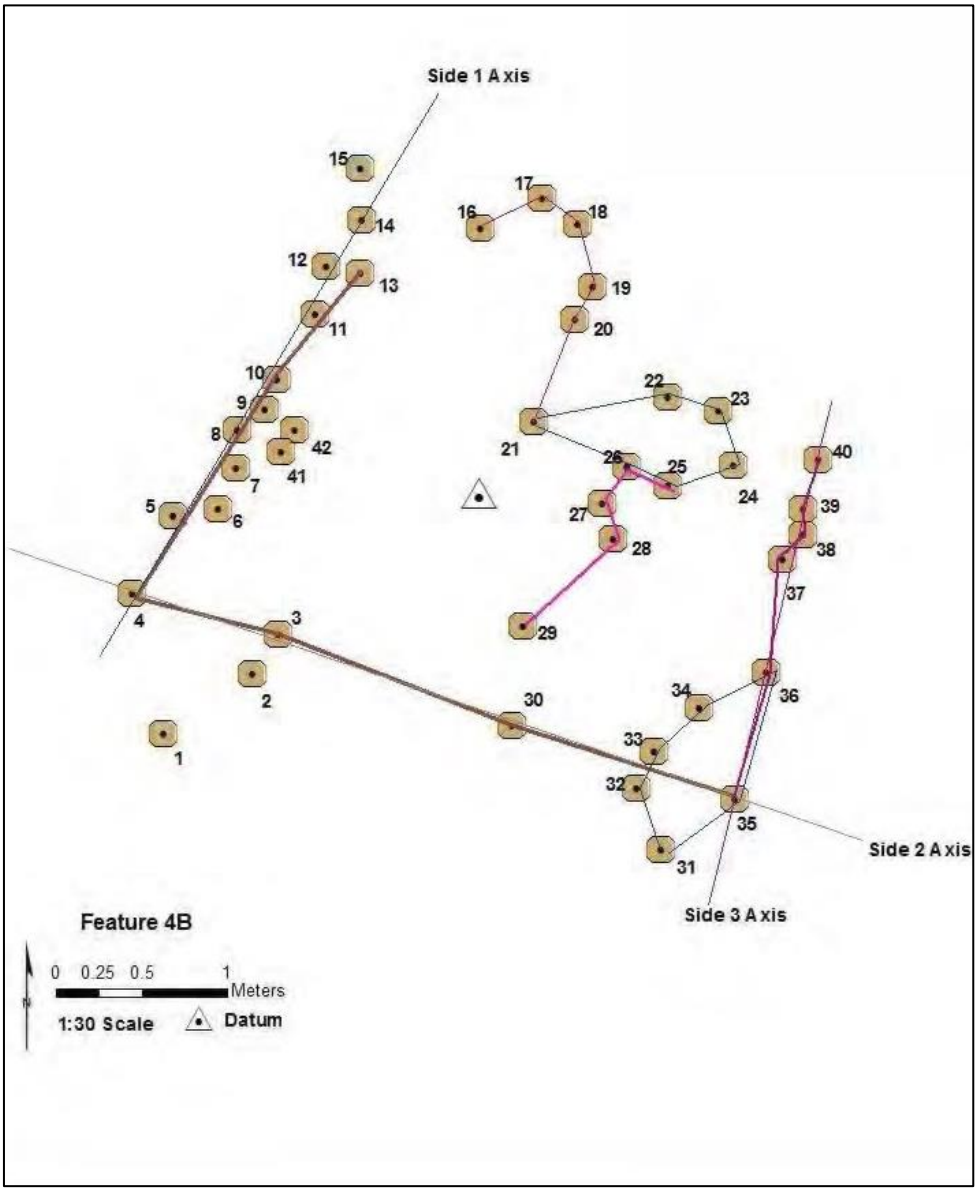


Figure 7. Plan map of Feature 4B.

3°azimuth points to the eastern Pinnacle on the interfluvial divide between Troublesome and Antelope Creeks about 3 miles north. The 183° azimuth intersects the top of Red Mountain at four miles and an elevation of 7,880 feet. It also intersects the eastern flank of Junction Butte at 12 miles and an elevation of 8240 feet, as well as Lawson Ridge. There are unconfirmed reports (pc. Liewer 2013) of stone circles on Junction Butte but they are currently unconfirmed. This alignment is considered repetitive, but inconclusive.

Alignment 3 is a geo-navigational alignment composed of three cobbles [2, 3 and18] which produced azimuths of 36°and 216°. The 36° azimuth points toward Troublesome Pass on the Continental divide between North and Middle Parks. The 216° azimuth crosses the

western flank of Twin Peaks at two miles and an elevation of 8,400 feet. It also points towards Radium, CO, and may possibly be associated with the location of hot springs in that area.

Alignment 4 is a geo-navigational alignment of five cobbles [40, 39, 38, 36, and 35] which creates the southeastern side of this feature. It produced azimuths of 14°and 194°. The 14° azimuth points to a pinnacle east of the Pinnacles on the interfluvial divide between Troublesome and Antelope Creeks at 2.5 miles and an elevation of 9,120 feet. The 194° azimuth crosses the top of a butte at 3.5 miles and an elevation of 8313 feet. This butte overlooks Antelope Pass, about one mile south-southwest and passes next to 5GA4090, a stone circle site.

Alignment 5 is a geo-navigational alignment of four cobbles [4, 3, 30, and 35] which creates the southwest side of this feature. It produced azimuths of 109°and 289°. The 109° azimuth points to the southernmost ridge spur of Elk Mountain, at 11 miles and an elevation of 10,720 feet. The 289° azimuth was inconclusive.

Alignment 6 is an east-west cardinal equinox alignment consisting of four cobbles [7, 26, 24, and 40] producing azimuths of 90°and 270°. The 90° azimuth intersects the top of the southern peak of Triad Peaks along the eastern horizon four miles away. This may represent an equinox sunrise marker, uncorrected for altitude. It also intersects Corral Peaks at 9.5 miles and an altitude of 11,000 feet. The 270° azimuth crosses the Southern Gunsight and continues to Tyler Mountain at 10 miles and an elevation of 9,280 feet. However, Tyler Mountain is below the western horizon line and cannot be seen or used as an equinox sunset marker.

Feature 5 is a large complex of circular to oval shapes composed of 71 cobbles (Figure 8; Plate 7). Three possible outlines are proposed from the inside out. The smallest interior outline (Ring 1) is unique in that it shares half of its outline with Ring 2. It has a strong oval shape and is composed of Ring 2 cobbles [25 - 29] and [37 - 40] along its southwestern half plus an additional seven cobbles [41 - 47] along its northeastern half. It may or may not share the same framed doorway as Ring 2. Its long axis has a northwest-southeast (315°/ 135°) orientation and is 3.35m long. The cross axis, measured from the long axis mid-point is oriented northeast-southwest (45°/ 225°) and is 2.47m long. Ring 1 encompasses 5.96m^2.

The larger interior outline (Ring 2) involves 15 cobbles [25 - 40] and is also oval in shape. A framed doorway about 1.25m wide and is oriented toward the west-southwest (236°/ 56°). Its northern side is defined by cobbles 23 and 40 while the southern side is defined by two cobbles 3 and 25. The Ring's long axis is roughly oriented northwest-southeast (317°/ 137°) and is 3.88m long. The cross axis, measured from the long axis mid-point, is roughly oriented northeast-southwest (227°/ 47°) and is 2.77m long. Ring 2 encompasses an area of 8.44m^2.

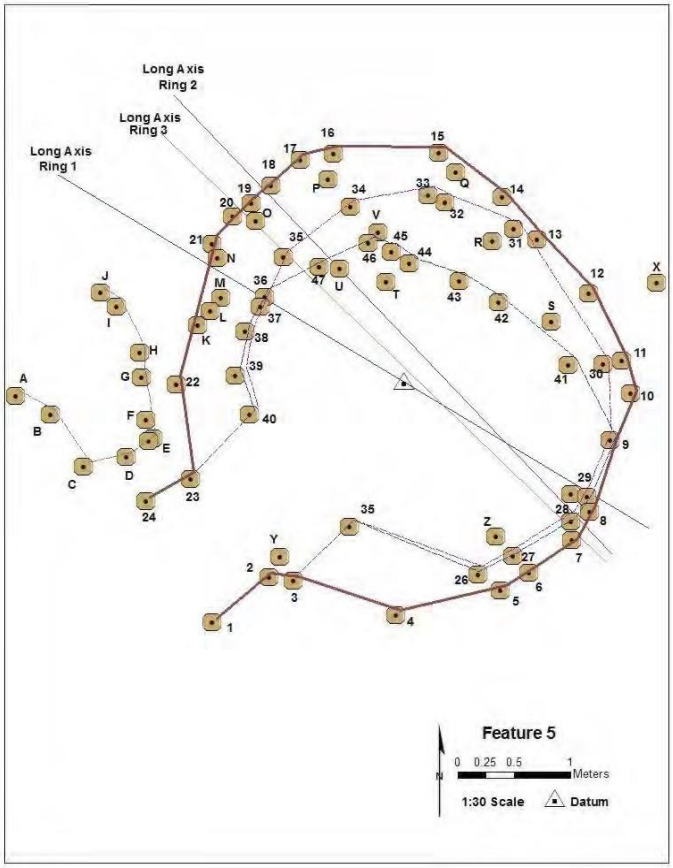


Figure 8. Plan map Feature 5.

Plate 7. Overview of Feature 5 looking north.

Ring 3 the largest ring and the peripheral outline, is circular to slightly oval and composed of cobbles 1 - 24. An opening in the outline is a proposed framed doorway/ viewing portal about one meter wide. The doorway is oriented toward the west-southwest (240°/ 60°) and defined by two aligned cobbles 24 and 23 on the northern side while the southern side is defined by cobbles 1 and 2. Its long axis composed of cobbles 7 and 20, is roughly oriented northwest-southeast (314°/134°) and is 4.12m long. The cross axis, measured from the long axis mid-point, is roughly oriented northeast-southwest (224°/ 44°) and is 3.73m long. Ring 3 encompasses an area of 12.06m^2.

All three rings appear to share a common denominator, cobble 9, and may represent three possible uses or remodels over time. On the west side of Ring 3 is a roughly U-shaped alignment composed of 11 cobbles [A - J] with an opening to the north-northwest (330°). It measures approximately 1.14m on the southwest side [cobbles A, B, and C]; 0.57m on the southeast side [cobbles C, D, and E]; and 1.38m on the northeast side [cobbles E - J]. The width of the opening [A and J] is approximately 1.14m.

Alignment 1 appears to have a solstice orientation associated with Ring 3. The doorway's north side cobbles 24, 23, and 12 produced azimuths of 245° and 65°. The 65° alignment points toward the top of Grimes Peak and the summer solstice sunrise, corrected for altitude. The 245° alignment was inconclusive but may be related to winter solstice sunset.

Alignment 2 is also associated with solstice as viewed from cobble [X] through the midpoint of the doorway cobbles [1 and 24]. Additionally, the midpoint of doorway cobbles [2 and 23] produces an azimuth of 240° which may align with the lunar maximum set of the 18.6 year Metonic Cycle, uncorrected for altitude.

Alignment 3 consists of five cobbles [4, Y, D, B, and A]. The alignment of 300°and 120°may be associated with a predictor for summer solstice sunset and/ or a winter solstice sunrise. It passes from the southern point of Ring 3 through the center to the southwestern tip of the U-shaped feature.

Alignment 4 is a geo-navigational alignment from the center of the U-shaped feature through the southwestern doorway outer cobbles [1, 24, D, and MP]. It produces an azimuth of 330° which is oriented toward Arapahoe Pass.

Alignment 5 is also a geo-navigational alignment. It runs through Ring 1's doorway along southern side and Ring 3 along cobbles 1, 2, 25, and 41. The 234° azimuth is oriented toward Gore Pass while the 54° azimuth points toward Grimes Peak Pass, as well as the southeastern half of Feature 4.

Alignment 6 is a NW/SE inter-cardinal alignment composed of five to seven cobbles [6, 27, Z, 36, and 21] involving all three rings with observation points at either cobble 6 or 21. It produced azimuths of 315°and 135°. Both directions of this alignment are considered inconclusive.

Alignment 7 is a cardinal N/S, geo-navigational, and possible inter-feature alignment. It is composed of three cobbles [5, 42, and 14] with azimuths of 360°and 180°. The 360^0 azimuth points toward the Pillars on the interfluvial divide between Troublesome and Antelope Creeks 3 miles north. The 180° azimuth intersects Lawson Ridge at 15 miles, as such it is a visual reference point. There may also be a relationship with Feature 11.

Alignment 8 is a cardinal E/W equinox alignment composed of four cobbles [G, 22, 39, and 10] producing azimuths of 90°and 270°. The 90° azimuth intersects the southern Triad peak four miles east and may represent an equinox sunrise marker, uncorrected for altitude. This azimuth also intersects with Corral Peak at 9.5 miles distant at an altitude of 11,000 feet. The 270° azimuth points toward South Gunsight at 1 mile and Tyler Mountain 10 miles distance however, Tyler Mountain cannot be seen from this feature. This alignment may be indicative of the autumn equinox sun set.

Feature 6 is a complex circular alignment involving 66 cobbles with an L-shaped, an arc-shaped, and a U-shaped cobble configuration (Figure 9; Plate 8).

The roughly circular peripheral outline contains 18 cobbles which encompasses an area of 4.67m^2. Its long axis, cobbles U, T, and 8, extends through the framed doorway/ viewing portal center at azimuths of 217°and 37° for a length of 2.40m. The cross axis, measured from the long axis center point, produced azimuths of 127°and 307°and measured 2.44m. The framed doorway is 1.17m wide defined on the north by aligned cobbles 17, 18, and possibly R, while the south side is defined by cobbles 1, 2, and possibly A, and B. Additionally, there are nine interior cobbles [29 - 37]; seven [31 - 37] of which cluster near the peripheral outline's north side. This cluster could represent a collapsed cairn, that may have worked in conjunction with southwest doorway's collapsed cairn [T, U, V, W, and X].

Surrounding the peripheral outline are 28 exterior cobbles {A - Y}, which cluster to the southwest, northeast, and northwest. The southwest cluster is composed of five cobbles [T, U, V, W, and X] and may be a collapsed cairn associated with a sight line through the center of the doorway/ viewing portal. The northeast cluster is composed of six cobbles [G, H, I, J, K, and L] that form an arc-shape open to the north-northeast. The northwest cluster is composed of four cobbles [M, N, O, and P].

A possible L-shaped linear arrangement of cobbles is defined along the west by cobbles [S, R, P, and O] with an X-axis of 12°and 192° with a length of 2.96m. The Y-axis forms the northern side of the L-shape cutting across the northern quarter of Feature 6. It starts at the common vector, cobble O, and is composed of four cobbles [12, 32, 7, and F] with azimuth of 98° and 278° with a length of 3.20m.

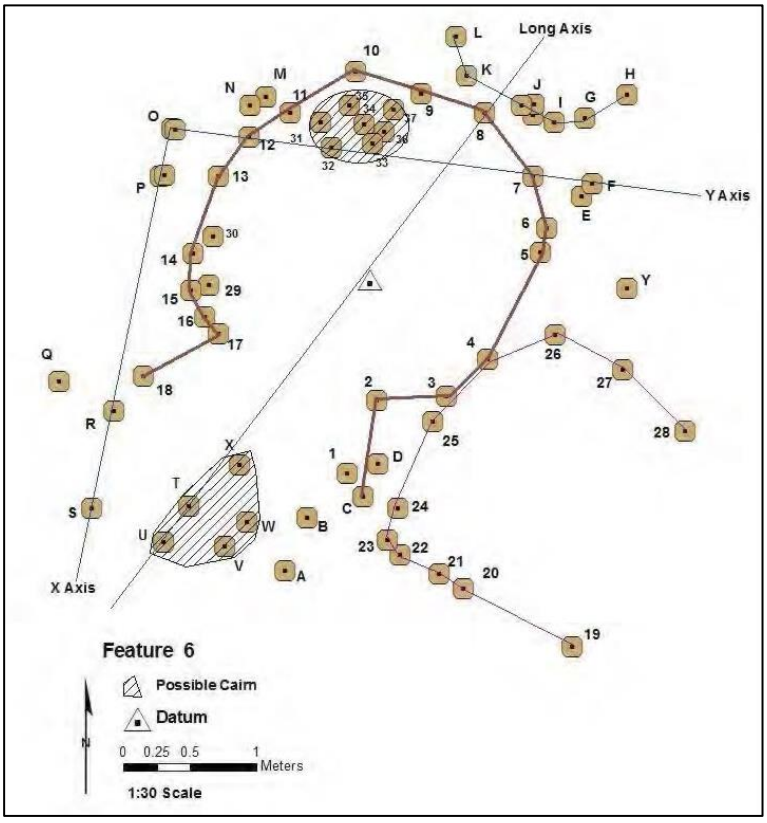


Figure 9. Plan map of Feature 6.

Plate 8. Feature 6 looking northeast.

There is a U-shaped configuration composed of cobbles 19 - 28, 3, and 4 on the southeast side of Feature 6. The length of the northeast and the southwest sides are each 1.60m. The length of the back, or northwest side is 2.0m. The width of the opening [19 and 28] is 1.7m and opens toward the east-southeast at an azimuth of 119°.

Given the complexity, Feature 6 may represent three occupations that made additions or remodels, like Feature 5. Given the configurations and general orientations, we suspect that Feature 5 and Feature 6 have related age and/or cultural affiliations.

Alignment 1A, 1B, and 1C may all be lunar events associated with the lunar minimum set/ rise of the 18.6 year Metonic Cycle, uncorrected for altitude. *Alignment 1A* is composed of three cobbles [15, 2, and 25] with the U-shaped alignment mid-point. It produced azimuths of 119°and 299°. *Alignment 1B* is composed of six to eight cobbles [19, 20, 21, 22, (B/X), R, and Q] with azimuths of 118°and 298°. *Alignment 1C* consists of four cobbles [18, 17, G, and H]. Cobbles 17 and 18 form the doorway/ viewing portal north side and cobbles G and H are located northeast and outside the main outline. Together they produce azimuths of 60°and 240°.

Alignment 2 is an equinox alignment composed of three to five cobbles [P, 13, possibly 7, and E/F]. It produced azimuths of 92°and 272° which are consistent with equinox sunrise, corrected for altitude. Paired cobbles P are located 30cm west of the peripheral outline while cobbles E/F are located 30cm east. Cobble 7 is less than 10cm north of the azimuth alignment and may have been associated with it. An autumnal equinox scenario seems the most probable.

Alignment 3 is a cardinal (N/S) alignment composed of at least three cobble alignments [N, 12, X, and W], [13, 17, and V], and [27, Y, and H] which produce azimuths of 360°and 180°. The 360° azimuth points toward the Pillars on the interfluvial divide between Troublesome and Antelope Creeks, 3 miles north. Line-of-sight azimuth 180° points to Larson Ridge, but is considered inconclusive.

Alignment 4 is an inter-cardinal (NE/SW) alignment of six cobbles [F, E, 6, 2, W, and V] which produced azimuths of 45°and 225°. Both azimuths are considered inconclusive for visual geographic reference points.

Alignment 5 appears to be a geo-navigational inter-site alignment composed of three cobble alignments [1, 2, 8, at 22°and 202°], [A, B, 8, at 23°and 203°], and [C, D, J, at 23°and 203°]. Both cobbles 8 and J are primary observation points. From a visual line-of-sight perspective, these three alignments are very tight, and focus on the western flank of Little Wolford Mountain at 202°. They have similar azimuths to Feature 3, Alignment 1B. However, Feature 6 is approximately 30m east and 72m north of Feature 3 therefore, it is not clear if it represents a link to site 5GA3644. The back azimuth (22°) was inconclusive.

Alignment 6 is a geo-navigational inter-site alignment of three cobbles [C, 2, and 9] which produced azimuths of 8°and 188°. Azimuth 188° crosses the upper western flank of

Junction Butte where there are unconfirmed reports of stone circles (pc. Liewer, 2013). Until these can be confirmed this alignment is considered repetitive, but inconclusive. The 8° azimuth was also inconclusive for a visual reference point.

Feature 7 consist of two nested asymmetrical oval alignments and two eccentrics composed of a total of 26 cobbles (Figure 10; Plate 9) and exhibits a generally northwest to southeast orientation.

The outer oval outline consists of 13 cobbles [1- 4 and 6-14] and encompasses an area of 4.34m^2. There are 11 interior cobbles [15 - 24] the majority of which are concentrated within 50cm of the north-northwestern peripheral outline. Two cobbles [A and B) are exterior to the northwest side. Its long axis produced azimuths of 338°and 158° and a maximum length of 2.65m. The cross axis, as measured from the long axis center point, produced azimuths of 248°and 68°with a maximum length of 2.10m. The 68° bearing is consistent with a full disk summer solstice sunrise corrected for altitude – like Feature 13, where this azimuth has been confirmed as a summer solstice sunrise indicator.

A secondary, more symmetrical oval is interior to the peripheral outline. It consists of five cobbles [8-12] on the northwest end and four cobbles [1-5] on the southeast end and is connected by cobbles [5, 15, and 16]. It encompasses an area of 3.36m$^{2.}$ This interior oval produced a long axis of 321°and 141° with a maximum length of 2.55m. The cross axis, as measured from the long axis center point produced azimuths of 231°and 51°with a maximum length of 1.68m.

Two eccentric shapes are comprised of cobbles along the north-northwestern side of the peripheral outline. Cobble sets [8,17, 18, 9, 20, and 19] and [A, B, 10, 11, 24, and 23] appear to form dipper shapes, and may represent the Big Dipper (Ursa Major) as it passes along the northern horizon between October and January.

Alignment 1 appears to be a lunar alignment composed of three cobbles [12, 16, and 6] which produced azimuths of 60°and 240°. These azimuths may point toward the lunar *maximum* rise/ set of the 18.6 year Metonic Cycle, uncorrected for altitude.

Alignment 2A is a solstice alignment comprised of three cobbles [4, 23, and 22] producing azimuths of 120°and 300°. These azimuths could be predictors for either a winter solstice sunrise or a summer solstice sunset, uncorrected for altitude. Summer solstice sunset seems the most probable.

Alignment 2B is a solstice and geo-navigational alignment composed of three to four cobbles [11, 22, 19? and 7] that produced a fore-sight azimuth of 68° which points to the south side of Grimes Peak. The back-sight azimuth of 248° was inconclusive for visual geographic reference points, but may be an unconfirmed predictor for winter solstice sunset.

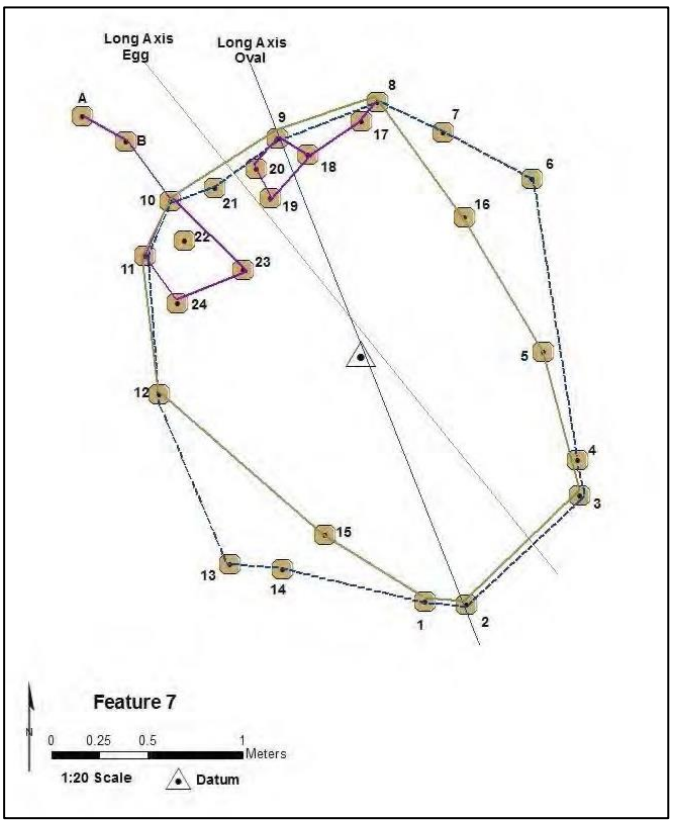


Figure 10. Plan map of Feature 7.

Plate 9. Overview of Feature 7 looking north.

Alignment 3 is a geo-navigational alignment of three cobbles [24, 19, and 18]. It produced a fore-sight azimuth of 41°, which points to Haystack Mountain at 11,500ft. The back-sight azimuth of 221° was inconclusive for visual geographic reference points.

Alignment 4 appears to be a geo-navigational alignment of three cobbles [11, 18, and 17]. It produced a fore-sight azimuth of 58°, which points toward the Grimes Peak pass area. The back-sight azimuth of 238° was inconclusive for visual geographic reference points.

Alignment 5 is geo-navigational alignment of three cobbles [14, 15, and 5]. It produced a fore-sight azimuth of 50°, which intersects Park View Mountain on the Continental Divide at 12,300ft. A commanding view of both Middle and North Parks is had from the top of this peak. The back-sight azimuth of 230° was inconclusive for visual geographic reference.

Alignment 6 is a geo-navigational alignment of three cobbles [23, 10, and A]. It produced a fore-sight azimuth of 315° which passes through the center of the Gunsight pointing to Middle Carter Mountain and Whitely Peak. The back-sight of 135° was inconclusive for visual geographic reference points.

Alignment 7 is a probable geo-navigational inter-site alignment of three cobbles [1, 19, and 20]. It produced azimuths of 159°and 339° which may be related to the peripheral oval long axis. The 159° line-of-sight crosses the southern end of east Sulphur Gulch ridge passing between sites 5GA4211 and 5GA4210. Site 5GA4211 is a low stacked rock wall oriented northwest - southeast. It is considered a possible hunting blind of historic or modern origin. Site 5GA4210 is a large U-shaped stacked rock wall vision quest, open to the northeast. It is consideration a traditional cultural property (O'Neil, 2011a). The 339° line of sight intersects the top of White Slide Mountain which may be a geo-navigational reference point.

Alignment 8 is geo-navigational configuration of two sets of three cobbles [15, 23, and 21] which produced azimuths of 162°and 342° and [14, 22, and 10] which produced azimuths of 163°and 343°. The 162°/ 163° azimuths point toward the two western most buttes along the north side of Reeder Creek, near its confluence with the Colorado River. The 342°/343° azimuths point to the White Slide Mountain area.

Alignment 9 is a geo-navigational alignment of three cobbles [9, 19, and 13]. It produced azimuths of 7°and 187°. The 7° azimuth takes you to a modern bench-mark atop the Continental Divide between Middle and North Parks. The 187° azimuth intersects the top of Junction Butte on the west side. There are unconfirmed reports (pc. Liewer, 2013) of stone circles atop Junction Butte, but until confirmation is made this alignment is considered repetitive, but inconclusive.

Feature 8A is composed of 20 cobbles lenticular in outline consisting of cobbles 1-14 generally aligned along a north-northwest to south-southeast axis encompassing an area of 4.05m^2 (Figure 11; Plate 10). There are two interior cobbles (15 and 16) and four exterior cobbles (A - D). The long axis produced azimuths of 341°and 161° and a maximum length of 3.06m. The cross axis, as measured from the long axis center point, produced azimuths of 251°and 71°with a maximum length of 1.69m. The unique lenticular shape is interesting, but problematic. There may be some symbolic relationship relative to bison morphology found in historic Arapahoe iconography and a remote possibility to the Ruby site (48CA302) which dates to the Late Plains Archaic.

Alignment 1 is a geo-navigational alignment of three cobbles [1, 15, and 9] along the long axis of Feature 8A. These produced azimuths of 341°and 161°. The 341° azimuth intersects the top of Red Slide Mountain and the flank of White Slide Mountain. The 161° azimuth points toward prominent buttes near the confluence of Reeder Creek and the Colorado River. This azimuth is presently considered inconclusive.

Alignment 2 is a solstice alignment of four cobbles [C, 7, 8, and 9] which produced azimuths of 115°and 295°. These azimuths might relate to bright star indicators–predictors for a winter solstice sunrise, or a summer solstice sunset, uncorrected for elevation. The summer solstice sunset seems the most probable, but both are presently considered inconclusive. It is also possible, given our ± 2° margin of error, that this alignment may relate to the lunar minimum rise/ set of the 18.6 year Metonic Cycle.

Alignment 3 is geo-navigational alignment of four cobbles [B, 4, 5, and 6] which produced azimuths of 142°and 322°. The 322° azimuth intersects with Carter Mountain while the 142° azimuth was inconclusive for visual geographic reference points.

Alignment 4 is geo-navigational alignment of three cobbles [A, 16, and 10] which produced azimuths of 133°and 313°. The 313° azimuth passes through The Gunsight intersecting with Whitely Peak. The 133° azimuth was inconclusive for visual geographic reference points.

Alignment 5 is a geo-navigational alignment of three cobbles [D, 16, and 14] which produced azimuths of 7°and 187°. The 187° azimuth intersects the top of Junction Butte on the west side. There are unconfirmed reports (pc. Liewer, 2013) of stone circles atop Junction Butte but until confirmation is made, this alignment is currently considered repetitive, but inconclusive. The 7° azimuth was inconclusive for visual geographic reference points, though it does intersect with the northern horizon.

Alignment 6 is cardinal (N/S) and geo-navigational alignment of three cobbles [8, 15, and 14] which produced azimuths of 0°and 180°. The 0° azimuth points leads toward the Pinnacles on the interfluvial divide between Troublesome and Antelope Creek 3 miles north. This alignment is currently considered repetitive, but inconclusive. The 180° azimuth points to Larson Ridge and is considered repetitive but inconclusive to a specific visual reference.

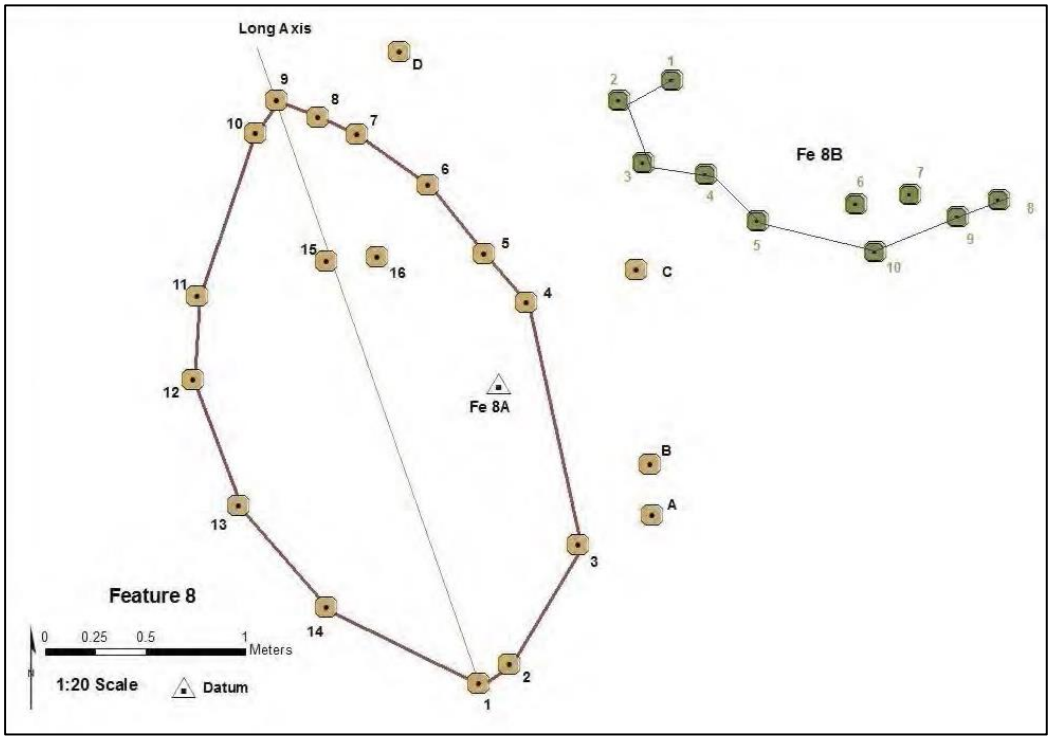


Figure 11. Plan map of Feature 8A and 8B.

Plate 10. Overview of Features 8A and 8B looking north.

Alignment 7 is a geo-navigational alignment of cobbles [A, B, and C] and possibly cobble 2 in Feature 8B which produced azimuths of 175°and 355°. The 175° azimuth leads to a pass at southeast end of Larson Ridge. This may be an intersection point with a prehistoric or historic trail system from the Blue River/ Harsha Gulch area, to Elliott Creek and Reeder Creek, and onto the Williams Fork River. However, this is unconfirmed. The 355° azimuth was inconclusive for visual geographic reference points.

Feature 8B is composed of 10 cobbles with a curvilinear shape with a slight hook on one end. It is generally aligned along a west-northwest to east-southeast axis (see Figure 11; Plate 10). The length measures 1.89m and its width measures 0.67m. There may be possible inter-feature relationships between Features 7, 8A, and 8B as they are all within two meters of each other. Future work is warranted.

Feature 9 is composed of 45 cobbles. It is oval in outline and aligned roughly along an east-west axis. Though it can also be viewed as two shallow arcs, each with paired rows of cobbles facing each other, one on the west the other on the southeast side (Figure 12; Plate 11). When viewed as an oval, there are 20 cobbles [1 - 20] comprising the peripheral outline with 16 cobbles [21 - 36] inside and nine cobbles [A - I] outside the outline. Cobble clusters along the east to southeast side may be three collapsed cairns, composed of cobble sets [8, 9, 10, 26, and 27], [7, 28, 29, 30, and 31], and [5, 6, 32, C, D, and E]. The long axis has azimuths of 280° and 100°, with a maximum length of 4.14m. The cross axis, as measured from the long axis center point, produced azimuths of 190°and 10°with a maximum length of 3.20m. It encompasses an area of 10.40m^2.

Alignment 1 is a cardinal (N/S) alignment of three cobbles [3, 34, and 12] which produced azimuths of 2°and 182°. The 2° azimuth points toward the Pillars on the interfluvial divide between Troublesome and Antelope Creeks three miles north. This alignment is currently considered repetitive, but inconclusive. The 182° azimuth intersects the east flank of Junction Butte and Larson Ridge, but is considered inconclusive as a specific visual reference.

Alignment 2 is a geo-navigational alignment of four cobbles [18, 21, 12, and G] which produced azimuths of 50°and 230°. The 50° azimuth points to Park View Mountain on the Continental Divide at an altitude of 12,300 feet. This peak has a commanding view of both Middle and North Parks. The back-sight of 230° points towards Gore Pass, but was inconclusive for visual geographic reference points.

Alignment 3 is a geo-navigational alignment composed of two sets of four cobbles each [1, 35, 11, and F] and [2, 36, 27, and 10]. Both sets produced azimuths of 37°and 217°. The 37° azimuth crosses the Continental Divide between Sheep Mountain and Haystack Mountain, near Troublesome Pass at 13 miles. The back-sight of 217° was inconclusive for visual geographic reference points.

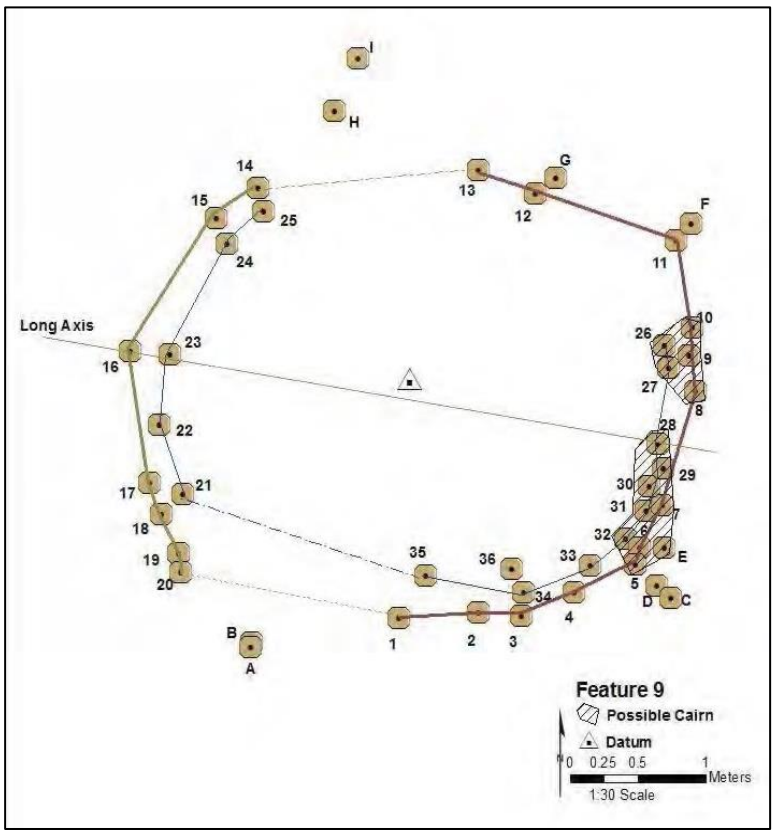


Figure 12. Plan map of Feature 9.

Plate 11. Overview of Feature 9 looking north.

Alignment 4 is a geo-navigational alignment of three cobbles [A/B, 26, and 10] producing azimuths of 55°and 235°. The 55° azimuth points to Grimes Peak Pass. The 235° azimuth leads to Gore Pass.

Alignment 5 may be a lunar alignment of three cobbles [A/B, 27, and 9] with a possible collapsed cairn that relate to the 18.6 year Metonic Cycle, uncorrected for altitude. This alignment produced azimuths of 59°and 239°. The 59° azimuth may be a lunar maximum rise indicator while the 239° azimuth may indicate the lunar maximum set. However, this is unconfirmed.

Alignments 6A, 6B, and 6C appear to be possible equinox geo-navigational alignments composed of four cobble sets of three to five cobbles each. *Alignment 6A* [18, 32, 6, and E] and [16, 23, and 8] produced azimuths of 94°and 274°. The 94° azimuth intersects with South Corral Peak and may be a spring equinox sunrise predictor. The 274° azimuth crosses South Gunsight. *Alignment 6B* is composed of cobbles [16, 23, and 27]. It produced azimuths of 92°and 272°. The 92° azimuth is a confirmed equinox sunrise indicator, corrected for altitude (See Feature 13 Alignment 5). The 272° azimuth is postulated as an equinox sunset, but has yet to be tested. Otherwise it is inconclusive for visual geographic reference points. *Alignment 6C* is composed of cobbles 20, 35, 36, 33, and 5 and produced azimuths of 89°and 269°. The 89° azimuth might be a generalized cardinal east-west and/or an equinox sunrise, uncorrected for altitude. The 269° azimuth may be an equinox sunset, corrected for altitude but has yet to be tested. Otherwise it was inconclusive for visual geographic reference points.

Alignment 7 is geo-navigational alignment of four cobbles [C, D, 5, and 14] producing azimuths of 134°and 314°. The 314° azimuth intersects Middle Carter Mountain at seven miles and Whitely Peak at 12 miles. The 134° azimuth was inconclusive for visual geographic reference points. But may represent inter-cardinal azimuths.

Alignment 8 is a geo-navigational inter-site alignment of three cobbles [1, 24, and 15] producing azimuths of 154°and 334°. The 154° azimuth intersects the highest point atop east Sulphur Gulch ridge and sites 5GA4204 and 5GA4214. Site 5GA4204 is a circular to slightly oval stacked-rock wall interpreted as a probable eagle trap or vision quest locality with possible astronomical alignments considered eligible to the NRHP and as a Traditional Cultural Property (cf. O'Neil, 2011a). Site 5GA4214 is a Kremmling Chert quarry site. The 334° azimuth points toward the west flank of White Slide Mountain and is considered repetitive, but inconclusive.

Alignment 9 is a geo-navigational alignment of three cobbles [1, 25, and 14] which produced azimuths of 162°and 342°. The 162° azimuth leads to the two western most buttes along the north side of Reeder Creek, near its confluence with the Colorado River. The 342° azimuth intersects Coal Mountain, the east flank of Red Slide Mountain, and White Slide Mountain. Both these alignments are currently considered repetitive, but inconclusive.

Alignment 10 is a solstice geo-navigational alignment of three to four cobbles [H, 13, 12, and 11] which produced azimuths of 111°and 291°. The 111° azimuth intersects with

Grouse Mountain on the eastern horizon, as viewed from 5GA4251. As such, it may have served as an advance predictor for winter solstice sunrise, or the rising of a bright star. The 291° azimuth could be a predictor for summer solstice sunset, but was inconclusive for visual geographic reference points.

Alignment 11 is a geo-navigational alignment of three cobbles [I, H, and 18] which produced azimuths of 203°and 23°. The 203° azimuth intersects the western flank of Little Wolford Mountain and the top of San Toy Mountain. The 23° azimuth was inconclusive for visual geographic reference points.

Feature 10 is composed of 44 cobbles in a generally egg-shaped to lenticular outline oriented along a west-northwest to east-southeast axis encompassing an area of 11.03m^2 (Figure 13; Plate 12). The peripheral outline consists of cobbles 1 - 18 while there are 24 cobbles [19 - 42] inside the peripheral outline, and two cobbles [A and B] outside the periphery. A classic isosceles triangle appears near the center and is composed of cobbles 33, 36 and 37. It has two equal sides and two equal angles of 68°, the third angle is 44°. The long axis azimuth is 292°/ 112° with a maximum length of 4.88m. The cross axis, as measured from the long axis center point, has azimuths of 202°/ 22° and a maximum length of 2.88m.

Alignment 1 is a geo-navigational alignment and the long axis of Feature 10. It includes cobble set [10, 33/34, and 1] and produced azimuths of 293°and 113°. The 293° azimuth points toward a pack trail over Buffalo Pass at 20 miles. The 113° azimuth intersects with Grouse Mountain at nine miles, and an elevation of 10,862 feet. Both are considered repetitive and inconclusive.

Alignments 2A, 2B, and 2C are geo-navigational consisting of three sets of similar cobble alignments. *Alignment 2A* is composed of four cobbles [11, 32, 31, and 9] and produced azimuths of 34°and 214°. *Alignment 2B* is composed of four cobbles [4, 20, 19, and 38] produced azimuths of 35°and 215°. *Alignment 2C* is composed of four cobbles [13, 33, 34, and 27] and produced azimuths of 36°and 216°. All three of these azimuths are very close, and within our ± 2° margin of error. The 35° azimuth intersects with Sheep Mountain nine miles' distance at an elevation of 10,600 feet. The 216° azimuth leads to the west flank of Twin Peaks at two miles an elevation of 8,440 feet. It also points toward Radium (hot springs) at 20 miles. The 216° is currently considered inconclusive.

Alignments 3A and 3B are considered geo-navigational, consisting of two sets of similar cobble alignments. *Alignment 3A* is composed of three to four cobbles [14, 42, 26, and 6?] which produced azimuths of 205°and 25°. *Alignment 3B* is composed of three cobbles [B, 34, and 28] which produced azimuths of 207°and 27°. Both of these azimuths are very close, and within our error range of ± 2°. The 205°/ 207° azimuths intersect the top of Twin Mountain at two miles at an elevation of 8580 feet. They also lead to Little Wolford Mountain, Wolford Mountain, and San Toy Peak. The 25°/ 27° azimuths are inconclusive for visual geographic reference points.

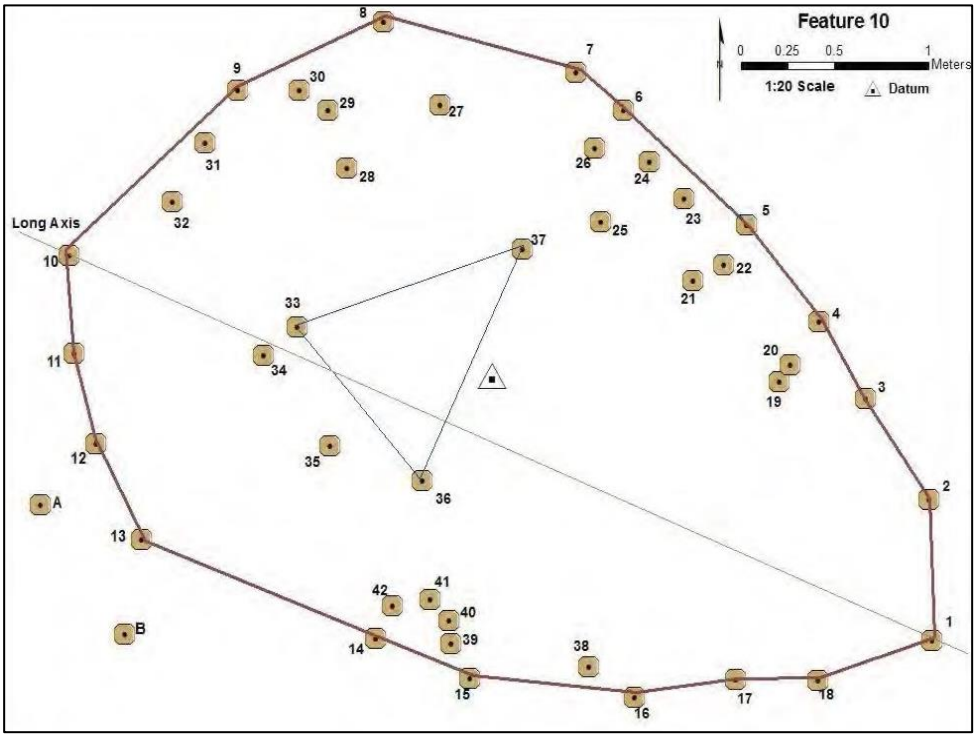


Figure 13. Plan map of Feature 10.

Plate 12. Overview of Feature 10 looking north-northeast.

Alignments 4A and 4B is a solstice alignment consisting of two sets of similar cobble sets. *Alignment 4A* is composed of three cobbles [12, 34, and 24] which produced azimuths of 64°and 244°. *Alignment 4B* is composed of four cobbles [13, 35, 21, and 22] which produced azimuths of 66°and 246°. Both azimuths are very close, and within our error range of ± 2°. The 66° azimuth has been confirmed for mid-solar disk for summer solstice sunrise, corrected for altitude, at Feature 13. The 244°/ 246° azimuths may correlate to a winter solstice sunset, corrected for altitude. However, this has not been confirmed.

Alignments 5A and 5B are considered geo-navigational, consisting of two sets of similar cobble alignments. *Alignment 5A* is composed of three cobbles [11, 28, and 27] which produced azimuths of 238°and 58°. *Alignment 5B* is composed of four cobbles [A, 34, 33, and 6] which produced azimuths of 237°and 57°. Both azimuths are very close, and within our error range of ± 2°. The 57°/ 58° azimuths may be geo-navigational relative to Grimes Peak pass. The 237°/ 238° azimuths intersect the top of a mountain peak one mile north of Gore Pass. Both are presently considered repetitive, but inconclusive.

Alignment 6 is cardinal (E/W) equinox alignment composed of four cobbles [B, 14, 39/40, 1] which produced azimuths of 90° and 270°. Azimuth 90° points to the center Triad 4 miles distant and a saddle between Corral Peaks at 9 miles. The 270° azimuth crosses the top of South Gunsight. Both azimuths are east - west cardinals, and may represent equinox sunrise/ sunset, uncorrected for altitude.

Alignment 7 is a cardinal (N/S) alignment of three cobbles [38, 25, and 26] which produced azimuths of 360°and 180°. The 180° azimuth crosses Lawson Ridge at 15 miles. The 360° azimuth points toward the Pinnacles. Both azimuths are cardinal north south. Presently these azimuths are considered repetitive but inconclusive.

Alignment 8 is a geo-navigational alignment of three to four cobbles [B, 35, 24, and 25] which produced azimuths of 50°and 230°. The 50° azimuth intersects with Park View Mountain at 14 miles and an elevation of 12,000 feet. The 230° was inconclusive for visual geographic reference points.

Alignment 9 is a solstice geo-navigational alignment of three cobbles [9, 28, and 1] which produced alignments of 127°and 307°. The 127° azimuth intersects with Slide Mountain seven miles and an elevation of 9,720 feet. This azimuth has a high probability as an indicator for winter solstice sunrise, corrected for elevation. However, this has not been verified. The 307° azimuth passes through The Gunsight and up Muddy Creek to Lake Agnes, in proximity to the Windy Ridge Quarry complex (5GA872).

Feature 11 consists of 41 cobbles. It is roughly egg-shaped with an inverted L-shape, and two eccentrics, one at the north end and the other at the south end (Figure 14; Plate 13). Overall, the feature covers an area of 16.53m^2.

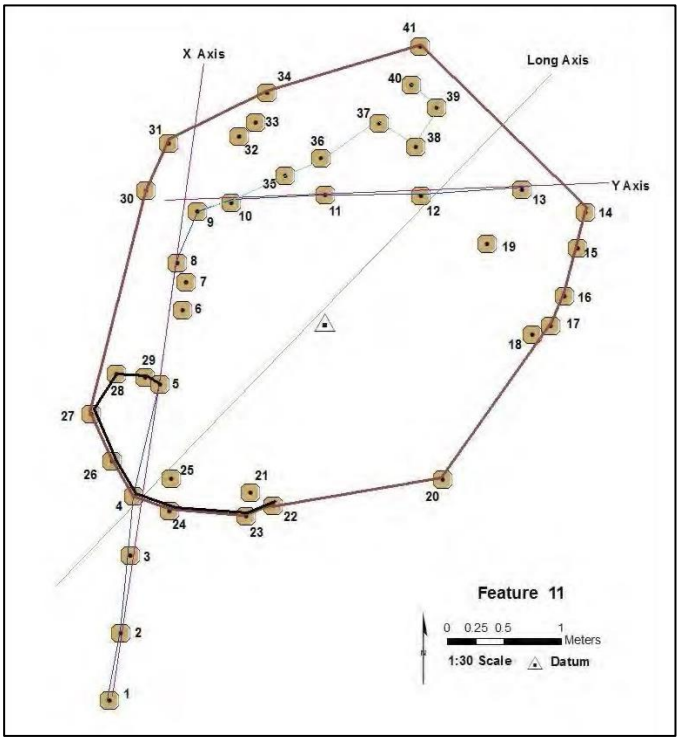


Figure 14. Plan map of Feature 11.

Plate 13. Overview of Feature 11 looking north-northeast.

The egg-shaped peripheral outline is composed of 16 cobbles [4, 26, 27, 30, 31, 34, 41, 14 - 18, 20, 22, 23 and 24] and is oriented northeast - southwest. The long axis has an azimuth of 45°/ 225° and a length of 4.46m. The cross axis, as measured from the long axis center point, has an azimuth of 135°/ 315° and a length of 3.57m. The egg-shaped figure encompasses an area of 12.5m^2.

The X axis of the L-shape is composed of six cobbles [1 - 5 and 8] and is oriented roughly north-south with a length of 4.23m. The Y axis composed of five cobbles [9 - 13] is oriented roughly east-west and is 2.80m long.

One eccentric appears to be a hooked curvilinear arrangement of cobbles [8-10 and 35-40] associated with the mid-point of the L-shaped X axis. Another similar curvilinear arrangement of cobbles [22-24, 26-29, 4 and 5] is found along the L-shaped Y axis consists of cobbles. Portions of each curvilinear arrangement also form the egg-shaped peripheral

Alignments 1A, 1B, 1C are three sets of geo-navigational and cardinal N/S alignments. *Alignment 1A* is composed of six cobbles [1, 2, 3, 4, 5, and 8] which produced azimuths of 8°and 188°. The 8° azimuth intersects the hill top upslope from the "Gunsight" benchmark at an elevation of 8720 feet and extends along with the eastern flank of the Pinnacles. The 188° azimuth intersects the western flank of Junction Butte at 12 miles and an elevation of 8040 feet. *Alignment 1B* may be a correctional axis, offset from Alignment 1A composed of four cobbles [24, 25, 8, and 31] about 25cm east of Alignment 1A. These cobbles produced azimuths of 2°and 182°. The 2° azimuth leads toward the Pinnacles. The 182° azimuth intersects the eastern flank of Junction Butte and Lawson Ridge. Both these azimuths are currently considered repetitive, but inconclusive for specific geographic references. However, they may be a later addition or correction to Alignment 1A, thus improving a cardinal north-south line of sight. *Alignment 1C* is composed three cobbles [23, 21, and 35]. Cobbles 21 and 23 are paired and are about 95cm east of Alignment 1A. These cobbles produced azimuths of 6°and 186°. They may be an intermediate addition/ correction to Alignment 1A. The 6° azimuth points to the modern "Gunsight" benchmark at one mile and the eastern flank of the Pinnacles. The 186° azimuth intersects the top of Junction Butte where there are unconfirmed reports of stone circles (pc. Liewer, 2013). Both azimuths are currently considered repetitive, but inconclusive.

Alignment 2 the Y-axis is a geo-navigational, cardinal (E/W) equinox indicator composed of four to five cobbles [9, 10, 11, 12, and 13] with cobbles [10 - 13] evenly spaced–about 88 cm apart. They produced alignments of 88° and 268°. The 88° azimuth leads to the central Triad Peak along the eastern horizon. This alignment is not a true cardinal east-west, but is within our margin of error of ± 2°. Or it might have served as a generalized, but inaccurate equinox sunrise marker. This azimuth also points to the northernmost Corral Peak at nine miles and an elevation of 11,191 feet. This peak is not visible from the feature. The 268° azimuth may be an Equinox sunset, corrected for elevation. A visual confirmation is required. However, it is currently inconclusive for visual geographic reference points on the western horizon.

Alignment 3 is a geo-navigational, cardinal (N/S), and inter-feature alignment composed of four cobbles [20, 12, 38, and 40] which produced alignments of 176°and 356°. The 176° azimuth points to a pass on the southeast end of Larson Ridge. This may be an intersection point with a prehistoric/ historic trail system from the Blue River/ Harsha Gulch area, to Elliott and Reeder Creeks, and onto the Williams Fork River. However, this is unconfirmed. The 356° azimuth leads to the flank of the westernmost Pinnacle. It also parallels (same azimuth) the western orientation line of Feature 12 and may link these features together.

Alignment 4 is a geo-navigational alignment composed of five cobbles [26, 5, 11, 37, and 40] which produced azimuths of 39°and 219°. The 39° azimuth crosses the Continental Divide between Sheep and Haystack Mountains, near Troublesome Pass, at a distance of 13 miles. The back-sight of 219° leads to the western flank of Twin Mountain, near 5GA4088, but is considered inconclusive.

Alignment 5 is a geo-navigational alignment composed of five cobbles [34, 33, 7, 29, and 26] which produced azimuths of 22°and 202°. The 202° azimuth intersects the top of Little Wolford Mountain and a possible link to 5GA3644, and its large cobble feature (F-3). It also crosses the eastern top of San Toy Mountain and the western peak of Sheephorn Mountain. The 22° azimuth was inconclusive for visual geographic reference points; but does align with Features 3, 9, 4a, 6, 8a and 8b, 11, and 12.

Alignments 6A and 6B are solstice alignments consists of two sets of cobbles. *Alignment 6A* is composed of five cobbles [9, 10, 35, 36, and 39] which produced azimuths of 66°and 246°. The 66° azimuth intersects a modern benchmark atop Grimes Peak, and may be related with a confirmed first glimmer summer solstice sunrise, corrected for altitude (See Feature 13). The 246° azimuth was inconclusive for visual geographic reference points, but may be a winter solstice sunset indicator, yet to be confirmed. *Alignment 6B* is composed of four cobbles [4, 25, 18, and 17] which produced azimuths of 68°and 248°. The 68^0 azimuth points toward the southern flank of Grimes Peak. It is a confirmed summer solstice sunrise, full solar disk alignment corrected for altitude (See Feature 13). The 248°azimuth was inconclusive for visual geographic reference points, but may be for a winter solstice sunset, yet to be confirmed.

Alignment 7 is a geo-navigational inter-site alignment composed of four cobbles [30, 8, 7, and 22] which produced azimuths of 158°and 338°. The 158° azimuth intersects the southern end of the East Sulphur Gulch ridge at 5GA4211 and is close to 5GA4210. Site 5GA4211 is a low stacked rock wall oriented northwest/southeast originally evaluated as a possible hunting blind. Site 5GA4211 is a large U-shaped stacked rock wall, open to the northeast originally evaluated as a prehistoric vision quest (O'Neil, 2011a). The 158°azimuth also leads to a pair of prominent buttes near the confluence of Reeder Creek and the Colorado River where several open camp and quarries sites (5GA1166, 5GA1172, 5GA1174, and 5GA1184) are located. It also crosses the modern Jessmer benchmark at 8,429 feet atop a prominent butte. This azimuth continues on to the Williams Fork Reservoir's main campground and to open camps/ lithic scatters with cobble quarries (5GA1955 and 5GA1956). The 338° azimuth intersects the top of White Slide Mountain at nine miles, and may be a geographic/ navigational reference point as there is a distinctive pillar rock outcrop nearby.

Alignment 8 is a geo-navigational alignment composed of three cobbles [39, 38, and 1] which produced azimuths of 209°and 29°. The 209° azimuth intersects the top of Twin Mountain at two miles and the top of Wolford Mountain at seven miles and an elevation of 9,182 feet. The 29° azimuth is currently considered inconclusive.

Feature 12 is composed of 78 cobbles and appears primarily as a U-shaped outline, open to the south with the west side being longer than the east, giving it somewhat of a J-shape and a dense cobble grouping near the northwestern end (Figure 15; Plate 14). It is also similar to Feature 11.

Hidden within this apparent U-shape is an internal structure resembling an inverted L-shape, similar to Features 11, 14, 15 but with a parallel western axis. This X axis is composed of two rows of cobbles, spaced about 25cm apart oriented roughly north-south. The eastern most row of 12 cobbles is 3.94m long. The western row of nine cobbles is 3.29m long. The Y axis is composed of six cobbles oriented roughly east-west. Three of the five cobbles are evenly spaced at 1.12m intervals. The Y-axis is approximately 3.0 to 3.4m long. Finally, there is a tight cobble cluster near the X and Y axes intersection consisting of 10 cobbles [18 - 27] which may be a collapsed cairn, with cobble 23 at its center.

Alignment 1 appears to be a western X axis, geo-navigational, and cardinal (N/S) alignment composed of two sets of parallel lines about 25 cm apart. The first set is composed of 12 cobbles [1, 2, 6, 9, 10, 12, 16, 18, 24, 25, 26, and 27]. The second set is composed of eight cobbles [3, 7, 8, 11, 15, 73, 72, and 71]. Both cobble sets produced azimuths of 356°and 176°. The 356° azimuth leads to the flank of the westernmost Pinnacle. The 176° azimuth points toward a pass on the southeast end of Larson Ridge which may be an intersection point with a prehistoric/ historic trail system from the Blue River/ Harsha Gulch area, to Elliott and Reeder Creeks, and onto the Williams Fork River. However, this is unconfirmed. This alignment may also provide a link to Feature 11. This azimuth set is currently considered repetitive but inconclusive.

Alignment 2 is the Y axis, cardinal (E/W), equinox alignment composed of six cobbles [28, 31, 68, 56, 61, and 62] which produced azimuths of 87°and 267°. The 87° azimuth leads to the middle Triad Peak along the eastern horizon. It also intersects the northern edge of Corral Peak at nine miles and an elevation of 11,191 feet. However, this peak is not visible from the feature. This azimuth also appears in Feature 11. The 267° azimuth may be related to an Equinox sunset, corrected for elevation. However, it is currently inconclusive for visual geographic reference points on the western horizon. A visual confirmation is required.

Alignment 3 is a geo-navigational equinox alignment composed of four cobbles [14, 13, 65, and 66] which produced azimuths of 97°and 277°. The 97° azimuth points to a

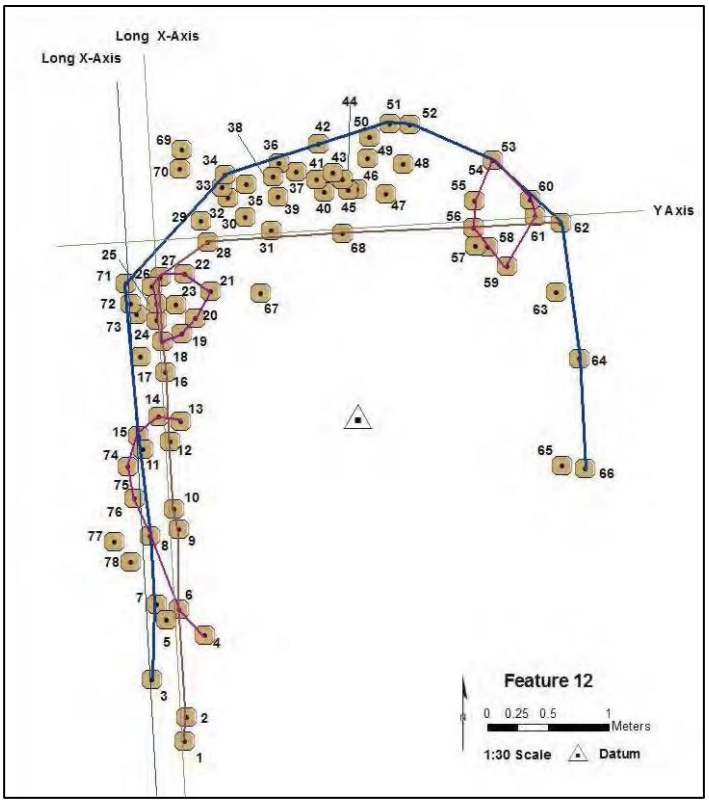


Figure 15. Plan map of Feature 12.

Plate 14. Overview of Feature 12 looking north.

saddle at the southern end of the Triad and Grimes Peak at four miles. It may be a possible predictor for spring equinox sunrise. The 277° azimuth is currently inconclusive for visual geographic reference points on the western horizon.

Alignment 4 is a geo-navigational alignment composed of three cobbles [5, 6, and 63] which produced azimuths of 49°and 229°. The 49° azimuth leads to Grimes Peak pass at four miles and intersects Park View Mountain on the Continental Divide at 14 miles. The 229° azimuth is inconclusive for geographic reference points.

Alignment 5 is a geo-navigational alignment composed of two cobble sets. The first set [7, 47, and 48] produced azimuths of 30°and 210°. The second set composed of cobbles [1, 55, and 54] produced azimuths of 29°and 209°. Both azimuth sets are very close and within our ± 2° margin of error. The 29°/ 30° azimuths lead to the north flank of Sheep Mountain at nine miles. The 209°/ 210° azimuths point to the top of Twin Mountain at two miles and the upper northwestern flank of Wolford Mountain at seven miles. These azimuths are currently considered repetitive, but inconclusive.

Alignment 6 is a geo-navigational inter-site alignment composed of six cobbles [66, 31, 30, 32, 33, and 70] which produced azimuths of 126°and 306°. The 126°azimuth intersects the top of Slide Mountain at seven miles. It is currently considered repetitive, but inconclusive. The 306° azimuth passes through The Gunsight intersecting with Lake Agnes and the Windy Ridge Quarry Complex 5GA872 at 14 miles, or a probable summer solstice sunset.

Feature 23 is composed of two large roughly triangular shaped upright rocks (Plate 15). They extend 25 – 30cm above the ground surface and are spaced about two meters apart. Both are heavily covered by lichens. Through they are an exception to our minimal three or more points of reference for an alignment, their unique triangular shape mimics the shape of Whitely Peak - to which these upright rocks point - appears to be the third reference point. This arrangement may be the reference for the name Gunsight Pass. Whitely Peak may be symbolic of a rifle 'foresight' and the two ridges a 'back' sight.

Plate 15. Feature 23 looking north-north-northwest toward Whitey Peak. Feature cobbles are flagged and highlighted in orange.

Alignment 1 is a geo-navigational inter-cardinal (NW/SE) alignment of two upright rocks which produces azimuths of 316° and 136°. The 316° azimuth intersects with Middle Carter Mountain as well as Whitely Peak. The 135° azimuth was inconclusive for visual geographic reference points, but may be a winter solstice sunrise indicator, which has yet to be tested.

LOCALITY C consists of four features 13, 14, 15, and 31 (Figure 16). This locality is north of loci A and B and slightly lower in elevation. Feature 13 was the first feature that alerted us to the possibility of solar alignments due to a large upright stone between two large cobbles in the outer ring, all three of which appeared to be oriented to the east. Our original hypothesis was that these cobbles might represent an equinox sunrise alignment. An analysis of the plan map was undertaken and additional potential cobble alignments were identified, including the summer solstice sunrise and sunset.

Feature 13 is composed of 40 cobbles arranged in an outer egg-shape configuration of 14 cobbles and an inner oval-shape of 14 cobbles (Figure 17; Plate 16). Both share a long axis oriented along a north-northwest to south-southeast line with azimuths of 338°and 158°. The outer egg-shape has a long axis of 5.75m long while the inner oval is 3.55m. The cross axis, as measured from the long axis center point, has azimuths of 248° and 68°. The egg-shape cross axis is 5.50m long while the inner oval cross axis is 2.30m. Feature 13 encompasses an elliptical area of approximately 21.0m^2.

The cobbles of the inner oval-shape tend to be more deeply buried than those of the outer egg-shape, and are therefore suspected to be an older configuration. The outer egg-shape is composed of 11 large cobbles [24 - 34] southeast of the cross axis and three large rocks [35 - 37] northwest. The inner oval consists of two sets of seven cobbles [1 - 7 and 17 - 23] arranged in opposing arcs, one north and the other south of the cross axis. Cobble 1 is distinctive in the inner oval as it is a large upright stone (40cm x 20cm) extending 19cm above the present ground surface with a long axis oriented north-south. East of this upright are three linear groupings of cobbles aligned north-south. Directly east are three cobbles [8 10]; near the center is a second grouping [11 and 12] approximately 1.35m east of Cobble 1; and the third linear grouping [13 - 16] is 2.5m to the east-southeast of the upright. About midway between the inner oval-shaped arrangement and the outer egg-shaped arrangement are three additional cobbles [A, B, and C] which may have corollary relationship(s) to the inner and outer cobble arrangements.

To test our hypothesis of June 2012 (O'Neil 2012)–during the initial survey–that this feature was a solar horizon calendar, instrumentation was set up on June 21, 2013 to observe the solstice. An additional attempt was made to observe the fall equinox on September 22, 2013 and on September 23, 2014, but were cancelled due to inclement weather. A successful measurement was made on September 23, 2015 with the sun setting at 270^0.

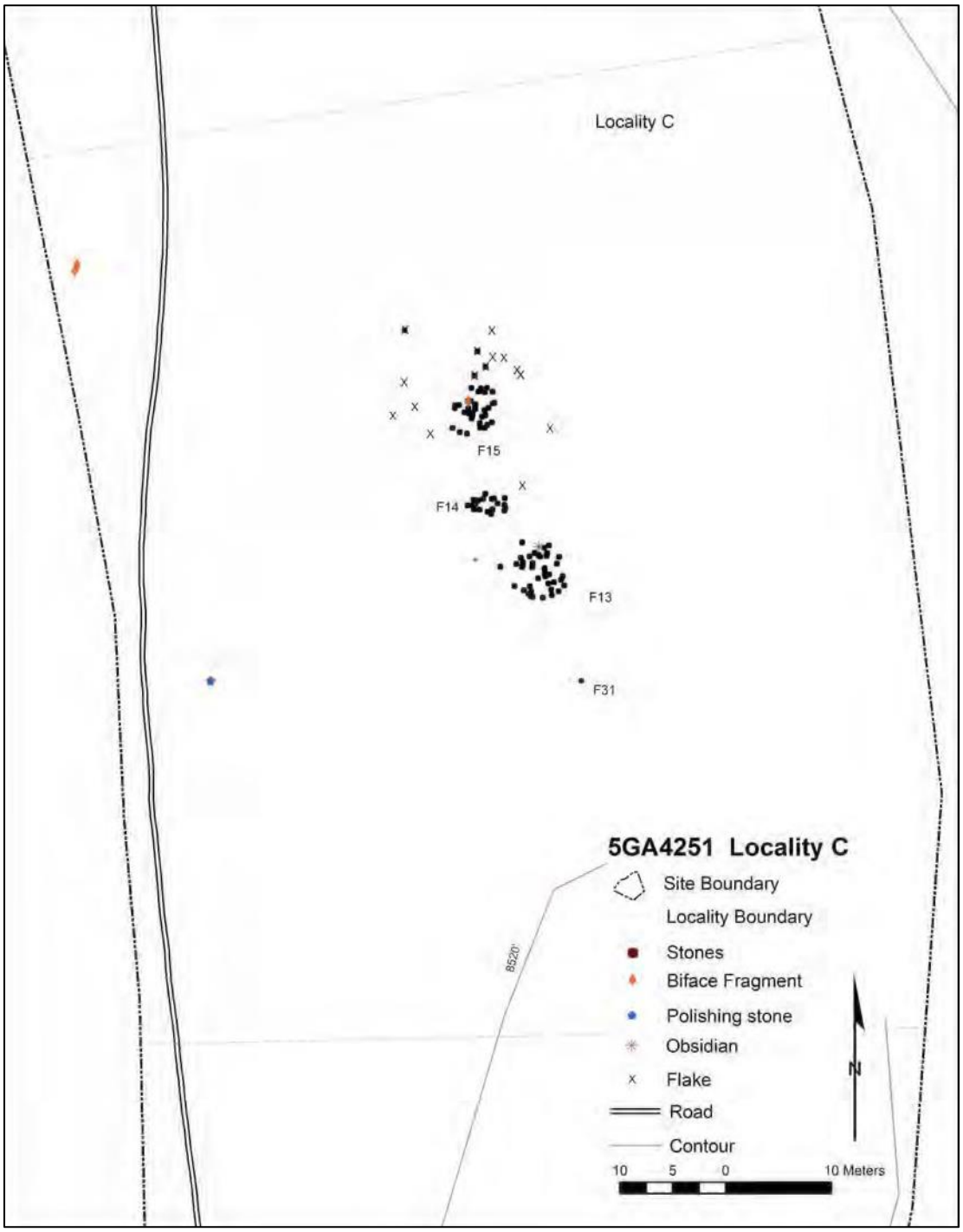


Figure 16. Plan map of Locality C.

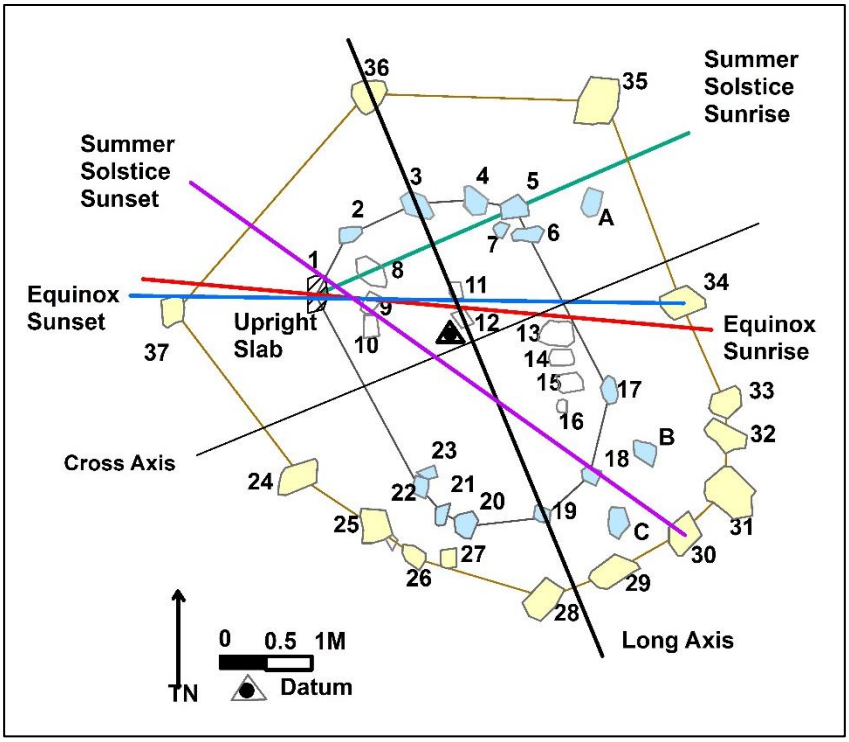


Figure 17. Plan map of Feature 13.

Plate 16. Overview of Feature 13 looking north.

For equinox sunrise, instruments were placed at Cobble 1, Alignment 5 [1, 9, MP 11/12, and 13]. This alignment involved only the inner oval and produced azimuths of 93°and 273°. The 93°line-of-sight passes about 500 feet south of a southern ridge top on the eastern horizon at four miles. This is the confirmed position of equinox sunrise at full solar disk, corrected for elevation, on September 21, 2012 (Plate 17).

Plate 17. Equinox sunrise on September 21, 2012 from Feature 13. Looking east (92˚).

First glimmer occurs at azimuth of 91º. Mid-solar diameter occurs at azimuth of 92°. This falls within our ± 2° margin of error for naked eye observations, and probably indicates an observer's choice between full solar diameter, which is difficult to look at, mid-solar diameter and first glimmer. Line-of-sight 273°crosses the top of South Gunsight suggests the probable location for the equinox sunset corrected for elevation. On September 23, 2015 instruments were set up along cobble set 4 [34, 11/12, 9,1, and 37] at 270˚ indicated first solar disk on the horizon at 269º, mid-solar diameter at 270˚, and full set (last glimmer) at 271º.

A summer solar solstice sunrise at 66° was tested for accuracy on June 22, 2013. This involved three cobble sets alignments 7A, 7B, and 7C with the instruments placed over Cobbles 1 and 37 (Plate 18).

Plate 18. First glimmer of summer solstice sunrise from Feature 13.

Alignment 7A involved cobbles [1, 8, and 5] of the inner oval producing azimuths of 66°and 246° with first glimmer occurring at 5:01am MST. Instrument readings confirmed a mid-solar diameter at 66° at 5:01:30, with a horizon elevation of 3°30' and an instrument height of 1.33m above present ground surface. Mid-diameter is shown in Plate 19.

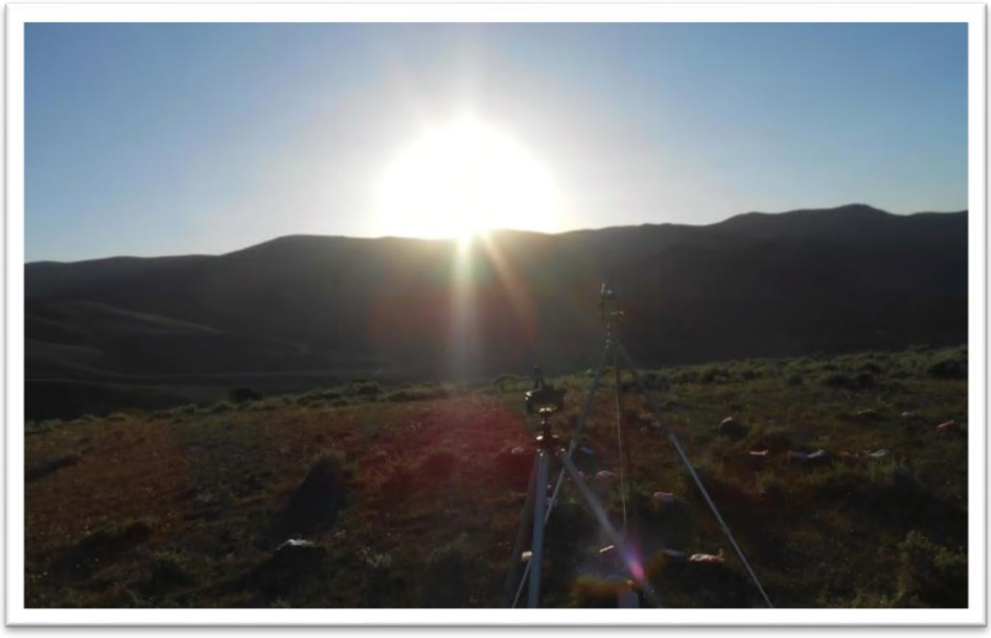


Plate 19. Mid-diameter summer solstice.

This suggests that *Alignment 7A* was laid out for a sunset mid-solar diameter rise and for ease of naked eye observations; within a 30 second time frame. Full solar diameter occurred at 5:02am at a 68° azimuth. The 246° line-of-sight intersects the upper southern flank of South Gunsight passing through the gap between it and Twin Mountain and across the Muddy Creek valley to the top of the Gore Range.

Alignment 7B involves both the inner oval and the outer egg-shape comprised of cobbles 37, 2, 3, and 35, which produced azimuths of 65°and 245°. This test indicated a ±1° variation between our feature plan map which generated an azimuth of 65° and the instrument reading of 64° at mid-solar diameter, and 66° at full solar diameter. Thus, falling within our postulated ± 2° margin of error for naked eye observations. Line-of-site 245° intersects the upper southern flank of the south Gunsight ridge passing through the gap between it and Twin Mountain and across the Muddy Creek valley to the top of the Gore Range.

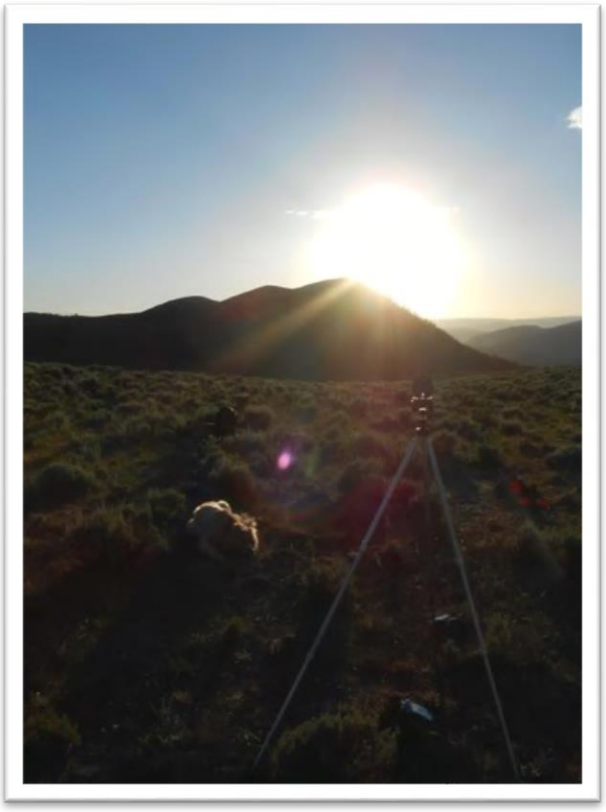


Plate 20. Summer solstice sunset from Fe 13.

Alignment 7C involves both the inner oval and the outer egg-shape and cobbles [24, 14, and 34] which produced azimuths of 65°and 245°. This map generated azimuth was not tested by instrumentation but appears to be accurate given alignments 7A and 7B. All three southwestern azimuths may be predictive of a winter solstice unconfirmed.

To test our hypothesis about summer solstice sunset on June 21, 2013 instrumentation was set up along alignment 10 cobble set [31, B,16, and 10/9] at 296˚ and alignment 11 cobble set [29,1 9, 23, and 27] at 302˚. By 7:17pm MST it became apparent that the 296° set up was too far south to be viable and the instrumentation was relocated and set up on alignment 8 cobble set [30, 18, 10, and 1] at 304º. At 7:24pm the lower left side of the full solar disk touched the top of the northern flank of south Gunsight ridge at 302° (Plate 20).

The sunset then began an impressive visual display as the lower left edge of the solar disk slid down the silhouetted northern flank of the south “Gunsight Ridge” toward its intersection with the far horizon line along the Gore Range at 7:28pm. The mid-solar diameter was cut by the Gore Range horizon at 7:32pm at an azimuth of 304° (Plate 21). Full summer solstice sunset, occurred at 7:36pm.

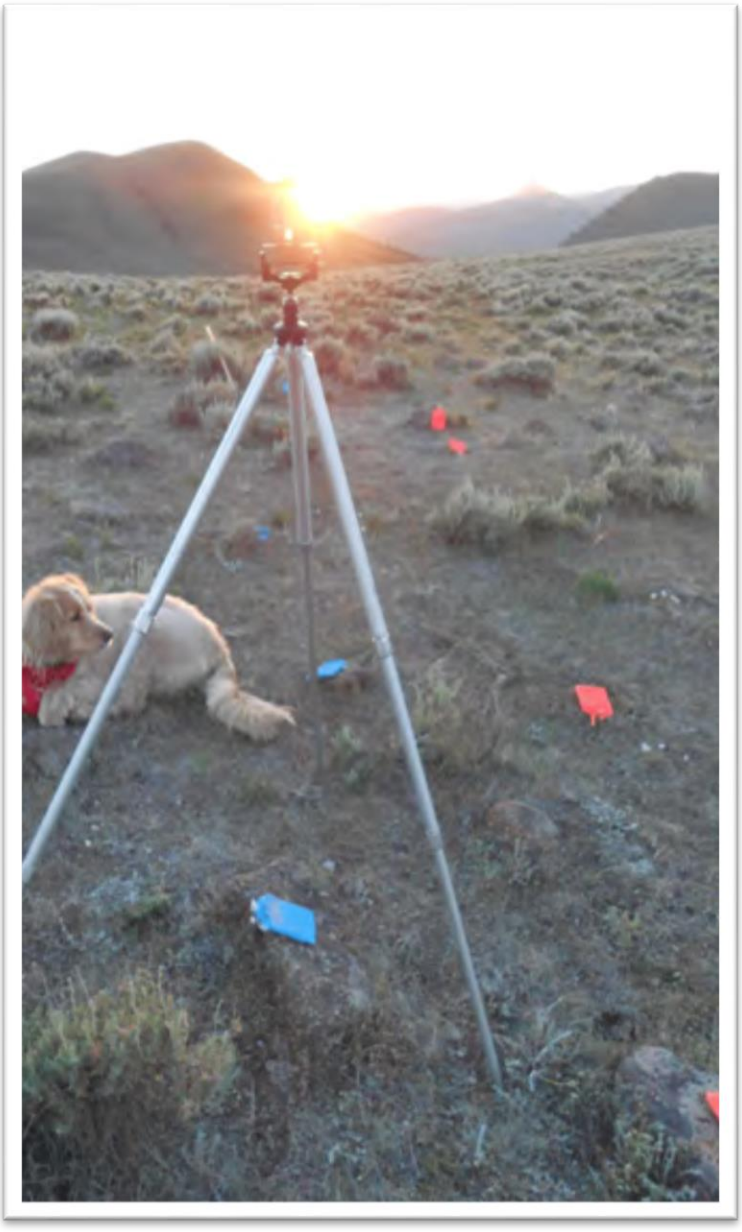


Plate 21. Summer solstice sunset passing behind the Gore Range.

Additionally, two small trowel tests were excavated to determine cultural depth. The first was on the east side of the upright stone (Cobble 1) while the second was 40cm east on the west side of an embedded surface exposed stone (Cobble 8). Excavation revealed that both cobbles were buried in a thin upper mantle of recent Holocene loess, underlain by a significantly deflated stratum of poorly sorted basalt with shale and sandstone clasts to a depth of 8cm at Cobble 1 and 4cm at Cobble 8 (Figure 20). This is likely due to the buildup of a small coppice mound on the leeward side of Cobble 1. Below this stratum is a contact between the upper and looser clastic deposits and the deeper, more compact, calcareous, Holocene sediments. Both cobbles lean toward the west their bottoms curving and extending into the earlier Holocene deposits. Excavation was stopped at 10cm below the present ground surface to avoid possible cobble displacement. Denser calcite concentrations are indicative of in-situ weathering due to high interstitial water levels and stored pore water with decreased aeolian activity during extended cool wet climate episodes. Significant periods of this weathering occurred around 10,000 - 9,500 years before present (BP); 6,000 - 4,000BP; 2,800 - 2,400BP; and 2,000 - 900BP. A more detailed description of site and Feature 13 geology is presented in Appendix D.

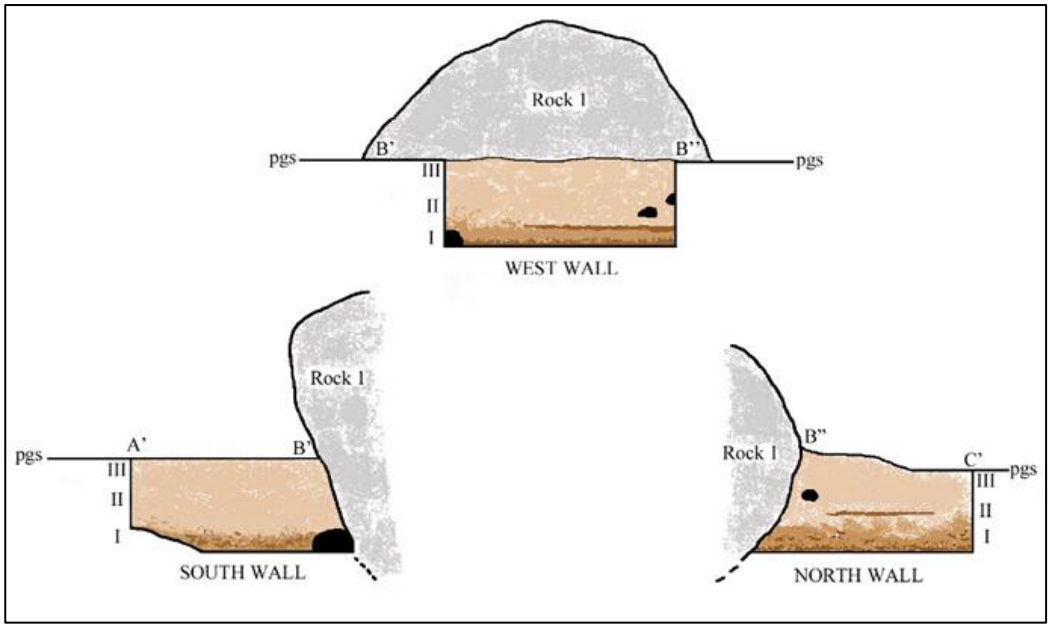


Figure 18. Trowel test soil profiles.

Alignment 1 is geo-navigational and long axis alignment composed of five cobbles and the midpoint between two others [36, 3, 11, 12, 19, and MP 28/29]. It produced azimuths of 158° and 338°. The 158° line-of-sight points to 5GA4211 at the southern end of East Sulphur Gulch ridge at 9 miles. 5GA4211 is a low stacked rock wall oriented northwest/ southeast that was evaluated as a possible hunting blind of historic or modern origin, due to the absence of lichens on the rocks. From there it crosses the top of Jessner Mesa at 15 miles. The 338°azimuth points toward the top of White Slide Mountain and may be a geographic/ navigational reference point.

Alignment 2 is a cross axis and solstice alignment involving the inner oval and the northwestern and southeastern arcs of cobbles [MP 1/22 and MP 6/17]. It produced azimuths of 68° and 248°. The 68° azimuth aligns with the confirmed summer solstice sunrise, at full solar disk. The 248° azimuth passes over the top of the South Gunsight and may relate to the winter solstice sunset, but this is presently unconfirmed.

Alignment 3 is a cardinal (N/S) alignment composed of five cobbles [25, 10, 9, 8, and 36] which produced azimuths of 359°and 179°. Line-of-sight at 359° lead toward the Pillars on the interfluvial divide between Troublesome and Antelope Creeks. Otherwise it was inconclusive for a local visual reference point. Line of sight 179° points to Larson Ridge, which is not visible due to the rise in the ridge — site high point and Locality B — south of Feature 13.

Alignment 4 is cardinal (E/W) alignment composed of four cobbles and the midpoint between the two center cobbles [37, 1, 9, MP 11/12, and 34]. This alignment utilizes both the outer egg-shape configuration and the inner oval arrangement. It produced azimuths of 90°and 270°. The 90° line-of-sight passes through a saddle between the middle and the southern ridge tops on the eastern horizon at four miles and Corral Peak at 9.5 miles. Line of sight 270° intersects a small knoll at the top center of South Gunsight, which was confirmed as equinox sunset in 2015. Both azimuths are true ecliptic equinox sunrise and sunset positions, but the only azimuth corrected for elevation is 270°.

Alignment 5 is an equinox sunrise composed of three cobbles and the midpoint between two center cobbles [1, 9, MP 11/12, and 13]. It involves only the inner oval and produced azimuths of 93°and 273°. The 93°line-of-sight passes within 500 feet south of a southern ridge top on the eastern horizon at four miles. This is the confirmed position of the equinox sunrise at full solar disk, corrected for elevation, on September 21, 2012. Line-of-sight 273°crosses the top of Southern Gunsight just north of the confirmed equinox sunset.

Alignment 6 is a potential lunar maximum rise/ set alignment composed of four cobbles [1, 8, 4, and 35]. This alignment utilizes both the outer egg-shape and the inner oval configuration. It produced azimuths of 60°and 240°. The 60° line-of-sight falls one half mile north of Grimes Peak, at four miles. This position is 6° north of the summer solstice sunrise (See *A-7a* below) and may represent the potential northern lunar maximum rise (corrected for elevation) in the 18.6 year Metonic Cycle. Line-of-sight 240° intersects the southern slope of South Gunsight passing through the gap between it and Twin Mountain and across the Muddy Creek valley to the top of the Gore Range. This position may represent a southern lunar maximum set in the Metonic Cycle. However, this is presently speculative and unconfirmed.

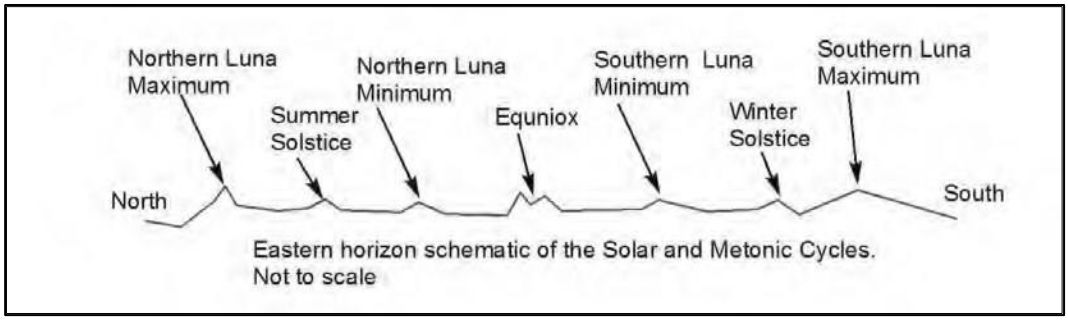


Figure 19. Solar and Metonic Cycles.

Alignments 7A, 7B, and 7C are summer solstice sunrise alignments composed of three cobble alignment sets. *Alignment 7A* involves cobbles [1, 8, and 5] of the inner oval producing azimuths of 66°and 246°. The 66° alignment was tested for accuracy on June 21, 2013, with first glimmer occurring at 5:01am MST. *Alignment 7B* involves both the inner oval and the outer egg-shape–cobbles [37, 2, 3, and 35] which produced azimuths of 65°and 245°. Line-of-site 245° intersects the upper southern flank of South Gunsight passing through a topographical gap, Twin Mountain and Muddy Creek valley to the Gore Range horizon line. This alignment was also tested for accuracy on June 21, 2013 and may represent a winter solstice sunset as of yet unconfirmed. *Alignment 7C* involves both the inner oval and the outer egg-shape and cobble set [24, 14, and 34] which produced azimuths of 65°and 245°. This map generated azimuth was not tested by instrumentation but appears to be accurate given alignments 7A and 7B.

Alignment 8 is a summer solstice sunset alignment composed of cobbles [30, 18, 10, and 1] utilizing both the outer egg-shape configuration and the inner oval. It produced azimuths of 304° and 124°. The mid-solar diameter was cut by the Gore Range horizon line at 304° at 7:32 pm. Full summer solstice sunset, below the horizon line, occurred at 7:36 pm MST. Line-of-sight 124° intersects the top of Slide Mountain at seven miles and may indicate a winter solstice sunrise that has yet to be tested.

Alignment 9 is an inter-cardinal (NW/SE) alignment composed of cobbles [1, 19, and 29]. It also utilizes both the outer egg-shape and the inner oval. It produced azimuths of 315° and 135°. Line-of-sight 315° passes through "The Gunsight" to Middle Carter Mountain at 6.5 miles and Whitely Peak at 12 miles. Whitely Peak is a likely vision quest site among the Utes. The 135° azimuth was inconclusive.

Alignment 10 is the hypothesized winter solstice sunrise composed of cobbles [1, MP 9/10, 16, B, and 31]. This alignment utilizes both the outer egg-shape and the inner oval. It produced azimuths of 116° and 296°. Line-of-sight 116° passes between two high points on the eastern horizon on the divide between Monument Creek and the East Fork of Troublesome Creek at six miles, intersecting with Grouse Mountain at 10 miles. This may be a predictor of winter solstice sunrise within our ± 2° margin of error. However, this hypothesis has not been tested. Line-of-sight 296° intersects the northern end of the southern Gunsight ridge line and was thought to be a

possible solstice sunset indicator. Observation of the summer solstice sunset on Jun 21, 2013, disproved this hypothesis. However, it may have been a predictor for the solstice sunset.

An additional 36 alignments were identified during analysis of Feature 13, yet to be of celestial or geo-navigational importance (See Appendix B).

Feature 14 is composed of 19 cobbles configured into an outer perimeter of a seven-sided polygon composed of 9 cobbles while the inner lens-shape consists of 10 cobbles (Figure 20; Plate 22) encompassing an area of 4.94m^2. The outer polygon has a long axis of that is almost east-west with azimuths of 269°and 89°and 3.50m long. The cross axis, as measured from the long axis center point, has azimuths of 359° and 179° and 1.80m long, and a maximum off-set width of 2m. The inner lens's long axis is also nearly east-west (267° and 87°) and 3.55m long. The cross axis has azimuths of 357°and 177° and 2.30m long. This feature looks suspiciously like the constellation Cepheus, one of the circumpolar constellations.

Alignment 1 is cardinal (N/S) alignment composed of cobbles [7, 5, and 4] along the eastern side of the outer polygon. It produced azimuths of 2° and 182°. Line-of-sight 2° points to the Pillars and interfluvial divide between Troublesome and Antelope Creeks 3 miles north. This alignment is currently considered repetitive, but inconclusive. The 182° azimuth intersects Junction Butte's east flank, continuing onto Larson Ridge, but is also considered inconclusive to a specific visual reference.

Alignments 2A, 2B, and 2C are composed of three cobble sets aligned east to west. All three utilize both the outer polygon and the inner lens. Both alignment A and B are within our ±2° margin of error for a true east-west directional orientation based upon the ecliptic plane of the earth. *Alignment 2A* is the outer polygon's long axis and composed of three cobbles [1, 10, and 5] which produced azimuths of 89°and 269°. Line-of-sight 89° points toward the central Triad along the eastern horizon four miles distant. Line-of-sight 269° intersects the central high spot atop the Southern Gunsight that forms the western horizon at one mile. *Alignment 2B* is composed of four cobbles [6, 17, 19, and 9] which produced azimuths of 88°and 268°. Line-of-sight for both azimuths are nearly equivalent to Alignment 2A above and within our ± 2° margin of error. *Alignment 2C* is composed of two cobble sets. One cobble set is composed of cobbles [2, 13, 14, 15, and 4]. The second includes cobbles [1, 10, and 16] also forms the inner lens-shape long axis. Both produced azimuths of 87°and 267°. Line-of-sight for 87° intersects the saddle between the central and northern Triad peaks at four miles. Line-of-sight for 267°intersects the center of a small ridge top near the center of the Southern Gunsight which forms the western horizon at one mile. There is an identified, but unrecorded open architectural site with cobble alignments located on a flat bench, downslope from the ridge line at 8570 feet. Whether this site is related to 5GA4251 is presently undetermined.

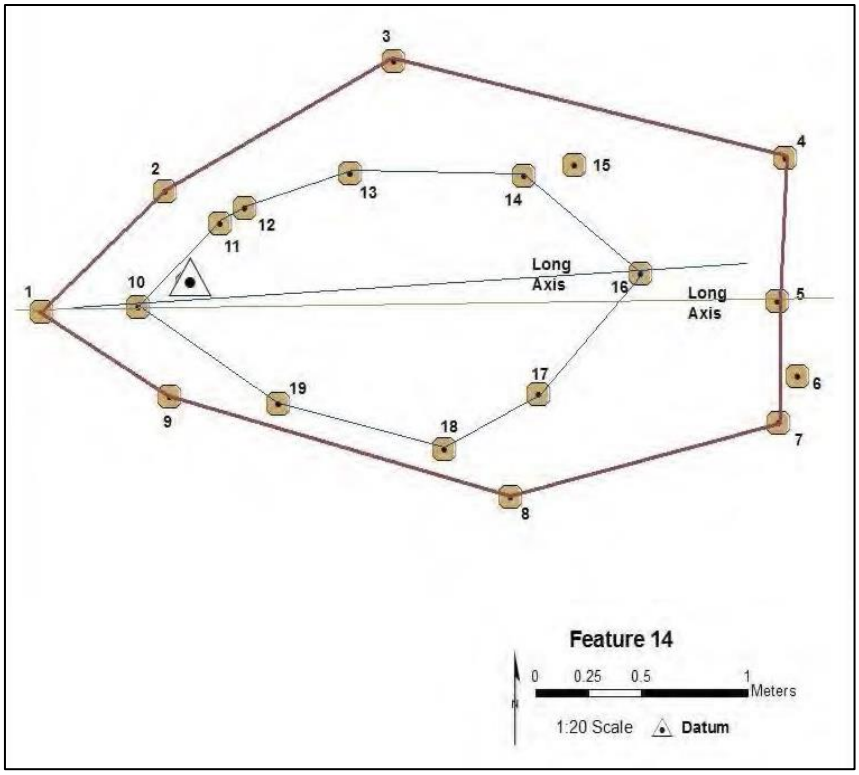


Figure 20. Feature 14 plan map possibly representing the constellation of Cepheus in June?

Plate 22. Overview of Feature 14 looking east**.**

Alignment 3 is a hypothesized winter solstice sunrise composed of cobbles [2, 11, and 17] utilizing both the outer polygon and the inner lens. It produced azimuths of 117°and 297°. Line-of-sight for 117° leads to the north slope of Slide Mountain at six miles continuing on to intersect the southwest point of Grouse Mountain at 10 miles at an elevation of 10,000 feet. Based upon our hypothesis and experiments at Feature 13 it appears that this may be another indicator for winter solstice sunrise within our ± 2° margin of error. Line-of-sight for 297° intersects the northern end at the top of South Gunsight. This location is currently inconclusive, but may be an advanced predictor for summer solstice sunset. This alignment has yet to be tested.

Alignment 4 is geo-navigational inter-site alignment composed of cobbles [8, 17, and 15] utilizing both the outer polygon and the inner lens shapes. It produced azimuths of 12°and 192°. The 12° azimuth intersects the Continental Divide at 10 miles at an elevation of 11,319 feet. The 192° azimuth points towards site 5GA4090, an open architectural site containing 10 stone enclosures and one cairn, at two miles. It also intersects Antelope Pass, and site 5GA639 (a Paleoindian kill site) at four miles. However, neither of those sites, nor Antelope Pass, can be directly seen from Feature 14, though they are visible from Locality B. Consequently, this alignment has potential, but is presently considered inconclusive.

Alignment 5 is a geo-navigational alignment composed of cobbles [18, 16, and 4] utilizing both the outer polygon and the inner lens shapes. It produced fore and back-sight azimuths of 51°and 231°. Line-of-sight 51° intersects Park View Mountain on the Continental Divide at 12,300 feet. This mountain has a commanding view of both Middle and North Parks. The 231°azimuth points towards Gore Pass, but was inconclusive for visual geographic reference points.

Feature 15 is a composite of one L-shaped and five eccentric cobble configurations composed of 33 cobbles (Figure 21; Plate 22). The basic L-shape has an X-axis composed of three cobbles [1, 2, and 3] oriented roughly north-south measuring 2.10m long. The Y-axis is composed of five cobbles [3, 4, 15, 5, and 6] oriented roughly east-west measuring 3.65m long. The area encompassed by Feature 15 is approximately 14.72m^2. The first eccentric is 1.25m north of the Y-axis mid-point. It consists of six cobbles [27 - 32] five of which appear to be arranged in a W-shape, suspiciously like the constellation Cassiopeia. The second eccentric grouping cuts through the Y-axis mid-point. It consists of six cobbles [13 - 18] forming a curvilinear line open to the west-southwest that arcs around the third eccentric grouping cobbles. This third grouping is a classic isosceles triangle of three cobbles [19, 20, 21] with two equal sides and two equal angles (65°, 65°and 50°) near the center of the feature. The fourth eccentric is about 2.0 to 2.5m east-southeast of the triangle and the arc. It consists of four cobbles [22 - 25] forming a four-sided polygon that is somewhat lenticular in shape. The fifth eccentric is located about one meter south of the fourth. It consists of cobbles [7, 8, 9, 10, and 26] forming a dipper shape.

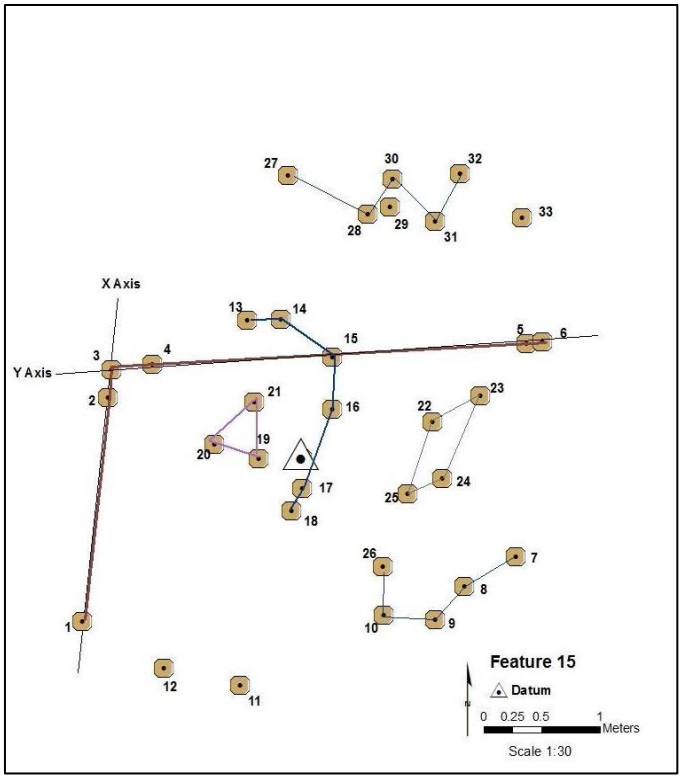


Figure 21. Plan map of Feature 15.

Plate 23. Overview of Feature 15 looking west-southwest.

Alignment 1 is a geo-navigational, cardinal (N/S), and feature X-axis configuration composed of three cobbles [1, 2, and 3]. It forms the short side of the L-shape and produced azimuths of 7°and 187°. Line-of-sight for 7° leads to the northern horizon crossing east of the Pinnacles and intersecting a modern bench mark atop the Continental Divide at 11, 522 feet at 9 miles. Line-of-sight for 187° leads to the southwestern top of Junction Butte at 12 miles. There are reports (pc. Liewer, 2013) of stone circles on Junction Butte but until confirmation is made this alignment is presently considered inconclusive.

Alignment 2 is a geo-navigational, cardinal (E/W), and equinox configuration composed of five cobbles [3, 4, 15, 5, and 6] which form the Y-axis or long side of the L-shape. It produced azimuths of 87°and 267°. Line-of-sight for 87° passes through the saddle between the northern and central Triad peaks which form the eastern horizon at four miles. Line-of-sight for 267°intersects the center point of the small ridge top near the center of South Gunsight which forms the western horizon at one mile. There is an identified, but unrecorded open architectural site with cobble alignments on a flat bench below the ridge line at 8570 feet.

Alignment 3 is a cardinal (N/S) alignment composed of four cobbles [10, 26, 29, and 30] which cuts across the feature involving two eccentrics, the W and the dipper. It produced azimuths of 1°and 181°. Line-of-sight at 1° intersects the northern horizon line passing through the Pinnacles. Line-of-sight at 181° crosses the eastern flank of Junction Butte and the top of Lawson Ridge at 15 miles. Both these azimuths are currently considered repetitive, but inconclusive for specific geographic references.

Alignment 4 is geo-navigational alignment composed of three cobbles [20, 15, and 33] which produced azimuths of 54°and 234°. Line-of-sight at 54° leads towards Grimes Peak and the southeast side of Park View Mountain on the Continental Divide at 14 miles. Line-of-sight at 234° leads to the top of Gore Pass at 14 miles.

Alignment 5 is a geo-navigational and cardinal (N/S) alignment composed of three cobbles [19, 21, and 13]. It cuts across the feature involving two eccentrics, the isosceles triangle and the arc shape. It produced azimuths of 355°and 175°. Line-of-sight at 355° intersects the northern horizon line along the westernmost flank of the Pinnacles. The 175° azimuth leads to a pass at the southeast end of Larson Ridge. This may be an intersection point with a prehistoric/historic trail system from the Blue River/Harsha Gulch area to Elliott and Reeder Creeks and onto to the Williams Fork River. However, this is unconfirmed and this azimuth set is considered repetitive but inconclusive.

Alignment 6 is a possible geo-navigational alignment composed of four cobbles [32, 31, 17, and 18] involving two eccentrics, the arc shape and the eastern side of the W-shape. It produced azimuths of 27°and 207°. Line-of-sight at 27° is inconclusive for visual geographic reference points. Line-of-sight at 207° intersects with the top of Twin Mountain at two miles at an elevation of 8580 feet. It also leads to Little Wolford Mountain, Wolford Mountain, and finally San Toy Peak at 15 miles.

Alignment 7 is a geo-navigational alignment composed of three cobbles [19, 15, and 31] involving two eccentrics, the isosceles triangle and the eastern side of the W-shape. It produced azimuths of 37°and 217°. Line-of-sight at 37° crosses the Continental Divide between Sheep and Haystack Mountains near Troublesome Pass at 13 miles. The back-sight of 217° was inconclusive for visual geographic reference points.

Feature 31 was discovered on June 21, 2013 at the end of the solstice investigation. It was hidden within a dense sage brush cluster making it difficult to see and map (Figure 22; Plate 24). It is about 12m south-southeast of Feature 13. The rocks were pin flagged, a compass and pace sketch map was made, and photographs taken. The feature appears to be egg-shaped in outline with a maximum length approximately 9-10m and a maximum width of 6-7m. The long axis is orientated around 330°and 150° with a cross axis around 60°and 240°. Two tight cobble clusters or possible collapsed cairns were also identified. One is at the NNW tip of the long axis and the other is on the WSW side of the feature. Three large rocks appear to be laid out along the long axis, SSE of the northern cairn. A detailed mapping will be necessary in the future.

LOCALITY D consists of eight features 16, 18, 19, 20, 21, 22, 24, and 30; and had the highest density of lithic debitage (Figure 23). Two concentrations occur containing between 25 - 35 flakes per 100m^2. Two hearth features (19 and 21) appear to be associated with Feature 20–our best candidate for a domestic structure. The only diagnostic artifact, a possible Cottonwood Triangular projectile point or bifacial preform made from quartzite was found within this locality. Cottonwood Triangular projectile points which have been cross-dated to between AD1100 - 1880. In addition, the only intrusive modern structure (Feature 30) may be a very recent pet burial or another memorial, which appeared sometime between June 29 and September 21, 2012.

Feature 16 is composed of 10 cobbles in a small, irregular, six-sided polygon outlined by cobbles [1 - 7 as well as one interior cobble (A) and two exterior cobbles B and C] (Figure 24; Plate 25). The long axis is oriented roughly northwest-southeast with azimuths of 320°and 140° with a length of 1.46m. The cross axis, as measured from the long axis center point, has azimuths of 229° and 49° and a length of 0.90m. The total area encompassed is approximately 1.03m^2.

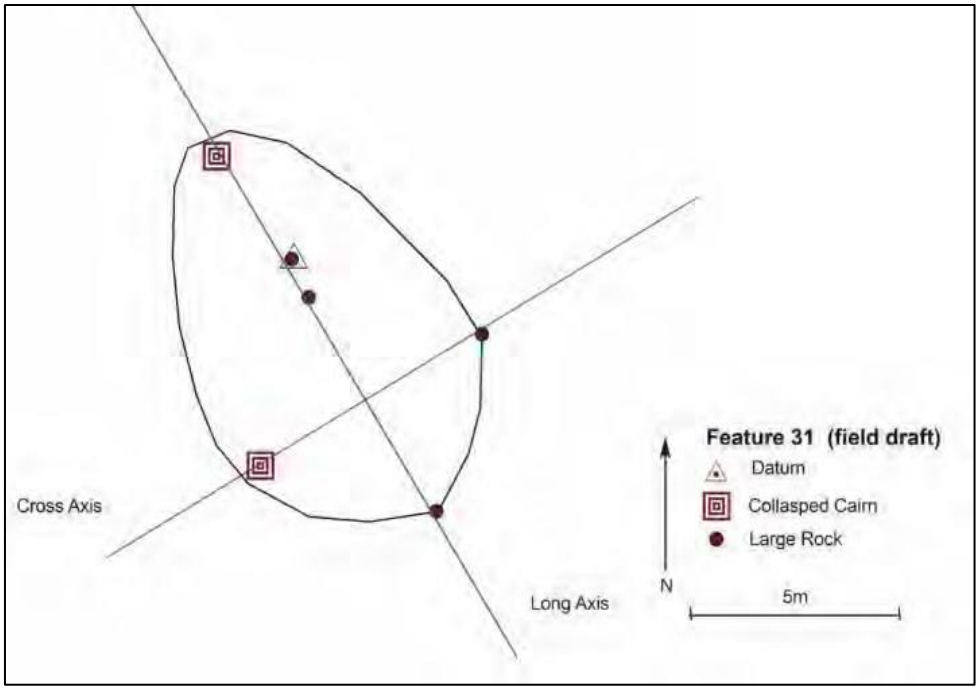


Figure 22. Plan map of Feature 31.

Plate 24. Overview of Feature 31 looking northeast.

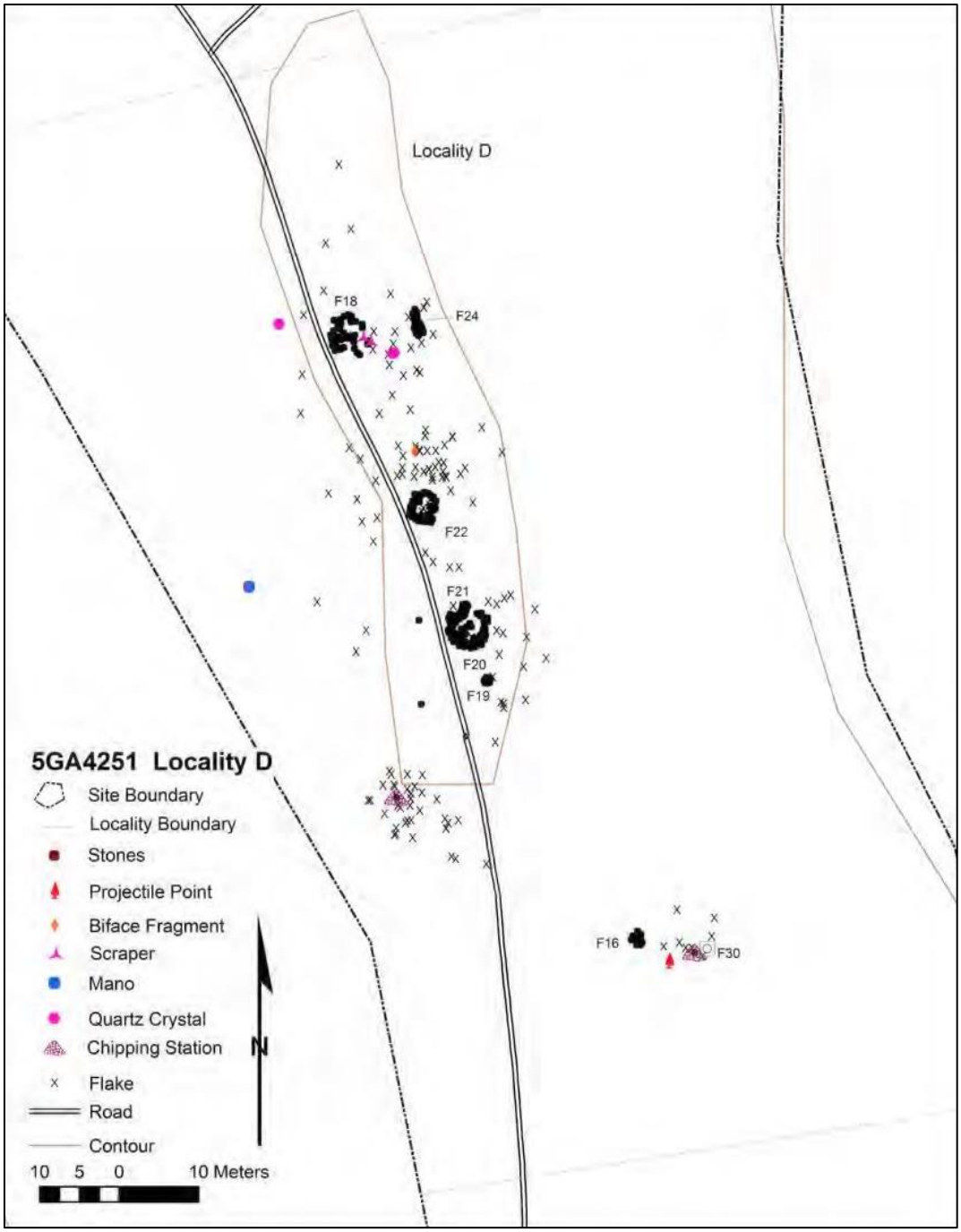


Figure 23. Plan map of Locality D.

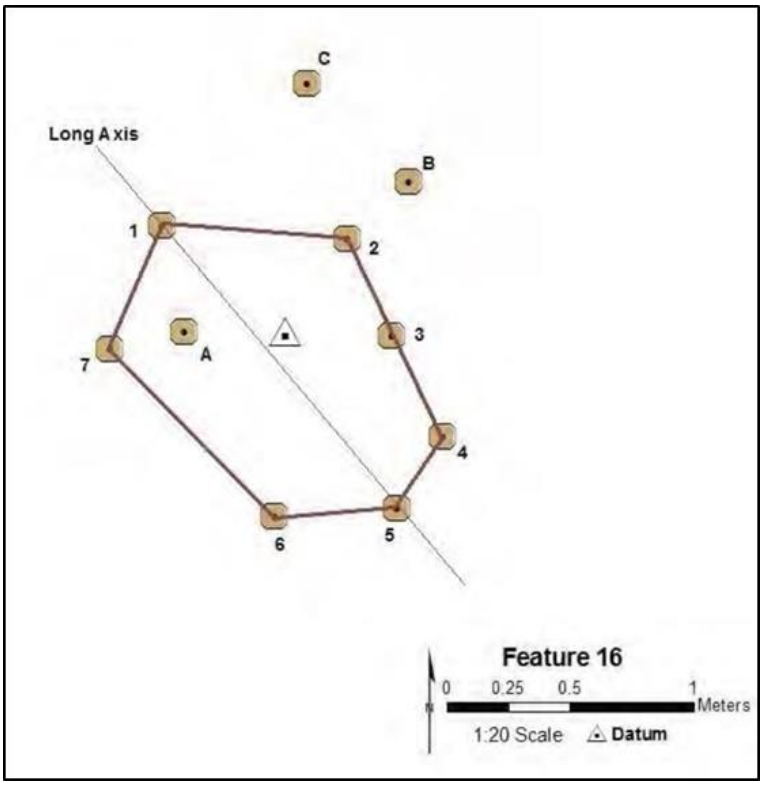


Figure 24. Plan map of Feature 16.

Plate 25. Overview of Feature 16 looking north.

None of the cobbles exhibit evidence of thermal alteration, nor is there any soil discoloration from charcoal staining. No alignments met our criteria of three cobbles over a minimal observational distance of 1.5 m. No determination as to function were made, though the possibilities of a shrine, a marker, or a vision quest cannot be ruled out.

Feature 17 was considered too small to do detailed mapping or photography. It may be a cairn, small deflated hearth, or a small shrine

Feature 18 has a roughly egg-shaped outline composed of 45 cobbles formed by 15 cobbles [1 - 15] along the perimeter and four eccentric shapes, two inside and two outside (Figure 24B; Plate 26). The long axis is oriented roughly northeast-southwest with azimuths of 61°and 241° and a length of 4.15m. The cross axis, as measured from the long axis center point, has azimuths of 151°and 331°and a length of 2.75m. It encompasses an area of 8.95m^2. The first eccentric is an arc of seven cobbles [25 - 31] along the southwestern end of the long axis. It looks suspiciously like the constellation Corona Borealis. The second eccentric consists of a slightly curved V-shape of seven cobbles [16 - 22] about 50cm east of the first eccentric and looks suspiciously like parts of the constellations Perseus or Andromeda. The first exterior eccentric is about 1.25m southeast of the egg-shape and consists of cobbles 41 - 45 arranged in a slightly skewed T-shape. This T-shape is suspiciously like the front half of the constellation Scorpius with the bright star Antares. The second eccentric is about 50cm north-northwest of the egg-shape consisting of cobbles 35 40 arranged in a curvilinear format similar to a question mark (?). It looks suspiciously like the middle portion of the constellation Draco or the tail of Scorpius.

Alignments 1A and 1B are two cobble sets associated with the long axis and possibly the lunar maximum which involve the outer egg-shape and one eccentric. *Alignment 1A* is composed of five cobbles [MP 4/5, 30, 26, and 13] which compose the long axis and the arc. It produced azimuths of 61°and 241°. The 61° azimuth intersects the southernmost point of a relatively flat ridge approximately one mile north of Grimes Peak at four miles. It also traces along a modern jeep trail, which might mark an older horse or foot trail. The 61°azimuth is about 6° north of the summer solstice sunrise (see Feature 13), which could indicate the lunar maximum rise. The 241° azimuth intersects a saddle between the center and southernmost high point atop the Southern Gunsight. This position could mark the lunar maximum set. *Alignment 1B* is composed of three cobbles [2, 1, and 15] along the southeastern side of the egg-shape. It produced the same azimuths and results. Further observations are necessary.

Alignment 2 is a cross axis alignment that involves the outer egg-shape and one eccentric. It is composed of cobbles [10, 21, 45, and tangent 44] which produced azimuths of 151°and 331°. The 151° azimuth intersects a prominent ridge top west of Williams Fork Reservoir Dam at 13 miles. It is presently considered inconclusive. The 331° azimuth intersects the northern slope of North Gunsight.

Alignments 3A and 3B are cardinal (N/S) geo-navigational alignments composed of two cobble sets utilizing the peripheral outline, both interior eccentrics arrangements, and the northern exterior eccentric. *Alignment 3A* is composed of five cobbles [1, 23, 37, and tangent 19/20] which

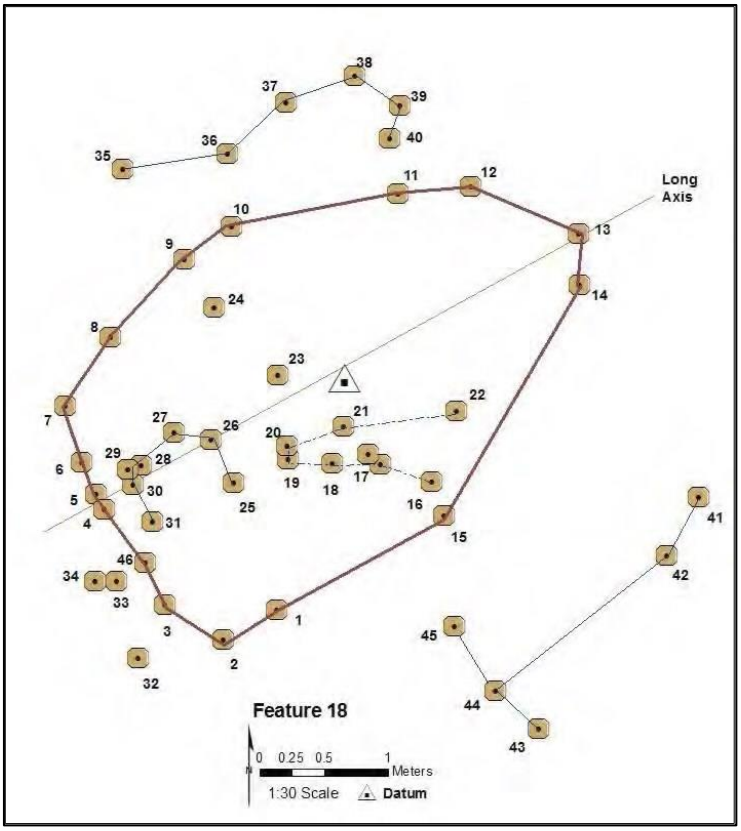


Figure 24B. Plan map of Feature 18.

Plate 26. Overview of Feature 18 looking north.

produced azimuths of 1°and 181°. Line-of-sight for 1° intersects the northern horizon passing through the Pinnacles. Line-of-sight for 181° crosses the eastern flank of Junction Butte continuing to the top of Lawson Ridge at 15 miles. However, neither of these land forms are visible from the feature and these azimuths are considered repetitive but inconclusive.

Alignment 3B is composed of three cobbles [36, 10, and 25] which produced azimuths of 359°and 179°. Line-of-sight for 359° intersects the northern horizon passing just west of the Pinnacles. Line-of-sight for 181°crosses the eastern flank of Junction Butte continuing on to the top of Lawson Ridge at 15 miles. These land forms are also not visible from the feature and are both considered repetitive, but inconclusive.

Alignment 4 is a cardinal (E/W) equinox alignment composed of three cobbles [30, 25, and 16] involving both interior eccentrics. It produced azimuths of 89°and 269°. Line-of-sight for 89° points to the central Triad along the eastern horizon at four miles. Line-of-sight for 269° intersects the central high point atop the Southern Gunsight along the western horizon at one mile. This azimuth is within our ± 2° margin of error for a true east-west orientation based upon the earth's ecliptic plane.

Alignment 5 is an inter-cardinal (NW/SE) alignment involving the peripheral outline and the eccentric arc. It is composed of four cobbles [1, 28/29, and 7] which produced azimuths of 314°and 134°. The 314° azimuth intersects Middle Carter Mountain at seven miles and Whitely Peak at 12 miles. The 134° azimuth was inconclusive for visual geographic reference points.

Alignment 6 is a proposed winter solstice rise, lunar minimum set, and/ or a distinctive bright star. It involves the egg-shaped periphery as well as both exterior eccentric configurations. It is composed of three cobbles [35, 10, and 41] but may also involve the mid-point between cobbles 14/15. It produced azimuths of 120°and 300°. The 120° azimuth intersects a knob on the horizon north of East Fork of Troublesome Creek at a distance of 3.5 miles. This places it near our projected winter solstice sunrise. If on the other hand, our speculation that the T-shaped arrangement southeast of the egg-shaped periphery is indeed the front half of the constellation Scorpius with Antares, then this azimuth could mark the rise of this constellation and may help date the site. Further investigation is necessary. The 300° azimuth passes through "The Gunsight" to an unnamed mountain top in the Gore Range, approximately 4 miles east-southeast of Walton Peak. This position could predict a potential lunar minimum set.

Alignment 7 is a geo-navigational alignment involving the egg-shaped periphery, eccentric arc, and the exterior eccentric T-shape. It is composed of four cobbles [43, 44, tangent 26, and 8] which produced azimuths of 312°and 132°. The 312° azimuth intersects the southern slope of the North Gunsight; Middle Carter Mountain at seven miles, the south slope of Whitely Peak at 12 miles, and the Gore Range at Rabbit Ears Pass at 20 miles. The 132° azimuth intersects the southwest side of Slide Mountain at eight miles, but this is presently considered to be inconclusive.

Alignment 8 is a geo-navigational and inter-site alignment involving the egg-shaped periphery, the eccentric curved V-shape, and the exterior eccentric curvilinear. It is composed of

five cobbles [39, 40, 20, 19, and 2] which produced azimuths of 18°and 198°. The 18° azimuth intersects a bench mark (VABM) atop Sheep Mountain at 12 miles. It also intersects the

Arapahoe Creek pack trail along the Continental Divide. The 198° azimuth intersects 5GA4089, an officially eligible open architectural site with 12 cobble wall configurations at two miles. It also intersects the east slope of Little Wolford Mountain at five miles.

Alignment 9 is a potential geo-navigational alignment involving the egg-shaped periphery, the eccentric arc, and exterior cobble 32. It is composed of four cobbles [32, 3, 25, and 11] which produced azimuths of 209°and 29°. The 209° azimuth intersects the top of Twin Mountain at two miles and the top of Wolford Mountain at seven miles at an elevation of 8,880 feet. The 29° azimuth is currently considered inconclusive.

Feature 19 is classified as a probable hearth composed of 12 cobbles (Plate 27). It is roughly oval with an outline consisting of nine cobbles, with three in the interior. It is oriented roughly north-northeast/ south-southwest along azimuths of 35° and 215°. It is small, measuring 79cm long and 63cm wide. There is evidence of thermal reddening, crazing, and spalling on several of the cobbles along with a slight ashy gray soil discoloration. It is approximately five meters south-southeast of Feature 20 and is considered associated with it.

Plate 27. Overview of Feature 19 looking down.

Feature 20 is classified as a domestic structure composed of 89 cobbles encompassing an area of 19.7m^2 (Figure 25; Plate 28). It is large and predominately circular in shape, with an entryway open to the north-northeast, at approximately 10°. Three concentric rings, or ring segments are present possibly indicating multiple occupations or perhaps the use of a tipi-liner.

The peripheral outline (Ring 1) is generally circular and composed of 19 cobbles [1 - 19] it is approximately 4.9m in diameter with an entry 2.20m wide. The second ring, inside the first, is also circular and composed of 28 cobbles [20 - 48] with a 4.2m diameter and a 1.30m wide entry to the northeast. There are 13 cobbles [68 - 81] between rings one and two concentrated into two linear groups. The first group cobbles [69 - 74] is on the south side while the second group [75 - 81] is on the west-southwest side of the feature. It appears likely that these stones were displaced from either Ring 1 or Ring 2. A segment of a third ring, the inner most ring is 3.7m in diameter, circular and composed of 17 cobbles [49 - 52 and 56 - 67]. It may have intersected Ring 2 at Cobble 23. Inside the third ring near the center is a quadrilateral outline of five cobbles [83 - 87] about 0.80 x 1.20m which may indicate a buried hearth. Finally, there are two exterior cobbles [A and B] on the northwest side of the structure. Due to the exceptionally large number and distribution of cobbles in this feature it is possible to create numerous three point alignments that are entirely the result of random probability. Consequently, no alignment measurements were made.

Given the potential for an interior hearth and the proximity of other hearths (Features 21 and 19), along with a diffuse debitage concentration east of the peripheral outline, Feature 20 is the best evidence for a domestic structure on the site. No surficial artifacts were observed within the interior.

Feature 21 is classified as a small hearth, roughly oval in shape with six cobbles outlining it along with one interior cobble (see Figure 25; Plate 28). It is oriented east-west along azimuths of 90°and 270°, measuring 45 by 27cm. There is some evidence of thermal reddening, crazing, and spalling on several of the cobbles as well as a slight ashy gray soil discoloration in the interior. It is approximately 50cm north of Feature 20, just west of the entryway, and is considered associated with it.

Feature 22 is a configuration of 40 cobbles covering an area 10m^2 (Figure 26; Plate 29). A roughly oval outline, cobbles [1 - 20] surrounds an inner egg-shape cobbles [21 - 30]. Both outlines share cobbles [7 - 9] on their northeastern perimeters. Additionally, there are six interior cobbles [A - F] and five exterior cobbles [G - K]. The long axis of the outer oval is oriented north-northeast to south-southwest, produced azimuths of 19°and 199°, and is 3.71m long. The cross axis, as measured from the long axis center point, has azimuths of 109°and 289°with a length of 2.88m. The oval outline encompasses an area of 8.38m^2. The egg-shaped long axis

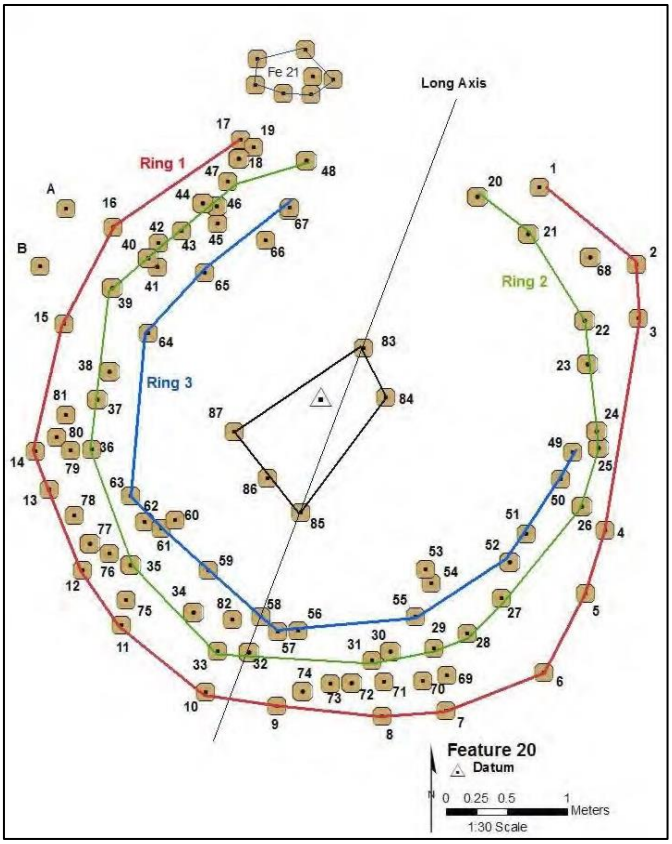


Figure 25. Plan map of Features 20 and 21.

Plate 28. Overview of Features 20 and 21 (blue) looking north.

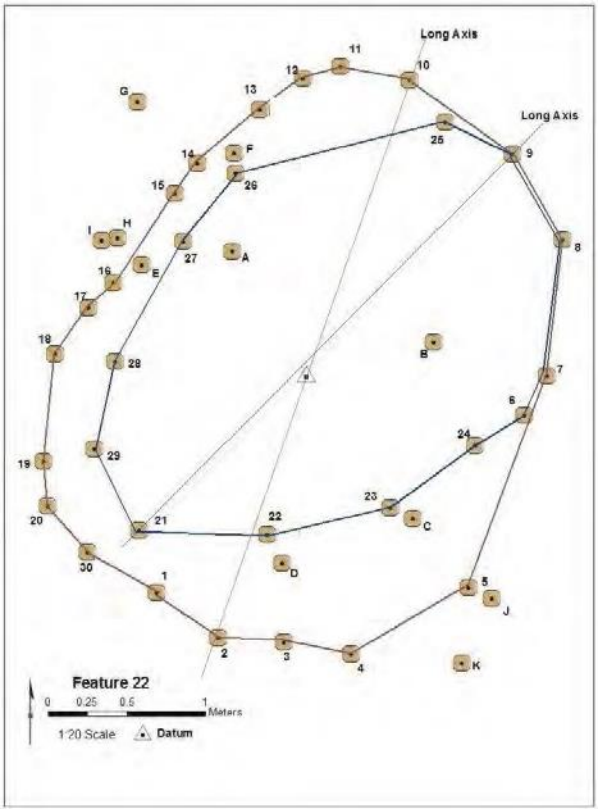


Figure 26. Plan map of Feature 22**.**

Plate 29. Overview of Feature 22 looking north-northwest.

is oriented northeast-southwest with azimuths of 45°and 225°, and is 3.35m long. The cross axis, as measured from the long axis center point, has azimuths of 135°and 315° and a length of 2.18m. The inner egg-shape encompasses an area 5.73m^2.

Alignment 1 is a geo-navigational alignment and the long axis of the outer oval. It is composed of cobbles 2 and 10 which produced azimuths of 19°and 199°. The 19° azimuth intersects the northern horizon line atop Sheep Mountain at 11 miles at an altitude of 11,588 feet and crosses the Arapahoe Creek pack trail on the Continental Divide. The 199° azimuth intersects Twin Mountain and site 5GA4089, an officially eligible open architectural site with 12 isolated wall alignments at two miles; intersecting the east slope of Little Wolford Mountain at five miles.

Alignments 2A and 2B are inter-cardinal and geo-navigational alignments composed of two cobble sets involving the inner egg-shape long and cross axes. *Alignment 2A*, the long axis, is composed of two cobbles [9 and 21] which produced azimuths of 45°and 225°. The 45° azimuth crosses the Continental Divide between Haystack Mountain and Park Mountain at a saddle on the northeastern horizon. Line-of-sight for 225° is inconclusive as visual reference point. *Alignment 2B*, the cross axis, is composed of two cobbles [15 and A] which produced azimuths of 135°and 315°. The 135° azimuth intersects the south flank of Slide Mountain at eight miles at an elevation of 9,188 feet. It is considered inconclusive. The 315° azimuth passes through "The Gunsight" to Middle Carter Mountain at 6.5 miles and the northeast flank of Whitely Peak at 12 miles at an elevation of 9,400 feet. Whitely Peak is a known vision quest site among the Utes.

Alignment 3 is a probable equinox alignment involving both the outer oval and the inner egg-shape. It is composed of three cobbles [6, 28, and 18] which produced azimuths of 97° and 277°. The 97° azimuth intersects the eastern horizon at the same point as the 92° azimuth documented for full solar disk equinox sunrise at Feature 13, Alignment 5. The 5° difference between the two azimuths is probably due to the location of Feature 22 which is approximately 126m north and 46m west of Feature 13. Direct observations are needed for confirmation.

Alignments 4A and 4B are likely solstice alignments involving both the outer oval and the inner egg-shape in conjunction with strategically placed inner and outer cobbles. *Alignment 4A* is composed of three cobbles [C, 23, and 28] which produced azimuths of 117°and 297°. The 117° azimuth intersects a strong dip in the east-southeast horizon between Grouse Mountain (10,362 ft) and Slide Mountain (9,931 ft). This is very close to our extrapolated position for the winter solstice sunrise, based upon Feature 13 data. The 297° azimuth intersects the west-northwest horizon along the north slope of South Gunsight and its intersection with the Gore Range. An association with the summer solstice sunset is also highly probable. Since this position is very close to our direct observation of summer solstice sunset from Feature 13. The azimuths discrepancy is probably due to the location of Feature 22 approximately 126m north and 46m west of Feature 13. Direct observations are necessary for confirmation. *Alignment 4B* is composed of three cobbles [J, 5, and 18] which produced azimuths of 118° and 298° which falls within our ± 2° margin of error, so the above descriptions are applicable.

Alignment 5 is a geo-navigational inter-site alignment involving the outer oval and the inner egg-shape in conjunction with a strategically placed inner cobble. It is composed of three cobbles [4, 23, and B] which produced azimuths of 14° and 194°. The 14°azimuth intersects the north-northeast horizon and crosses the Continental Divide about one mile west of Sheep Mountain crossing the Arapahoe Creek pack trail. The 194° azimuth intersects with Antelope Pass and 5GA639 (Jerry Craig Site), a Paleoindian kill/ camp site, at four miles. However, neither can be seen from Locality D, Feature 22. Consequently, this alignment has potential, but is considered inconclusive.

Alignment 6 is a geo-navigational inter-site alignment involving the inner egg-shape and two inner cobbles. It is composed of three cobbles [D, 22, and E] which produced azimuths of 154°and 334°. The 154° azimuth intersects East Sulphur Gulch ridge passing between sites 5GA4204, an oval stacked rock wall enclosure thought to be an eagle trap or a vision quest, and 5GA4214 a quarry site. It then crosses the Reeder Creek bluffs at 12 miles, onto Battle Mountain at 20 miles, ending up at Ute Park at 25 miles and Ute Pass at 33 miles. However, none of these can be directly seen from Locality D, Feature 22. The 334° azimuth intersects with the north-northwest horizon through a small saddle north of North Gunsight. Though this alignment has potential, it is considered inconclusive.

Alignment 7 is a geo-navigational inter-site alignment involving the outer oval and one exterior cobble. It is composed of three cobbles [I, 16, and 2] which produced azimuths of 163°and 343°. The 163° azimuth intersects with Reeder Creek bluffs near the confluence of the Colorado River, passing near quarry sites 5GA1172 and 5GA1174. However, though these sites, and the confluence of Reeder Creek and the Colorado River might be visible from Locality D, Feature 22, they are definitely visible from Locality B. Therefore, this alignment has potential, and is considered inconclusive The 343° azimuth intersects with the southwestern slope of Coal Mountain at four miles at an elevation of 9130 feet continuing on to the east slope of White Slide Mountain and Red Slide Mountain at nine miles. It is currently considered inconclusive.

Alignments 8A, 8B, 8C, and 8D are geo-navigational-trail alignments involving the outer oval and the inner egg-shape, in conjunction with strategically placed inner and outer cobbles. *Alignment 8A* is composed of three cobbles [J, 24, and 25] while *Alignment 8B* is composed of four cobbles [3, 22, 26, and F]. Both produced identical azimuths of 175°and 355°. The 175° azimuth points to a pass on the southeast end of Larson Ridge. This may be an intersection point with a prehistoric/ historic trail system from the Blue River/ Harsha Gulch area to Elliott and Reeder Creeks onto the Williams Fork River. However, this is unconfirmed at this point. The 355° azimuth intersects the northern horizon along the flank of the westernmost Pinnacle. *Alignment 8C* is composed of three cobbles [1, E, and G] while *Alignment 8D* consists cobbles [3, D, and 13]. Both produced identical azimuths of 177°and 357°. These azimuths fall within our ± 2° margin of error with similar results. These azimuths are currently considered repetitive, but inconclusive.

Feature 24 is an eccentric polygon composed of a quadrilateral with a handle-like extension covering an area of 5.0m^2 (Figure 27; Plate 30). The overall appearance of the feature is a dipper shape with the handle pointing northward. There may also be a relationship with Feature 18 located 7m west.

The quadrilateral consists of 15 cobbles [1 - 15] with nearly parallel sides, lengths, and azimuths. The southwest side is 1.35m long with azimuths of 339°and 159°while the northeast side is 1.38m long with azimuths of 340°and 160°. The northwest side is 1.15m long with azimuths of 64°and 244° while the southeast side is 1.27m long with azimuths of 64°and 244°. A possible collapsed cairn composed of six cobbles [26 - 31] is present on the east side in addition to three other interior cobbles [32 - 34]. The handle is immediately adjacent to the quadrilateral's northeast corner. It is a 46cm wide linear cobble cluster [16 - 25] extending north-northwest for 1.70m.

Alignments 1A and 1B are geo-navigational. *Alignment 1A* consists of two cobble sets. The first is composed of cobbles [8, 26, 14, 16, 18, and 25] while the second is composed of cobbles [32, 31, 19, and 24]. Both produced azimuths of 352°and 172°. The 352° azimuth intersects the northern horizon, passing one half mile east of Coal Mountain at four miles at an elevation of 9,543 ft. The 172° azimuth intersects the Barger Gulch area at 11 miles and the west slope of Copper Mountain at 17 miles. *Alignment 1B* is composed of five cobbles [7, 15, 17, 20, and 22] which produced azimuths of 354°and 174°. Both alignments are within our ± 2° margin of error, with similar results. They are currently considered repetitive, but inconclusive.

Alignments 2A and B are geo-navigational, possibly referencing an inter-site connection. *Alignment 2A* is composed of six cobbles [5, 4, 34, 15, 17, and 24] which produced azimuths of 10°and 190°. The 10° azimuth intersects the northern horizon but was inconclusive as a visual reference. The 190° azimuth intersects with Twin Mountain and site 5GA4090, an officially eligible, open architectural site with 10 stone enclosures at two miles; eventually intersecting Antelope Pass and 5GA639 (Jerry Craig site) a Paleoindian kill site, at 4.25 miles. *Alignment 2B* is composed of four cobbles [2, 21, 22, 25] which produced azimuths of 9°and 189° pointing to the same geographic reference points well within our ± 2° margin of error.

Alignment 3 is a geo-navigational inter-site alignment composed of four cobbles [10, 11, 12, and 25] which produced azimuths of 340°and 160°. The 340° azimuth crosses the northeast flank of White Slide Mountain at nine miles at an elevation of 10,760 feet continuing onto the top of Red Slide Mountain at 10 miles at an elevation of 10,840 feet. The 160° azimuth intersects the southern tip of East Sulphur Gulch ridge and site 5GA4210, a large U-shaped structure with stacked rock walls, at nine miles. Continuing on to intersect the Reeder Creek buttes and 5GA1184, a quarry and open campsite, at 11 miles. These locations are both visible from Feature 24.

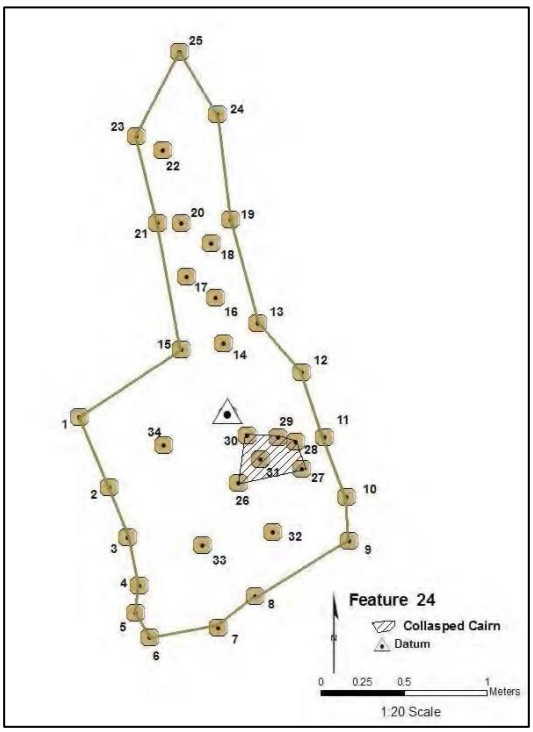


Figure 27. Plan map of Feature 24.

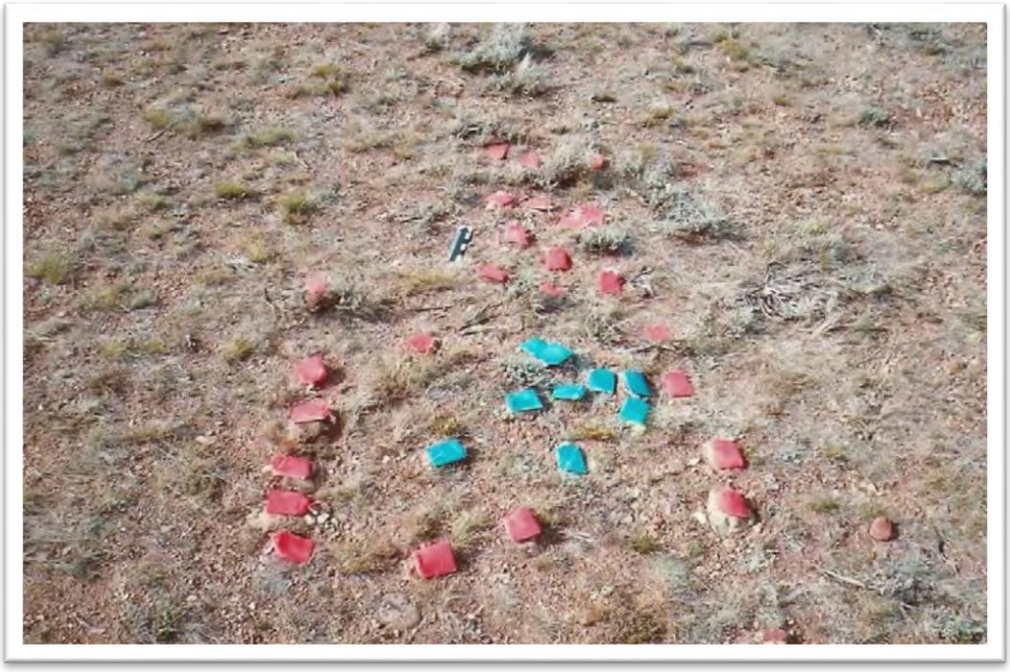


Plate 30. Overview of Feature 24 looking north**.**

Feature 30 is a modern, undetermined burial and/or memorial (Plate 31). It is a modern intrusion which appeared sometime between our visits in June and September, 2012. Surface vegetation and soil disturbances indicate probable burial activities. The memorial consists of a black heavy gauge bent wire ornate cross with the base buried. Attached at the top is a turquoise and white angel figurine which appears to be part of a wind chime. Below the wind chime ringer disk is a rectangular, scroll shaped, wind catcher imprinted with the phrase "Whispers from Heaven". Three empty liquor bottles with their necks buried are adjacent. On the west side of the cross is a large, cylindrical, clear glass bottle of imported Schonauer Apfel–Apple Liquor; on the north is a small, cylindrical, clear glass, one ounce bottle of Berenstern Applecorn Liquor; and to the east a large, rectangular, clear glass bottle of Berenstien Apple Liquor. The relatively small size of the disturbance area suggests a pet burial, but it could also be someone's cremation remains, or simply a memorial.

Plate 31. Feature 30 modern memorial**.**

LOCALITY E consists of six features (17, 25, 26, 27, 28, and 29) in or adjacent to a well-traveled two-track road (Figure 28) that is part of the BLM/ KFO Travel Management Plan. Besides the features, a lithic concentration is present on a small knoll to the northwest. It too is bisected by the track. This locality has the lowest elevation.

Feature 17 is a small, irregular, six-sided polygon outlined by cobble set [1, 3, 4, 6, 8 10, and 12] with four interior cobbles [2, 5, 7, and 11] encompassing 2.08m^2 (Figure 29; Plate 32). Three cobbles [5, 7, and 11] form a small right triangle with two equal sides measuring 38cm and the third side measuring 59cm near the northeastern outline. The long axis is oriented roughly northeast-southwest with azimuths of 41°and 221° with a length of 1.92m.

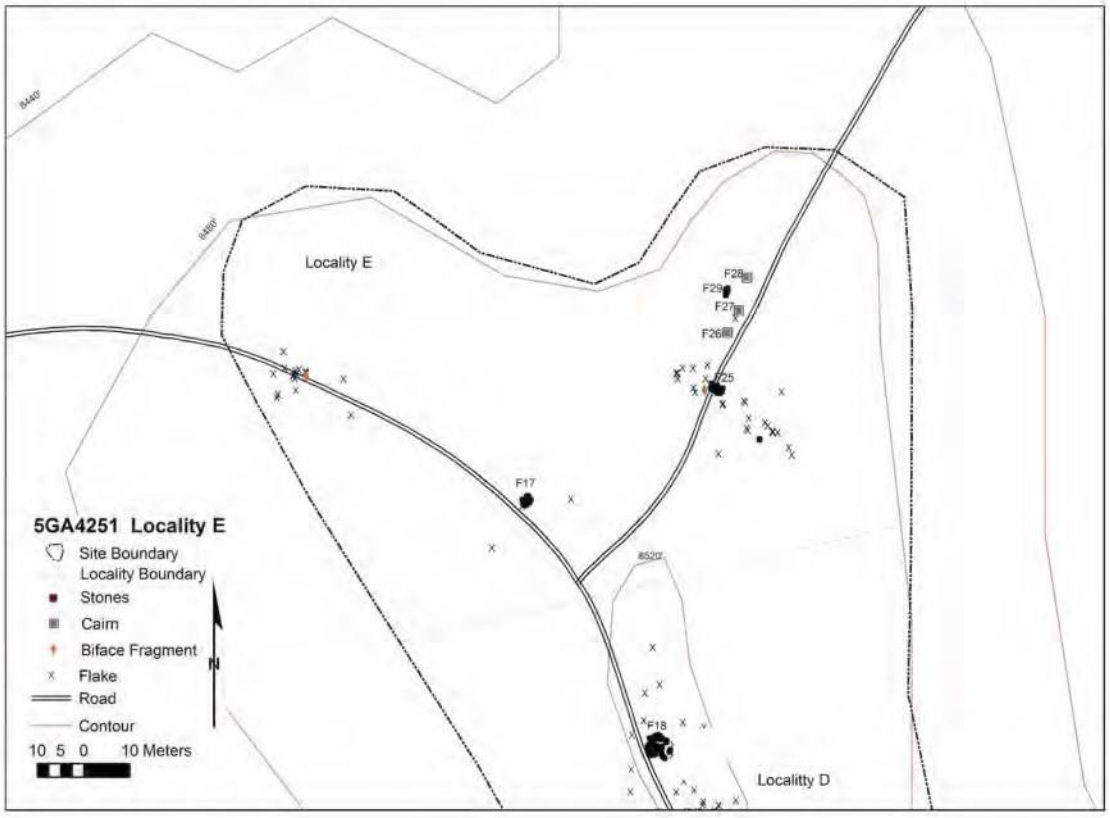


Figure 28. Plan map of Locality E.

The cross axis, as measured from the long axis center point, has azimuths of 131°and 311° and a length of 1.38m. None of the cobbles exhibit evidence of thermal alteration, nor is there any soil discoloration from charcoal staining. No determination of function was made, though the possibilities of a shrine, a marker, or a vision quest cannot be ruled out.

Alignment 1 is comprised of cobbles [2, 11, 10]. It produced azimuths of 10° and 190°. Both azimuths are considered repetitive and inconclusive.

Feature 25 is a partial cobble outline that has been severely impacted by the two-track road. The road has disturbed over 66% of the feature. Of the 13 cobbles thought to be involved, only four or five appear to be in-situ. Therefore, the outline is uncertain and any azimuths would be unreliable (Figure 30; Plate 33).

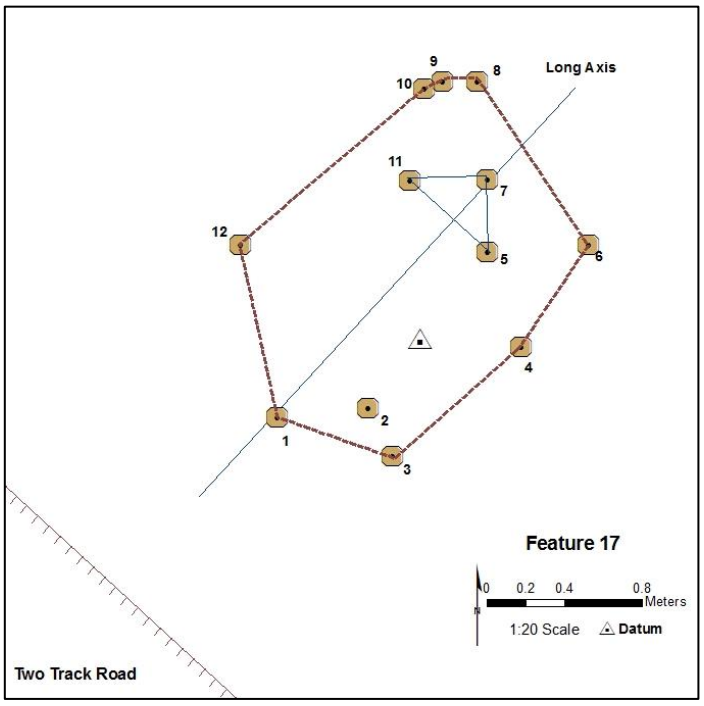


Figure 29. Plan map of Feature 17.

Plate 32. Overview of Feature 17 looking north-northeast.

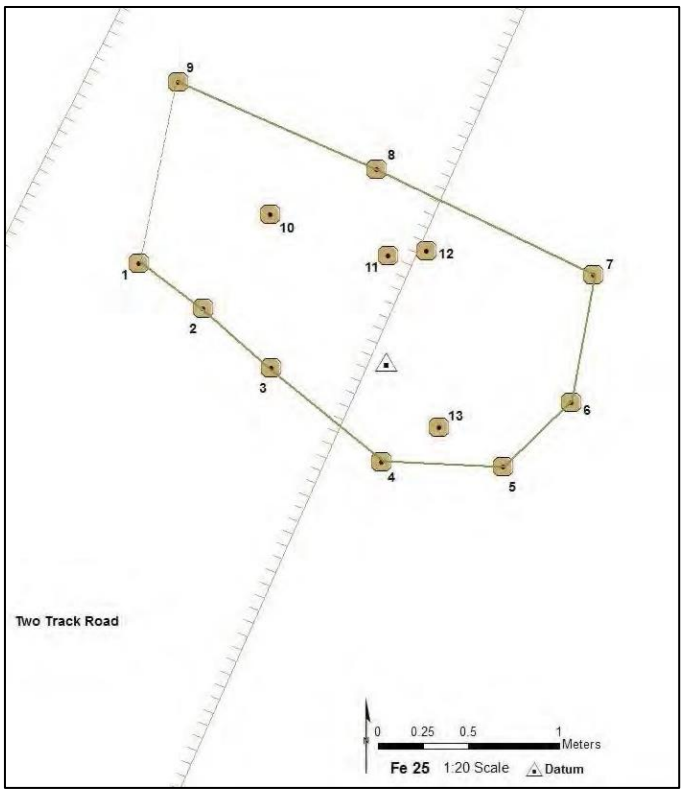


Figure 30. Plan map of Feature 25.

Plate 33. Overview of Feature 25 looking north-northeast.

Features 26, 27, and 28 comprise a somewhat linear cluster of 13 cobbles (Figure 31; Plate 34 - 36) concentrated into three collapsed cairns on the northwestern side of the two-track road. Features 26 and 27 are about 5m apart while Feature 28 is 7m from Feature 27 and slightly northwest of the line between Features 26 and 27. *Feature 26* is approximately 1.10m long by 0.65m wide. *Feature 27* is a roughly circular cluster of 12 cobbles measuring approximately 1.05 by 1.03m. *Feature 28* is a roughly circular cluster of 10 cobbles approximately 1.10 by 1.10m. No function has been assigned to these cairns. They could simply be trail markers or point to some celestial event or land form. These features do not appear to be part of a drive line. Additional work is needed.

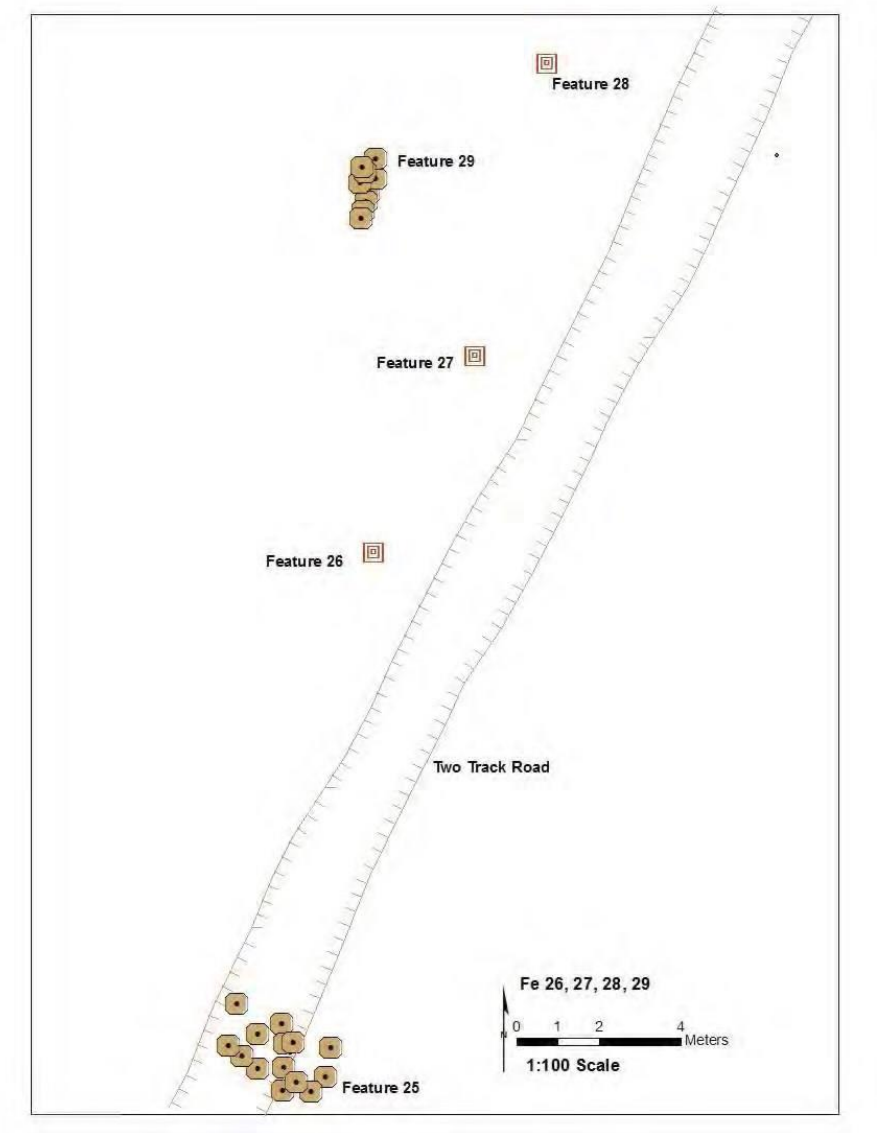


Figure 31. Plan map of Features 25 through 29.

Plate 34. Overview of Feature 26 looking north.

Plate 35. Overview of Feature 27.

Plate 36. Overview of Feature 28.

Feature 29 is a linear alignment of nine cobbles arranged along an axis of 14° and 194° (Figure 32; Plate 37). Cobbles 1-6 are linear along an axis of 14°, while cobbles 7-9 are off set 25 to 30cm west. The feature measures approximately 1.57m long with a maximum width of 0.40m. No function has been assigned to this feature but, the w-shape is reminiscent of Feature 15 cobbles 27-33 (see Figure 21). Both feature cobble sets appear to emulate to the constellation Cassiopeia. Also, this feature is much too short to be considered part of a game drive.

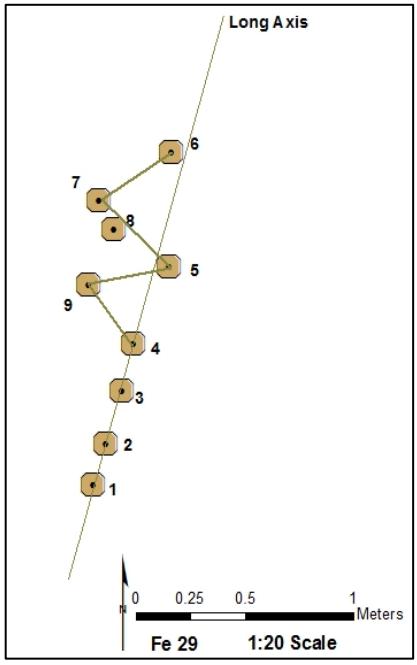


Figure 32. Plan map of Feature 29.

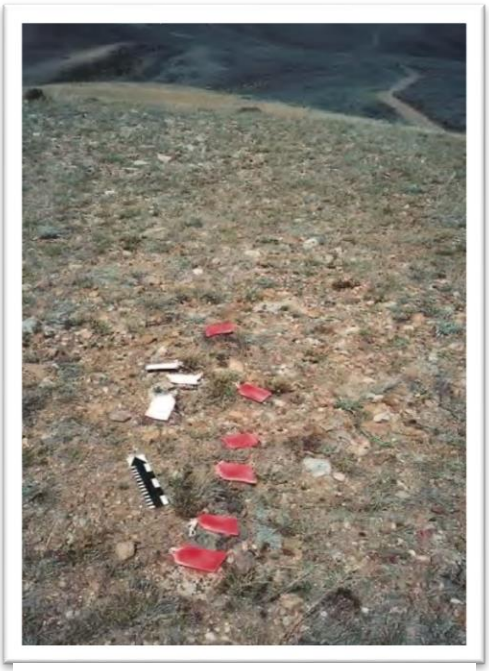


Plate 37. Overview of Feature 29 looking north north-west.

ARTIFACT ASSEMBLAGE

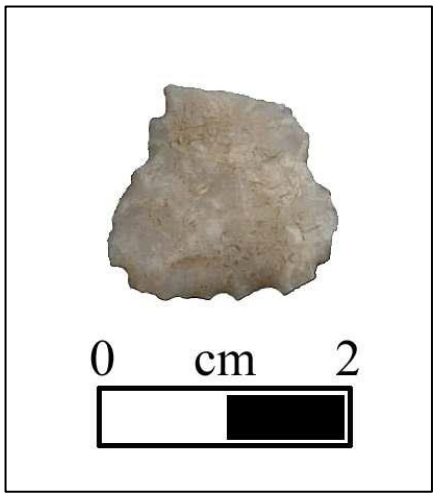


Plate 38. Biface fragment – Cottonwood projectile point.

All stages of the lithic reduction sequence are present, though the artifact assemblage is dominated by secondary and tertiary flakes, composed primarily of Troublesome Formation or Kremmling Chert. Windy Ridge orthoquartzite is also present in lessor amounts. Four chipping stations have been identified along with two tested cobbles. Tools include: seven biface fragments (Stage 3 to 4); five end scrapers (one appears to have been hafted); a unifacial quartzite mano; a polished, unifacial, vesicular basalt cobble–possible hide rubbing stone; six utilized or retouched flakes; a spoke shave; a perforator; and a biface fragment that is probably from a Cottonwood Triangular projectile point. The possible Cottonwood Triangular projectile point fragment (Plate 39) is made from a Kremmling Chert secondary flake. Overall it exhibits a random flaking pattern from direct pressure and bifacial edge retouch/sharpening including the strongly convex base. No evidence of grinding, edge rounding, or other use wear was present. This and the presence of a hinged snap fracture near the triangular blade midpoint indicates it was probably broken during manufacture and discarded. Maximum length is 17.3mm, maximum width is 18.6mm, and maximum thickness is 8.4mm. Holmer (1986) states that this point type appears on the Colorado Plateau at some Fremont sites between AD950 and 1150, but are most often found at Numic sites after AD1300. Reed and Metcalf (1999) note that in the Northern Colorado River Basin these points tend to date after AD1000. An end date while not specific is generally assumed to coincide with the Ute removal in 1881. Four small quartz crystals and two obsidian flakes were also found. One obsidian flake was collected and sent to the Northwest Research Obsidian Studies Laboratory in Corvallis, Oregon, where an XRF study indicated the source as Cerro del Medio, New Mexico. Both the obsidian flake and the Cottonwood Triangular projectile point fragment are curated at the Museum of Western Colorado.

Trail Systems

Aboriginal groups were a highly mobile people who migrated seasonally across diverse environments in small groups of extended family members, keeping pace with plant and animal food resources. Their territory ranged from canyon-cut semi-desert shrublands, to woodlands, through dense aspen and pine forests, upward in elevation to the highest alpine peaks of the Rockies. Their material culture was for the most part lightweight, portable, and ephemeral, allowing for only what they could cache or carry (Duncan 2003; Smith 1974; Fowler and Fowler 1971; Fowler 2000; Burns 2004) leaving little behind–often making site identification difficult. Cultural resources identified as isolated finds may in fact be single use aboriginal sites designed for specific activities. For the Utes, "movement was a basic value. You could say they had a sacred mandate, passed on to them by tradition from their deity–that they were supposed to do this. This pattern wasn't just economic, but was sacred and they were mandated to realize it (Goss 2003b). It might be said that "life" was movement for the Utes. One of the earliest written vocabularies for Ute language, recorded by John Wesley Powell in his 1868-1880 manuscripts, included the Northern Ute word pa-ant-ni, meaning to "walk about; to live" (Fowler and Fowler 1971:189; Knight 2008).

Throughout prehistory Utes traveled on foot. Later, some two to three hundred years ago, as they acquired horses from the Europeans, their mobility became significantly more expansive, their material culture more substantive, and their regional presence more pronounced (Lewis 1994; Blackhawk 2006). Nevertheless, in either mode, by foot or on horseback, Ute mobility relied on their knowledge of and use of trails and trail networks to access diverse ecological zones across varied and often ruggedly complex terrains.

John Wesley Powell, one of the first anthropologists to record observations of aboriginal Ute lifeways, went so far as to remark that:

> "It is curious to notice with what tenacity an Indian clings to a trail; a path which has been followed by his forefathers is sacred to him, and though in the constant and rapid erosion of the gulches and sides of the hills and mountains these trails have become very difficult yet he never abandons them when they can by any possibility be followed, even though a shorter and better road is very perceptible" (Fowler and Fowler 1971:39).

Historic and prehistoric trails, therefore, to the extent they can be reliably identified, represent perhaps the clearest and most direct evidence of aboriginal mobility patterns we can find today. In an attempt to identify possible trails the John Fremont 1848 Exploration map, the 1877 Hayden Exploration map, historic topographic maps, and Government Land Office (GLO) maps were inspected.

The John Fremont 1848 map (Figure 33) indicates that the closest they got to the Gunsight Pass Site was near and just north of Kremmling. The route enters Middle Park along the Blue River traveling north from the Frisco area, crossing the Colorado River west of Kremmling near the mouth of Gore Canyon. He may have taken this route to not only observe the surroundings but to check out the entrance to Gore Canyon. It's also likely that the river bottom was more firm at this point and less swampy than the area closer to modern day Kremmling. From there it crosses the Colorado River onto or in the vicinity of what is now Grand County Road 12W; crossing the toe slopes of the Gore Range, possibly along the old U.S. 40 (Moffatt Road) up and over Muddy Creek Pass into North Park.

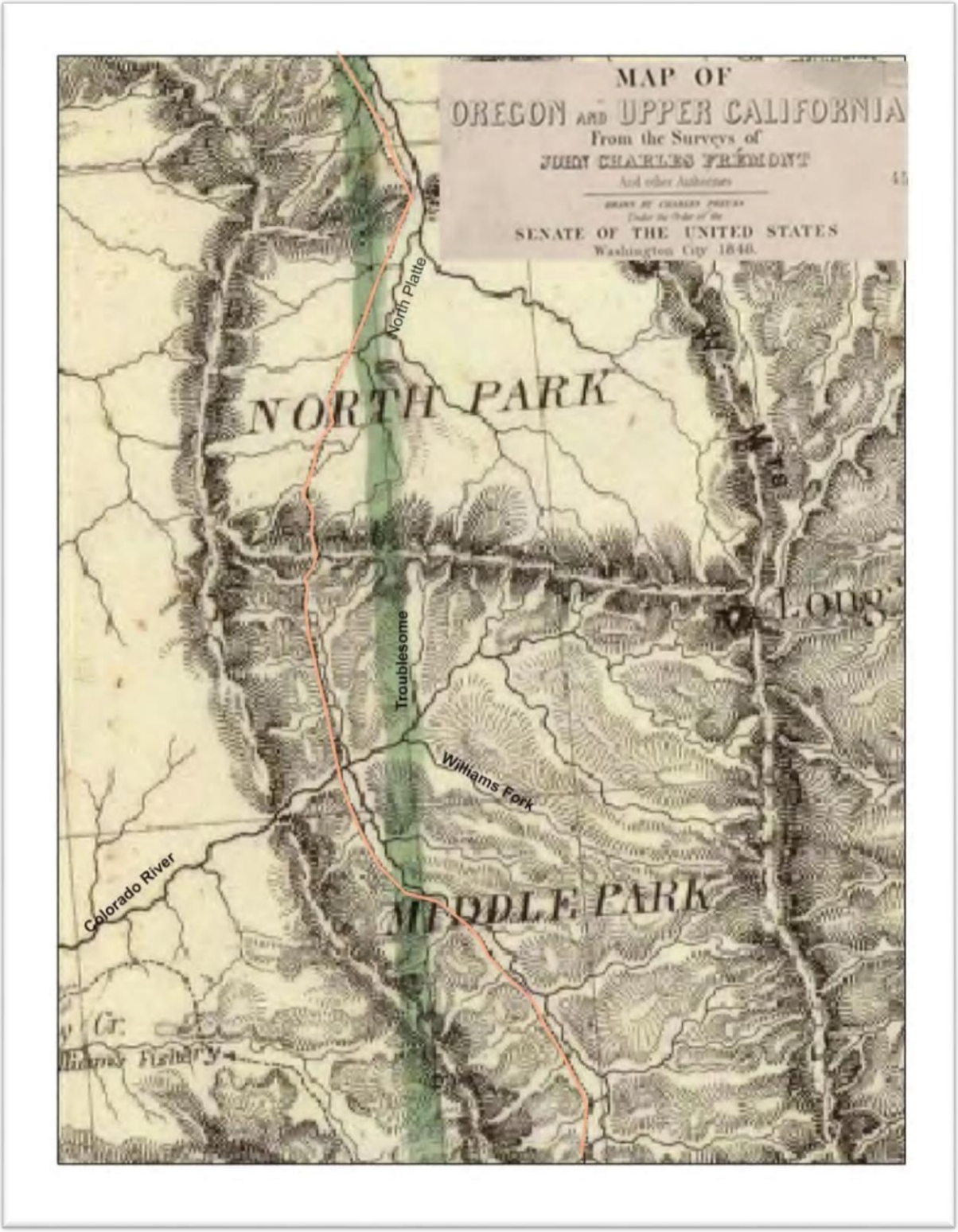


Figure 33. Fremont 1848 expedition map through Middle Park. Pink line indicates the route taken (please ignore the green line).

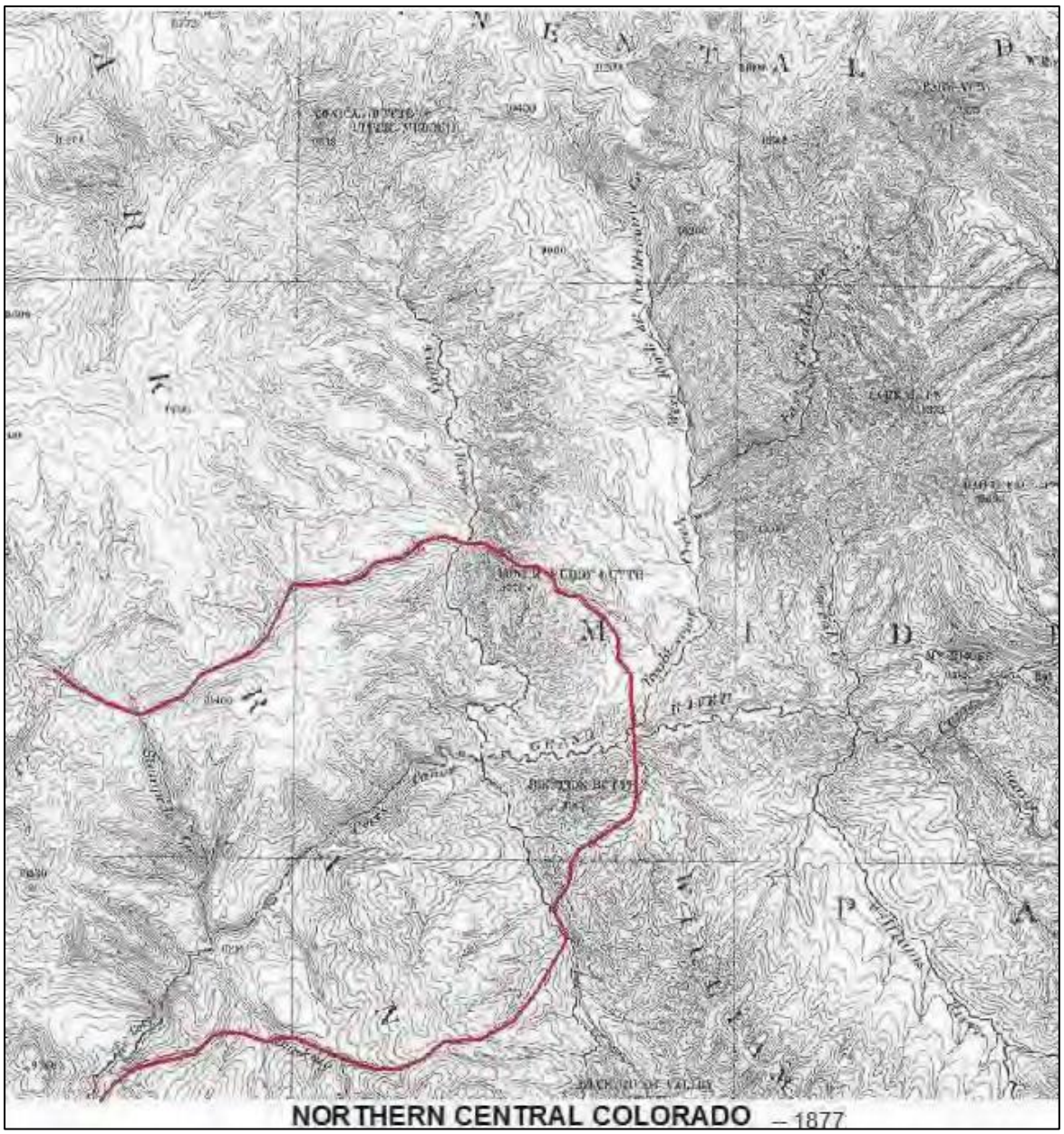


Figure 34. F. V. Hayden 1848 expedition map through Middle Park. Route through Middle Park shown in red.

The 1877 Hayden map (Figure 34) indicates a trail from the Wollcott area on the Eagle River toward State Bridge. But, unlike Colorado Highway 131, the trail does not cross the Colorado River at State Bridge, but rather crosses Piney Creek upstream from its confluence with the Colorado River skirting around the steep slopes of Gore Canyon, eventually descending along a ridge finger to the Blue River. Much of this route follows the current day Trough Road. The trail then crosses the Fremont route near Junction Butte where it turns east across a slight pass, south of the Butte. This pass may be the one that many of the 5GA4251 feature azimuths point to at the southern end of Lawson Ridge from Harsha Gulch into the Williams Fork drainage. After crossing the Colorado River east of Kremmling near Troublesome Creek it continues north turning west across Antelope Pass and down into Muddy Creek near the confluence of Pass Creek, which it follows west over Gore Pass into the Toponas area.

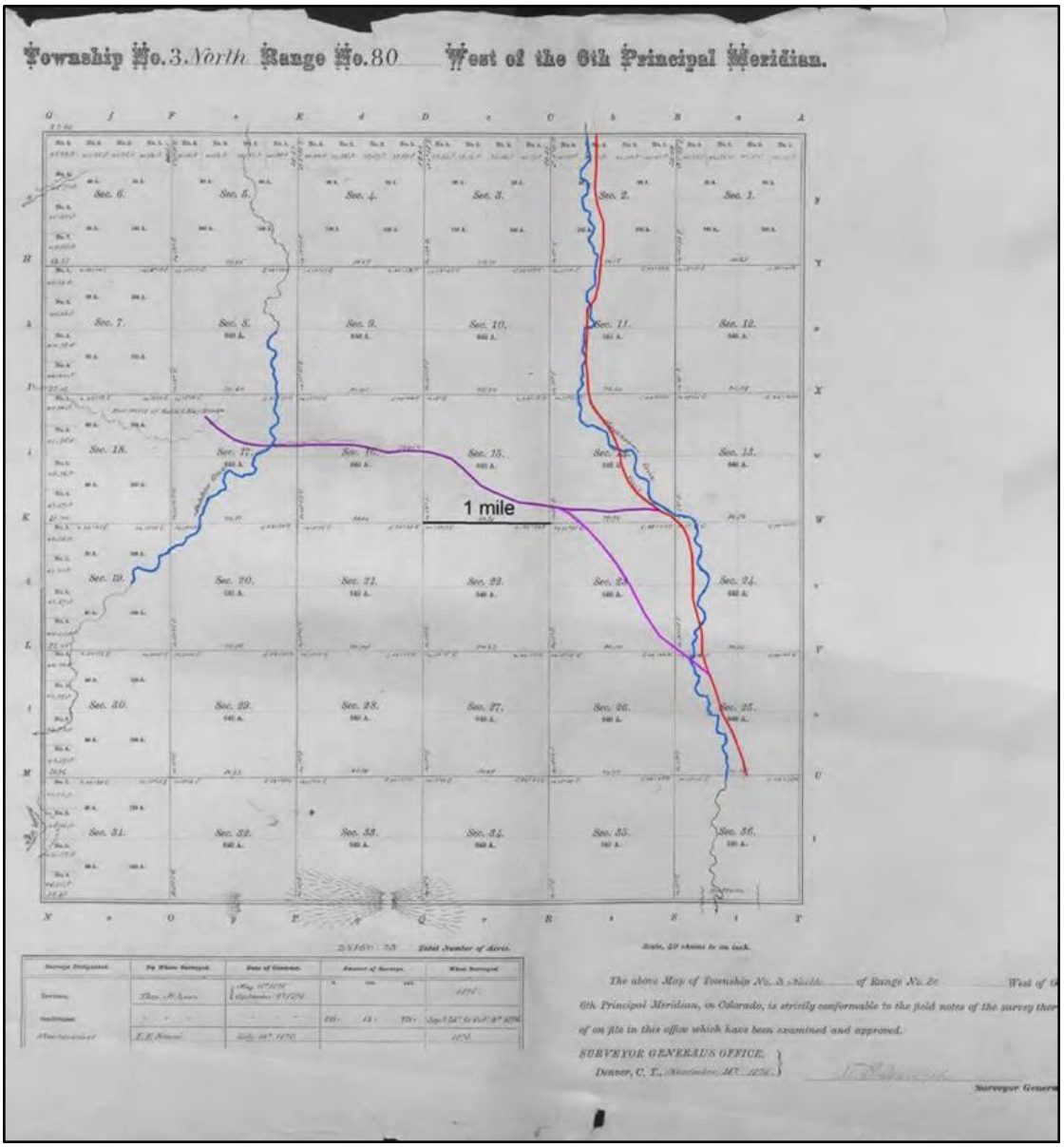


Figure 35. Government Land Office map dated 1875 for Township 3N Range 80W.

The 1873 GLO survey, finalized in 1875, indicates a trail up Troublesome Creek with a westerly diversion going toward Muddy Creek (Figure 35). These trails as plotted appear to be at least a mile north of the existing road through the 'Gunsight' as are all the cadastral sections. It is unlikely that the Troublesome Creek channel has changed radically. If the traced creek and trails are overlain on the U.S.G.S. Kremmling 15' topographic map (1956) the early trail is closer to the existing road through the 'Gunsight' (Figure 36). While it is not perfect it does suggest that the early trail and the current Grand County Road 2 may be one and the same. Additionally, the collapsed stone cairns on Features 26, 27, and 28 may have served as markers for a possible prehistoric/ historic trail connecting Troublesome Creek through the 'Gunsight' onward to Whitely Peak and Muddy Creek Pass.

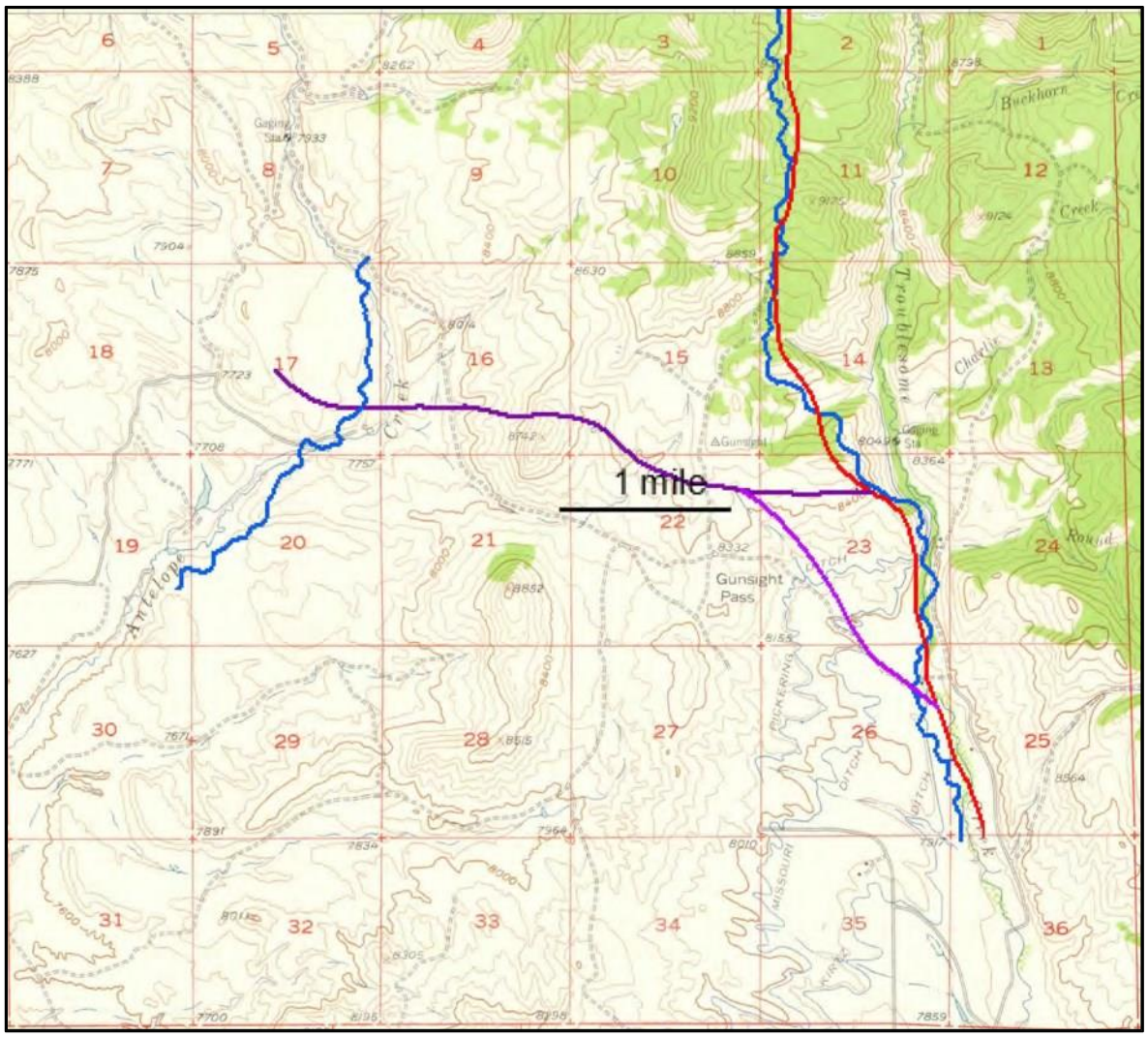


Figure 36. Kremmling 15' USGS 1956 topographic map with GLO map overlay.

We have also mentioned several other possible trails in our analysis of the 5GA4251 feature azimuths which might have a prehistoric origin – Troublesome Pass, Arapahoe Trail and passes along and crossing the Centennial Divide between North and Middle Parks. Some other possibilities include: Grimes Trail (so named by the authors) along the eastern horizon, Harsha Gulch/ Lawson Ridge Trail, Ute Pass, Willow Creek Pass (Colorado Highway 125), and Grizzly Creek Pass.

DISCUSSION

Our knowledge of 'stone circle' or 'tipi-ring' sites, has increased dramatically since the seminal work of Kehoe (1958; 1960). An excellent overview of the ensuing 20 years is presented in From *Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation* (Davis, L. B. ed. 1983). This compendium of articles is wide ranging and includes: domestic vs. non-domestic; locational significance; preferential selection of stone weights; significance of ring numbers per site; camp plan or pattern; ring size; number of occupants per ring; size-age

relationships; overlapping rings; incomplete or robbed rings; associated vegetational patterns; interior hearths; exterior hearths; living floors; door gaps; cardinal directions; perimeter weighting; inside vs. outside concentrations of material; patterned artifact distribution; nearby and multi-component sites; arbitrary site boundaries; buried rings; artifact density; projectile points per ring; and projectile point chronology. Kehoe (ibid: 341) summed it up "Although a rare few could have served other functions, they were mainly 'circles of stones used to hold down lodge covers' of resident Indians". Our interests at 5GA4251 are with the rare few that weren't used as lodge covers but rather as celestial observation stations.

New perspectives on possible cultural landscapes and ceremonial or astronomical aspects appeared in the *Eleventh Annual Conference of Chacmool, Archeological Association of the University of Calgary, entitled Megaliths to Medicine Wheels: Boulder Structures in Archaeology* (ed. Wilson, M. et.al. 1981). One interesting observation on the shapes of megalithic rings in Britain (Thom 1967) is that there are four shapes: true circles; flattened circles; ellipses; and egg-shapes. Shapes we're quite familiar with at 5GA4251.

Ovenden and Rodger (1981; 377-386) provide an interesting discussion and illustrations on the application of stake(s), a rope, and arc intersections to the geometric construction of ring shapes at the Big Horn Medicine and Moose Mountain Medicine Wheels. They inferred that ring construction was geometrical, not astronomical (cf. Eddy 1974, 1977, 1979; Kehoe and Kehoe 1979). Their proposal was that ring construction involved bilateral symmetry and the use of equilateral, right, and classic isosceles triangles using whole integer sides. At Gunsight Pass we observed classic isosceles triangles associated with Features 3, 10, and 15 and a right triangle at Feature 17; giving us pause and due consideration for this concept. Ovenden and Rodger also concluded that "...departures from 'smooth' or 'true' shapes in the medicine wheels are not accidental... or due to carelessness, but are integral features of the geometries. The rings are, in fact, in part polygons (Ibid: 386)." Could what we're seeing at 5GA4251 be conceptually similar, but down sized from the larger medicine wheels?

Williamson (1981; 1987) disputes this argument instead noting that Plains Indian traditions support an astronomical hypothesis for medicine wheels — as there is no similar tradition known to support the purely geometrical explanation. Nor is there any compelling supportive data for extending hypotheses about megalithic structures from different times and places to Plains cultures. Furthermore, medicine wheels, when understood as celestial observation structures, are different from horizon calendars commonly used in several Southwestern cultures. Instead of using specific horizon markers and only fore-sights for denoting important celestial events — medicine wheel construction integrates both fore and back-sights within the structure. This could be particularly important to nomadic cultures visiting during a single season. Everything one needed to know to observe an astronomical event is contained within the structure itself. Thus, the user needn't be particularly familiar with the distant landscape, but only had to understand the function of the various pairs of cairns. In addition, he notes that at the Big Horn and Moose Mountain medicine wheels, both summer solstice sunrise and sunset are observable, an important redundancy at sites where cloudy weather is likely to be common in mid-June especially in the afternoon. Additionally, the potential of observing the heliacal rise of Aldebaran just before the summer solstice, heightens the probability of identifying the correct day of summer solstice.

Consequently, after due consideration of the above thesis and based upon our observations we incorporated the concept of 'paired' cobbles for sightings extending across the cobble perimeters(s). A minimal distance of 1.5m between cobbles was required whether or not the cobbles were inside or outside the perimeter. Both the fore and back-sight azimuths in an alignment were recorded as were possible land-form markers.

Unlike a solely Plains Indian Tradition with far distant horizons, and a need to include fore and back-sights within a structure, 5GA4251 is a Mountain Tradition phenomena, where horizon land marks are incorporated within a horizon calendar. In short, it is not simply a case of either/ or, but rather both/ and. There is a congruity between the concept of something that is appropriate to highly nomadic cultures visiting the site only during a single season, and a more sedentary people with considerable use of a place specific horizon calendar.

Indeed, the construction of an archaeoastronomy feature which includes both fore and back-sights as well as horizon features incorporated into a horizon calendar is not unique to 5GA4251. Dust Devil Gorge Medicine Wheel, 5MF4423 (Hauck and Mueller, 1999), represents our best analog. It is positioned between two opposing canyons, Rock Art Canyon to the northeast and Dust Devil Gorge to the southwest. As medicine wheels go, 5MF4423 is rather small at 8.4m in diameter incorporating 119 cobbles in two concentric circles with four spokes roughly aligned to the cardinal directions. A single center stone comprises the radial base. Hauck's conclusion is that the wheel was constructed with a 98% correspondence to the solar/ lunar rise/ set patterns along the site's eastern and western horizon. The inner circle corresponds with the south lunar maximum, the outer circle correlates with the north lunar maximum, and the seven stones in each of the four axes correlate with the five solar paths between the solstices. The eastern spoke corresponds to the equinox sunrise along the horizon; while a peak to the southeast marks the winter solstice sunrise.

Hauck and Mueller have demonstrated that during the 19 year Metonic Cycle between 219BC and AD105 a series of new moons set into Dust Devil Gorge which correspond to winter solstice sunsets. This overlap of celestial events presents itself as a series of partial to nearly complete eclipses between 105BC and AD10. An event that would have astonished onlookers correlating to the early Formative Era (400BC - AD1300) for the Northern Colorado River Basin– preceding the currently accepted appearance of the Fremont culture (AD200 - 1500) by almost 100 years (Reed and Metcalf 1999). These celestial events also fit within the Basketmaker II period (1000BC - AD500) for the Southern Colorado River Basin (Lipe, Varien, and Wilshusen 1999). We mention this here as there is a Fremont rock art panel 100m west as well as within Rock Art Canyon, Irish Canyon, and the Browns Park area. This evidence suggests that Dust Devil Gorge medicine wheel may be associated with the Fremont — the northern extent of the ancestral Puebloan culture.

Additionally, there are extraneous cobbles mapped which were not incorporated into their analysis. One group of four cobbles were arranged in a linear format roughly oriented east-west about one meter long and one meter outside the peripheral outline, in the southeast quadrant. The second group, also in the southeast quadrant but interior to the peripheral outline, consisted of four cobbles about 0.50-2.0m east of the southern spoke. Three of these rocks form a classic isosceles triangle. The fourth cobble is about 20cm east. The third group of three cobbles were within the peripheral outline but in the northeast quadrant and about 0.20-1.0m east of the northern spoke.

These three cobbles form an obtuse isosceles triangle, which is the most common triangular form, and is probably random. We mention this because of our experience with "eccentrics" at 5GA4251 and the presence of three classic isosceles triangles with short linear alignments of four or more rocks.

Ring Morphology

Medicine wheel taxonomy and morphology hypothesis are common in archaeology. Three will be presented here.

Brumley (1988:2-6) defined medicine wheels as: largely constructed of unmodified stone, consisting of a combination of at least two of three primary components–a prominent, centrally located stone cairn of varying size, one or more concentric stone rings of generally circular shape, and/ or two or more stone lines radiating outward from a central origin point, central cairn, or the margins of a stone ring — that make up the generalized and radially symmetrical arrangement of the above primary components. Based upon this he designed a classification system of 49 medicine wheels in Alberta, Canada into eight categories.

Type 1 consists of a central cairn surrounded by a stone circle.

Type 2 consists of a central cairn surrounded by an egg-shape with a marked passageway leading out.

Type 3 consists of a central cairn with four radiating cobble lines or spokes.

Type 4 consists of a stone circle, with no central cairn, from which multiple spokes radiate outward.

Type 5 consists of a circle with spokes radiating inward toward the center without a central cairn.

Type 6 consists of a circle with spokes radiating inward to a central cairn.

Type 7 consists of a central cairn surrounded by a stone circle with multiple outward spokes radiating

Type 8 consists of a central cairn surrounded by a circle with multiple spokes radiating out from the central cairn, crossing and extending beyond the perimeter of the circle.

Regarding smaller stone rings with less than a 9m diameter, Grant and Harrison (1980) and Grant (1981:78) investigated 91 stone circles at the Dave Johnston Coal Mine in central Wyoming. This included the Red Butte site (48CO26), sites 48CO345 and 48CO357. They arrived at seven morphological categories. From our perspective, Grant and Harrison's Types 6 and 4 match very well with Brumley's Types 4 and 5 for medicine wheels. It appears what we have is a difference in scale, both in size and complexity. Grant and Harrison's Type 7 with its small cairns incorporated into the periphery also has a 'medicine wheel' aspect that may represent astronomical relationship(s). At any rate, they are more than just 'tipi rings' holding down lodge covers.

Type 1 consists of complete circles two or more meters in diameter with two or more courses of stones forming their circumference.

Type 2 consists of semicircular or D-shaped enclosures.

Type 3 consists of complete circles composed of a single course of relatively widely spaced stones.

Type 4 consists of complete circles like Type 1 but exhibiting spokes with radial lines of stones emanating from the center to the interior circumference.

Type 5 consists of concentric circles like Types 1 and 3, but containing a smaller interior enclosure.

Type 6 consists of complete circles, such as Type 1, with alignments of stones radiating outward from one or more points along the exterior (48CO357 only).

Type 7 consists of complete circles, such as Types 1 or 4, with one or more small cairns incorporated into the exterior of the enclosure.

Another interesting morphological analysis was conducted by Davis (1983: 71-79) on the Copper Mountain project in north-central Wyoming. Using a data base of 113 stone circles he considered eight variables, using both interval and ordinal measurements. His interval variables include: interior diameter; exterior diameter; number of stones that form the stone circle; and the distance between the circle and its nearest neighbor. His ordinal variables include: type of course outline (single, double, or multiple); outline shape (complete or partial); the density or spacing of ring stones (70-50cm apart, 50-30cm apart, 30-10cm apart, and 10-0cm apart); and the presence or absence of central stone concentrations.

Two statistical analyses were performed to identify the morphological variations within gross types to isolate and identify configurations that display "tipi ring" attributes. A cross-tabulation comparison of bivariate relationships between the eight variables suggested that double course stone circles with diameters of four to six meters which contained 50 to 105 cobbles spaced 10-50cm apart are more likely to be tipi remnants than are the single or multiple course alignments.

A multivariate hierarchical cluster analysis was conducted to expose the overall similarities or differences within the gross morphological variations – producing six clusters. The first four clusters did not exhibit central rock concentrations and were marked by single course stone circles displaying a wide range of exterior and interior diameters, dominated by the stone spacing forming the configurations, with spatial distributions remaining relatively constant relative to the fluctuating increase or decrease in circle diameters. Consequently, a reliable functional classification could not be assigned to these four clusters.

The other two clusters share double-course alignments that exhibit variable diameter ranges, rock totals, and rock spacing like those identified in the cross-tabulation analysis as probable tipi remnants. The principle difference between these two is the presence of a central rock concentration in Cluster 5 and the absence of same in Cluster 6. Taken together, the presence of a double course alignment–indicative of the use of a tipi liner, and the presence of a central rock concentration–indicative of a hearth, are supportive for habitation function and interpretation.

In summation, roughly 51% were classifiable as habitation 'tipi rings' while 49% are unclassifiable as to function. Perhaps Kehoe's (1983:341) observation that ... "a rare few could have served other functions" ... is not as rare as conceived.

Any attempt to formulate specific 'types' using our smaller data set of 19 outline features (Figure 37) at the Gunsight Pass site, is problematical. However, we do have some partial correlations with Brumley's Type 2, Grant and Harrison's Types 1, 2, 5, and 7, and Davis's Clusters 5 and 6. Table 1 is a summary of our feature types and Figure 37 are feature shapes.

Table 1. Summary of Feature Shapes at 5GA4251.

Feature Description	Feature No.	Feature Description	Feature No.
Outline with a marked entry	3, 5, 6, and 20	Irregular polygons	16 and 17
Egg-shapes	3, 10, 13, 18, 22, and 31	Paired upright stones	23
Oval-shapes	5, 7, 9, and 13	Linear	29
Combination egg and oval shapes	5, 7, and 13	Collapsed medium size cairn	26, 27, and 28
Lens shapes	8A and 14	Collapsed small cairn/prayer circle	1, 2
Three sided shapes	4A and 4B	Probable thermal features	19 and 21
L-shapes	11, 12, and 15	Impacted - undefinable	24
J-shape	12	Modern intrusive - memorial	30
Eccentrics*	8B, 14, 17, 18, 24	Eccentrics incorporated or associated	3, 4A, 4B, 5, 6, 7, 10, 15, 17

*Eccentrics alignments are arrangements of cobbles with shapes that may look suspiciously like constellation forms (or parts thereof). These include: dipper shapes; U-shapes; arc-shapes; curvilinear shapes like question marks (?); lens shapes; curved V-shapes; W-shapes; T-shapes; and triangles (classic isosceles and equilateral).

Cultural Astronomy

Several problems occur when dealing with surface manifested 'alignments' and their possible outlines and/or orientations. The first is whether you have the full archaeological picture, since you can't see what may be buried. The second is coincidence of random chance–the greater the number of points (cobbles) in an arrangement or outline, the greater the potential for possible orientations and azimuth alignments. The third is your imagination and idiosyncratic preconceptions. In a game of 'connect-the-dots' anything can happen, and usually does. When it comes to the "eccentrics" any attempt at interpretation involves historical particularism present in any cultural Zodiac construction, or as Aveni (1972) puts it "cultural astronomy or ethnoastronomy." In short, different astronomy — different cultures — different cultural relativism questions.

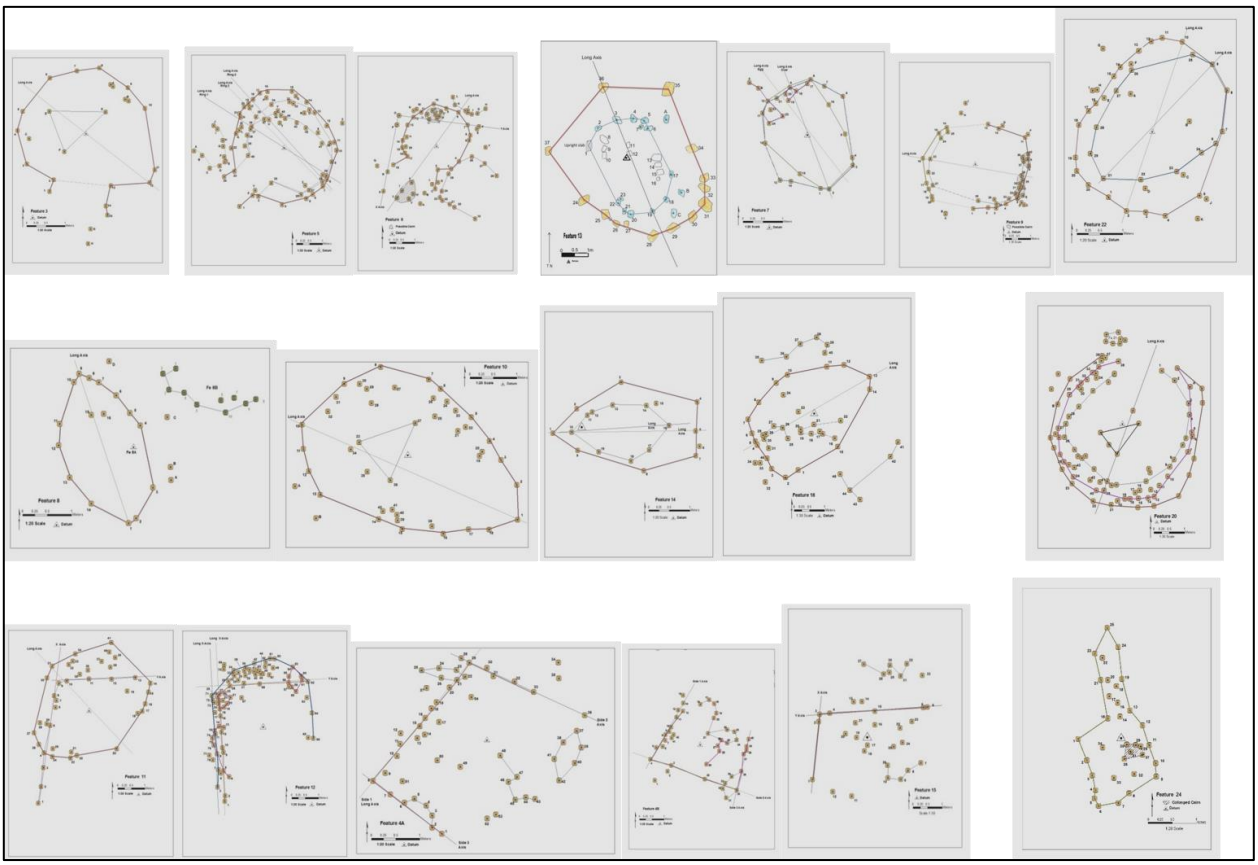


Figure 37. The 18 most unique stone features arranged by shape Similar shapes include: Egg shaped, oval, lens, arc, linear and eccentric.

To get a handle on this, McCluskey (2005:69-79) proposed a preliminary "taxonomy of astronomies" to provide a guide for the classification of diverse astronomical traditions in terms of their main characteristics (Ibid Table 1:73). McCluskey's 11 main characteristics of astronomic taxonomy are:

Function	Theoretical / Practical
General Approach	Secular / Sacred
Method	Observational / Predictive
Phenomena	Continuous / Discrete
Compared in	Spatial Terms / Temporal Terms
Kind of Model	Arithmetic / Geometric
Principal Bodies Considered	Sun / Moon / Planets / Stars /...
Observation Reference and Model	Horizon / Stars / Equator / Ecliptic
Benchmark for Reference	Tropical / Sidereal / Lunar Phase / Irregular
Mode of Explanation	Descriptive / Causal
Application	Global / Regional / Local

He provides five examples: Western Geometrical Astronomy; Puebloan and "Megalithic" Horizon Astronomies; Greek and Pawnee Stellar Astronomies; Maya and Babylonian Arithmetical Astronomies; and Medieval Computus. Puebloan/ "Megalithic" Horizon and Pawnee Stellar Astronomies appeared the most applicable for Gunsight and are presented in Table 2.

Table 2. Summary of Puebloan/ "Megalithic" Horizon and Pawnee Stellar Astronomies.

Main Characteristics	Puebloan & Megalithic	Pawnee-Stellar
Function	Practical	Practical
General Approach	Sacred	Sacred
Method	Observational	Observational
Phenomena	Discrete	Discrete
Compared in	Spatial Terms *	Temporal Terms
Kind of Model	Arithmetic to Weak Geometric	Arithmetic to Weak Geometric
Principle Bodies	Sun and Moon *	Stellar and Planetary
Observation Reference	Horizon Landmarks	No Horizon Landmarks
Reference Benchmarks	Tropical	Tropical
Mode of Explanation	Descriptive to Weak Predictive	Descriptive to Weak Predictive
Application	Local	Regional

*It should be noted that Zuni and Tewa speakers also utilized several stars and constellations (or parts thereof) in the timing of various ceremonies.

According to McCuskey the four main characteristic differences between the Puebloan and "Megalithic" Horizon, and Pawnee Stellar astronomies are:

a) the comparisons in terms of spatial vs. stellar;
b) the principle bodies considered, sun and moon vs. stellar and planetary;
c) the references for observation, horizon landmarks vs stars-no fixed local landmarks;
d) the application, local vs. regional.

Stars and constellations identified in association with medicine wheels, and the Pawnee are available in Williamson (1987:199-217, and 218-235); and for the Zuni and Tewa speakers (Young and Williamson 1981:183-191). A sample of these comparisons are provided in Table 3.

Table 3. Sample Comparison of Identified Stars, Constellations, and Planets.

Skidi Pawnee	Zuni and Tewa	Medicine Wheels	
		Big Horn	Moose Mountain
Morning Star – Mars/Venus	Morning Star – Venus?	Aldebaran	Aldebaran
Evening Star – Venus	Evening Star – Venus?	Rigel	Rigel
NW Star – Capella, Set-Spring	Arcturus	Sirius	Sirius
*SE Star – Antares	Antares	Fomalhaut	
NE Star – Vega, Rise-Autumn	Vega	Sum. Solstice Rise	Sum. Solstice Rise
SW Star – Sirius, Set-	Spica	Sum. Solstice Set	
Polaris	Polaris		Sunburst stone mosaic, also found at Ft. Smith Medicine Wheel and others (Williamson, 1987:212).
Lambda	Deneb		
*Antares – Head of Snake, Scorpius	Sagittarius		

Skidi Pawnee	Zuni and Tewa	Medicine Wheels	
		Big Horn	Moose Mountain
Body of Snake – Scorpius	Cygnus		
Upsilon Scorpio – Stinger in Scorpius	Pegasus (4 Big Square)		
Big Dipper –Ursa Major	Big Dipper –Ursa Major		
Little Dipper – Ursa Minor	Little Dipper –Ursa Minor		
Corona Borealis – Council of Chiefs	Corona Borealis		
Pleiades	Pleiades		
Delphinus	Delphinus		
Taurus	Cassiopeia		
Orion	Orion - Belt & Sword		
Milky Way – Path of Departed Spirits	Milky Way		
Jupiter	Jupiter		
Saturn	Sun		
Crescent Moon	Full Moon		

*Note: The Pawnee focus on inter-cardinal directions rather than cardinal directions utilizing them to lay out their earth lodges and inter-village ceremonial formation.

Based upon the preceding, it is obvious that the Puebloan–Zuni and Tewa had as strong an interest in the stars, constellations, and planets, as the Pawnee and the builders of the Medicine Wheels.

Gunsight Pass Site – 5GF4251

Documentation of horizon alignments at 5GA4251, Feature 13 during autumnal equinox sunrise/ sunset and summer solstice sunrise/ sunset opened up a whole new dimension regarding the perception of simple cobble arrangements/ alignments normally viewed as ‘tipi rings’ or the more generic ‘stone circle’ site type. Though these ‘types’ are nominally descriptive, we may be better off using a more generic term like ‘cobble formations’. This constrains the a priori perception that they all have functioned as domestic structures and/or that they are all circular.

Based upon the preceding discussions we chose to examine the site and features from the following perspectives and questions based upon the larger group data set (all the features) as opposed to the individual data set of Feature 13.

Location

The Gunsight Pass site location was chosen specifically for its fore-shortened horizon landmarks. The southeastern, eastern, northeastern, north, northwestern, western, and southwestern horizons provide specific landmarks for accurate observation of celestial events. This is especially

noticeable along the western horizon which is formed by the South Gunsight. Both the western and eastern horizons form a reciprocal mirror image of an undulating horizon line composed of three humps and a pinnacle (Figure 38 and 39; Plates 40 and 41). The northern horizon is also clear and distinct. The southern horizon is less clear with topographic features either interrupting the view or a greater distance to any major land marks. Azimuth accuracy for sun and moon rise/ sets is less of a problem because of their larger diameters, but becomes more critical for the heliacal rise or set of bright stars, constellations, or planets.

Cobble Formations – Shapes

From the Medicine Wheels, we inherited: true circles, flattened circles, ellipses/ovals, and egg-shapes, all associated with astronomical observations and summer solstice sunrise. Plus, at 5GA4251 we have combinations of oval and egg-shapes, lens shapes, three sided shapes, L-shapes, a J-shape, and irregular polygons. A real mix and match scenario. Is this a reflection of different techniques used by different groups and/ or at different times, for different celestial bodies or events under observation?

Scale

The cobble features are down-sized versions from "big" Medicine Wheels. This may reflect variation in the distances to the horizon markers or the size of the social group(s) utilizing the features. An appropriate consideration, as construction of small cobble arrangements and/or alignments can be successfully done by small groups, whether seasonally mobile or semi-sedentary. It may also reflect a scalar difference in function between a more mundane practical application and/or a more esoteric ceremonial application, and whether the mode of explanation is descriptive, weakly predictive or highly predictive.

Directional Orientations

Cardinal and/ or inter-cardinal. How does a cultural group directionally orientate? Is the application local and/or regional, and how accurate do you want or need it to be? As Anglo-Americans, our prime directional orientation is north, while for many Native American Plains cultures it's east (sunrise). For the Northern Utes, it's south (pc. Clifford Duncan). How do you find 'North'? Do you use the gnomon technique during the day, or a constellation technique at night that involves the 'Dipper-shape' parts of constellations like Ursa Major, Ursa Minor, and/ or the head of Draco? Then there's the 'Time' factor and the precession of the equinoxes. Five millennia ago the star Thuban, near the base of the tail in the constellation of Draco, was the celestial north pole star. Two and a half millennia ago the star Polaris was 14° from the earth's geographic north pole. Today it is slightly less than one degree away. Could the variation in northern/ southern azimuths reflect this? How old are these features?

Principle Celestial Considerations

Are celestial considerations based primarily on the sun and moon for basic seasonal determinations, with secondary consideration probably given to stars/ constellations, and/ or selected planets as backups or predictors. The solstices and equinoxes are stable, but the moons

Figure 38. Schematic profile of eastern horizon from Feature 13.

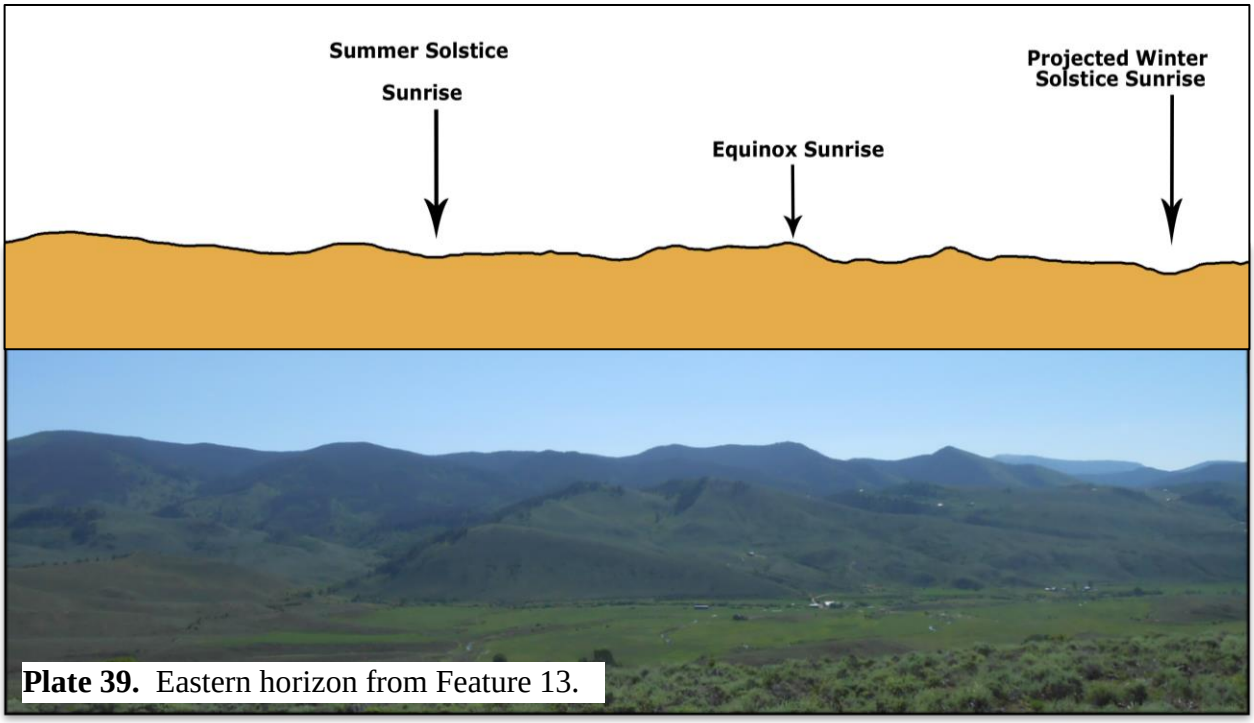


Plate 39. Eastern horizon from Feature 13.

Figure 39. Schematic profile of western horizon from Feature 13.

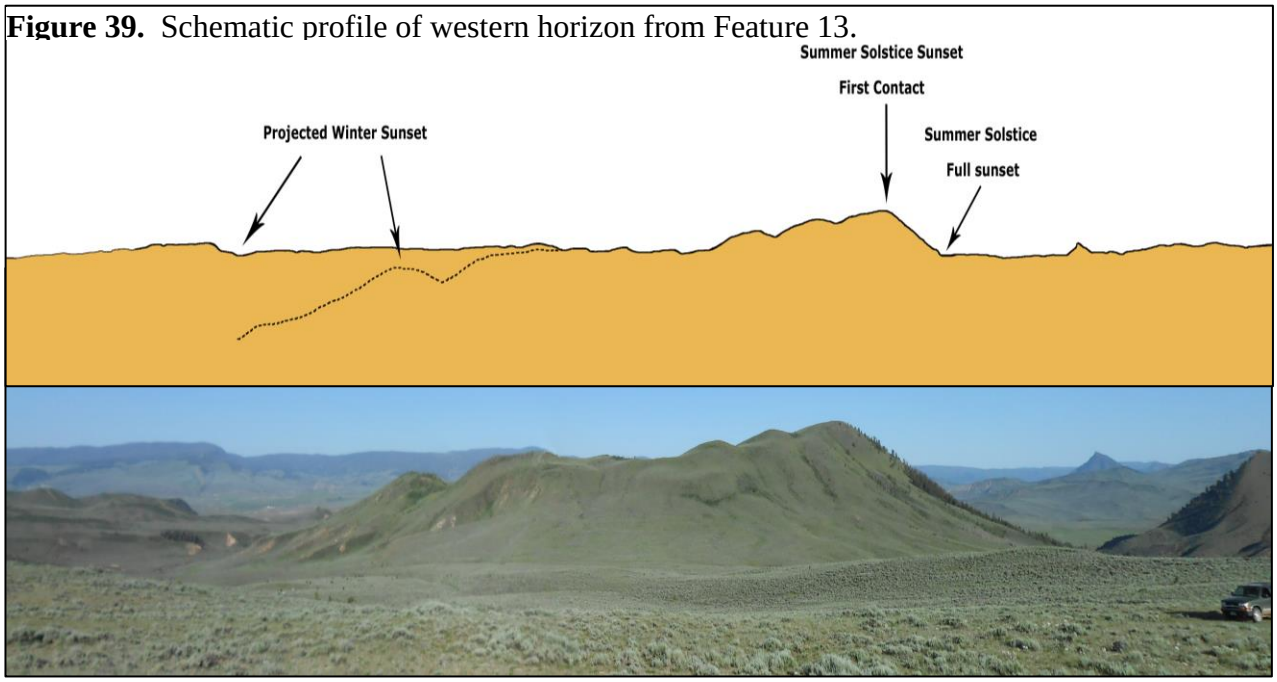


Plate 40. Western horizon from Feature 13.

path along the horizon follows three different cycles–monthly, yearly, and the 18.61 year Metonic Cycle. At Gunsight, the lunar minimum or maximum "stand still" positions depend upon the horizon elevation. The moon generally rises or sets either inside or outside the solstice horizon positions by an estimated 6° north and south of the summer and winter solstices, respectively. At Feature 13 the summer solstice sunrise was confirmed at 66°, but we also have a cobble alignment at 60°, which may mark the northern lunar maximum standstill. At the Dust Devil Gorge Medicine Wheel, Hauck and Mueller (1999) aptly demonstrated their wheel's highly predictive nature regarding a series of partial to almost complete eclipses which occurred during the 19-year interval between 105 BC and AD 10.

Methods of Observation and Construction

Start with arithmetic day counts, coupled with repeated direct observations on a seasonal basis, over decades of time. What about the use of a simple two pole sighting device, along with a weak geometric triangulation (?) to track the parallactic ellipse of a selected star and map it on the ground (ovals and egg-shapes), followed by later corrections added through the placement of paired cobbles, small cairns, and/ or marked viewing portals or entryways such as at Features 3, 5 and 6. Does this represent multiple persons or groups working it out over time, transferring information through stories and mythology, or drawings on perishable materials? Even though you didn't build it, everything one would need to know to observe a specific astronomical event would be contained within the structure itself. Thus, the user needn't have been particularly familiar with the landscape, but only had to understand the function of the various cobble pairs.

Eccentric Formations

These are the most nebulous of our observations and include cobble arrangements with shapes that look suspiciously like some of our constellations (or parts thereof). These include: dipper shapes (Ursa Minor, Ursa Major, and the head of Draco); a W-shape (Cassiopeia); curvilinear shapes like question marks (Draco's tail or Scorpius' tail); and a row boat shape (part of Cepheus). If so, then we may have representations of all five circumpolar constellations visible in the northern sky year. Though the handle of the Big Dipper disappears below the northern horizon in November and reappears fully in January; the head of Draco disappears in January and fully reappears in April. Also present are U-shapes (Corona Borealis); curved V-shape (part of Perseus or Andromeda); T-shape (head of Scorpius); lens shapes (Pleiades); and arc shapes. This is all quite speculative based upon our present observations, but all or parts of these constellations do appear in the ethnographic literature.

Azimuths

To make azimuth determinations, the accuracy of any alignment is dependent upon multiple factors: the identification and location of observation point(s); the presence of least three or more reference points and their relationship(s) to the surrounding terrain; the identification of potential observation target point(s) on the horizon; and whether they represent geographical (fixed) and/or geographical to celestial (mobile) points. Additional factors which can affect ground observations include: the deviation of the observed skyline from the astronomical horizon (latitude, longitude, and declination or elevation); atmospheric refraction or extinction; local weather conditions; and barometric and elevation variations. For example, temperature inversions can cause a mirage

effect on a raised horizon producing the appearance of a changed elevation on the horizon line. Finally, the sun executes about a 60° angular swing between extreme positions along the horizon during a year (±30° north or south of equinox). Depending upon latitude and horizon elevation, this produces azimuths between 110°to 120° and 240°to 250° for winter solstice sunrise/ sunset, respectively. Summer solstice sunrise/ sunset will produce azimuths between 60°to 70° and 300°to 310°, respectively. Consequently, each feature must be tested individually as the alignment azimuths to the horizon line will change slightly depending upon which Locality (A, B, C, D, or E) the feature is in and whether the solar sighting is taken at first/ last glimmer or at full disk (± 1°, for a 2° spread).

The alignment axis of the various features was also a consideration. Consequently, we incorporated a visual approximation of bilateral symmetry in the drawing of the long axis and then derived a cross axis taken from the long axis mid-point within the confines of the peripheral outline. This was accomplished by getting as many points (cobbles) as possible within a symmetrical arrangement so that more cobbles were within an alignment (in-situ) than were out of it (disturbed). We illustrated our cobble shapes in a similar fashion producing polygons rather than curved, smooth shapes. We also included the few perceived interior triangles in our feature maps, as this information may be useful to future researchers regarding construction technique(s). What we consider to be the 19 most important features are illustrated in Figure 37.

As we don't know if the builders were selecting for a single specific azimuth we gathered both fore and back sight azimuths, giving the graphic representation a general appearance of symmetry. By dropping the single and double frequency of occurrence azimuths, we could factor out most of the potential randomness and focus on those azimuths with the highest occurrence. Consequently, we created a frequency of occurrence plot with three as a base line involving 23 features (2, 3, 4A, 4B, 5, 6, 7, 8A, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 29, and 31). By plotting the frequency of occurrence in a polar format produced a set of interesting symmetrical patterns that is illustrated in Figure 40. The strongest tendency is for the cardinal directions with east/ west being slightly stronger than north/ south; followed by the strong inter-cardinal direction northwest/ southeast, and a frequency drop to the northeast/ southwest. The east-northeast azimuths of 60° and 66° may reflect an orientation to the northern lunar maximum rise and the confirmed first solar disk glimmer of the summer solstice sunrise at Feature 13, with full disk at 68°. The opposing west-southwest orientation is slightly over balanced with azimuths of 240°, 245°, and 248° which may reflect orientations to the winter solstice sunset and the lunar maximum set, respectively, which has yet to be confirmed.

The east-southeast orientation of 109° may correspond to the lunar minimum rise, while a strong orientation at 120° may correspond to the lunar maximum rise. The opposing west-northwest is slightly under balanced at 289° with a drop to the base line, while the 300° azimuth is balanced, possibly corresponding to the lunar minimum set or a preliminary marker of summer solstice sunset.

At the extreme south-southeast azimuth (175°) is equally balanced to the extreme north-northwest at 355°. What this correspond to is problematic. The 355° azimuth has a clear view of the fore shortened northern horizon, while the 175° azimuth may have a geo-navigational link to a trail/ pass at the southeastern end of Lawson Ridge through Harsha Gulch.

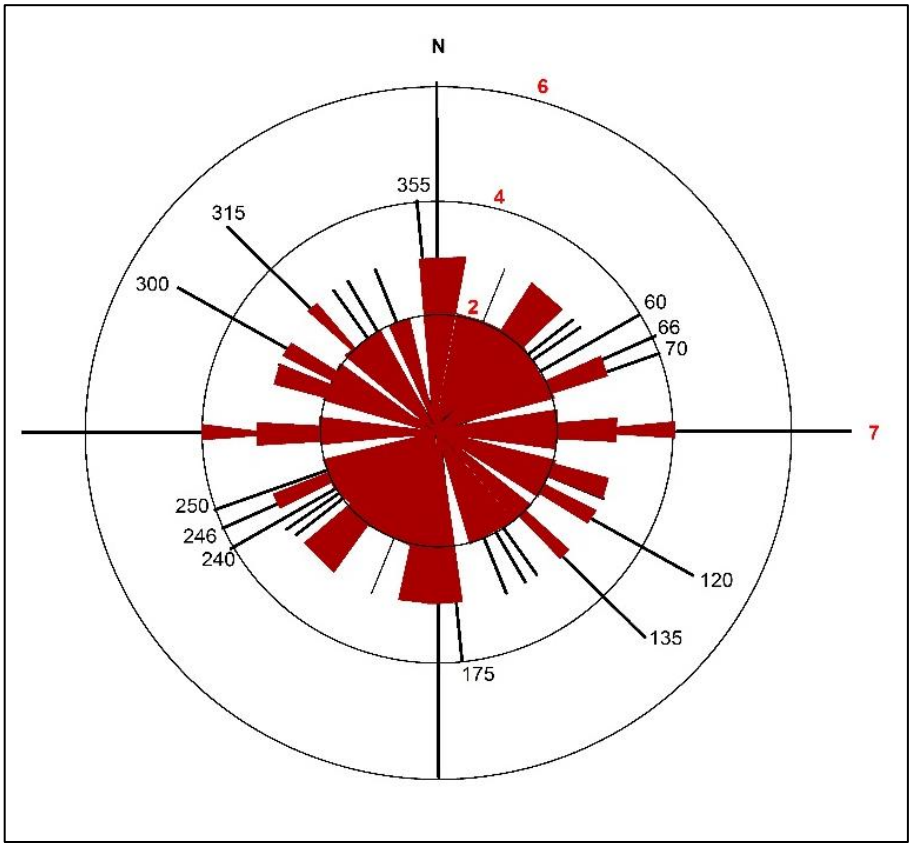


Figure 40. Frequency diagram of analyzed azimuths on cobble alignments from 23 stone features (2, 3, 4A, 4B, 5, 6, 7, 8A, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 29, and 31). Total number of azimuths analyzed is 444. Black numbers are degrees.

We then examined the long and cross axis azimuths from the data set of 15 features. Again, both fore and back sight azimuths were gathered and are presented in Figure 41. When we factored in a margin of error of ± 1° there is a strong tendency for an intercardinal directional layout on Features 3, 5, 11 and 22. This may indicate a shared conceptual relationship in their design and/ or function. Within this ± 1° error factor Features 7 and 13 share long axis of 158° and 338°, and cross axis of 68°and 248°. The 68° azimuth corresponds with the full solar disk at summer solstice on the eastern horizon; the inverse (248°) may be related to the winter solstice sunset. The 158° azimuth points toward sites 5GA4210 and 5GA4211 in the lower East Sulphur Gulch TCP area. The 338° azimuth points toward White Slide Mountain on the northern horizon and may be a sighting reference, involving the reappearance of all seven stars in the Big Dipper during January. Table 4 is a summary of the nine-combined egg/ oval shapes.

When we compare our observations and the larger group data set with the Feature 13 data set the contextual framework becomes clearer allowing us to formulate a preliminary predictive model for Feature 13 (Figure 42). The preliminary predictive model repetitive matches within ±1°occur at:

60° Features 6, 7, 31, and 13	Possible Northern Lunar Maximum Rise
66° Features 10, 11, and 13	Summer Solstice Sunrise, First Glimmer
68° Features 7, 11, and 13	Summer Solstice Sunrise, Full Solar Disk
93° Feature 6, 9 and 13	Equinox Sunrise, Full Solar Disk
109° Features 4B, 7, and 13	Possible Southern Lunar Minimum Rise
120° Features 3, 5, 7, 18, and 13	Possible Southern Lunar Maximum Rise
248° Features 7, 11, and 13 (back sight)	Possible Winter Solstice Sunset

Cardinal and inter-cardinal repetitive fore and back azimuths within ± 1°occur at:

90°/ 270°	Features 3, 4A, 4B, 5, 9,10, 14, 18, and 13	East - West
135°/ 315°	Features 5, 7, 9, 18, 22, 23, and 13	Southeast - Northwest
180°/ 360°	Features 3, 4A, 5, 6, 8A, 15, 18, and 13	North - South

Additional close cardinal and inter-cardinal repetitive matches within ± 2° occur at:

240°/ 242°	Features 6, 7, 31, and 13	Possible South Lunar Maximum Set
298°/ 300°	Features 3, 5, 7, 14, 18, 22 and 13	Possible North Lunar Minimum Set

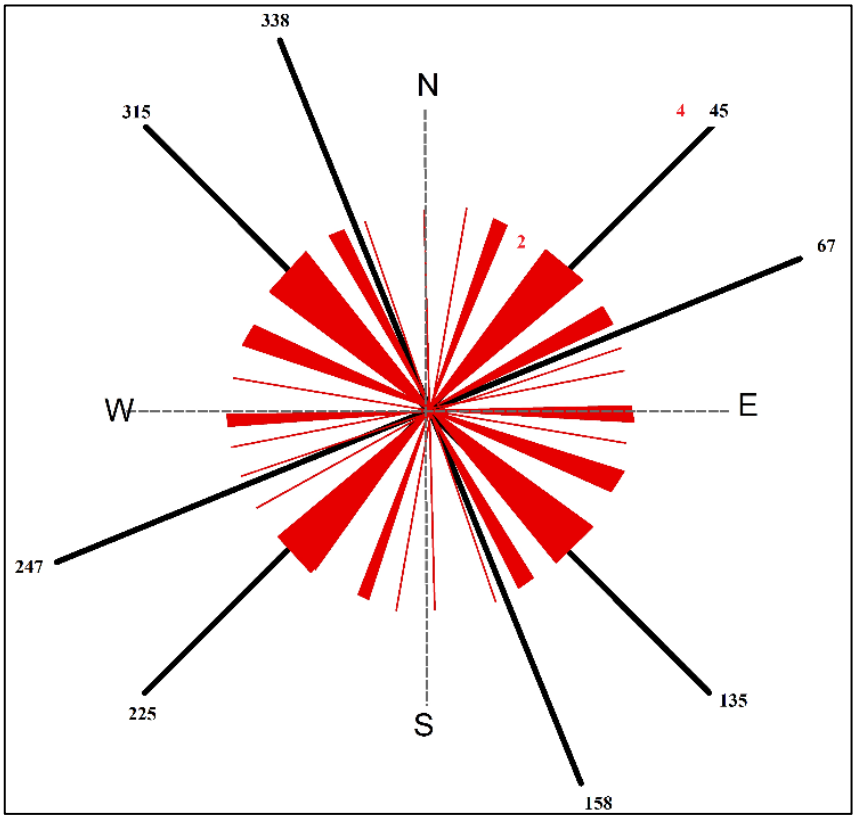


Figure 41. Frequency of occurrence (red numbers) of long and cross axis analyzed from 15 features (3, 5, 6, 7, 8A, 9, 10, 11, 13, 14, 16, 17, 18, 22, and 31) and 72 azimuths. Black numbers are degrees.

As stated previously, each of the features and their alignments must be tested individually as slight differences in the north/ south ground location relative to the horizon along with variations in the sighting elevation angle from ground elevation and/ or shifts in east/ west ground location may reflect changes; especially since 5GA4251 is almost one half mile in length with elevation changes of at least 60ft (see Figure 3).

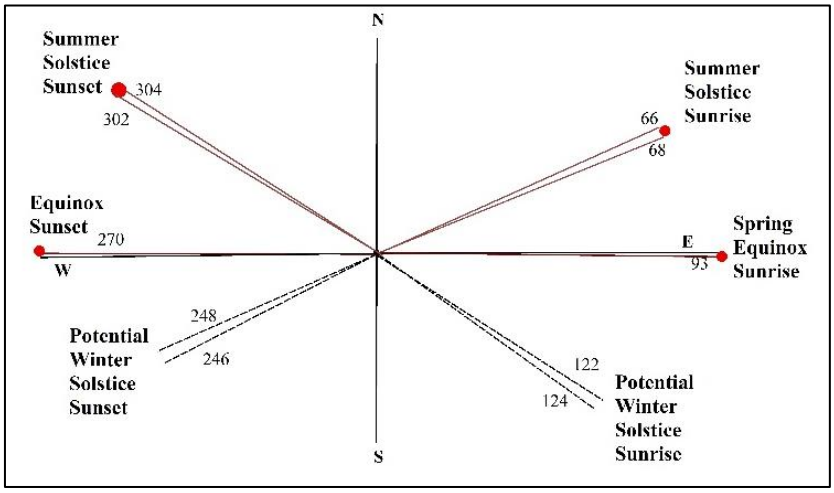


Figure 42. Preliminary predictive model for astronomical events at Feature 13. Orange dot indicates known events.

The importance and sacredness of the four cardinal directions is a common theme among numerous Native American groups. Therefore, our findings that 10 features on 5GA4251 have azimuths linked to those directions should come as no surprise. The use of the intercardinal directions is less common, but was used among the Plains Caddoans, especially the Pawnee (Wedel 1977: 131-145; Murie 1984). However, the inter-cardinals are generally represented at 5GA4251 primarily in the lay out of the long axis on nine oval and egg-shaped features. Six have a northwest/ southeast orientation and three have a northeast/ southwest orientation (Table 4). One interesting aspect is that the Big Horn Medicine Wheel in Wyoming is oval shaped and the Moose Mountain Medicine Wheel in Saskatchewan is egg-shaped; and both are laid out with a northwest/ southeast long axis. We aren't suggesting there is a connection, but think if there was.

Table 4. Combined Egg/Oval Shapes with Long and Cross Axis.

Feature No. (Orientation)	**Egg shape Long Axis**	**Egg shape Cross Axis**	**Oval Shape Long Axis**	**Oval Shape Cross Axis**	**Long Axis Length (m)**	**Cross Axis Width (m)**	**Area m2**
3 (NW/SE)	316°/136°	226 /46°			3.72	2.88	8.41
5 (NW/SE) Top = 3rd remodel Bottom = 1st design			300 /120° 317 /137° 314 /134°	210°/30° 227°/47° 224°/ 44°	4.12 3.88 3.30	3.73 2.77 2.30	12.06 8.44 5.96
7 (NW/SE)	321°/141°	231°/51°	338°/158°	248°/68°	2.55 2.63	1.68 2.10	3.36 4.34

Feature No. (Orientation)	Egg shape Long Axis	Egg shape Cross Axis	Oval Shape Long Axis	Oval Shape Cross Axis	Long Axis Length (m)	Cross Axis Width (m)	Area m2
9 (WNW/ESE)			280°/100°	190°/10°	4.14	3.20	10.40
10 (WNW/ESE) Bilaterally Symmetrical	292°/122° 299°/119°	202°/22° 209°/29°			4.88 4.70	2.88 2.84	11.03 10.48
11 (SW/NE)	225°/45°	315°/135°			4.46	3.57	12.50
13 (NW/SE)	338°/158°	248 /68°	338°/158°	248°/68°	5.75 3.55	4.65 2.30	20.99 6.41
18 (SW/NE)	241°/ 61°	331°/151°			4.15	2.75	8.96
22 (SW/NE)	225°/45°	315°/135°	199°/19°	289°/109°	3.35 3.71	2.18 2.78	5.73 8.10

Note: Area was computed L x W x 0 .785 (ellipse) and rounded up.

John Eddy (1977:159-162) summarized his study of 13 Medicine Wheel sites in Canada coming to several general conclusions.

1. Most sites are dominated by a central cairn often with a roughly circular ring or rings around them, 5 to 50m in diameter. Though some consisted of nothing but a cairn which can be highly variable in size.

2. The number of spokes is highly variable, ranging from none to as many as 28.

3. Spokes point to nearly all directions and are not predominately oriented to cardinal oriented-cardinal directions. Though there is a slight preference for southwesterly oriented spokes which could then be oriented to the summer solstice sunrise, if the central cairn is used as a foresight. More than half of the wheels he investigated have spokes or other directional features that fall within 2° of the summer solstice sunrise. Some wheels show a tendency for spokes or other features to line-up with the rising of the three brightest stars associated with the summer dawn, Aldebaran, Rigel, and Sirius when using the ring's center as a focal point. In other wheels, there is no indication of astronomical use.

4. All his sites are on hilltops or high mesas which have clear horizons. They are commonplace on the bald and treeless prairie; but none are known in the mountains or foothills, or even within sight of the mountains. The exception to this is, of course, is the Big Horn Medicine Wheel in Wyoming.

5. Medicine wheel patterns are diverse and seldom if ever repeated from site to site. Symmetry is unusual as the spokes seldom extend from the center in diametrically opposed directions.

There appears to be no consistent selection for an even or odd number of spokes, or for the number four, as might be expected if they were meant to point to cardinal or inter-cardinal directions.

6. Almost all the sites had tipi rings in the general vicinity indicating they were likely associated with places of semi-permanent encampment.

A comparison of differences between the Canadian Medicine Wheels with Gunsight Pass (5GA4251) and Dust Devil Gorge (5MF4423) we came to the following conclusions.

1. There are no central cairns at any of the features at 5GA4251, though a few small cairns are associated with some perimeter outlines. Dust Devil Gorge does have a central stone, a block of chalcedony, surround with two concentric circles of locally derived sandstone, but no cairns.

2. There are no spokes in the features at Gunsight Pass, but Dust Devil Gorge has four.

3. The alignments at Gunsight Pass are dominated by cardinal orientations as are Dust Devil Gorge's four spokes, which are roughly oriented toward the cardinal directions.

4. Both Gunsight Pass and Dust Devil Gorge incorporate fore-shortened horizons for their observations. Gunsight Pass is on a north-south oriented ridge and utilizes east, north, and west fore-shortened horizons. The eastern and western horizons are both defined by three rises and a pinnacle, though the western horizon is reversed from the eastern. The Dust Devil Gorge Medicine Wheel lies on a remnant bench within an isolated canyon/ basin complex. It also utilizes fore-shortened horizons with a maximum correlation to three topographic features along the eastern horizon to a peak just south of equinox. The lunar maximum rise appears from within Rock Art Canyon, while the lunar maximum set drops into Dust-Devil Gorge, as does the winter solstice sunset. The construction of Dust Devil Gorge Medicine Wheel was designed to correlate these topographic features to these celestial events.

5. There is both diversity and repetition in the feature forms of Gunsight Pass. The oval and egg-shapes are repetitively predominating, though there are three that are circular to oval shaped; one lens shape, boat shape, L-shape, and J-shape in addition to two three sided features. Bilateral symmetry is present–or nearly so–in the ovals, egg shapes, and circular forms, though the long axis is variable they are generally intercardinal based. It maybe they're trying to map a declination based upon the seasonal rise/set locations of certain stars or constellations. The "eccentric" cobble arrangements that look like constellations may provide a clue, as they may provide a technique to 'wiggle-in' toward the true cardinal directions through interpolation of selected stellar rise/ set positions.

Dust Devil Gorge has bilateral symmetry and is delineated by the diametrically opposed directions of the four spokes, though the spokes are slightly off along the north-south (8.3°/189.8°) and east-west (6°/275.6°) lines. This is probably due to construction based on equinox sunrise at 96°along the eastern horizon line. The number of stones in the wheel are both a solar and lunar calendar which can also be used to predict eclipses. "The outer circle and four axes [are] dedicated to the definition of lunar days, and the inner circle used

as a solar day count cycle and a means of positioning the solar months during the annual solar cycle from winter solstice initiation to the following winter solstice completion" (Hauck and Mueller 1999:31).

6. A large open campsite (5GA4283) is 350m northeast of Gunsight Pass. Hauck and Mueller (1999) report evidence of a locality that may have had an extended occupation near Dust Devil Gorge. Additionally, the locals know of numerous camp sites west of the wheel in and around Irish Canyon and Brown's Park.

The features at Gunsight Pass while relatively simple in their construction have diverse shapes that are not "tipi rings" nor are they large "medicine wheels" with defined central and/ or peripheral cairns and radiating spokes. They do, however, have sight lines across or along multiple cobbles related to feature outlines indicating astronomical alignments for summer solstice sunrise/ sunset, equinox sunrise/ set, the cardinal directions, and possibly the lunar maximum/ minimum rises and sets. Additionally, these alignments may also point toward bright stellar targets such as Sirius and/ or to the rise/ set of several possible constellations. Many of the feature outlines appear as ovals or egg-shapes which are very similar to the parallactic ellipse which is formed when a star is intermediate between the earth's ecliptic plane and the ecliptic pole–which results in the star seeming to shift position along an annual elliptical path–and mapping its path on the ground with stones. Furthermore, the Gunsight Pass Site uses a fore-shortened horizon line calendar which is not common at the Northern Plains medicine wheels, but is quite common in the Southwest culture area. The same can be said of the Dust Devil Gorge medicine wheel which incorporates aspects of both the northern medicine wheel format and the southern horizon calendar. Additionally, Dust Devil Gorge is within a region with demonstrated Fremont and possibly Basket Maker II affiliations. The differences in size may well be a function of differences in group size and social/ political/ economic systems. Thus, from our view point, the Gunsight Pass Site observatory was probably built by different hunting/ gathering peoples over a long period and for the same or possibly different and evolving purposes.

Eddy (1977) has succinctly concluded the authors opinions that: "there is a great deal of diversity, with the medicine wheels in Canada being a "mixed bag" of things classified under a rather miscellaneous heading; that an appreciable number of them show astronomical alignment to the directions of rise on a restricted set of summer sky objects; and that they were probably built by different peoples over a long period and for possibly different or evolving purposes." Additionally, Gunsight Pass not only is a sacred place, but serves a sacred function as an astronomical observatory.

SUMMARY AND CONCLUSIONS

In summary, the principle objectives for this project were: 1) a detailed recording of the archaeological and architectural stone features identified; 2) make initial determinations as to whether these features represented domiciles, or ceremonial features; 3) identify potential astronomical alignments with the surrounding horizon lines; 4) make observations concerning other orientations toward potential sacred land forms such as Whitely Peak, Wolford Mountain, or the Sulphur Gulch area; and 5) assess the data for consideration as a Traditional Cultural Property (TCP) relevant to historic Ute, Arapahoe, and/ or eastern Shoshoni tribes. Lastly, NRHP evaluations were made along with recommendations to mitigate any observed adverse effects.

5GA4251, Gunsight Pass is classified as an open architectural site with an associated diffuse lithic scatter. The site is located atop a distinctive north-south trending ridge west of Troublesome Creek at an elevation of 8460-8520 feet. The location was chosen specifically for its fore-shortened horizon lines to provide distinctive landmarks for celestial observation. Water sources are close by – Troublesome Creek east and springs or seeps were also likely given the current vegetational communities of sage with scattered aspen groves. The depositional environment is Quaternary alluvial deposits topped with shallow Holocene loess.

A total of 34 features were identified; 33 are prehistoric architectural stone features with one modern memorial. Cobble feature shapes include: five egg; three oval; three circular to oval; four L-shaped; one J-shaped; two lens; one square with a cairn and a linear extension; three eccentric curvilinear; one paired upright slab/ rock; two small prayer circles, three stone cairns; one linear alignment; and two thermal features. While wind deflation is a threat many feature cobbles are at least 50% to 75% buried, so there is excellent potential for intact cultural deposits. The most deeply buried cobble features may date into the Archaic Era while the surficial to shallowly buried rock features probably represent later occupations in the Formative or Proto-historic Eras.

Feature 13, the focus of this assessment, was hand mapped using a tape measure and an Ushikata S-25 transit. The rest of the features were mapped using a Trimble GPS; data was downloaded into ArcView v.10 to create the master site and feature plan maps. Azimuth orientations were based on plan maps and Terrain Navigator Pro. Hypothesized alignments had to meet three criteria: 1) identification and location of an observation point(s); 2) a minimum of at least three or more points of reference in the alignment; and 3) identification of the potential observation target point(s) within a 20-mile radius. Line-of-sight alignment error factors had a ± 2° of arc and a cobble offset distance of ± 20cm. A group data set of all the feature alignments and an individual data set of alignments for Feature 13 were generated. Hypothesized cobble alignments for equinox sunrise/ sunset and summer solstice sunrise/ sunset at Feature 13 were field tested relative to the solar events by direct observation. A preliminary alignment predictive model produced repetitive matches within ± 1° at 10 features (3, 4B, 5, 6, 7, 10, 11, 13, 18, and 31); cardinal and inter-cardinal matches within ± 1° occurred at 14 features (3, 4A, 4B, 5, 7, 8A, 9, 10, 13, 14, 15, 18, 22, and 23). Possible lunar alignments occur at nine features (3, 5, 6, 7, 13, 31, 14, 18, and 22). Azimuths related to the sacred cardinal directions are the most prevalent, while intercardinal azimuths are represented by the long axis of nine oval and egg-shaped features. Six have a northwest/ southeast orientation and three have a northeast/ southwest orientation.

In conclusion, 5GA4251 in not your typical "tipi ring" site. With a single exception (Feature 20), the feature outlines do not appear to be domestic structures. Based upon our observations, the site is an astronomical observatory/ calendar. Though the features are simple compared to other astronomically related constructions in the archaeological record, they still can function as horizon calendars. The diversity of outline shapes suggests different construction formats, orientation toward different celestial objects and/ or events –probably reflecting different observations made at different seasons, or for different reasons. This site has generated more questions than answers. Just to name a few:

Are the features within a given locality related to each other?
Do the different localities interact with each other?

Are some still under construction?
Have others been refurbished? How old are they?

Since the cardinal directions are so prominently represented, is there a sequence involving the precession of the equinoxes from Thuban (in Draco) as the pole star at ca. 3000 BC to Polaris (in Ursa Minor) as the current pole star? Are the bright stars and/or planets involved?

Thus, our initial evaluation and assessment of the Gunsight Pass Site observatory is that it may have been built and utilized by different hunter/ gathers over a long period for possibly different or evolving purposes.

Trails

At least three explorers ventured into the Middle Park area–John Wesley Powell, John Fremont, and Hayden. However, based upon their maps it does not appear that any were near Gunsight Pass. Large portions of their trails were based upon existing Indian trails which later became major transportation routes in Middle Park. For example: U.S. Highways 6 and 40, Colorado Highway 134 over Gore Pass, and the Trough Road.

While the 1875 GLO map does indicate, a trail going up the Troublesome from the Colorado River with a deviation to the west, through the 'Gunsight'. However, it appears that the surveyors were over a mile off in their placement of the track. If its assumed that the Troublesome Creek drainage has not deviated much in the last 170 years – then this westerly trending track should go through the 'Gunsight' north of site 5GA4251. Otherwise, the roads and trails today have not changed much in the past 100 years.

The review indicated several more possible trail routes which could have been used by prehistoric people. For example, the track from Blue River through Harsha Gulch over Lawson Ridge into the William Fork River drainage. There are several redundant feature alignments pointing to this area. Additionally, the Arapahoe, Troublesome, and Willow Creek passes are well known trails/ roads. This preliminary review of the archival data suggests that there is much more work to be done in the identification possible prehistoric trails.

EVALUATIONS AND RECOMMENDATIONS

Significance is a quality of cultural resource properties that qualifies them for inclusion in the National Register of Historic Places (NRHP) and/ or the State Register of Historic Places (SRHP). The statements of significance are field assessments to support recommendations to the BLM and State Historic Preservation Officer (SHPO).

The Code of Federal Regulations was used as a guide for the field evaluation of the site. Titles 36CFR50, 36CFR800, and 36CFR64 are concerned with the concepts of significance and (possible) historic value of cultural resources. Titles 36CFR65 and 36CFR66 provide standards for the conduct of significant and scientific data recovery activities. Finally, Title 36CFR60.6 establishes the measure of significance that is critical to the determination of a site's National Register of Historic Places (NRHP) eligibility, which is used to assess a site's research potential:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and a) that are associated with events that have made a significant contribution to the broad patterns of history; or b) that are associated with the lives of persons significant in our past; or c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or d) that have yielded, or may be likely to yield, information important to prehistory or history.

Most of the architectural features on 5GA4251 appear to be ceremonial features associated with astronomical alignments and surrounding horizon lines, vision quests, or small prayer circles/ shrines. Identification of age and cultural affiliation(s) are presently limited. A possible Cottonwood Triangular projectile point and one large (3.8m diameter) cobble configuration (Feature 20) indicates a possible Proto-historic or Historic Period occupation. Many of the feature cobbles are at least 50% to 75% buried, so there is excellent potential for intact cultural deposits. The most deeply buried cobble features may date into the Archaic Era while the surficial to shallowly buried rock features probably represent later occupations in the Formative or Proto-historic Eras. There also appears to be geo-navigational orientations toward possible sacred land forms such as Whitely Peak, the Wolford Mountain vicinity, Junction Butte, and east Sulphur Gulch area (O'Neil et.al. 2011a). It has become increasingly evident that there are Traditional Cultural Properties involving multiple Native American tribes. These areas need to be protected and respected through consultation with the various Native American groups. Some of these sites may be reintegrated back into traditional tribal practices, and local area residents and public land users need to be made aware and educated about multi-cultural values. One way to accomplished this is through local BLM/KFO Resource Advisory Councils.

Therefore, this site is considered Field Eligible for listing on the National Register of Historic Places as it meets Criteria C and D, as well as Criteria D and E of the State Register of Historic Places.

Recommendations

Given the current prevalent precipitation patterns, overgrazing should be controlled to minimize the impacts from wind deflation and slope wash. Based upon past and present experiences, nearly all sites on exposed ridge tops, ridge slopes, and terraces show severe effects due to lack of vegetation cover exacerbating erosional effects.

It is strongly recommended that the BLM/ KFO conduct Native American consultations with the Northern Ute, Eastern Shoshone, and Northern Arapahoe. In addition, we recommend the following actions be undertaken:

- Conduct detail GIS mapping of and analysis of alignment azimuths on Feature 31.
- Hypothesized celestial observations need to be verified by a professional archaeo-astronomer to determine if the hypotheses are valid.

- Testing of Features 19 and 21 to obtain radiocarbon, pollen, and macrofloral samples for analysis.
- Archaeological excavation on at least one of the features to determine construction techniques and provide information on cultural activities.
- Geomorphological testing to establish soil horizons in concert with cultural and environmental data gathering to compare upland and lowland soil data from excavated sites on the terraces along Wolford Mountain Reservoir.
- Additional archival review and ground verification of known and potential trails.
- Continued investigation of similar open architectural sites in Middle Park and how they may relate to the "Gunsight Pass" site as part of a sacred landscape.
- Maintain the current travel closure, monitor site condition for impacts and develop mitigation measures as necessary.
- Respect for the memorial – Feature 30.

BIBLIOGRAPHY

Antevs, Ernst

1948 Climatic Changes and Pre-White Man in the Great Basin with Emphasis on Glacial Times and Postglacial Times. Bulletin of the University of Utah 38(20), Biological Series 10(7):168-191.

1955 Geologic-climate dating in the West. American Antiquity 20(4, Pt.1):317-355.

Ashmore, Wendy and A. Bernard Knapp

1999 *Archaeologies of Landscape.* Blackwell Publishers, Lt

Athearn, Frederick J.

1976 *An Isolated Empire, A History of Northwestern Colorado.* Bureau of Land Management Cultural Resources Series Number 2, Historical, Denver.

Aveni, Anthony F.

1972 Astronomical Tables intended for use in Astro-Archaeological Studies. *American An*tiquity, Vol. 37, No. 4, pp. 531-540.

Benedict, James B.

1985a Arapaho Pass: Glacial Geology and Archeology at the Crest of the Colorado Front Range. Research Report No. 3. Center for Mountain Archaeology, Ward, CO.

1985b Old Man Mountain: A Vision Quest Site in the Colorado High Country. Research Report No. 4. Center for Mountain Archeology, Ward, CO.

1989 Age of Punctate Pottery from the Caribou Lake Site: Comparison of Three Physical Dating Methods. *Southwestern Lor*e 55(2):1-10.

Bevan, Andrew and James Conolly

2004 GIS, Archaeological Survey, and Landscape Archaeology on the Island of Kythera, Greece. *Journal of Field Archaeology,* 29(1):123-138.

Black, Kevin D. And Michael D. Metcalf, Editors

2012 Colorado Archaeology Vol. 3, Papers in Honor of James B. Benedict, and Southwestern Lore, *Journal of Colorado Archaeology* Vol. 78, No. 1. A Joint Publication of The Colorado Archaeological Society and The Colorado Council of Professional Archaeologists, Denver.

Blackhawk, Ned

2006 *Violence Over the Land: Indians and Empires in the Early American West*. Harvard University press.

Brumley, John H.
1988 Medicine Wheels on the Northern Plains: A Summary and Appraisal. *Archaeological Survey of Alberta Manuscript Series*, No. 12, Alberta Cultural and Multiculturalism Historical Resources Division, Ethos Consultants Ltd., Medicine Hat, Alberta., Canada.

Buckles, William G.
1971 The Uncompahgre Complex: Historic Ute Archaeology and Prehistoric Archaeology of the Uncompahgre Plateau, West-Central Colorado. Ph.D. dissertation, University of Colorado. University Microfilms, Ann Arbor.

Burns, Sam
2004 *The Ute relationships to the lands of West Central Colorado: An Ethnographic Overview* prepared for the U.S. Forest Service. Office of Community Services, Fort Lewis College, Durango, Colorado. http://swcenter.fortlewis.edu/inventory/UteLands.htm, accessed January 6, 2009.

Campana, Stefano and Riccardo Francovich
2001 *Landscape Archaeology in Tuscany: Cultural Resource Management, Remotely Sensed Techniques, GIS Based Data Integration and Interpretation*. http://internt.ht.lu.se/media/utbildning/dokument/kurser/ARKN06/20102/Landscape_Archaeology_in_Tuscany.pdf.

Cassells, E. Steve
1997 *The Archaeology of Colorado*. Revised Ed. Johnson Books, Boulder, CO.

Chandler, Katy
1994 *A Cultural Resource Inventory for the Northend Fence in Grand County, CO.* (GA.LM. R65). Ms. on file at Bureau of Land Management, Kremmling Field Office.

Church, Minette C., Steven G. Baker, Bonnie J. Clark, Richard F.Carrillo, Jonathon C. Horn, Carl D. Spath, David R. Guilfoyle, and E. Steve Cassells.
2007 *Colorado History: A Context for Historical Archaeology*. Colorado Council of Professional Archaeologists, Denver.

Conner, Carl E., Barbara Davenport and Nicole Darnell
2012 *Report of the Class III Cultural Resources Inventory for a Block Area of 2425 Acres within the proposed Red Wash Coal Lease (COC74813) in Rio Blanco County, Colorado, for Blue Mountain Energy, Inc*. Ms on file, Bureau of Land Management, Grand Junction Field Office.

Criado, Filipe and Cesar Parsero
1997 *Landscape, Archaeology, Heritage Postela* 1st Edition.

Cummings, Linda Scott, and Thomas E. Moutoux

1998 Pollen Analysis at the Jerry Craig (5GA639) and Lower Twin Mountain Sites and a Paleoenvironmental Summary of the PaleoIndian Period in Middle Park, Colorado. In *Early Prehistory of Middle Park: The 1997 Project and Summary of Investigations*. Edited by M. Kornfeld, pp 95-100. Technical Report 15a, Department of Anthropology, University of Wyoming, Laramie.

DARG - Dominguez Archeological Research Group

2005 - 2011 *The Colorado Wickiup Project, Volumes 1 – 5*. Prepared for The Colorado Historical Society, State Historical Fund. Ms. on file at the Office of Archaeology and Historic Preservation and the Bureau of Land Management, Colorado State Office, Denver. dargnet.org/publications.html.

Davis, Leslie B., editor

1983 From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation. *Plains Anthropologist*, Memoir 19, Vol. 28, No. 102, Part 2. Plains Anthropological Society.

Davis, William E.

1983 A Morphological Analysis of Stone Circles from the Copper Mountain Project, Shoshoni, Wyoming. *Plains Anthropologist*, Memoir 19, Vol. 28, No. 102, Part 2, pp.71 - 79. Plains Anthropological Society.

Duncan, Clifford

2003 The Northern Utes. In *A History of Utah's American Indians*. Forrest S. Cuch ed. Pp. 167-224. Utah State Division of Indian Affairs, Utah State Division of History, Salt Lake City.

Eddy, John A.

1974 Astronomical Alignment of the Big Horn Medicine Wheel. *Science no. 184.*

1977 Medicine Wheels and Plains Indian Astronomy. *In Native American Astronomy*. Edited by Anthony Aveni. University of Texas Press, Austin.

1979 Medicine Wheels and Plains Indian Astronomy. *In Astronomy of the Ancients*. Edited by Kenneth Brecher and Michael Feirtag. Massachusetts Institute of Technology Press, Cambridge.

Emmitt, Robert

1954 *The Last War Trail*. University of Oklahoma Press, Norman.

Fall, P. L.

1997a Timberline Fluctuations and Late Quaternary Paleoclimates in the Southern Rocky Mountains, Colorado. *GSA Bulletin 109* (10):1306-1320.

1997b Fire History and Composition of the Subalpine Forest of Western Colorado During the Holocene. *Journal of Biogeography* 24:309-325.

Farnham, Thomas J.

1841 *Travels in the Great Western Prairies, the Anahuac and Rocky Mountains, and in the Oregon Territory*. Killey and Lossing, Printers, Poughkeepsie.

Fitting, J. E., H. L. Wittier; J. G. Franzen; K. A, Paulsen; D. G. Anderson

1978 *A Class II Cultural Resources Inventory of the Middle Park Planning Unit, Craig District, Colorado.* Commonwealth Associates Report No. R-1879. Prepared for the Bureau of Land Management, Craig District.

Fowler, Catherine S.

2000 Great Basin Affiliations of the Ute Peoples of Colorado, in *Ute Indian Arts and Culture from Prehistory to the New Millennium*, edited by William Wroth, pp. 89-106. Taylor Museum of the Colorado Springs Fine Arts Center, Colorado Springs.

Fowler, Don D. and Catherine S. Fowler, editors

1971 *Anthropology of the Numa*: John Wesley Powell's Manuscripts on the Numic Peoples of Western North America, 1868-1880. Smithsonian Contributions to Anthropology, No. 14. Smithsonian Institution Press, Washington, D.C.

Fremont, John C.

1887 *Memoirs of My Life (Volume 1).* Belford, Clarke & Company, Chicago.

1970 *The Expeditions of John Charles Fremont (Volume 1 -- Travels from 1838 to 1844.* Edited by Donald Jackson and Mary Lee Spence. University of Illinois

Frison, George C.

1978 *Prehistoric Hunters of the High Plains.* Academic Press, New York.

1991 *Prehistoric Hunters of the High Plains*. 2nd. ed. Academic Press, New York.

1992 The Foothills-Mountains and the Open Plains: The Dichotomy in PaleoIndian Subsistence Strategies Between Two Ecosystems. In *Ice Age Hunters of the Rockies*, edited by D. J. Stanford and J. S. Day, pp. 323-342. Denver Museum of Natural History and University Press of Colorado, Niwot, CO.

Grant, Marcus and Cheryl Harrison

1980 *Archaeological Reconnaissance of the Red Butte Stone Circle Site (48CO26) Near Glenrock, Wyoming*. Vol. 1, Report of Findings. Western Cultural Resource Management, Inc. Boulder, CO.

Grant, Marcus

1981 *Prehistoric Settlement in the Dave Johnston Coal Mine Lease Area Near Glenrock, Wyoming.* Vol. 1, Report of Findings. Western Cultural Resource Management, Inc. Boulder, CO.

Greenberg, Marc E., Suzanne Brant, Alexander Cragg, and Lovella Learned Kennedy.

2007 *Class III Cultural Resource Inventory of the Gunsight Pass Dixie Harrow Project, Grand County CO.* (GA.LM.R235). Cultural Resource Analysts, Inc. Ms. on file at Bureau of Land Management, Kremmling Field Office.

Greubel, Rand A.

2001 Simpson Wickiup Site (5SM2425). Volume 4, Chapter 24, in *The TransColorado Natural Gas Pipeline, Archaeological Data Recovery Project, Western Colorado and Northwestern New Mexico.* Alpine Archaeological Consultants, Inc., Montrose, CO.

Goss, James A.

2003 An Ethnographic Conversation held with Sam Burns, tape-recorded at Fort Lewis College, October 24, 2003, Durango, Colorado. Quoted in "The Ute relationships to the lands of West Central Colorado: An ethnographic overview", prepared for the U.S. Forest Service by Sam Burns, Office of Community Services, Fort Lewis College, Durango, Colorado. Electronic document, http://swcenter.fortlewis.edu/inventory/UteLands.htm, accessed January 6, 2009

Gulliford, Andrew

2000 *Sacred Objects and Sacred Places: Preserving Tribal Traditions*. University Press of Colorado, Boulder.

Harrison, Cheryl A. and Marcia J. Tate

2000 *Cultural Resources Inventory of the Wolford Mountain Reservoir Shoreline, Grand County, Colorado.* Tate and Associates, Denver. Ms. on file at Bureau of Land Management, Kremmling Field Office.

Hauk, F. Richard and Brian Mueller

1999 The Dust Devil Gorge Medicine Wheel: A study in Time and Space. *Archaeoastronomy Research Series*: No. 1. Archaeological Research Institute, Bountiful, Utah.

Holmer, Richard N.

1978 *A Mathematical Typology for Archaic Projectile Points of the Eastern Great Basin*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Utah, Salt Lake City.

1986 Common Projectile Points of the Intermountain West. *In Anthropology of the Desert West, Essays in Honor of Jesse D. Jennings*, edited by C. J. Condie and D. D. Fowler, pp. 89-115. Anthropological Papers No. 110. University of Utah, Salt Lake City.

Kehoe, Thomas F.

1958 Tipi Rings: The 'Direct Ethnological' Approach applied to an Archaeological Problem. *American Anthropologist* 60(5):861-873.

1960 Stone Tipi Rings in North Central Montana and the Adjacent Portion of Alberta Canada: Their Historical, Ethnological and Archaeological Aspects. *Bureau of American Ethnology*, Bulletin 173. Washington, D.C.

1983 A Retrospective and Commentary. In From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation. *Plains Anthropologist, Memoir* 19, Vol. 28, No. 102, Part 2, pp. 327-342. Plains Anthropological Society.

Kehoe, Thomas F. And Alice B. Kehoe.

1979 Solstice Aligned Boulder Configurations in Saskatchewan. *National Museum of Man Mercury Series*, Canadian Ethnology Service Paper No. 48.

Knight, Terry, Sr.

2008 Personal communication with Richard Ott, Grand Junction, Colorado.

Kornfeld, Marcel

2012 Being High in Middle Park. In *Colorado Archaeology* Vol. 3:30 -34, and *Southwestern Lore*, Vol. 78, No. 1. A Joint Publication of The Colorado Archaeological Society and The Colorado Council of Professional Archaeologists, Denver.

Kornfeld, Marcel, George C. Frison, and Mary Lou Larson

2010 *Prehistoric Hunter-Gatherers of the High Plains and Rockies*, 3rd Edition. Left Coast Press, Inc. Walnut Creek, CA.

Kornfeld, Marcel and George C. Frison

2000 PaleoIndian Occupation of the High Country: The Case of Middle Park, Colorado. *Plains Anthropologist* Vol. 45, No. 172:129-153.

Kornfeld, Marcel, George C. Frison, Mary Lou Larson, James C. Miller, and Jan Saysette

1999 PaleoIndian Bison Procurement and Paleoenvironments in Middle Park, Colorado. *Geoarchaeology* 14:655-674.

Kvamme, Kenneth L.

1979 Archaeological Clearance Survey of Nine Sunoco Drill Sites in Grand County, CO. (GA.LM.R178). Centuries Research, Inc. Ms. on file at the Bureau of Land Management, Kremmling Field Office.

Larson, Mary Lou, and Marcel Kornfeld

1994 Betwixt and Between the Basin and the Plains: The Limits of Numic Expansion. In Across the West: Human Population Movement and the Expansion of the Numa,

edited by D. B. Madsen and D. Rhode, pp 200-210. University of Utah Press, Salt Lake City.

Laubin, Reginald and Gladys Laubin
1957 *The Indian Tipi: Its History, Construction, and Use*. Ballantine Books, New York.

Lewis, David Rich
1994 *Neither Wolf Nor Dog: American Indians, Environment, and Agrarian Change*, Oxford University Press.

Liestman, Terri L.
1984 *Archaeological Excavations at the Pontiac Pit Site: A Multi-component Campsite in the Rocky Mountains*. Midwest Arcaeological Center, Lincoln, Nebraska.

Liewer, Jim, pc.
2013 Personal communications regarding knowledge and location of stone ring sites on private land and Colorado Division of Wildlife lands in Middle Park. Mr. Liewer (retired Colorado Division of Wildlife Game Warden and a member of the Colorado Archaeological Society).

Lipe, William D., Mark Varien, and Richard H. Wilshusen, editors.
1999 *Colorado Prehistory: A Context for the Southern Colorado River Basin.* Colorado Council of Professional Arcaeologists, Denver.

Lischka, Joseph J. and Kevin Black
1979 *Final Report on a Cultural Resource Inventory and Testing Program of Archaeological Sites in the Right of Way of the Gore Pass - Windy Gap Transmission Line.* University of Colorado - Boulder (Department of Anthropology). Ms. on file at Bureau of Land Management, Kremmling Field Office.

Madsen, D. B., and M. D. Metcalf (editors)
2000 *Intermountain Archaeology*. University of Utah Press, Salt Lake City.

McClusky, Stephen C.
2005 *Different Astronomies, Different Cultures and the Question of Cultural Relativism*. Current Studies in Archaeoastronomy: Conversations Across Time and Space. Selected Papers from the Fifth Oxford Conference at Santa Fe, 1996. John W Fountain and Rolf M. Sinclair, editors. Carolina Academic Press, Durham, North Carolina.

Mehls, Steven F.
1984 *Colorado Mountain Historic Context*. Colorado Historical Society, Denver.

Metcalf, Michael D. and Kevin Black

1991 *Archaeological Excavations at the Yarmony Pit House Site, Eagle County, Colorado*. United States Department of the Interior, Bureau of Land Management, Colorado, Cultural Resource Series No. 31.

Metcalf, Michael D., Ronald J. Rood, Patrick K. O'Brien, and Bret R. Overturf

1991a *Kremmling Chert Procurement in the Middle Park Area, Colorado: 5GA1144 and 5GA1172*. Metcalf Archaeological Consultants, Inc., Eagle, CO. Submitted to J. F. Sato and Associates, Golden, CO. Ms. on file, Office of Archaeology and Historic Preservation, Denver, and BLM, Kremmling.

Metcalf, Michael, Kimberly Spurr and John M. Scott

1991b *Grand River Ranch Land Exchange (Dan Ritchie Ranch) and Addendum*. Metcalf Archaeological Consultants. Ms. on file at Colorado Office of Archaeology and Historic Preservation, Denver, BLM, Kremmling Field Office, and Routt National Forest.

Meyer, James, Marcel Kornfeld, and Richard G. Reider

2010 The Geoarchaeological and Paleoenvironmental Context of Paleoindian Sites in Western Middle Pare, Colorado, USA. *Geoarchaeology* Vol. 25, No. 2: 151-194.

Miller, James C.

1990 *Lithic Resources in the Troublesome Formation*. Prepared for Metcalf Archaeological Consultants. Ms. on file at Bureau of Land Management, Kremmling Field Office, Kremmling, CO.

1991 Lithic Resources. Chapter 12 in Prehistoric Hunters of the High Plains (Frison, G., 1991)

1992 *Geology in Archaeology: Geology, Paleoclimates, and Archaeology in the Western Wyoming Basin*. M.A. thesis (anthropology), University of Wyoming, Laramie.

1993 Geology of Sites 39PN972, 39PN974, 39PN975, and 39PN976, Pennington County, South Dakota. Chapter 2 in Results of Archaeological Investigations at 39PN972, 39PN974, 39PN975, and 39PN976, Pennington County, South Dakota. Thomas K. Larson and Dori M. Penny (editors). Prepared for USDA, Forest Service, Black Hills National Forest by Larson-Tibesar Associates, Laramie Wyoming.

1995 Geology of 5GA1598, 5GA1599, 5GA1602, 5GA1604, and 5GA1609 Colorado River Water Conservation District, Wolford Mountain Dam and Reservoir Project, Grand County, Colorado. Appendix A in Wolford Mountain Dam and Reservoir Project: Results of Phase I and Phase II Excavations at Seven Sites in Grand County, Colorado. Ms. on file at Bureau of Land Management, Kremmling Field Office, Kremmling, CO.

2005 Evidence for Mid-Holocene Climatic Amelioration in Rocky Mountain Basins and Western Plains Areas. Paper presented at the 7th Biennial Meeting of the Rocky Mountain Anthropology Conference, Park City, UT. James C. Miller, Department of Geology, University of Wyoming, Laramie.

2011 (in prep.) Geology and Geoarchaeology of Latest Pleistocene and Holocene Deposits in the Wyoming Basin, Rocky Mountains, eastern Colorado Plateau, and western Plains. Ph.D. dissertation, Department of Geology and Geophysics, University of Wyoming, Laramie.

Naze, Brian

1986 The Folsom Occupation of Middle Park, Colorado. *Southwestern Lore* 52(4):132.

1994 *The Crying Woman Site: A Record of Prehistoric Human Habitation in the Colorado Rockies*. M. A. thesis, Department of Anthropology, Colorado State University, Fort Collins.

O'Neil, Brian

1994 *The Archaeology of the Grand Junction Resource Area: Crossroads to the Colorado Plateau and the Southern Rocky Mountains*. A Class I Overview. Unpublished Manuscript on file at the Grand Junction Resource Area Office, Grand Junction, Colorado.

2002 *Salvage Data Recovery at Sites 5GA2524 and 5GA2526 on Grazing Lease Allotment 7505, Lower Sulphur Gulch, in Middle Park, Grand County, Colorado.* Prepared for the Bureau of Land Management, Kremmling Field Office. Western Colorado Archaeological Consultants, Grand Junction, CO. [WCAC Project No. 2001-2]. Ms. on file at Bureau of Land Management, Kremmling Field Office.

2003a *An Assessment of Archaeological Impacts on Grazing Allotments: 7503; 7507; 7538; 7556; 7558; 7560; 7784; and 7049; in Middle Park and North Park, Grand and Jackson Counties, CO*. Western Colorado Archaeological Consultants. [WCAC Project No. 2002-2]. Ms. on file at Bureau of Land Management, Kremmling Field Office.

2003b *Salvage Data Recovery at Site 5GA2912, Feature # 1, on Grazing Lease Allotment 7556, Moore Reservoir Basin-North, in Middle Park, Grand County, Colorado.* Western Colorado Archaeological Consultants, Grand Junction, CO. [WCAC Project No. 2003-2]. Ms. on file at Bureau of Land Management, Kremmling Field Office.

2006 *A Class III Cultural Resources Survey of Selected Roads for the 2006 - BLM Travel Management Plan, Wolford Planning Area, Wolford Mountain Sub Unit, in Grand County, CO*. Western Colorado Archaeological Consultants, Grand Junction, CO. [WCAC Proj. No. 2006-1]. Ms. on file at Bureau of Land Management, Kremmling Field Office.

2011a *Cultural Resources Report for the East Sulphur Gulch Block Survey in Middle Park, Grand County, Colorado*. Dominguez Anthropological Research Group, Grand Junction, CO. Ms. prepared for and on file at the Bureau of Land Management, Kremmling Field Office.

2011b *A Class III Archaeological Survey and Assessment of Archaeological Impacts on Grazing Lease Allotment 7503, in Middle Park, Grand County, CO.* Western Colorado Archaeological Consultants, Grand Junction, CO. [WCAC Proj. No. 2011-2]. Ms. on file at Bureau of Land Management, Kremmling Field Office.

2012 *A Class III Archaeological Survey and Assessment of Impacts on Grazing Lease Allotment 7552, in Middle Park, Grand County, CO*. Western Colorado Archaeological Consultants, Grand Junction, CO. [WCAC Proj. No. 2011-1]. Ms. on file at Bureau of Land Management, Kremmling Field Office.

O'Neil, Brian and Carl E. Conner, Barbara J. Davenport, and Richard Ott

2004 *Archaeological Assessment of the Rifle Wickiup Village: 5GF308, in Garfield County, Colorado*. Dominquez Archaeological Research Group, Grand Junction, CO. Ms. on file at the Colorado Historical Society, Office of Archaeology and Historic Preservation, and at BLM, Glenwood Springs Field Office.

Ovenden, Michael W. and David A. Rodger

1981 Megaliths and Medicine Wheels. In *Megaliths to Medicine Wheels: Boulder Structures in Archaeology*. Proceedings of the Eleventh Annual Chacmool Conference, pp. 371-386. Michael Wilson, Kathie L. Road and Kenneth J. Hardy, editors. Archaeological Association, Department of Archaeology, University of Calgary, Alberta, Canada.

Pitblado, Bonnie L.

1993 *PaleoIndian Occupation of Southwest Colorado*. M. A. thesis, Department of Anthropology, University of Arizona, Tucson.

1994 PaleoIndian Presence in Southwest Colorado. *Southwestern Lore* 60 (4):1-20.

Powell, J. W.

1961 *The Exploration of the Colorado River and its Canyons*. Dover Publications Inc., New York. (Reprint of Canyons of the Colorado, Flood and Vincent, 1895.)

Reed, Alan D. and Michael D. Metcalf

1999 *Colorado Prehistory: A Context for the Northern Colorado River Basin.* Colorado Council of Professional Archaeologists, Denver.

Reed, Alan D., S. Rheagan Alexander, Johnathon C. Horn, and Summer Moore
2008 *Class I Cultural Resource Overview of Bureau of Land Management, Kremmling Field Office, North-Central Colorado*. Report prepared for USDI Bureau of Land Management, CO, Kremling Field Office, by Alpine Archaeological Consultants, Montrose, CO. Ms. on file at BLM/Kremmling Field Office.

Reider, Richard G.
1998 Soil Investigations at Archaeological Sites, Middle Park, Colorado. In *Early Prehistory of Middle Park*: The 1997 project and Summary of Paleoindian Archeology, edited by Marcel Kornfeld, pp. 63-69. Technical Report No. 15a, Department of Anthropology, University of Wyoming.

Schubert, Karen C.
1981 *Final Report of a Class I Cultural Resource Inventory of the Kremmling Resource Area*. Reports of the Laboratory of Public Archaeology No. 57. Colorado State University, Ft. Collins, CO.

Smith, Anne M.
1974 *Ethnography of the Northern Utes. Papers in Anthropology 17.* Museum of New Mexico Press, Santa Fe

Stiger, Mark A.
1981 *1979 Investigations at Seven Archaeological Sites in Curecanti National Recreation Area*. Ms. on file, National Park Service - Midwest Archaeological Center, Lincoln.

2001 *Hunter Gatherer Archaeology of the Colorado High Country.* University Press of Colorado, Norman, OK.

Surovell, Todd A., Nicole Waguespack, Marcel Kornfeld, and George C. Frison
2003 *The First Five Field Seasons at Barger Gulch, Locality B, Middle Park, Colorado*. Technical Report No. 26, George C. Frison Institute of Archaeology and Anthropology, University of Wyoming, Laramie.

Swanton, John R.
1953 The Indian Tribes of North America. *Smithsonian Institution Bureau of American Ethnology Bulletin #145.* Government Printing Office, Washington, D. C.

Thom, Alexander
1967 *Megalithic Sites in Britain*. Oxford University Press, England.

Troyer, Michael
2012 Formal Thermal Feature Variation and High Altitude Plant Use in Northern Colorado. In *Colorado Archaeology* Vol. 3:23-26, and *Southwestern Lore*, Vol. 78, No. 1. A Joint Publication of The Colorado Archaeological Society and The Colorado Council of Professional Archaeologists, Denver.

Tucker, Gordon C. and Marcia J. Tate, with contributions by Cheryl A. Harrison, Brian P. O'Neil, Byron L. Olson, Laurie Simmons, and Thomas H. Simmons.

2000 *Wolford Mountain Dam and Reservoir Project: Results of Phase I and Phase II Excavations at Seven Sites in Grand County, Colorado*. Prepared for the Colorado River Water Conservation District, Glenwood Springs, CO. by Powers Elevation Co., Inc. Ms. on file at Bureau of Land Management, Kremmling Field Office, Kremmling, CO.

Tweto, Ogden - compiler

1979 *Geologic Map of Colorado.* United States Geological Survey, Denver.

U.S.D.A. Soil Conservation Service, Colorado

1983 Soil Survey of Grand County Area, Colorado.

Vickers, W. B.

1881 History of Colorado and Postscript. In: *History of the Arkansas Valley, Colorado.* O. L. Baskin & Company, Historical Publishers, Chicago.

Wendlund, Wayne M. and Reid A. Bryson

1974 Dating climatic episodes of the Holocene. *Quaternary Research* 4;9-24.

Wheeler, Charles W. and Gary Martin

1984 *Windy Gap: Aboriginal Adaptation to Middle Park, Grand County, Colorado*. Western Cultural Resource Management, Inc. Prepared for Northern Colorado Water Conservancy District. Ms. on file, Office of Archaeology and Historic Preservation, Denver, and BLM, Kremmling.

Williamson, Ray A., editor

1981 *Archaeoastronomy in the Americas*. The Center for Archaeoastronomy, University of Maryland, College Park. Ballena Press Anthropological Papers No. 22, Los Altos, CA.

1987 *Living the Sky: The Cosmos of the American Indian*. University of Oklahoma Press, Norman.

Wyatt, Bill B.

2010 *Class III Cultural Resource Inventory for the North Hay Gulch Sagebrush Treatment, Grand County, CO*. (GA.LM.249). Ms. on file at the Bureau of Land Management, Kremmling Field Office

Young, Robert G. and Joann W.

1977 *Colorado West, Land of Geology and Wildflowers.* Wheelwright Press, Ltd.

APPENDIX A:

Trowel Testing Report for 5GA4251

by
Holly “Sonny” Shelton

Physiography

The site is in the Middle Park region of the Southern Rocky Mountain province that Fenneman (1931) defines as part of the Rocky Mountain System division. Middle Park is one of a series of parks that formed by north to south trending faults and lies in part of a synclinal, high altitude basin that is approximately 40 miles wide and 100 miles long with elevations ranging from 7440 feet to 9000 feet. It is underlain by Mesozoic and Tertiary rocks and bordered by Precambrian rocks that form the mountain ranges. The periphery of the basin and mountain ranges are complex due to over-thrusting and exposure of bedrock in the area is limited. Several over-thrust formations transect the Middle Park, including the Williams Range overthrust system (Izette and Barclay 1973) which has moved Precambrian rocks atop younger Cretaceous rock resulting in a clearly visible demarcation zone.

Basement and sedimentary rocks are often up-thrust due to Laramide extensional faulting (Izette 1968) resulting in a rugged topography that includes ridges, steep slopes, strath terraces, rock outcrops, multiple drainages and intermittent valleys and sub-basins filled with later deposition (Tweto 1957). Many of the crests of prominent ridges throughout the Middle Park are relatively level, tending to slope toward the south and southeast. Late Quaternary terraces border the sub-basins and these tend to have semi-level surfaces and steep sides covered with poorly sorted alluvial deposits. The floor of the basin, a sagebrush and grassland steppe, is dissected by secondary and tertiary drainages that expose the sequences of alluvial deposition.

Geology

The study area is in a long and broad stratigraphic unit of the Troublesome Formation found in the Miocene series of the Tertiary system. This is underlain by basalt and Rabbit Ears volcanics (Miocene and Oligocene); a multicolored tuff breccia and occasional occurrences of trachyandesite flows, rhyolite flows, sills, and rhyolite ash flow. Near the study area the Pete Gulch member (Oligocene); found atop Middle Park Formation (Paleocene), is intruded upon by a dark gray to black olivine bearing trachy basalt. Finally, undifferentiated sedimentary rock and Pierre Shale (Upper Cretaceous) lie beneath an unconformity. Dakota Sandstone, Morrison and Sundance Formations occur in the Lower Cretaceous and Jurassic while and various quartz and granite are present in the Precambrian bedrock base.

Trowel test results

A trowel test 20cm north/south by 19cm east/west and 8cm deep was performed on the eastside of rock #1 in Feature 13 to evaluate sedimentology. No cultural remains were found. Rock #1, a large basalt rock, rises 12cm above pgs and extends to an unknown depth. It has been intentionally placed as indicated by a vertical orientation unlikely to have occurred secondary to frost heave (Miller 2011). The excavated profile of trowel test #1 reveals four principal units. The present ground surface (pgs) consists of sparse organics and organic detritus atop seleniferous (USDA 2012), dark grey brown soils likely originating from Pierre Shale (Troublesome Fm.). The surface deposition is thin and significantly deflated exposing a rough pavement of poorly sorted basalt and shaly sandstone fragments with small to large basalt rocks interspersed throughout the soil. Aeolian deposition has aggregated at the root bases of sagebrush, forbs and

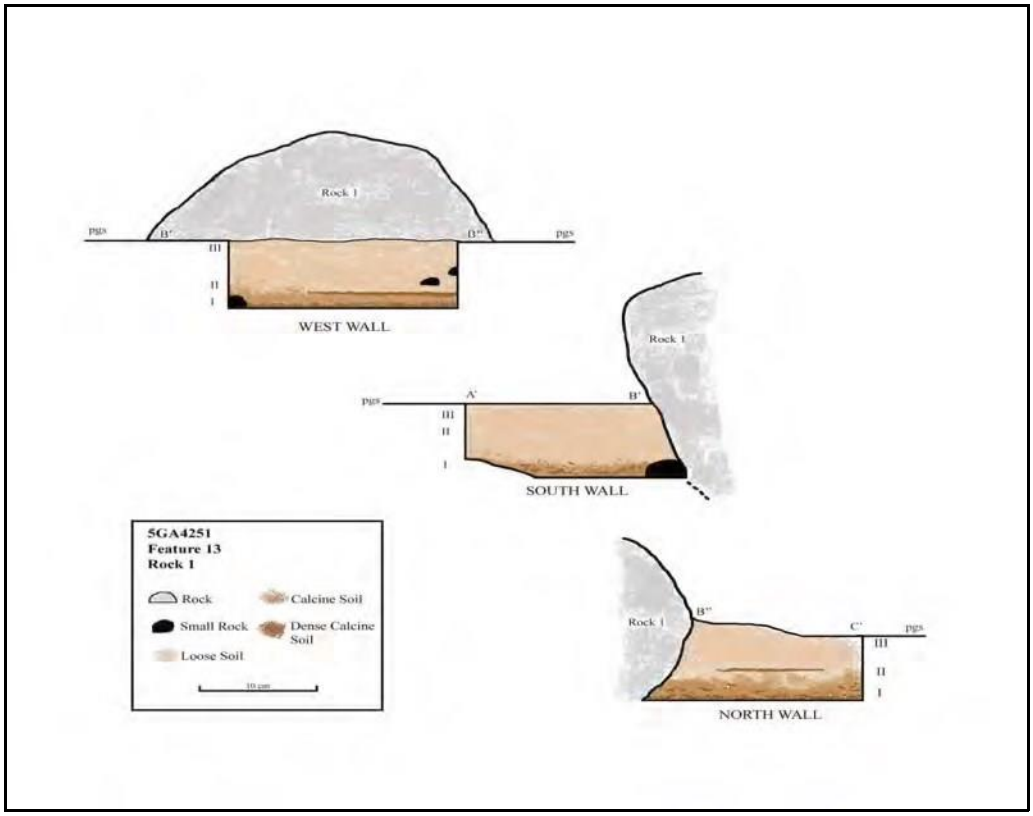
grasses to form small coppice mounds and at the bases of the features larger basalt rocks including the lee (east) side of rock #1. Unit III is composed of moderately loose silty, soil and well consolidated shaly sandstone and basalt clasts and occasional small basalt rocks. Due to a small particle sand shadow type of accumulation these soils are deeper on the lee (east) side of rock #1. This accumulation is moderately mineralized as evidenced by visible calcite accumulation and increased density. Sulfites are not present. Unit II presents as a 2cm thick by 14cm long lens of dense calcite occurring approximately 6cm below pgs. Unit I, occurring 7cm below pgs, consists of an increasingly dense, lighter colored calcine soil with multiple small poorly consolidated basalt clasts. Two approximately 0.5cm long root casts are noted. In this unit evidence of frost heave is exhibited by the presence of occasional clasts that are perpendicular to the bedding plane.

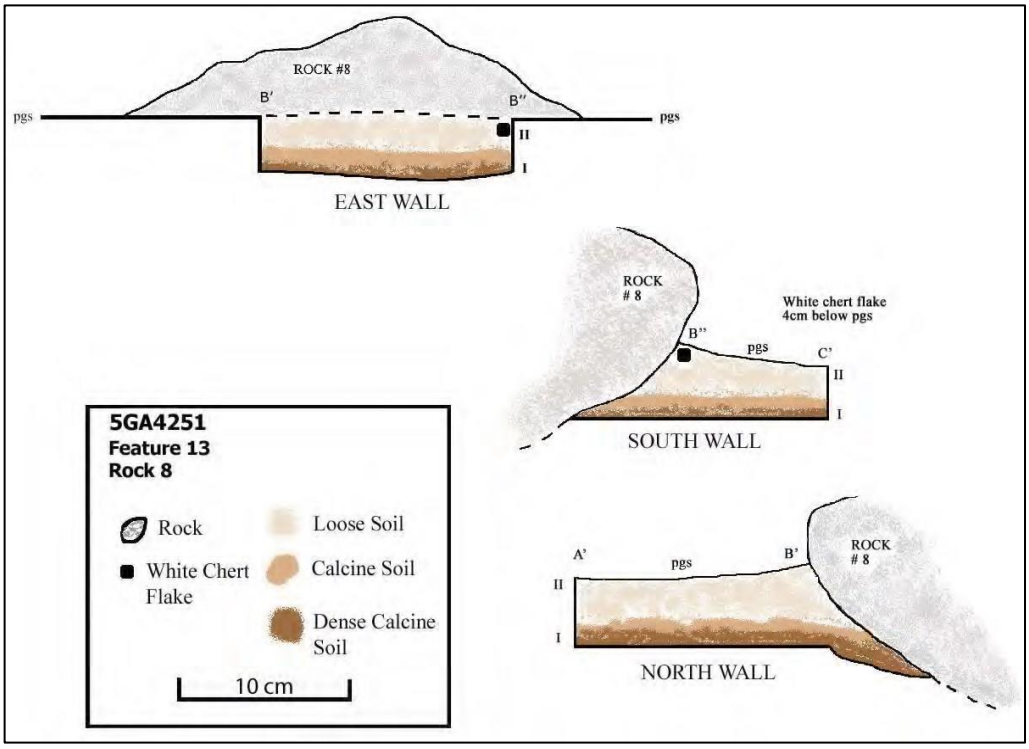
An additional trowel test was performed on the west face of rock #8 of feature 13. The west face of the profile was 15cm wide and 4cm deep. As rock #8 was unexpectedly found to rest at a significant angle the test was extended beneath rock #8 for 6cm to a depth of 6cm. The north wall of the profile extended 21cm west and was 4cm deep while the south wall extended 15cm and terminated at a depth of 3cm. Three stratigraphic units were observed during testing. The present ground surface (pgs) does not differ from trowel test #1. Unit II consists of moderately loose silty soil with well sorted clasts of basalt and sandstone with mixed organic detritus in the form of roots desiccated grass fragments. A single white chert flake measuring 1.5cm by 1.2cm by 3mm thick by was in Unit II 4mm below pgs in the southwest aspect of the profile. Unit I consists of compact, calcine soil with multiple small clasts. A significant increase of calcite with depth is evidenced by a lighter color and increasing density. There is no evidence of frost heave at this level. It is suspected rock #8 was initially intentionally placed in a vertical position and due to ongoing natural erosional processes has tilted significantly to the west. As the face of the rock has angled eastward, testing beneath rock #8 was terminated at level I to minimize the risk of destabilization that might result in damage to the feature.

Summary

The primary depositional processes at the study area are alluvial and aeolian. Sheet flow alluviation has impacted the slopes of the study area resulting in movement and deposition of fine clastics. There is limited alluvial erosion in the form of rills due to slope stability that is also enhanced by a consistent pavement of basaltic clasts and sparse to moderate vegetation. Aeolian activity is presently the most significant primary processes occurring in the study area resulting in deflated surfaces and very thin soils. Limited trowel testing in feature 13 revealed an episode of stabilization as exhibited by secondary processes of chemical weathering showing increased calcite mineralization and moderately cemented deposits beginning in Unit III of rock #1 of feature 13 and significantly increasing in density through to Unit I of both rocks #1 and #8. The denser calcite concentrations are indicative of in place weathering due to high interstitial water levels and stored pore water and decreased aeolian activity such as occurs during extended episodes of cool wet climate (Huntington 1914). As stated by Miller (1992, 1993) significant periods of in place weathering occurred 10,000-9500 BP, 6000-4000 BP, 2800-2400 BP, with the most recent period being 2000-900 years BP. Accurate interpretation of the exposed strata is difficult pending more extensive testing and deeper profiles. Although soil surfaces are deflated the depth of alluvial erosion on the site is minimal indicating the weathered strata in the exposed

units is likely at least representative of the most recent relic soils. Additional excavation may reveal points of contact with unconformities that would aid in more accurately dating these remarkable features.





References

Fenneman, Nevin M.

1931 *Physiography of the Western United States*. McGraw Hill, New York.

Huntington, E.

1914 *The Climate Factor as Illustrated in Arid America*. Carnegie Institute Publication 192:22-28.

Izette, G. A.

1968 Geology of the Hot Sulphur Springs quadrangle, Grand County, Colorado: Washington, D.C., United States Government Printing Office, 79 p.

Izette, G.A., and Barclay, C.S.V.,

1973 Geologic map of the Kremmling 15-minute quadrangle, Grand County, Colorado: Washington, D.C., U.S. Government Printing Office, 1 p.

Jones, M. E.

2012 United States Department of Agriculture Natural Resources Conservation Service, Plant Fact Sheet. Kremmling Milkvetch, *Astragalus osterhoutii*, Contributed by: USDA NRCS Colorado Plant Materials Program. https://plants.usda.gov/factsheet/pdf/fs_asos.pdf 1/10/2014

Miller, James C.

1992 *Geology in Archaeology: Geology, Paleoclimates, and Archaeology in the Western Wyoming Basin.* M.A. thesis (anthropology), University of Wyoming, Laramie.

1993 Geology of Sites 39PN972, 39PN974, 39PN975, and 39PN976, Pennington County, South Dakota; Chapter 2 in Thomas K. Larson and Dori M. Penny (eds.), *Results of Archaeological Investigations at 39PN972, 39PN974, 39PN975, and 39PN976, Pennington County, South Dakota*. Prepared for USDA, Forest Service, Black Hills National Forest by Larson-Tibesar Associates, Laramie, Wyoming.

2011 in prep., Geology and Geoarchaeology of Latest Pleistocene and Holocene Deposits in the Wyoming Basin, Rocky Mountains, eastern Colorado Plateau, and western Plains; Ph.D. dissertation, Department of Geology and Geophysics, University of Wyoming, Laramie.

Tweeto, Ogden

1957 *North and Middle Parks Basin, Colorado. Geologic Sketch of Southern Middle Park, Colorado. Guidebook to the Geology of the North and Middle Parks Basin, Colorado.* U.S. Geological Survey, Denver Colorado. p. 18

APPENDIX B:

Feature 13 Azimuths

Table B-1. 5GA4251 Feature 13 Azimuths by Alignment Number.

Loc	FE	Alig	P.O.	Az	Comments
B	13	1	MP 28/29	158	Long axis outer ring & inner oval. Sulphur Gulch ridge near 5GA4211 @ 9mi; Jessner Mesa @ 15 mi
B	13	1	36	338	Long axis of outer ring & inner oval. Saddle N of N Gunsight Pk @ 1.5 mi; White Slide Mtn
B	13	2	MP 1/22	68	S Side of Grimes Pk @ 4 mi
B	13	2	MP 6/17	248	Cross axis of outer ring & inner oval. Top of S Gunsight Pk
B	13	3	25	179	Lawson Ridge Top @ 15mi
B	13	3	36	359	Pinnacles
B	13	4	37	90	Between Middle and S Triad Pk @4mi; Corral Pk @10mi
B	13	4	34	270	Top Center S Gunsight Pk; Tyler Mtn saddle @10mi
B	13	5	13	93	500ft S of S Triad Pk @4mi
B	13	5	1	273	Center top of S Gunsight; Tyler Mtn @10mi; S ridge Gore Mtn @17mi
B	13	6	11	60	0.5 mi N of Grimes Pk @4mi; Gravel Mtn @18mi
B	13	6	35	240	S Slope of S Gunsight Pk looking down valley
B	13	8	1	124	Top of Slide Mtn @ 7mi
B	13	8	30	304	Through S side of Gunsight; near Windy Ridge Quarry (ca. 1mi S of Lake Agnes) @ 18mi
B	13	9	1	135	IC
B	13	9	29	315	Through Gunsight; Middle Carter @ 6.5mi; Whitley Pk
B	13	10	1	116	Between 2 high points on ridge/divide between Monument Crk & E Fork Troublesome @ 6mi; Grouse Mtn @ 10mi
B	13	10	31	296	N top of S Gunsight Pk
B	13	7A	1	66	Grimes Pk top @4mi
B	13	7A	5	246	S Slope of S Gunsight Pk (closer to top than 240º) looking down valley
B	13	7B	37	65	Grimes Pk top @4mi
B	13	7B	35	245	Divide between Gore & Hazel Crks @ 14mi
B	13	7C	24	65	Grimes Pk top @4mi
B	13	7C	34	245	S flank slope S Gunsight; Top of divide between Gore and Bobtail Crks @14mi; Knob top 1/2 mi N of Pass Crk @ 10.5mi
B	13		1	74	0.5 mi S of Grimes Pk @4mi; Gravel Mtn @18mi; lunar min metonic cycle
B	13		6	254	S Saddle of S Gunsight Pk
B	13		1	106	Elk Mtn @11mi
B	13		33	286	N top of S Gunsight Pk
B	13		1	110	S ridge of Elk Mtn @ 12mi (between Elk and Grouse Mtns)
B	13		32	290	N top of S Gunsight Pk
B	13		1	128	S side of Slide Mtn @ 7mi
B	13		1	128	S side of Slide Mtn @ 7mi
B	13		C	308	Through Gunsight; near Windy Ridge Quarry (ca. 1mi S of Lake Agnes) @ 18mi
B	13		1	149	Top of mtn E of Williams Fork Res. @ 14mi (8400ft elev); View up Williams Fork Valley
B	13		20	329	Top N Gunsight Pk; between N & S Ryder Pks (Continental Divide) @ 12-13mi

Loc	FE	Alig	P.O.	Az	Comments
B	13		24	11	Ca 500ft E of Gunsight BM; Saddle between Pinnacles and E Pinnacle (along jeep trail) @ 2.5mi
B	13		24	23	Pass between Gunsight BM & hill to E; Up Troublsome Crk; Poison Ridge E of Sheep Mtn @ 11mi (Cont' Divide)
B	13		24	38	E tip hill E of Gunsight BM @ 1.5mi; E of Sheep Mtn @ 9mi; Between Troublesome Pass & Haystack Mtn @ 11mi
B	13		37	43	Divide between Buckhorn and Siebert Crks @ 4mi; S flank of Haystack Mtn @ 11mi
B	13		24	46	Top of divide between Siebert & Buckhorn Crks @ 4mi;
B	13		37	65	Grimes Pk top @4mi
B	13		24	74	Between Grimes & Triad Pks @ 4mi; Gravel Mtn @ 18mi
B	13		24	80	Gunsight BM; Pinnacles
B	13		24	84	N Triad Pk @ 4mi; N side Top Searight Pk @ 110mi
B	13		24	91	Center Triad Pk @ 4mi; Corral Pks @ 9mi
B	13		24	98	N Ride tip of NE trending ridge of Slide Mtn @ 7mi; N ridge line Elk Mtn @ 10.5mi
B	13		37	100	N edge of Pk 0.6mi SSE of S Triad Pk @ 4mi
B	13		37	104	Top Elk Mtn @ 11mi (11,600ft)
B	13		24	106	S side Elk Mtn @ 11mi
B	13		37	109	S ridge tip Elk Mtn @ 12mi (10,940 ft)
C	13		37	114	Top Grouse Mtn @ 10mi
C	13		24	117	Top of knob1/2 mi N of E Fork Troublesome @ 3.5mi; N top Slide Mtn @ 6mi; S pointy ridge finger Grouse Mtn @ 11mi
C	13		36	117	Knob N of E Fork of Troublesome @ 4mi; N Slide Mtn @ 6mi; S ridge of Grouse Mtn @ 9mi
C	13		37	122	N top Slide Mtn @ 7mi (9890ft elev)
C	13		36	123	Top Slide Mtn @ 7mi;
C	13		24	124	Top Slide Mtn @ 7mi;
C	13		37	129	Saddle w/trail ca. 2500ft S of Slide Mt @ 7mi
C	13		36	131	IC. Similar to 138 degrees
C	13		37	133	S ridge top Slide Mtn @ jeep trail (1.2 mi S of Slide Mtn) @ 7mi
C	13		36	134	Same as 138 degrees
C	13		37	137	Top of S ridge line/jeep trail (1.5 mi SSW of Slide Mtn @ 8 mi
C	13		36	138	IC. Jeep Trail S ridge, Slide Mtn
C	13		36	142	Same as 144 degrees
C	13		37	144	IC; Up Williams Fork valley; Pk S of Sylvan Res @ 20mi
C	13		36	149	IC. Mtn E of Williams Pk @ 14 mi
C	13		36	170	IC. Barger Gulch @ 19mi
C	13		36	184	IC; E top Junction Butte @ 12mi (not visible)
C	13		24	191	Blind Spot; Antelope Pass
C	13		24	203	Blind Spot. 5GA186 @ 1.5mi; Twin Pks Saddle @2mi; W flank Little Wolford @ 5mi; E side Wolford @ 6mi; San Toy Mtn @ 15mi
C	13		24	218	W side Little and Wolford Mtns & Twin Pks
C	13		24	226	IC. SW view of Muddy Crk
C	13		24	254	Between center & S rise S Gunsight Pk

Loc	FE	Alig	P.O.	Az	Comments
C	13		24	260	S tip of Center high pt S Gunsight Pk
C	13		24	264	Top Center high pt S Gunsight Pk
C	13		24	271	Center of S Gunsight Pk; Tyler Mtn @ 10mi.
C	13		24	278	S end of Northern hill, S Gunsight
C	13		33	280	S top of northern top of S Gunsight Pk
C	13		32	284	S center of northern top of S Gunsight Pk
C	13		24	286	Top of S Gunsight Pk (S most top of N high pt)
C	13		31	289	Top center northern S Gunsight Pk
C	13		30	294	N edge of northern top S Gunsight Pk
C	13		24	297	N slope of S Gunsight Pk
C	13		36	297	Near top of N slope, S Gunsight; Top of Gore Range @ 18mi
C	13		29	302	Through Gunsight (along S Gunsight Pk; Top ridge line 1.4 mi SW of Lake Agnes @ 17mi (9260ft elev)
C	13		36	303	Through Gap base of S slope of N Gunsight Pk; Middle Carter @ 7mi; Whitley Pk @ 12mi
C	13		24	304	N Flank of S Gunsight Pk-- Sun sliding into Gap over Windy Ridge Quarry/ Lake Agnes
C	13		28	309	Through Gunsight S side of Whitley Pk @ 12mi; S of Middle Carter Mtn @ 6mi; N of Lake Agnes & S Baker Mtn @ 19mi.
C	13		36	311	Center of Gunsight Gap; Baker Mtn @ 18mi
C	13		27	313	Through Gunsight; S flank of Middle Carter Mtn @ 7mi Whitley Pk @ 12mi
C	13		36	314	Through Gap base of S slope of N Gunsight Pk; Middle Carter @ 7mi; Whitley Pk @ 12mi
C	13		26	317	Through Gunsight along S flank of N Gunsight Pk; N side Middle Carter Mtn @ 7 mi; Saddle between Whitley Pk and Mtn NE of Whitley @ 12mi. Top of Bear Mtn @ 16mi (9845ft elev)
C	13		36	318	S slope of N Gunsight Pk; Middle Carter Mtn @ 7mi; Bear Mtn @ 15mi; Rabit Mtn @ 16mi
C	13		36	322	Same as 324 degrees
C	13		34	324	Top N Gunsight Pk; N side Carter Mtn @ 8mi
C	13		36	324	N Gunsight Pk; Carter Mtn @ 8mi
C	13		36	329	N tip N Gunsight Pk;
C	13		36	350	Coal Mtn @ 4mi; Cont' Divide @ 11mi

KEY

Az	Azimuth
Loc	Locality
Fe	Feature
Alig	Alignment
IC	Inclusive
P.O.	Point of Observation
Geo-Nav	Geographic - Navigation Reference
NA	Not Applicable

Appendix C

All Feature Azimuths

Feature Azimuths for 5GA4251. All azimuths are in degrees.

Loc	Fe No.	Alig No.	P.O.	Az	Comments
A	1	NA			Sighting Point - collapsed cairn?
A	2		Fe3	120	From Fe 3
A	2			300	Through Fe 3
A	3	1a	M/P	19	IC
A	3	1a	A	199	Fe 1, Little Wolford Site
A	3	1b	1	22	IC
A	3	1b	8	202	Little Wolford, 5GA3644, San Toy Mtn, Sheephorn Mtn
A	3	1c	14	11	IC
A	3	1c	9	191	E Flank Little Wolford, 5GA2173?
A	3	2	D	120	To Fe 2
A	3	2	D	300	IC
A	3	3	5	90	IC
A	3	3	E	270	IC
A	3	4	6	180	Larson Ridge high point, Green Mtn
A	3	4	1	360	Pinnacles
A	3	5	F	45	Saddle E horizon
A	3	5	9	225	IC
A	3	6	D	158	Sulpher Gulch - 5GA4210 & 5GA4211; Reeder Creek Quarries; Ute Pass vicinity
A	3	6	G	338	White Slide Mtn
A	3	7	H	8	East Flank Pinnacles
A	3	7	A	188	East Flank Little Wolford Mtn- 5GA2173, Upper W Flank Junction Butte
B	4A	1	8	41	NW line of Fe 4A, To Fe 7, Haystack Mtn @ 11mi
B	4A	1	29	221	NW line of Fe 4A, IC
B	4A	2	28	114	NE line of Fe 4A, Grouse Mtn @ 9 mi
B	4A	2	36	294	NE line of Fe 4A, IC
B	4A	3	8	126	SW line of Fe 4A, Top Slide Mtn @7 mi
B	4A	3	1	306	SW line of Fe 4A; Through Gunsight to Lake Agnes & Windy Ridge Quarry 5GA872
B	4A	4	1	54	Top of Pk N of Grimes Pk @ 4mi; S slope of Haystack Mtn.
B	4A	4	37	234	Toward Gore Pass
B	4A	5	8	90	Center Triad Pks @4mi; Corral Pk @ 9mi; Equinox not corrected
B	4A	5	42	270	Center S Gunsight Pk; Tyler Mtn @ 10 mi; Equinox not corrected
B	4A	6	90	180	Lawson Ridge @ 15mi
B	4A	6	42	360	Pinnacles
B	4A	7	24	167	Reeder Crk Buttes - Quarries ??
B	4A	7	29	347	Top Coal Mtn @4 mi
B	4A	6B	15	176	Lawson Ridge Pass
B	4A	6B	2	356	Western most Pinnacle
B	4A	NA	11	70	IC
B	4A	NA	33	250	S top of S Gunsight Pk; IC

B	4B	2	30	3	Just E of Pinnacles-Repetitive but IC
B	4B	2	17	183	Red Mtn @ 4mi; E flank Junction Butte @ 12mi
B	4B	3	2	36	Troublesome Pass-Continental Divide
B	4B	3	18	216	W flank Twin Pks @ 2mi; Toward Radium
B	4B	4	35	14	Pinnacle E of main Pinnacle group @ 2.5mi
B	4B	4	40	194	Toward Antelope Pass @ 4mi
B	4B	5	4	109	S ridge spur Elk Mtn @11mi
B	4B	5	35	289	IC
B	4B	6	7	90	W center Triad Pks @ 4mi; Corral Pks saddle @ 9 mi
B	4B	6	40	270	Top center S Gunsight Pk; Tyler Mtn @ 10mi
B	4B	1 A&B	29	32	Sheephorn Mtn @ 9mi
B	4B	1 A&B	22	212	Top Twin Pk Mtn; W flank Wolford Mtn @ 6.5mi
B	5	1	24	65	Top of Pk N of Grimes Pk
B	5	1	12	245	IC
B	5	2	X	240	Through door mid-point
B	5	3	A	120	
B	5	3	4	300	
B	5	4	1	330	N North Gunsight Peak, toward Arapahoe Pass
B	5	5	1	54	Grimes pk pass
B	5	5	41	234	N flank Gore Pass
B	5	6	21	135	IC
B	5	6	6	315	IC
B	5	7	45	180	Lawson Ridge same as Fe 3
B	5	7	4	360	Pinnacles; Fe 11
B	5	8	G	90	West Triad Pk
B	5	8	10	270	Center of S Gunsight Pk
B	5	NA	NA	252	Top of S Gunsight Pk
B	6	2	P	92	W Triad Pk ??
B	6	2	F	272	
B	6	3	N	180	Junction Butte, Lawson Ridge
B	6	3	W	360	Pinnacles
B	6	4	V	45	IC
B	6	4	F	225	IC
B	6	5	8	202	Little Wolford
B	6	6	C	8	Pinnacles
B	6	6	9	188	Junction Butte
B	6	1a	15	119	
B	6	1a	MP	299	MP = center of SE U-shape arc
B	6	1b	Q	118	
B	6	1b	19	298	
B	6	1c	18	60	
B	6	1c	H	240	

B	6	NA		12	
B	6	NA		37	
B	6	NA	X	40	Haystack Mtn
B	6	NA		85	
B	6	NA		169	
B	6	NA		192	Antelope Pass
B	6	NA	8	217	W flank both Wolford Mtns.
B	6	NA		220	
B	6	NA	26	265	S Top Center Pk; Red Dirt Area=Pigment source?
B	6	NA	T	349	Coal Mtn @ 4mi
B	7	2	24	41	Haystack Mtn @11mi
B	7	2	8	221	IC
B	7	4	14	50	Park Mtn - Continental Divide
B	7	4	5	230	IC
B	7	5	A	135	IC
B	7	5	M/P 3 & 4	315	Through Gunsight, Middle Carter Mtn, Whitely Pk
B	7	7	20	159	Between 5GA4210 and 5GA4211- intersite; Reeder Crk Quarries
B	7	7	1	339	White Slide Mtn @ 9.5mi
B	7	8	21	162	W most Butte N side Reeder Crk
B	7	8	15	342	E flank of Haystack Mtn @11miWhite Slide Mtn
B	7	9	13	7	E flank of Pinnacles, BM Continental Divide
B	7	9	9	187	Junction Butte Top
B	7	1a	12	60	Grimes Pass
B	7	1a	6	240	ca. 1mi N of Gore Pass
B	7	1b	22	120	N. Slide Mtn @ 6mi
B	7	1b	4	300	N flank of S Gunsight Pk
B	7	3A	11	58	Grimes Pk
B	7	3A	17	238	IC
B	7	3B	11	68	S flank Grimes Pk
B	7	3B	7	248	IC
B	8a	1	9	160	IC, Two Buttes Reeder Crk - Quarries
B	8a	1	1	340	Red Slide & White Slide Mtn @ 9.5mi; Long axis of lozen shape
B	8a	2	9	115	Grouse Mtn @ 10mi
B	8a	2	C	295	N end top S Gunsight Pk
B	8a	3	6	142	IC
B	8a	3	B	322	Through Gunsight, Carter Mtn @ 7mi
B	8a	4	10	133	IC
B	8a	4	A	313	Through Gunsight - Carter Mtn - Whitley Pk
B	8a	5	14	7	E flank of Pinnacles
B	8a	5	D	187	Junction Butte - West Top @12 mi
B	8a	6	8	180	Lawson Ridge @ 15mi

B	8a	6	14	360	Pinnacles
B	8a	7	C	175	Lawson Ridge Pass
B	8a	7	A	355	IC
B	8a	?	12	76	Connects to Fe 8b through dipper handle; Little Gravel Pk @ 17.5mi
B	8a	?	13	85	On BPO worksheet connects to Fe 7
B	8a	?	C	256	S Gunsight Pk saddle
B	8a	?	B	265	On BPO worksheet connects to Fe 7
B	9	1	3	2	Pinnacles
B	9	1	12	182	E Flank Junction Butte, Lawson Ridge
B	9	2	18	50	Park View Mtn - Continental Divide
B	9	2	G	230	IC
B	9	3	1	37	Continential Divide between Sheep & Haystack Mtn near Troublesome Pass
B	9	3	F	217	IC
B	9	4	A/B	55	Grimes Pk
B	9	4	10	235	Toward Gore Pass
B	9	5	A/B	59	N Grimes Pass
B	9	5	9	239	
B	9	7	14	134	IC
B	9	7	C	314	Middle Carter, Whitley Pk
B	9	8	15	154	E Sulphur Gulch ridge line, 5GA4204 & 5GA4214; Ute Park @ 25 mi; Pass @ 33 mi
B	9	8	1	334	W flank White Slide Mtn
B	9	9	14	162	W 2 buttes Reeder Crk
B	9	9	1	342	Coal Mtn, E flank Red & White Slide Mtns
B	9	10	H	111	Grouse Mtn
B	9	10	11	291	IC
B	9	11	18	23	IC
B	9	11	I	203	W flank Little Wolford Mtn & San Toy Mtn
B	9	3B	2	38	Continental Divide between Sheep & Haystack Mtn near Troublesome Pass
B	9	3B	10	218	IC
B	9	6A	16	94	S Corral Pks
B	9	6A	8	274	Top center S Gunsight Pk
B	9	6B	16	92	
B	9	6B	27	272	IC toward Tyler Pk
B	9	6C	20	89	
B	9	6C	5	269	IC toward Tyler Pk
B	9	NA	17	108	IC
B	9	NA	13	150	Williams Fork Dam; N Battle Mtn; Ute Park
B	9	NA	3	288	IC
B	9	NA	7	330	N Gunsight Mtn
B	10	1	10	113	Grouse Mtn @ 9mi;
B	10	1	1	293	Top of S Gunsight Pk
B	10	6	B	90	Center Triad Mtn @4mi; Saddle between Corral Pks @ 9mi

B	10	6	1	270	IC Top Middle S Gunsight Pk
B	10	7	26	180	Lawson Ridge @ 15mi
B	10	7	38	360	Pinnacles
B	10	8	B	50	Grimes Pass @ 4mi; Parkview Mtn @14mi
B	10	8	24	230	IC
B	10	9	9	127	Slide Mtn @ 7 mi
B	10	9	1	307	Through Gunsight; Windy Ridge Quarry (5GA872)
B	10	2A	10	34	E ridge tip above Troublesome Crk @ 1mi; Sheep Mtn @9mi
B	10	2A	9	214	W flank of Twin Pks @ 2mi; toward Radium
B	10	2B	38	35	E ridge tip above Troublesome Crk @ 1mi; Sheep Mtn @9mi
B	10	2B	4	215	W flank of Twin Pks @ 2mi; toward Radium
B	10	2C	13	36	E ridge tip above Troublesome Crk @ 1mi; Sheep Mtn @9mi
B	10	2C	27	216	W flank of Twin Pks @ 2mi; toward Radium
B	10	3A	14	25	IC
B	10	3A	26	205	Twin Pk @2 mi; Between Little and Wolford Mtns; W of San Toy radio tower
B	10	3B	B	27	IC
B	10	3B	28	207	Twin Pk @ 2 mi; W Saddle Little Wolford (jeep Trail) @ 5 mi; W of San Toy radio tower
B	10	4A	12	64	Grimes pk @ 4 mi
B	10	4A	24	244	IC
B	10	4B	13	66	Grimes pk @ 4 mi
B	10	4B	22	246	IC
B	10	5A	A	57	Grimes Pass@ 4 mi
B	10	5A	6	237	Top of pk 1 mi N of Gore Pass; IC
B	10	5B	11	58	Grimes Pass@ 4 mi
B	10	5B	27	238	Top of pk 1 mi N of Gore Pass; IC
B	10	NA	33	73	Ridge S of Grimes Pk @ 4mi; Gravel Mtn @18mi
B	10	NA	9	98	IC W edge of Pk S of Triad Pks @ 4mi
B	10	NA	32	146	IC Ridge NE of Sulphur Gulch @ 8mi
B	10	NA	23	253	IC S end of S Gunsight Pk
B	10	NA	26	278	IC
B	10	NA	15	326	Top of N Gunsight Pk
B	11	2	10	88	Center Triad Mtn @ 4mi; Corral Pk @ 9mi
B	11	2	13	268	Center S Gunsight Pk
B	11	3	41	176	Lawson Ridge @ 15mi
B	11	3	39	356	W Flank of Pinnacles
B	11	4	26	39	Divide of Buckhorn Crk & Middle Fork Crk @ 5 mi
B	11	4	40	219	W flank of Twin Pks @ 3mi
B	11	5	26	22	IC
B	11	5	34	202	Top of Little Wolford Mtn; San Toy Mtn
B	11	7	28	109	S tip Elk Mtn @ 11mi
B	11	7	39	289	Center high pt S Gunsight Pk

B	11	8	30	158	5GA4211 @ 9mi; Reeder Crk Butted Saddle @ 12mi; Jessner Pk BM @15mi; 2 mi W of Ute Pass @ 33mi
B	11	8	22	338	Coal Mtn @4 mi; Top White Slide Mtn @ 9 mi
B	11	9	1	29	Divide of Troublesome & Middle Fork Crk Divide @ 5 mi
B	11	9	39	209	Top of Twin Pks @ 2mi; Top of Wolford Mtn @7 mi
B	11	1A	1	8	Gunsight BM -- E flank of Pinnacles
B	11	1A	8	188	W flank of Junction Butte @ 12 mi
B	11	1B	24	2	Pinnacles
B	11	1B	8	182	E Flank of Junction Butte; Lawson Ridge @15 mi
B	11	1C	23	6	E Flank of Pinnacles @1.5mi
B	11	1C	35	186	Top of Junction Butte @12mi
B	11	6A	9	66	Top Grimes Pk @ 4mi
B	11	6A	39	246	S flank S Gunsight Mtn; Valley
B	11	6B	4	68	Just S of Grimes Pk
B	11	6B	17	248	S flank S Gunsight Mtn; Valley
B	12	1	1 & 3	176	S Larson Ridge Pass @ 15mi
B	12	1	26 & 71	356	W Flank Pinnacles
B	12	2	28	87	N edge Center Triad Mtn @ 4mi; and N edge of Corral Pk @ 9mi
B	12	2	67	267	Top of S Gunsight Pk
B	12	3	14	97	Saddle S of S Triad Pk @ 4mi
B	12	3	66	277	S saddle S Gunsight Pk
B	12	4	5	49	Grimes Pack Trail @ 4mi; Parkview Pk @ 14mi
B	12	4	63	229	View down Muddy Crk Valley
B	12	5	11	30	N flank of Sheep Mtn @ 9 mi
B	12	5	48	210	Top of Twin Mtn @ 2 mi; W flank of Wolford Mtn @ 9mi
B	12	6	7	126	Slide Mtn @ 7 mi
B	12	6	66	306	Through Gunsight; Windy Ridge Quarry (5GA872) @14 mi
B	12	NA	77	148	William Fork Valley E side of Res. @ 14mi. **Rocks to close together.**
B	12	NA	5	328	N Gunsight Mtn @ 1.5mi
B	13	1	MP 28/29	158	Long axis outer ring & inner oval. Sulphur Gulch ridge near 5GA4211 @ 9mi; Jessner Mesa @ 15 mi
B	13	1	36	338	Long axis of outer ring & inner oval. Saddle N of N Gunsight Pk @ 1.5 mi; White Slide Mtn
C	13	2	MP 1/22	68	S Side of Grines Pk @ 4 mi
C	13	2	MP 6/17	248	Cross axis of outer ring & inner oval. Top of S Gunsight Pk
C	13	3	25	179	Lawson Ridge Top @ 15mi
C	13	3	36	359	Pinnacles
C	13	4	37	90	Between Middle and S Triad Pk @4mi; Corral Pk @10mi
C	13	4	34	270	Top Center S Gunsight Pk; Tyler Mtn saddle @10mi
C	13	5	13	93	500 ft S of S Triad Pk @4mi
C	13	5	1	273	Center top of S Gunsight; Tyler Mtn @10mi; S ridge Gore Mtn @17mi
C	13	6	11	60	0.5 mi N of Grimes Pk @4mi; Gravel Mtn @18mi
C	13	6	35	240	S Slope of S Gunsight Pk looking down valley

C	13	8	1	124	Top of Slide Mtn @ 7mi
C	13	8	30	304	Through S side of Gunsight; near Windy Ridge Quarry (ca. 1mi S of Lake Agnes) @ 18mi
C	13	9	1	135	IC
C	13	9	29	315	Through Gunsight; Middle Carter @ 6.5mi; Whitley Pk @ XXX
C	13	10	1	116	Between 2 high points on ridge/divide between Monument Crk & E Fork Troublesome @ 6mi; Grouse Mtn @ 10mi
C	13	10	31	296	N top of S Gunsight Pk
C	13	7A	1	66	Grimes Pk top @4mi
C	13	7A	5	246	S Slope of S Gunsight Pk (closer to top than 240^{o}) looking down valley
C	13	7B	37	65	Grimes Pk top @4mi
C	13	7B	35	245	Divide between Gore & Hazel Crks @ 14mi
C	13	7C	24	65	Grimes Pk top @4mi
C	13	7C	34	245	S flank slope S Gunsight; Top of divide between Gore and Bobtail Crks @14mi; Knob top 1/2 mi N of Pass Crk @ 10.5mi
C	13		1	74	0.5 mi S of Grimes Pk @4mi; Gravel Mtn @18mi; lunar min metonic cycle
C	13		6	254	S Saddle of S Gunsight Pk
C	13		1	106	Elk Mtn @11mi
C	13		33	286	N top of S Gunsight Pk
C	13		1	110	S ridge of Elk Mtn @ 12mi (between Elk and Grouse Mtns)
C	13		32	290	N top of S Gunsight Pk
C	13		1	128	S side of Slide Mtn @ 7mi
C	13		1	128	S side of Slide Mtn @ 7mi
C	13		C	308	Through Gunsight; near Windy Ridge Quarry (ca. 1mi S of Lake Agnes) @ 18mi
C	13		1	149	Top of mtn E of Williams Fork Res. @ 14mi (8400ft elev); View up Williams Fork Valley
C	13		20	329	Top N Gunsight Pk; between N & S Ryder Pks (Continental Divide) @ 12-13mi
C	13		24	11	Ca 500ft E of Gunsight BM; Saddle between Pinnacles and E Pinnacle (along jeep trail) @ 2.5mi
C	13		24	23	Pass between Gunsight BM & hill to E; Up Troublesome Crk; Poison Ridge E of Sheep Mtn @ 11mi (Cont' Divide)
C	13		24	38	E tip hill E of Gunsight BM @ 1.5mi; E of Sheep Mtn @ 9mi; Between Troublesome Pass & Haystack Mtn @ 11mi
C	13		37	43	Divide between Buckhorn and Siebert Crks @ 4mi; S flank of Haystack Mtn @ 11mi
C	13		24	46	Top of divide between Siebert & Buckhorn Crks @ 4mi;
C	13		37	65	Grimes Pk top @4mi
C	13		24	74	Between Grimes & Triad Pks @ 4mi; Gravel Mtn @ 18mi
C	13		24	80	Gunsight BM; Pinnacles
C	13		24	84	N Triad Pk @ 4mi; N side Top Searight Pk @ 110mi
C	13		24	91	Center Triad Pk @ 4mi; Corral Pks @ 9mi
C	13		24	98	N Ride tip of NE trending ridge of Slide Mtn @ 7mi; N ridge line Elk Mtn @ 10.5mi
C	13		37	100	N edge of Pk 0.6mi SSE of S Triad Pk @ 4mi
C	13		37	104	Top Elk Mtn @ 11mi (11,600ft)
C	13		24	106	S side Elk Mtn @ 11mi
C	13		37	109	S ridge tip Elk Mtn @ 12mi (10,940 ft)

C	13		37	114	Top Grouse Mtn @ 10mi
C	13		24	117	Top of knob1/2 mi N of E Fork Troublesome @ 3.5mi; N top Slide Mtn @ 6mi; S pointy ridge finger Grouse Mtn @ 11mi
C	13		36	117	Knob N of E Fork of Troublesome @ 4mi; N Slide Mtn @ 6mi; S ridge of Grouse Mtn @ 9mi
C	13		37	122	N top Slide Mtn @ 7mi (9890ft elev)
C	13		36	123	Top Slide Mtn @ 7mi;
C	13		24	124	Top Slide Mtn @ 7mi;
C	13		37	129	Saddle w/trail ca. 2500ft S of Slide Mt @ 7mi
C	13		36	131	IC. Similar to 138 degrees
C	13		37	133	S ridge top Slide Mtn @ jeep trail (1.2 mi S of Slide Mtn) @ 7mi
C	13		36	134	Same as 138 degrees
C	13		37	137	Top of S ridge line/jeep trail (1.5 mi SSW of Slide Mtn @ 8 mi
C	13		36	138	IC. Jeep Trail. S ridge, Slide Mtn
C	13		36	142	Same as 144 degrees
C	13		37	144	IC; Up Williams Fork valley; Pk S of Sylvan Res @ 20mi
C	13		36	149	IC. Mtn E of Williams Pk @ 14 mi
C	13		36	170	IC. Barger Gulch @ 19mi
C	13		36	184	IC; E top Junction Butte @ 12mi (not visible)
C	13		24	191	Blind Spot; Antelope Pass
C	13		24	203	Blind Spot. 5GA186 @ 1.5mi; Twin Pks Sadd;e @2mi; W flank Little Wolford @ 5mi; E side Wolford @ 6mi; San Toy Mtn @ 15mi
C	13		24	218	W side Little and Wolford Mtns & Twin Pks
C	13		24	226	IC. SW view of Muddy Crk
C	13		24	254	Between center & S rise S Gunsight Pk
C	13		24	260	S tip of Center high pt S Gunsight Pk
C	13		24	264	Top Center high pt S Gunsight Pk
C	13		24	271	Center of S Gunsight Pk; Tyler Mtn @ 10mi.
C	13		24	278	S end of Northern hill, S Gunsight
C	13		33	280	S top, northern top of S Gunsight Pk
C	13		32	284	S center of northern top of S Gunsight Pk
C	13		24	286	Top of S Gunsight Pk (S most top of N high pt)
C	13		31	289	Top center northern S Gunsight Pk
C	13		30	294	N edge of northern top S Gunsight Pk
C	13		24	297	N slope of S Gunsight Pk
C	13		36	297	Near top of N slope, S Gunsight; Top of Gore Range @ 18mi
C	13		29	302	Through Gunsight (along S Gunsight Pk; Top ridge line 1.4 mi SW of Lake Agnes @ 17mi (9260ft elev)
C	13		36	303	Through Gap base of S slope of N Gunsight Pk; Middle Carter @ 7mi; Whitley Pk @ 12mi
C	13		24	304	N Flank of S Gunsight Pk-- Sun sliding into Gap over Windy Ridge Quarry/ Lake Agnes
C	13		28	309	Through Gunsight S side of Whitley Pk @ 12mi; S of Middle Carter Mtn @ 6mi; N of Lake Agnes & S Baker Mtn @ 19mi.
C	13		36	311	Center of Gunsight Gap; Baker Mtn @ 18mi

C	13		27	313	Through Gunsight; S flank of Middle Carter Mtn @ 7mi Whitley Pk @ 12mi
C	13		36	314	Through Gap base of S slope of N Gunsight Pk; Middle Carter @ 7mi; Whitley Pk @ 12mi
C	13		26	317	Through Gunsight along S flank of N Gunsight Pk; N side Middle Carter Mtn @ 7 mi; Saddle between Whitley Pk and Mtn NE of Whitley @ 12mi. Top of Bear Mtn @ 16mi (9845ft elev)
C	13		36	318	S slope of N Gunsight Pk; Middle Carter Mtn @ 7mi; Bear Mtn @ 15mi; Rabit Mtn @ 16mi
C	13		36	322	Same as 324 degrees
C	13		34	324	Top N Gunsight Pk; N side Carter Mtn @ 8mi
C	13		36	324	N Gunsight Pk; Carter Mtn @ 8mi
C	13		36	329	N tip N Gunsight Pk;
C	13		36	350	Coal Mtn @ 4mi; Cont' Divide @ 11mi
C	14	1	7	2	Pinnacles
C	14	1	4	182	Junction Butte east flank/ Lawson Ridge
C	14	3	2	117	N slope Slide Mtn @ 6mi/ SW pt Grouse Mtn @ 10mi
C	14	3	17	297	North end S Gunsight Pk
C	14	4	8	12	Continental Divide @ 10mi @ 11,319ft
C	14	4	15	192	5GA4090 Not visible--IC
C	14	5	18	51	Park View Mtn - Continental Divide
C	14	5	4	231	Toward Gore Pass
C	14	2a	1	89	Center Triad Pk @ 4mi
C	14	2a	5	269	Top Center high pt S Gunsight Pk
C	14	2b	6	88	Center Triad Pk @ 4mi
C	14	2b	9	268	Top Center high pt S Gunsight Pk
C	14	2c	1, 2	87	Center Triad Pk @ 4mi
C	14	2c	4, 16	267	Top Center high pt S Gunsight Pk
C	14	NA		82	Saddle between Triad Pks & Gimes Pk @ 4mi; N ridge top Searight Mtn @ 10 mi
C	14	NA		130	S ridge top Slide Mtn @ 7.5
C	14	NA		262	S center of S Gunsight Pk
C	14	NA		310	Through center Gunsight; SW of Middle Carter @ 7mi; Baker Mtn @ 18mi
C	15	1	1	7	Pinnacles/ Continental Divide @ 9mi @ 11,522 ft, cross axis, IC
C	15	1	3	187	SW top Junction Butte - IC
C	15	2	3	87	Saddle N &Center Triad
C	15	2	6	267	Center ride top center S Gunsight
C	15	3	10	1	Pinnacles
C	15	3	30	181	E Flank Junction Butte, Lawson Ridge
C	15	4	20	54	Grimes Pk/ SE side Park View/Continental Divide @ 14 mi
C	15	4	33	324	Gore Pass
C	15	5	13	175	SE end Lawson Ridge (pass)
C	15	5	19	355	Pinnacles west flank
C	15	6	32	27	IC
C	15	6	18	207	Twin Mtn top --NOT visible??
C	15	7	19	37	Continental Divide between Sheep & Haystack Mtn @ 13mi

C	15	7	31	217	Inc
C	16	Cross	NA	49	Cross axis
C	16	Cross	NA	229	Cross axis
C	16	Long	NA	140	Long axis;
C	16	Long	NA	320	Long axis;
C	17	1	2	10	IC
C	17	1	10	190	IC
D	17	NA	NA	41	Long axis
D	17	NA	NA	131	Cross axis
D	17	NA	NA	221	Long axis
D	17	NA	NA	311	Cross axis
D	18	1a	MP	61	Long axis; Ridge 1mi N of Grimes Pk @ 4mi; Lunar Max rise
D	18	1a	13	241	Saddle between center & S center high point S Gunsight Pk; Lunar Max set
D	18	1b	2	61	Long axis; Ridge 1mi N of Grimes Pk @ 4mi; Lunar Max rise
D	18	1b	15	241	Saddle between center & S center high point S Gunsight Pk; Lunar Max set
D	18	2	10	151	Ridge top W of William Fork Dam--IC; Cross axis
D	18	2	44	331	N slope N Gunsight Pk; Araphoe Pass Not visible; Cross axis
D	18	3a	1	1	Pinnacles
D	18	3a	20	181	E flank Junction Butte; Lawson Ridge - Not visible
D	18	3b	25	179	E flank Junction Butte; Lawson Ridge - Not visible
D	18	3b	36	359	W flank Pinnacles
D	18	4	30	89	Center Triad Pk @ 4mi
D	18	4	16	269	Center Top S Gunsight Pk
D	18	5	7	134	IC
D	18	5	1	314	Middle Carter @ 7mi; Whitley @ 12 mi
D	18	6	35	120	Knob N of E Fork Troublesome Ck @ 3.5mi;
D	18	6	41	300	Gunsight, unnamed Mt Gore Range 4mi ESE of Walton Pk; Lunar Min set
D	18	7	8	132	SW side Slide Mtn
D	18	7	43	312	S slope N Gunsight Pk; Middle Carter @ 8mi; S slope Whitley Pk @ 12mi
D	18	8	39	18	Sheep Mtn @ 12mi, Continental Divide
D	18	8	2	198	5GA4089 @ 2mi; E slope Wolford Myn
D	18	9	11	29	IC
D	18	9	32	209	Twin Mtn top @ 2mi; Wolford @ 7mi
D	22	1	2	19	Sheep Mtn @ 12mi, Continental Divide; Long axis
D	22	1	10	199	5GA4089 @ 2mi; E slope Little Wolford Mtn @ 5mi
D	22	3	6	97	500 ft S of S Triad Pk @4mi
D	22	3	18	277	Center top of S Gunsight; Tyler Mtn @10mi; S ridge Gore Mtn @17mi
D	22	5	4	14	Continental Divide 1mi W of Sheep Mtn; Arapahoe Trail
D	22	5	B	194	5GA639 (Jrey Craig); Antelope pass--Not Visible
D	22	6	D	154	E Sulphur Gulch Ridge between 5GA4204 & 5GA4214 -- Not Visible
D	22	6	E	334	IC
D	22	7	I	163	Reeder Crk Bluffs near 5GA1172 & 5GA1174 -- Not Visible

D	22	7	2	343	SW slope Coal Mtn @ 4mi
D	22	2a	9	45	Saddle N horizon line; between Park & Haystack Mtns
D	22	2a	21	225	IC
D	22	2b	15	135	S flank Slide Mtn @ 8mi; IC
D	22	2b	A	315	Through Gunsight->Middle Carter@ 6.5; NE flank Whitely Pk @ 12mi
D	22	4a	C	117	Topo dip SE horizon line between Grouse & Slide Mtns
D	22	4a	28	297	N slope N Gunsight Pk;
D	22	4b	J	118	Topo dip SE horizon line between Grouse & Slide Mtns
D	22	4b	18	298	N slope N Gunsight Pk;
D	22	8a	J	175	Larson Ridge Pass
D	22	8a	25	355	W flank Pinnacles
D	22	8b	3	175	Larson Ridge Pass
D	22	8b	F	355	W flank Pinnacles
D	22	8c	1	177	Larson Ridge Pass
D	22	8c	G	357	W flank Pinnacles
D	22	8d	3	177	Larson Ridge Pass
D	22	8d	13	357	W flank Pinnacles
D	22	NA	19	73	IC
D	22	NA	7	105	IC
D	22	NA	K	140	IC
D	22	NA	B	253	IC
D	22	NA	E	285	IC
D	22	NA	H	320	IC
D	23	1	B	135	IC
D	23	1	A	315	Gunsight, Middle Carter Mtn, Whitley Pk
D	24	3	25	160	Sulphur Gulch 5GA4210 @ 9mi; Reeder Crk Buttes 5GA1184 @ 11mi
D	24	3	10	340	NE flank White Slide @9 mi. 10,760ft; Red Slide Top @ 10mi. 10,840ft
D	24	1a	25	172	Barger Gulch @ 11mi
D	24	1a	8	352	0.5mi E of Coal Mtn @ 4mi
D	24	1b	22	173	Barger Gulch @ 11mi
D	24	1b	7	353	0.5mi E of Coal Mtn @ 4mi
D	24	2a	5	10	IC
D	24	2a	24	190	5GA4090 @ 2mi; Antelope Pass 5GA639 (Jerry Craig) @ 4mi
E	24	2b	2	9	IC
E	24	2b	25	189	5GA4090 @ 2mi; Antelope Pass 5GA639 (Jerry Craig) @ 4mi
E	29	NA	NA	14	IC; N horizon
E	29	NA	NA	194	IC; Antelope Pass; 5GA639 (Jerry Craig) -- Not Visible
E	31	Cross	NA	60	
E	31	Cross	NA	248	
E	31	Long	NA	150	
E	31	Long	NA	330	

Key:		
	Az	Azimuth
	Loc	Locality
	Fe	Feature
	Alig	Alignment Number
	IC	Inconclusive
	P.O.	Point of Origin
	NA	Not Applicable