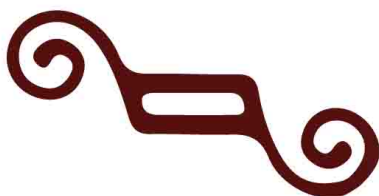
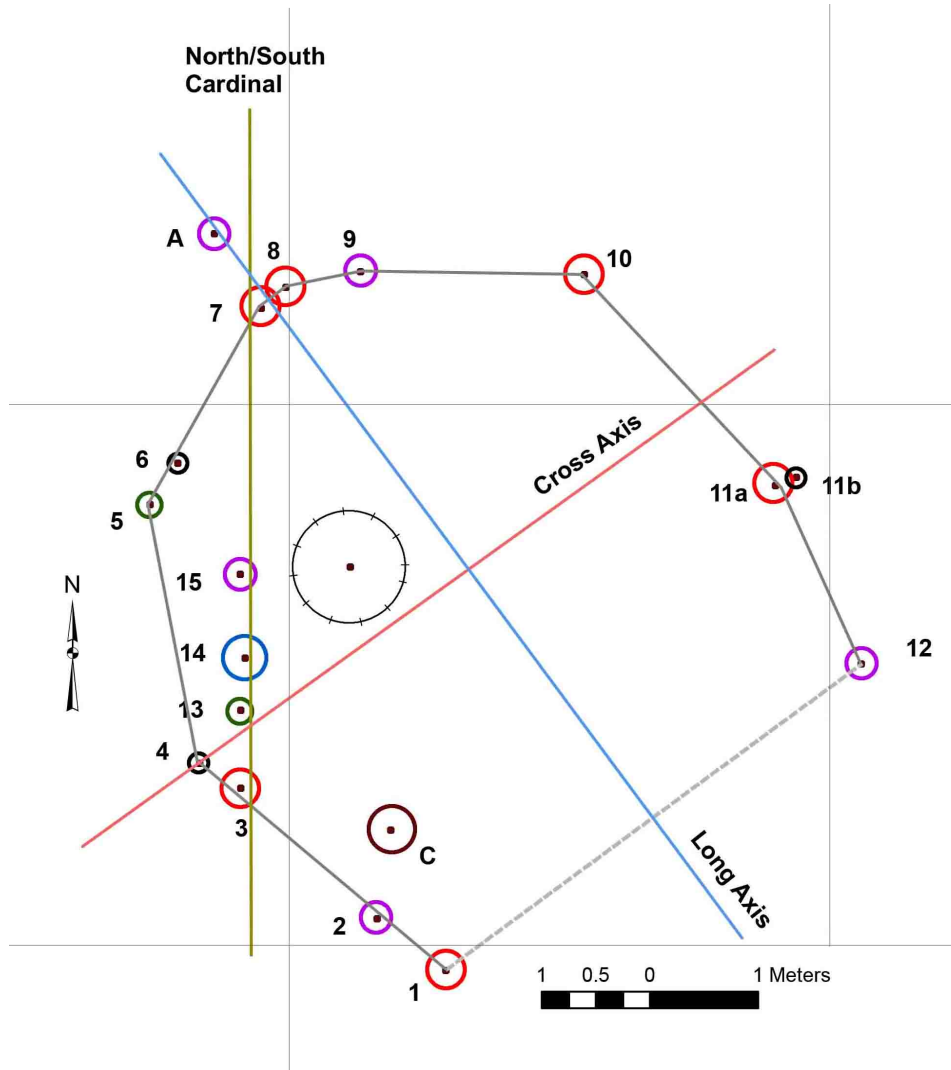


**Independence Mountain Archaeological Assessment of
Sites 5JA1099, 5JA1100, 5JA1102, 5JA1103, and 5JA1104
in Jackson County, Colorado**

**A State Historical Fund Project
No. 2016-AS-001**

**Cheryl Harrison
and Brian O'Neil**

December 2017



D A R G

Dominquez Archaeological Research Group

Frontispiece

5JA1100 north-south cardinal
and long and cross alignments

Forward

Archaeoastronomy had a popular revival with the Stonehenge discoveries of the 1960s (The Center for Archaeoastronomy, n.d.). In association with the examination of prehistoric and historic Native American cultures, it has since made use of archaeological methods and records to sort out the relationship between functional and symbolic astronomical knowledge, and to identify structures serving as seasonal markers for rituals. Medicine wheels are one of the most commonly known such sites in North America. Between 100 and 200 have been identified with the majority being found in the Canadian Provinces of Saskatchewan and Alberta. Fewer have been recorded in North Dakota, Wyoming, Montana, and Colorado. The oldest and largest known, located near Majorville in southern Alberta, was radiocarbon dated about 5000 years before present from an associated bone fragment, and another medicine wheel was dated about 2600 years old (David 2010). These dates suggest a Middle Archaic origin for the wheels and their geographic distribution appears to match that of the appearance and spread of the Athabaskan people in North America.

With this project, the number of recorded archaeoastronomy sites in North and Middle Parks of Colorado is increased to two. The first to be extensively documented was 5GA4251, the Gunsight Pass site, whose study was primarily funded through State Historical Fund Grant No. 2013-AS-003. Notably, the rock alignments at 5GA4251 are not characterized as medicine wheels. Some are comparable to star charts of the Skidi (Wolf) Pawnee; however, the Pawnee's stellar maps give no indication of solar observations, and their ceremonial calendar was based on positions of stars, constellations and planets.

Accordingly, these sites represent a unique type in the Native American archaeo-astronomical record. They also bring into question the documentation of other sites in Colorado that have been categorized as tipi rings. No materials have been obtained or direct associations have been made that can provide a temporal context for these sites, which leaves open the question of their assignment as prehistoric or historic Native American.

Carl Conner, President of DARG

**INDEPENDENCE MOUNTAIN ARCHAEOLOGICAL ASSESSMENT OF
SITES 5JA1099, 5JA1100, 5JA1102, 5JA1103, AND 5JA1104
IN JACKSON COUNTY, COLORADO
FOR HISTORY COLORADO, STATE HISTORICAL FUND
STATE HISTORICAL FUND PROJECT #2016-AS-001
OAHP Document No. JA.SHF.R37
DARG Project No. D2015-5**

8 December 2017

Project Authors:

Cheryl Harrison and Brian O'Neil

Archaeological Resources Preservation Act Permit # CO67009

DOMINQUEZ ARCHAEOLOGICAL RESEARCH GROUP, INC.

2832 Unaweep Avenue

Grand Junction, CO 81502

Submitted to:

History Colorado

Colorado Historical Society

1200 Broadway

Denver, CO 80203

ABSTRACT

Dominguez Archaeological Research Group (DARG) relocated and mapped the five stone alignment sites (5JA1099, 5JA1100, 5JA1102, 5JA1103, and 5JA1104) predicated in the State Historical Fund Archaeological Assessment grant (Project # 2016-AS-001). These sites consisted of stone cairns, stone rings, and low stone walls or combinations of these features along the crest or southern slopes of Independence Mountain in North Park, Colorado. None of the sites are considered domestic structures or should be referred to as “tipi” rings.

Of the five sites only one, 5JA1100, appears to have potential as a celestial calendar (archaeoastronomy site), and has a high probability of being associated with the summer solstice sunrise and sunset. Direct field observations and instrument measurements of the cobble alignment sets, and their associated azimuths from identified observation points need to be made. Such would increase the accuracy of the apparent solar observations and confirm the summer solstice sunrise and sunset skyline positions and the possible use of foreshortened horizons. This site should be considered Eligible under Criterion C of the NRHP as it embodies distinctive characteristics of an architectural type and method of construction, and under Criterion D as it is likely to yield information important in prehistory or history. This level of significance also applies to State and Local levels.

Two sites 5JA1099 and 5JA1104 should retain their original evaluation of “Need Data.” Site 5JA1099 may be associated with 5JA1100, but it will require direct visual observation of solar events to confirm the calendar status and relationship of those two sites and determine eligibility. The U-shape stone feature of 5JA1104 may have been used for a variety of activities, from a hunting blind, observation blind, vision quest or for observing solar events. As such, it should retain its NRHP “Need Data” status.

Sites 5JA1102 and 5JA1103 are considered “Not Eligible” for listing on the National Register of Historic Places (NRHP) and no further work is recommended.

Native American consultation may provide information on all of the sites particularly 5JA1100 and 5JA1099. It is also recommended that all five sites be avoided and if possible, access controlled.

TABLE OF CONTENTS

Abstract.	i
Introduction.	1
Effective Environment.	1
Existing Data and Literature Review.	2
Statement of Objectives.	4
Methodology	4
Literature Search	6
Results.	6
Discussion.	21
Evaluation and Recommendations	24
References Cited	26
Appendix A: Table of Alignments from Site 5JA110	A.1
Appendix B: Site location map and OAHN Site Forms.	B.1

LIST OF FIGURES

Figure 1. Site Map of 5JA1099.	7
Figure 2. Site map of 5JA1100	11
Figure 3. 5JA1100 north-south cardinal and long and cross alignments.	12
Figure 4. 5JA1100 possible summer solstice sunrise/winter solstice sunset alignments.	13
Figure B-1. Project location map.	B.2

LIST OF PLATES

Plate 1. View of southern horizon from 5JA1099 Cairn 1 at 180°.	8
Plate 2. 5JA1100 U-shaped stone feature looking south-southwest.	10
Plate 3. 5JA1100 U-shaped stone feature looking southeast.	10
Plate 4. 5JA1102 stone cairn/rock ring and wing walls looking west.	17
Plate 5. 5JA1103 stone wall on eastern side slope of small knoll looking west.	17
Plate 6. 5JA1103 rock Cairn #1 looking west.	18
Plate 7. 5JA1103 possible stone ring/cairn outlined in red looking west.	18
Plate 8. 5JA1103 rock Cairn #2 looking west.	20
Plate 9. 5JA1103 rock Cairn #2 looking down.	20
Plate 10. 5JA1104 U-shaped rock alignment looking south.	21

TABLES

Table 1. Sunrise sunset data for site 5JA1100 and Walden, CO on June 21, 2017	14
Table A.1. Alignments for 5JA1100	A.2

INTRODUCTION

This report documents the results of an Archaeological Assessment Grant (2016-AS-001) awarded to Dominquez Archaeological Research Group (DARG) to reinvestigate five stone ring sites (5JA1099, 5JA1100, 5JA1102, 5JA1103, and 5JA1104) on Independence Mountain, North Park, Colorado (see site location map, Figure B-1). The sites are on lands administered by the USDI Bureau of Land Management (BLM), Colorado Northwest District, Kremmling Field Office (KFO). Fieldwork, consisting of site revisits, was conducted under Archaeological Resources Preservation Act Permit # CO67009 in August 2017 by DARG director Carl E. Conner. Project archaeologists were Cheryl A. Harrison and Brian P. O'Neil. Additional crew consisted of Masha Conner, Thuong (Nikki) Pham and volunteer Roger Carpenter. Brian O'Neil conducted the archaeoastronomy assessment. These sites were expeditiously recorded almost 20 years ago and needed updating, including National Register of Historic Places assessment as all were placed in the "Need Data" category. Additionally, recent archaeoastronomy investigations in Middle Park, Colorado (O'Neil and Harrison, 2017) has suggested that some stone rings may represent prehistoric calendars used to predict annual solar events, of which one or more of the previously recorded sites may also be.

EFFECTIVE ENVIRONMENT

The project area is along the crest and south facing slopes of Independence Mountain, at the north end of North Park. Independence Mountain is considered a relatively narrow east-west ridge with narrow finger ridges and saddles of the Park Mountain Range, part of the Southern Rocky Mountains physiographic province (Mutel and Emerick 1984; USGS 1981) with elevations averaging 9300ft. Overall, an excellent view of the entire North Park area is provided from Independence Mountain.

Slopes in the project area are steep and range from 3° to over 60°. Southern side slopes are especially steep in comparison to the northern side slopes. The southern slopes are covered with low vegetation mostly grasses and forbs. The northern slopes are covered with a dense mixed coniferous forest that burnt in the 2016 Beaver Creek wildland fire.

The North Platte River, the primary drainage of North Park, flows along the eastern flank of Independence Mountain from its headwaters in the Park Range north into Wyoming. Intermittent and ephemeral drainages are common along both sides of Independence Mountain, particularly during spring runoff. Fischer Draw, also an intermittent stream, is the closest water and most reliable source almost a mile away at bottom of the steep southern slope.

The climate of the area, as it is throughout most of Jackson County, is characterized by short, cool summers and long, cold winters; low to moderate amounts of precipitation; a wide range of daily and seasonal temperatures; and a short growing season (USDA 1981). Climatic conditions across North Park vary generally by elevation and aspect and less so by latitude. At Walden, the average daily temperature for January is 15.3° F, and for July 59° F. Average annual precipitation is 9 inches and snowfall is less than 12 inches per year at Walden (USDA 1981).

The depositional environment is comprised of metamorphic rocks of felsic, Hornblendic gneisses, either separate or interlayered and includes metabasalt, metatuff, and interbedded metagraywacke; locally contains interlayered biotite gneiss. These rocks are derived principally from volcanic rocks. The soils are Bowen gravelly sandy loams and are found on 15 to 45 percent slopes on mountainsides and ridges. These soils include areas of Rock outcrop and have characteristics that include very shallow soils found on the crests of ridges and slope breaks. Small areas of Rogert gravelly sandy loam are also included. Granite outcrops are common on the top of Independence Mountain and as boulders and cobbles on the slopes.

The predominant vegetation type is a mountain sage-grassland complex. This vegetation community is dominated by sage and a variety of grasses and forbs and primarily limited to the ridge top and south slope. A mixed conifer forest is present on north facing slopes consisting mainly of Bristle Cone pine, aspen, and other low shrubs. Mountain riparian vegetation is found along the North Platte River and in the some of the more prominent intermittent drainages.

Fauna include bear, mule deer, elk, coyotes, bobcats, weasels, badgers, rabbits, and several other small mammals typical of a mountain climate. In the past it also likely included bison.

EXISTING DATA AND LITERATURE REVIEW

Evidence gathered from the region thus far demonstrates that humans have occupied portions of the Colorado Mountains culture area for a time span of more than 12,000 years. The framework for the prehistoric cultural context is based upon *Colorado Prehistory: A Context for the Platte River Basin* by Gilmore et al. 1999. They divided the cultural continuum up into stages with one or more periods.

STAGE	DATE RANGE
Paleoindian	12,040 – 5740 BC
Clovis Period	12,040 – 9750 BC
Folsom Period	11,340 – 8720 BC
Plano Period	10,850 – 5740 BC
Archaic	5500 BC – AD 150
Early Archaic Period	5500 – 3000 BC
Middle Archaic Period	3000 – 1000 BC
Late Archaic Period	1000 BC – AD 150
Late Prehistoric	AD 150 – 1150
Early Ceramic Period	AD 150 – 1150
Middle Ceramic Period	AD 1150 – 1540
Protohistoric	AD 1540 – 1860

Archaeological evidence for Paleoindian sites indicate specialized hunting activity of extinct mega fauna. This supposition is based upon the high percentage of big game kill and processing sites compared to other types of sites, i.e. camps. Tools are characterized by large extremely well-made flaked stone tools, primarily dart points and specialized hide-processing tools technologically distinct from following cultural periods.

The Archaic stage occurred in a time of changing environmental conditions that necessitated lifestyle modifications from the preceding Paleoindian stage. As such it represents a shift in emphasis from specialized big game hunting to a more diversified subsistence pattern with the addition of smaller game animals and an increased emphasis on plant resources (Guthrie et al. 1984).

Late Prehistoric stage as described by Gilmore et al. (1999) is patterned after the Late prehistoric period defined by Mulloy (1958) and Frison (1978; 1991). In general, it represents a continued reliance on hunting and gathering. The bow and arrow being the technological innovation with smaller projectile point rather than ceramics – as the presence of ceramics in the mountains is extremely low for use as a cultural marker.

The Protohistoric stage references the time from first European contact to the permanent settlement by literate peoples, or the beginning of the Historic period. Initial contact needn't be in person but can manifest itself as trade goods assimilated by Native American groups (Gilmore et al. 1999). All the principal Protohistoric and Historic tribes in Colorado, the Apache, Arapaho, Cheyenne, Comanche, Shoshoni, and Ute pursued the vision quest to a greater or lesser extent, as did many other historic Plains tribes (Berthrong, 1963; Conner 1982; Grinnell 1962; Hoebel 1960; Hultkrantz 1956; Irwin 1994; Kroeber 1983; Lowie 1954; Murphy and Murphy 1986; Shimkin 1986; Steward 1941, 1943). The Shoshoni and Arapaho were known to have made forays into North, South, and Middle Parks (Fowler, 2001), and may have conducted such ceremonies there. However, according to Callaway (et al. 1986), the Utes did not regularly perform the vision quest, though Stewart (1942) reports that the Tabeguache or Uncompahgre band sought guardian spirits and shamanistic power by fasting on mountains.

Additional synthetic works on the region's prehistory can be found in the *Archaeology of Colorado* (Cassells 1984, 1997).

Briefly, evidence exists for human occupation in North Park dating from the Paleoindian through the 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 as aboriginal populations fluctuate, principally in response to changing environmental conditions. The most intense occupations appear to have been those of the Middle Archaic through the Protohistoric/ Historic cultural stages. Despite the fluctuations in populations and usage of any one area, the aboriginal inhabitants of the Mountain region, including North Park, have generally pursued a subsistence pattern of broad spectrum hunting and gathering and seasonal transhumance.

Prehistoric settlement and subsistence patterns in the Colorado Mountains culture area changed little through time, and were largely determined by the availability of water, lithic, and plant and animal resources to support a generalized hunting and gathering lifeway. Lischka et al. (1983) hypothesized that multiple activity prehistoric sites with features and no architecture were located primarily at lower elevations, near water, in catchment areas with high values for wild plant resources and game animals. While multiple activity sites with both features and architectural features, usually stone circles, were located predominantly on upland ridges, some distance from water, and had catchment areas with high values for wild plant foods and big game, but low values for small game animals.

STATEMENT OF OBJECTIVES

The objective of this Archaeological Assessment grant was to document and map several stone ring, wall, and cairn features on sites 5JA1099, 5JA1100, 5JA1102, 5JA1103, 5JA1104 on Independence Mountain, in North Park, Colorado using current GIS technology. National Register of Historic Place (NRHP) assessments were to be made and if possible determine the temporal/cultural affiliation and site function.

The archaeoastronomy goal was not to make direct observations of all potential astronomical alignment(s) in the field since direct observation requires a year or more depending upon weather conditions. Additionally, any determination as to cobble placement resulting from cultural placement or natural deposition; disturbance and/or displacement by grazing animals; frost heave; and/or later cultural modifications would require excavation - which is beyond the scope of this assessment.

METHODOLOGY

In general, the methodology used by DARG for this assessment was adapted from the 5GA4251, Gunsight Pass (O'Neil and Harrison 2014) site investigation: 1) a visual inspection would determine if there are additional stone features or artifacts not previously recognized; 2) a detailed recording of the archaeological and architectural stone features utilizing GPS mapping and photography; 3) an initial determination as to whether these features represent domiciles, observation points, ceremonial features i.e. vision quests and eagle traps, or possible game drive lines; 4) visual observations of geographic orientations toward potential sacred land forms; or potential astronomical alignments along the horizon lines; 5) assess whether the data obtained from this assessment is relevant to historic Ute, Arapahoe, and/ or Eastern Shoshoni tribes for possible consideration as Traditional Cultural Property (TCP); and 6) make NRHP evaluations along with management recommendations.

All artifacts and features were mapped using a Trimble Geo XH GPS unit using NAD 1983 which has an accuracy of ± 20 cm. Trimble data was corrected and loaded into ArcView version 10.5.1 and the resulting data was used to create a master site map and individual site/feature maps. Photographs documenting the sites and features were taken. However, no overhead photographic views could be taken due to extremely windy conditions, making the use of a six-foot step ladder dangerous. Additionally, DARG did not use soil sample bags

to define the features as there was little to no vegetation obscuring the ground surface and/or the feature cobbles and the features were either several tiers high or were constructed of very large boulders. No radiocarbon samples were taken as proposed since no datable material (charcoal or bone) was present in the interior feature of 5JA1100. Additionally, no cultural artifacts of any kind were observed at any of the sites. Therefore, no analysis or curation was necessary.

5JA1100 Methodology

An inspection of the site maps indicated only one site, 5JA1100, had potential celestial markers and underwent further analysis. Initial 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 side of the peripheral outline. Special attention was paid to paired or triad groups of cobbles. In some cases, strong linear relationships between multiple cobbles in the peripheral outline were also considered. Generation of the observation points and determination of the three or more points of reference were made by sighting across the site over a minimal distance of 1.5m. Once these criteria were met, observation of the relationship(s) to the surrounding terrain could be hypothesized and whether the alignment represents geographical to geographical (fixed) and/ or geographical to celestial (changeable) points. Before a hypothesized alignment was accepted, it had to meet three criteria:

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

For this facet of the project, we assumed simple line-of-sight alignments as having a potential mapping error of $\pm 20\text{cm}$ at the observation point(s), and $\pm 2^\circ$ arc to the potential target point(s). An assumed maximum unobstructed long range observational distance was set at ≤ 50 miles, based upon the site elevation (ca. 9300ft). Potential azimuth orientations were generated using a straight edge placed over the aligned cobble centers and measured with a protractor placed on the declination corrected north line of Longitude $106^\circ 23' 22''$ W, which passes through the western portion of the stone feature. Fractional azimuths were rounded up to the nearest full degree. Terrain Navigator Pro was utilized to check for potential geographical to geographical azimuth intercepts based upon the elevation profile along the azimuth intercept line.

The site latitude/longitude was then entered in to the U.S. Naval Observatory, Astronomical Applications Department data base (http://aa.usno.navy.mil/cgi-bin/aa_altazw.pl) to determine the summer/winter solstice and the autumnal equinox rise/set times and azimuths for the site for 2017. From this data some basic assessments between potential geographical landmarks to summer solstice and autumnal solar equinox rise/set alignments were made. These were then compared to the recorded rise/set times from Walden, CO, the closest National Oceanic and Atmospheric Administration (NOAA) weather station.

The postulated hearth within the rock ring at 5JA1100 was tested by excavating a small vertical hole in the center of the feature with a trowel. Thereby, restricting the disturbance to the width of the trowel. No evidence of charcoal or thermally altered rock was found, and no samples were taken or analyzed.

LITERATURE SEARCH

In 1999 Grand River Institute conducted an inventory for a BLM fence which resulted in the identification of the five sites 5JA1099, 5JA1100, 5JA1102, 5JA1103, and 5JA1104, the focus of this report. Additionally, in 1985 Centuries Research surveyed an exploratory drill hole location with negative cultural results. Few large cultural resource projects have been conducted in North Park leaving cultural evidence as viewed through a keyhole rather than a picture window, thereby restricting the overall cultural perspective and cultural associations.

RESULTS

Per the grant from the History Colorado, State Historical Fund Archaeological Assessment (2016-AS-001), DARG relocated, mapped, photographed and made recommendations for sites 5JA1099, 5JA1100, 5JA1102, 5JA1103, and 5JA1104 previously evaluated as Need Data for listing on the National Register of Historic Places.

Site 5JA1099 is a linear arranged site composed of two rock cairns and a linear rock alignment/wall on the west facing slope of a small knob on Independent Mountain. It was originally recorded as:

... located on the west facing slope of a small knob along Independent Mountain's crest. The stone wall measures about 150 x 50 x 50cm. Both the cairn and the wall are composed of local granite boulders piled on top of one another. The wall and cairn are about 30 m apart. There is an excellent view of the mountain crest and a small saddle to the west. Modern trash had been stashed in the cairn, resulting in the rearrangement of the boulders, which are about three courses high. It is uncertain whether these cairns are modern/historic or prehistoric in origin. No associated artifacts, other than the modern trash, was identified. However, the area is currently hunted heavily for deer and elk. Therefore, this site is considered not eligible for listing on the NRHP.

DARG expanded the old site boundary to incorporate an additional cairn. The site now includes two rock cairns and a rock alignment/wall on the east facing slope of a small knob on Independent Mountain (Figure 1). The central rock cairn (#1) is 90 x 80 x 30cm and composed of very large granitic cobbles. One large upright boulder, within this cairn, has sloped edges that converge to an edge/point, which mimics a mountain peak on the southern horizon at 180°; suggesting that this cairn could be a geographic landmark indicator. The second cairn, on the northern end of the site, measures approximately 130 x 86 x 26cm. It also is composed primarily of large granite boulders. The rock alignment appears to be a wall incorporated into and on top of an existing rock outcrop. It measures about 150 x 50 x 80cm and is composed of two to three rock layers all of which are granite. The wall is oriented

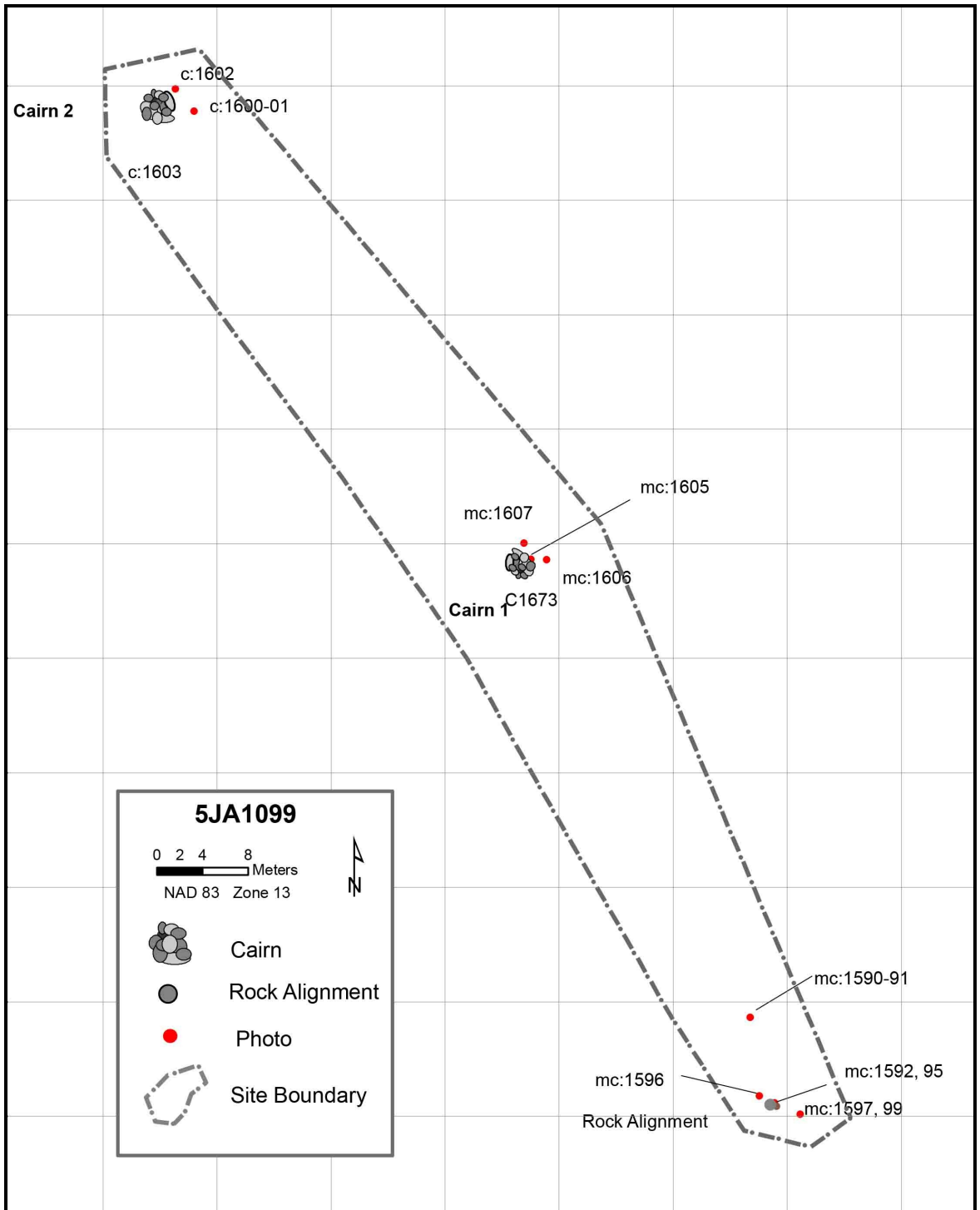


Figure 1. Site Map of 5JA1099.

southeast to northwest along a 100/280° alignment. From the southern end of the wall site 5JA1100, a possible archaeoastronomy site, is visible at an azimuth of 103° and 500 feet. There is an excellent view to the south. No associated artifacts were found, and it appears that the 2016 wildland fire did not affect the site.

These types of sites and features are common along high-altitude ridges and mountaintops and are generally considered insignificant. Historically they are often references for trails or tracks or other geographic landmarks. But, cairn #1 has a 180° aspect and appears to mimic a mountain peak on the southern horizon (Plate 1). The peak may be Diamond Mountain in the Rabbit Ears Range on the Continental Divide, the divide between Middle and North Parks and may be a geographic landmark indicator of a pass or other culturally important site or area. Additionally, the site contains aspects of integrity critical to its significance. The Feeling and Setting of the site are largely intact in that environment and natural geologic features are relatively unchanged. Materials used to create the cultural manifestations reflect an understanding of local geologic resources. Integrity of Design may be intact based upon possible solar or geographic association(s). But, Association and Workmanship appears to be lacking. Given the above and the possible association with 5JA1100 it should retain its “Need Data” assessment until direct observations of potential solar events and further research on the importance of the Diamond Mountain area can be made. Native American consultation is recommended.



Plate 1. View of southern horizon from 5JA1099 Cairn #1 at 180°. Red line on horizon appears to be Diamond Mountain.

Site 5JA1100 is a stone ring located in a small saddle on the crest of Independence Mountain. It was originally described as:

There is one stone ring composed of fairly large granitic boulders approximately 5 m in diameter with a possible hearth in the center. No artifactual material was found in association with the ring. The ring is somewhat protected from the east and west by small topographic knobs, but has an open view to the south. A mixed conifer forest is directly north of the site. The stone ring which comprises the site appears to have a possible hearth near the center. Therefore, this site could help identify the cultural/ temporal affiliation of the occupants, subsistence, and possibly seasonality and is considered a need data site as far as listing on the NRHP.

DARG considers 5JA1100 to be a U-shaped cobble arrangement composed of 17 cobbles (Plates 2 and 3), with an interior feature that is a 1.3m diameter, 5 -10cm deep depression feature (B). The U-shaped perimeter outline consists of 12 cobbles with a wide opening or observation portal open to the south-southeast (Figure 2). This opening is defined by two cobbles [1 and 12] and is approximately 4.37m wide. There are four interior cobbles (13, 14, 15, and C) and one exterior cobble (A) located near the northwest perimeter. There are four distinct occurrences of paired cobbles which occur along the perimeter outline. These include: cobble sets [3, 4]; [5, 6]; [7, 8]; [11a/b]. Cobbles 11a/b may have once been stacked, with the smaller cobble (b) atop cobble (a). Due to their close proximity, it is assumed that exterior cobble A is associated with paired cobble set [7, 8], to form a triad grouping [A, 7, 8].

The long axis of the cobble arrangement was determined by drawing a straight base line between cobbles 1 and 12 at the open end of the U-shape, finding the mid-point and drawing a line to the triad cobble cluster [A, 7, 8] at the apex of the U-shape. The cross axis was determined by finding the mid-point of the long axis and drawing a perpendicular line across the peripheral feature outline. The azimuth orientations were generated based upon longitudinal true north.

Alignment 1 is a north-south cardinal alignment (Figure 3). It consists of five cobbles [3, 13, 14, 15, and 7] with azimuths of $360^{\circ}/180^{\circ}$. Line-of-sight along both azimuths were inconclusive for a visual reference point due to atmospheric conditions. However, under ideal conditions, the Terrain Navigator Pro program showed a potential intercept at 360° with Brown Peak in the Snowy Range, WY at an elevation of 11,605ft at 33 miles. In reality, this observation likely could not occur if the north face of Independence Mountain was heavily forested as it was prior to the 2016 wildland fire. The back-sight showed a potential intercept of 180° with Pole Mountain at an elevation of 9234ft at 27 miles.

Alignment 2 is a possible summer solstice sunrise/winter solstice sunset alignment consisting of cobble set [3, 11a/b] at $60/240^{\circ}$ (Figure 4). The 60° azimuth showed a potential intercept with an unnamed high point on the Snowy Mountains ridge line along the Jackson/Larimer County line at an elevation of 9240ft at 12 miles. The 60° alignment compares favorably with the sunrise time of 4:34am MST for Walden, CO (Table 1), at an azimuth of 57.6° . At the site, this alignment, with a -1° (below the horizon) altitude could be a “first glimmer”



Plate 2. 5JA1100 U-shaped stone feature looking south-southwest. Tape is at the depression/interior feature and is extended to 1m.



Plate 3. 5JA1100 U-shaped stone feature looking southeast. Tape is at the depression/interior feature and is extended to 1m.

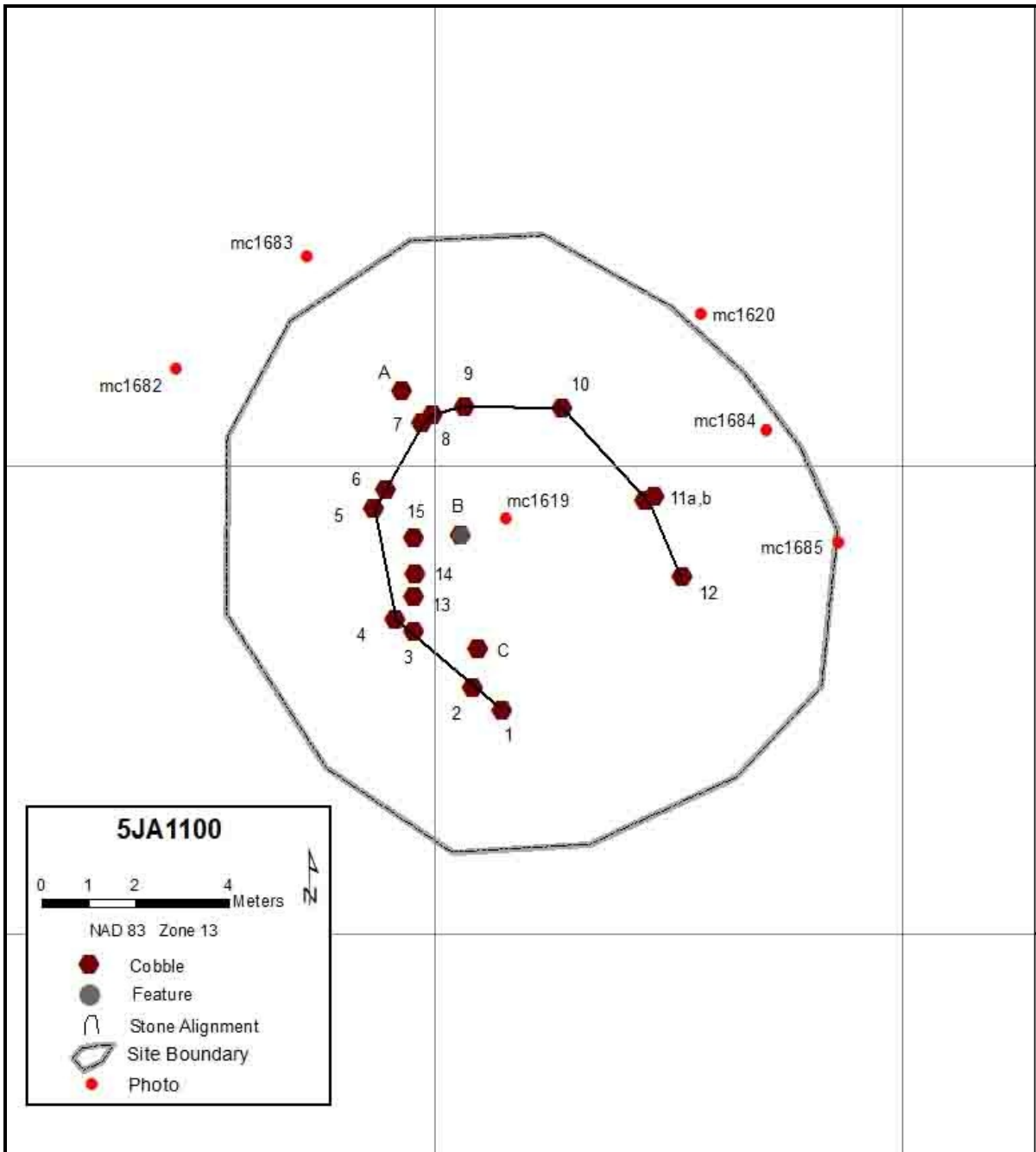


Figure 2. Site map of 5JA1100.

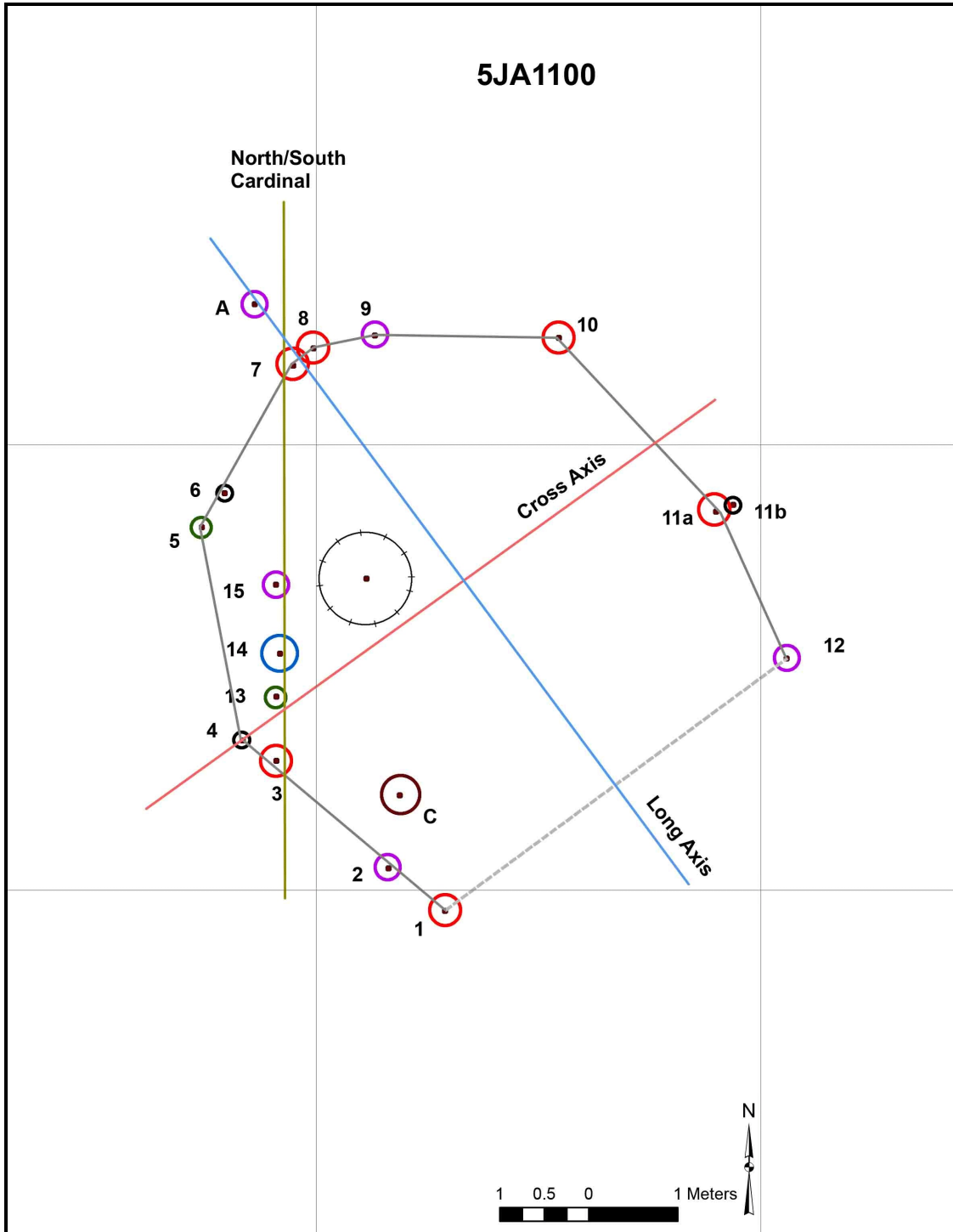


Figure 3. 5JA1100 north-south cardinal and long and cross alignments. Color circles indicate relative sizes of cobbles. Hatched circle indicates internal depression feature.

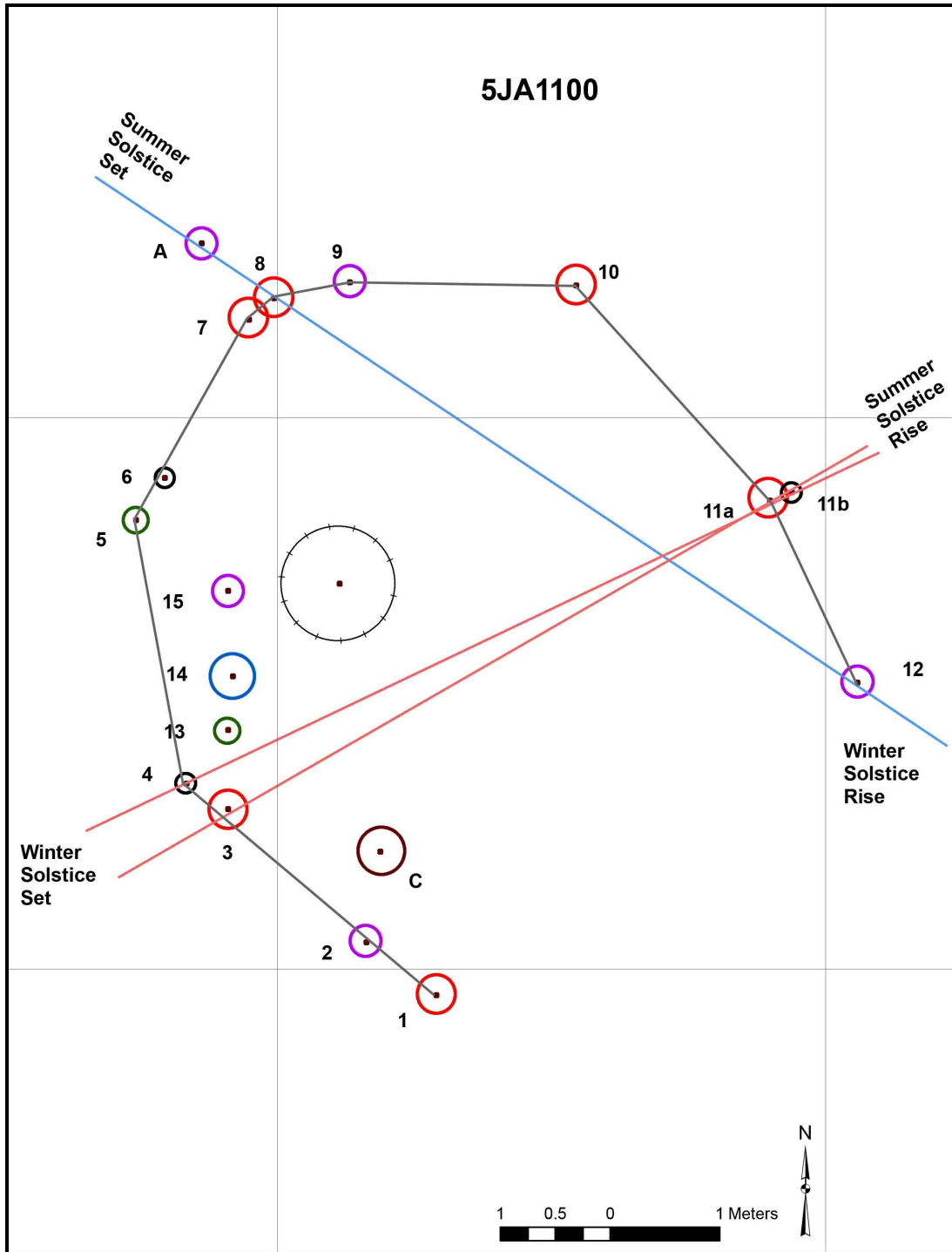


Figure 4. 5JA1100 possible summer solstice sunrise/winter solstice sunset alignments. Color circles indicate relative sizes of cobbles. Hatched circle indicates internal depression feature.

position. However, the 4:40 time and altitude of 0.6° above the horizon at 58.4° is a better fit for a “first glimmer” position particularly using a naked eye. The 4:50 time with an altitude of 2.1° above the horizon at 60° would likely provide a half solar disk. While the 5:00 time with an altitude of 3.6° above the horizon at 61.6° would provide a full solar disk. Thus, there is a potential for a summer solstice sunrise observation along cobble set [3, 11a/b] with its azimuth of 60° , using cobble 3 as the point of observation. On the other hand, using the reverse observation point at cobbles 11a/b, along a 240° azimuth provides a very good potential for a winter solstice sunset over Mt. Zirkel, as a distinct horizon marker. This alignment also intersects with a known stone ring site (5JA25).

Table 1. Sunrise sunset data for site 5JA1100 and Walden, CO on June 21, 2017.

5JA1100---USNO/AAD Data			Walden
Time	Altitude	Azimuth	NOAA data MST
4:30	-1.5°	56.7°	4:34 AM sunrise
4:40	0.6°	58.4°	
4:50	2.1°	60.0°	
5:00	3.6°	61.6°	
5:10	5.2°	63.2°	
5:20	6.9°	64.7°	
7:40	-0.1°	302.5°	7:39 PM sunset
7:50	-2.3°	304.1°	

Alignment 3 consists of cobble set [4, 11a/b] at $64^\circ/244^\circ$ and is a possible summer solstice sunrise/sunset alignment (Figure 4). The 64° azimuth indicated a potential intercept point along the small hill slope east of the site at an elevation of 9340ft at 500ft, thus providing a *foreshortened horizon* for the site. Whether or not this very short distance (500ft) to target (observed skyline) with its increased elevation of approximately 40ft (slope intercept) would raise the horizontal angle (altitude) enough to bring the margin of error differential to within acceptable parameters is uncertain at this time. The question is best answered by both direct instrument based and naked eye observations, on site; and would probably involve the exposure of the full solar disk. The 244° azimuth indicated a potential intercept point along the north slope of Mt. Zirkel at an elevation of 11,640ft at 15 miles. When this data is compared to the Walden sunrise time of 4:34am MST it is short by approximately 8° (56.7° vs 64.7°) which is well beyond our acceptable margin for error of $\pm 2^\circ$ arc. The only possible way to potentially compensate for this is by using a foreshortened horizon – the deviation of the *observed skyline* from the astronomical horizon.

Alignment 4 is also a probable summer solstice sunset and/or winter solstice sunrise alignment(s). It is composed of three cobbles [12, 8, and A] and produced azimuths of $123^\circ/303^\circ$. The 123° azimuth intercepts an unnamed mountain on the divide between Larimer and Jackson counties in the Medicine Bow Range at an elevation of 12,000ft at 33 miles. This alignment bodes well for a possible winter solstice sunrise, but a range of 33 miles brings into question problems with target visibility due to barometric and elevation variations affecting

atmospheric refraction. When the 303° alignment is compared to the NOAA sunset data of 7:39pm at 302.5° with a horizon altitude of approximately -1° (below the horizon) the alignment matches so tightly with our site map derived azimuth of 303° that we feel confident that this is a summer solstice sunset alignment from observation point cobble 12. Incidentally, this azimuth intercepts the top of a small hill west-northwest of the site at an elevation of 9350ft at 500ft, intersecting with site 5JA1099, close to the rock wall alignment on the southeastern tip of 5JA1099. Indeed, 5JA1100 is visible from the southern end of the rock alignment. Whether these two sites are related is intriguing but presently undetermined and can only be ascertained by direct visual and instrument observation.

Additional alignments were delineated from the GIS and Terrain Navigator data but were considered inconsequential as no solar data could be ascertained. They may point to other celestial events, geographic reference points, trails or sacred areas. These alignments are presented in Appendix A.

No lithic debitage, tools, or ceramics, were observed on the site. The circular feature (B) was trowel tested. The fill consisted of very small pebbles consistent with the Bowen gravelly very shallow soils found on the crests of ridges and slope breaks on mountainsides and ridges. No charcoal was present within the feature, though there was some evidence of thermal fracturing on the underlying rock at the bottom of the depression. Beyond that, there was no evidence of habitation and/ or domestic activities, thus suggesting that the site was primarily ceremonial concerned with solar events.

The site contains aspects of integrity critical to its significance. The Feeling and Setting of the site are largely intact in that the environment and natural geologic features are relatively unchanged; Materials used to create the cultural manifestations reflect an understanding of local geologic resources; Integrity of Design is probable with prior knowledge of making a geoglyph solar calendar. Association and Workmanship are good with a probable working knowledge of equinox and solstice alignments. The site should be considered “Eligible” under Criteria C as it embodies distinctive characteristics of an architectural type and method of construction, and under Criteria D as it is likely to yield information important in prehistory or history. This level of significance also applies to State and Local levels. Direct field observations and measurements must be made to confirm the solstice sunrise and sunset skyline positions and the use of foreshortened horizons before it can be considered a solar calendar. Native American consultation is recommended.

Site 5JA1102 consists of a stone ring/stone walls located on the top of a small knob on the crest of Independence Mountain. It was originally described as:

One stone ring, which appears to open to the northeast, is composed of fairly large granitic boulders. The ring is approximately 6 x 4m with rocks pile up 2 to 3 courses high. The stone wall/alignments are west of the ring and may have been blinds or rings which have been disturbed. They are about 3 - 4m long and 2 - 3 stones high. No artifactual material was found in association with the ring or walls. None of the structures are protected from the winds, being located on the top of the knob. But, there is an excellent view of the surrounding area particularly to the south. The site is considered a need data site for the NRHP field evaluation.

The stone ring and rock alignments which comprises the site located on a high point may be for ceremonial reasons or as a hunting blind. More information and detailed mapping could indicate which if either are true. Artifacts may be found, or Native American cultural groups may help in this determination.

DARG relocated the site, identifying the stone ring/cairn at the apex of the knob on Independence Mountain, but not the stone walls west of the ring. The ring/cairn was made of granite cobbles/boulders piled 2 to 3 high. Extending from the ring/cairn were what appeared to be somewhat parallel wing walls opening to the northeast (Plate 4). The ring/wall complex is approximately 4m long and 3m wide at a maximum. Again, no artifacts were found and no impacts from the 2016 wildland fire were evident. While the site contains aspects of integrity critical to its significance; the Feeling and Setting are largely intact in that the environment and natural geologic features are relatively unchanged, and the Materials used to create the cultural manifestations do reflect an understanding of local geologic resources; but some of the rocks may have been realigned affecting the integrity of Location, Design, Association and Workmanship. The site in and of itself is not significant. These types of sites and features are common along high-altitude ridges and mountaintops; historically they often are references for trails or tracks or other important geographic landmarks. As such this site is considered not eligible for listing on the NRHP.

Site 5JA1103 is composed of multiple stone features located on the top and east facing slope of a small knob along the crest of Independence Mountain. It was originally recorded as:

The site consists of a stone ring and two stone cairns on the top of the knob and a stone wall on the east facing slope. The ring is relatively small at approximately 2-3 m in diameter with granitic stones piled up 3-4 high. The granitic stone cairns are south of the ring and about a 1 m in diameter and 3-4 stones high. The wall is east of the ring and half way down the east slope toward a small saddle. It measures about 2 m long and is composed of three courses of granitic boulders. There is an excellent view of the area south of Independence Mountain. No artifactual material was located so the origin and age of the site could not be determined. The site is considered a need data site for the NRHP field evaluation. The stone ring and rock alignments which comprises the site may be for ceremonial reasons or as possibly used as a hunting blind. More information and detailed mapping could indicate which if either are true. Artifacts may be found, or Native American cultural groups may help in this determination.

DARG relocated the site, identifying the two stone cairns, a stone ring/cairn, and a rock wall on the top and east facing slope of a small knob along the crest of Independence Mountain. The stone wall comprises the eastern boundary of the site and is 1.5 x 1.0 x 0.50-0.90 m and is composed of granite boulders/cobbles up to three tiers high. It is oriented more or less parallel to the slope along the east facing knob (Plates 5). Cairn #1 is composed of large granitic boulders pulled upright on the top of a small knoll. It is approximately 1 x 1m and is due east of site 5JA1102 (Plate 6). The stone ring/cairn may be what was originally recorded as the "stone ring". This assessment is based upon a comparison of the DARG photograph and the original photos. The ring/cairn is approximately 3 x 2m and is composed of many granitic cobbles scattered around a main concentration on the eastern side and was likely 3 – 4 courses high (Plate 7). Some of the cobbles appear to be recently spalled as no lichen is



Plate 4. 5JA1102 stone cairn/rock ring and wing walls looking west. Tape is extended to 1m.



Plate 5. 5JA1103 stone wall on eastern side slope of small knoll looking west. The cairn/ring is on top of the knoll.



Plate 6. 5JA1103 rock Cairn #1 looking west. Note size of upright boulders. Tape is extended 1m.



Plate 7. 5JA1103 possible stone ring/cairn outlined in red looking west. Tape is extended 1m.

present on the exposed surface, possibly the result of the fire, target practice or vandalism. Cairn #2 is the smallest feature being less than 1m in diameter, composed of the fewest cobbles (Plates 8 and 9). It is downslope from the stone ring/cairn. No artifacts were observed so the age, affiliation, and/or function of the site could not be determined. This site contains aspects of integrity critical to its significance. The Feeling, Setting, and Location are largely intact as the environment and natural geologic features are relatively unchanged and the Materials used to create the cultural manifestations reflect an understanding of local geologic resources. However, the features may have been disturbed thereby affecting the integrity of Design, Association and Workmanship. The site in and of its self is not significant. These types of sites and features are common along high-altitude ridges and mountain tops. Historically, the features within the site have been associated with ceremonial use, hunting, or geographic references for trails or tracks or other important landscape features. As such this site is considered not eligible for listing on the NRHP.

5JA1104 is a single stone ring on a small rise within a small saddle along the crest of Independence Mountain. The ring was originally recorded as:

The ring is composed of granite cobbles piled 2-3 high creating a wall of about 50 cm and a diameter of approximately 3 m. No artifactual material was identified in association with the ring. The site may represent a component of a larger game drive system or be part of a vision quest local. The field NRHP evaluation places this site in the need data category. The stone ring which comprises the site may have a possible hearth near the center, which could help identify the cultural/temporal affiliation, subsistence, seasonality, and use.

DARG relocated this stone ring feature which has a definitive U-shape (Plate 10). The U-shape is approximately 3m long by 2m wide with a height of about 50-75cm. The ring is open to the north-northwest with the highest wall to the south. The walls are composed of granite cobbles piled 2-3 high creating walls 50-75cm high. A small pine tree had grown up on the southwestern edge since the original recording which was apparently burnt during the 2016 wildland fire. Burnt fence posts were also observed to the north and east of the ring. Otherwise the site appears pretty much the same as it did in 1998. No artifacts were identified. This site contains aspects of integrity critical to its significance. The Feeling, Setting, and Location are largely intact as the environment and natural geologic features are relatively unchanged and the Materials used to create the cultural manifestations reflect an understanding of local geologic resources. The distinct U-shape reflects integrity of Design and possibly Workmanship. Although at this time integrity of Association is lacking, overall the site is in good condition and could add significant information regarding Native American activity in the region. The U-shaped stone feature at 5JA1104 could have been used for a variety of activities, from a hunting blind, observation blind, vision quest or for observing solar events. There is an excellent view to the south overlooking North Park for observing game or others traveling through North Park. However, the U-shape is reminiscence of similar stone features in Middle Park at East Sulphur Gulch and in South Park. Historically, these features have been associated with ceremonial use, hunting, or geographic references for trails or tracks or other important landscape markers (O'Neil 2012, O'Neil and Harrison 2014, Wiemer 2009). As such this site should retain its "Need Data" status. Native American consultation is recommended.



Plate 8. 5JA1103 rock Cairn #2 looking west. Tape is extended 1m.

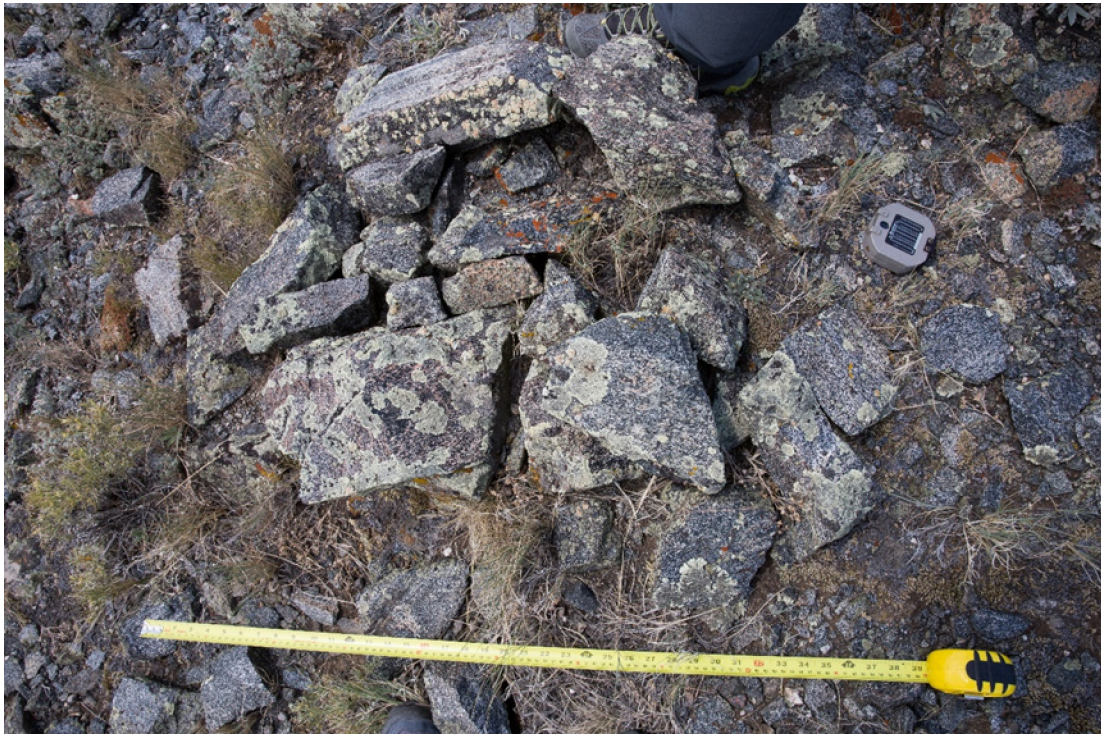


Plate 9. 5JA1103 rock Cairn #2 looking down. Tape is extended 1m.



Plate 10. 5JA1104 a U-shaped rock alignment looking south, note burnt tree. Tape is extended 1m.

DISCUSSION

DARG relocated and mapped the five stone alignment sites predicated in the SHF Archaeological Assessment grant. They consisted of cairns, stone rings, and low walls or combinations of these features along the crest or southern slopes of Independence Mountain. Of the five sites (5JA1099, 5JA1100, 5JA1102, 5JA1103, 5JA1104) only one 5JA1100 showed any potential as a celestial calendar. None of the sites could be considered domestic structures or be referred to as “tipi” rings. The possible relationship between these sites was explored, and only sites 5JA1099 and 5JA1100 may have a relationship as elements of an archaeoastronomy complex.

Our knowledge of “stone circle” or “tipi-ring” sites has increased dramatically since the seminal work of Kehoe (1958, 1960) in which he stated, “Although a rare few could have served other functions, they were mainly ‘circles of stones used to hold down lodge covers’ of resident Indians.” 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.

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 involved bilateral symmetry and the use of equilateral, right, and classic isosceles triangles using whole integer sides in ring construction. 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)."

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.

Several problems occur when dealing with surface manifested "stone alignments" and their possible outlines and/or orientations. First is whether you have the full archaeological picture, since you cannot see what may be buried. 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. 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 "eccentric shapes," interpretation involves the historical particularism in cultural Zodiac construction, or as Aveni (1972) puts it: "cultural astronomy or ethnoastronomy"; in short, different astronomy — different cultures — different cultural relativism questions.

Unlike a solely Plains Indian Tradition with far distant horizons, and a need to include fore and back-sights within a structure, 5JA1100 is a Mountain Tradition phenomenon, where horizon landmarks are incorporated within a horizon calendar similar to Gunsight Pass Site 5GA4251 (O'Neil and Harrison 2014). 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. At Feature 13 on 5GA4251 instrumented field observations on both the 60° azimuth and the 64° azimuth produced positive summer solstice sunrise results; wherein, the 60° aligned with first glimmer and the 64° aligned with the full solar disk above a foreshortened horizon. Feature 13 also produced azimuths of 302° and 304° for positive summer solstice sunset results; wherein, 302° marked where the full solar disk first touched the foreshortened horizon skyline, and the 304° marked the mid-solar diameter and full solar set on the far horizon of the Gore Range (ibid).

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 ($\pm 30^\circ$ 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.

Since it is unclear if the builders were selecting for a single specific azimuth, both fore and back sight azimuths were gathered, giving the graphic representation 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 the most likely to fit within the range of azimuths associated with possible solar occurrences.

Thus, the correspondence of 60°, 64°, and 303° at 5JA1100 with similar findings at 5GA4251 bodes well for a probable archaeoastronomy function for 5JA1100. However, due to the likely use of foreshortened horizons for both the summer solstice sunrise and sunset, direct field observations and measurements must be made to confirm the hypothesis.

However, it should be noted there are problems when dealing with the potential winter solstice rise/set azimuths. These include: access, site elevation, snow cover, and cobble height above the ground surface. Access is arduous with slopes of 60° in many places. Though the southern slope of Independence Mountain might be clear of snow, the top of the ridge at 9300 ft. probably would be snow covered, the question is — How much? The measured height of the cobbles, above the present ground surface, ranged from 4cm to 18cm.

The average is 9.2cm, the median is 7cm, and the mode is 7cm and 8cm (3 each). In short, if there were 10cm of snow on the ridge top, only seven cobbles would be visible (A, C, 15, 14, 11, 10, and 7). With 12cm of snow the number of cobbles visible drops to five (A, C, 14, 11, and 10), thus rendering the site useless for winter solstice observations. But, a warmer/dryer fall season could leave the site open for use; high velocity winds could clear the snow from the site; or marking the cobbles with stakes or brushing away the snow with a pine branch are all possible. However, the first two are highly unpredictable and thus unreliable. Would someone even go up there in late December? Practical intuition says, probably not. Therefore, it is unlikely that 5JA1100 was used to observe winter solar solstice events.

Site 5JA1099 may be associated with 5JA1100. The stone wall on the eastern end of is oriented southeast to northwest along a 100/280° alignment and from the southern end of the wall, site 5JA1100 a possible archaeoastronomy site, is visible at an azimuth of 103° and 500 feet. Direct observation during solar events may clarify what part this site played in the proposed 5JA1100 solar calendar. Additionally, Cairn #1 has a 180° aspect and appears to mimic a mountain peak on the southern horizon. This peak may be Diamond Mountain in the Rabbit Ears Range on the Continental Divide, the divide between Middle and North Parks, and may be a geographic landmark indicator of a pass or other culturally important site or area.

The stone cairns on sites 5JA1102 and 5JA1103 are common along high-altitude ridges and mountaintops and do not appear to be geographic landmark indicators. The stone wall at the eastern end of site 5JA1103 is likely a hunting blind. It conforms to the slope and aspect along and above a small drainage which could have been used to drive game animals. The cairns on the other sites may also be hunting blinds.

The U-shaped stone feature at 5JA1104 could have been used for a variety of activities, from a hunting blind, observation blind, vision quest or for observing solar events. There is an excellent view to the south overlooking North Park for observing game or others traveling through North Park. However, the U-shape is reminiscent of similar stone features in Middle Park at East Sulphur Gulch and in South Park. Historically, these features have been associated with ceremonial use, hunting, or geographic references for trails or tracks or other important landscape (O'Neil 2012, O'Neil and Harrison 2014, Wiemer 2009).

EVALUATION AND RECOMMENDATIONS

Five sites were reevaluated for listing on the NRHP as part of this assessment. Sites 5JA1102 and 5JA1103 are considered “Not Eligible” and no further work is recommended. Two sites 5JA1099 and 5JA1104 should retain their original evaluation of “Need Data.” Site 5JA1099 may be associated with 5JA1100, the potential solar calendar site, which requires direct visual observation of solar events to determine eligibility. The U-shape stone feature of 5JA1104 may have been used for a variety of activities, from a hunting blind, observation blind, vision quest or for observing solar events. These sites are considered to be either prehistoric or historic Native American, and consultation may provide information to make final eligibility determinations.

Site 5JA1100 has a high probability of being an archaeoastronomy site associated with the summer solstice sunrise and sunset. There is very little evidence of domestic activities except for a possible hearth feature (B). A trowel test showed no evidence of charcoal and/or ash within the feature though there was some evidence of thermal fracturing of the underlying rock formation at the bottom of the depression. It is entirely possible that the contents of the hearth was removed by wind deflation. The site is in good to excellent condition with light disturbance and no evidence of vandalism was observed. It qualifies under Criteria D in that it is likely to yield information important in prehistory or history. This level of significance also applies on the State and Local levels.

Site 5JA1100 is considered a potential prehistoric horizon calendar and 5JA1099 may be directly associated with this site. As such, it is recommended that these sites be avoided and if possible, access controlled. Direct field observations and instrument measurements of the cobble alignment sets, and their associated azimuths from identified observation points need to be made to increase the accuracy of the solar observations and confirm the summer solstice sunrise and sunset skyline positions and the use of foreshortened horizons.

Native American consultation with the Ute, Eastern Shoshone, and Arapaho Tribes by the BLM should be considered a priority, especially if these cultural resources concern potential sacred or ceremonial features. Based on the outcome of those consultations, it is recommended that data from the sacred sites and areas in this part of North Park be included in Diggs and Brunswig (2006) model. This model could be used to test variables related to: 1) individual feature alignments and solar, astronomical, and other features, 2) the role of geology in building materials for features and if specific rock types make the features or landmarks “stand out;” and 3) the development of view sheds for individual sacred landmarks and other possible sacred sites and landmarks.

REFERENCES CITED

- Aveni, Anthony F.
1972 Astronomical Tables intended for use in Astro-Archaeological Studies. *American Antiquity*, Vol. 37, No. 4, pp. 531-540.
- Berthrong, Donald J.
1963 *The Southern Cheyennes*. University of Oklahoma Press, Norman.
- Callaway, Donald, Joel Janetski and Omer C. Stewart
1986 Ute. In *Great Basin*, edited by Warren L. D'Azenvedo, pp. 336-367, Handbook of North American Indians Vol. 11, William C Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
- Cassells, E. Steve
1984 *Archaeology of Colorado*. Johnson Publishing, Boulder.
1997 *The Archaeology of Colorado*. Revised Ed. Johnson Books, Boulder.
- The Center for Archaeoastronomy
nd A Brief Introduction to Archaeoastronomy.
http://terpconnect.umd.edu/~tlaloc/archastro/cfaar_as.html
- Conner, Stuart. W.
1982 Archaeology of the Crow Indian Vision Quest. *Archaeology in Montana* 23(3): 85-127.
- David, Trevor
2010 The Medicine Wheels of North America. *Atlas Obscura*, February 11.
- Davis, L. B. ed.
1983 Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation. *Plains Anthropologist, Memoir 19, Vol. 28, No. 102, Part 2*. Plains Anthropological Society.
- Diggs, David M. and Robert H. Brunswig.
2006 Modeling Native American Sacred Sites in Rocky Mountain National Park. *Proceedings of the Twenty-Sixth Annual ESRI International User Conference*, San Diego, CA (August 5-8, 2006). Also, School of Social Sciences, College of Humanities and Social Sciences, University of Northern Colorado, Greeley.
- Eddy, John A.
1974 Astronomical Alignment of the Big Horn Medicine Wheel. *Science no. 184*.

- Eddy, John A.
 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.
- Fowler, Loretta
 2001 Arapaho. In *Plains*, edited by Warren L. D'Azevedo, pp. 840-862. Handbook of North American Indians, Volume 13, William C Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
- 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.
- Gilmore, Kevin P., Marcia Tate, Mark L. Chenault, Bonnie Clark, T. Mc Bride, and M. Wood
 1999 Colorado Prehistory: A Context for the Platte River Basin. Colorado Council of Professional Archaeologists. Denver.
- Grinnell, George Bird
 1962 *The Cheyenne Indians: Their History and Ways of Life*. Cooper Square Publishers, New York.
- Guthrie, Mark R., Powys Gass, Renee Johnson, and Joseph J. Lischka
 1984 *Colorado Mountains Prehistoric Context*. Colorado Historical Society, Denver.
- Hoebel, E.A.
 1960 *The Cheyennes: Indians of the Great Plains*. Holt, Rinehart and Winston, New York.
- Hultkrantz, Ake
 1956 Configurations of Religious Belief Among the Wind River Shoshoni. *Ethnos* 1956 (3-4): 194-215.
- Irwin, Lee
 1994 Dreams, Theory and Culture: The Plains Vision Quest Paradigm. *American Indian Quarterly* 18(2): 229-245.
- Kehoe, Thomas F.
 1958 Tipi Rings: The 'Direct Ethnological' Approach applied to an Archaeological Problem. *American Anthropologist* 60(5): 861-873.

- Kehoe, Thomas F.
 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.
- 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.
- Kroeber, Alfred L.
 1983 *The Arapaho.* Reprinted. Bison Books. University of Nebraska Press, Lincoln. Original publication 1902, *Bulletin of the American Museum of Natural History*, New York.
- Lischka, Joseph J., Mark E. Miller, R. Branson Reynolds, Dennis Dahms, Kathy Joyner-McGuire, and David McGuire
 1983 *An Archaeological Inventory in North Park.* USDI, Bureau of Land Management, Colorado.
- Lowie, Robert H.
 1954 *Indians of the Plains.* University of Nebraska Press, Lincoln.
- Mulloy, W.
 1958 *A Preliminary Historical Outline for the Northwest Plains.* University of Wyoming Publications in Science 22(1): 1-235
- Murphy, Robert F. and Yolanda Murphy
 1986 Northern Shoshone and Bannock. In *Great Basin*, edited by Warren L. D'Azevedo, pp. 284-307. *Handbook of North American Indians*, Vol. 11, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.
- Mutel, Cornelia Fleischer and John C. Emerick
 1984 *From Grassland to Glacier: The Natural History of Colorado.* Johnson Books, Boulder.
- O'Neil, Brian P.
 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 No. 2011-1]. Ms. on file at Bureau of Land Management, Kremmling Field Office.
- O'Neil, Brian P. and Cheryl A. Harrison
 2014 *An Archaeological Assessment of the Gunsight Pass Site: 5GA4251 Archaeoastronomy and Landscape Archaeology in Middle Park, Grand County, Colorado.*

- O'Neil, Brian P. and Cheryl A. Harrison
 2017 *An Archaeological Assessment of the Gunsight Pass Site: 5GA4251
 Archaeoastronomy and Landscape Archaeology in Middle Park, Grand County,
 Colorado. Revised ed.*
- 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.
- Shimkin, Demitri B.
 1986 Eastern Shoshone. In *Great Basin*, edited by Warren L. D'Azevedo, pp. 308-335.
Handbook of North American Indians, Vol. 11, William C. Sturtevant, general
 editor, Smithsonian Institution, Washington, D.C.
- Steward, J. H.
 1941 Culture element distributions: XIII, Nevada Shoshoni. *University of California,
 Anthropological Records* 4(2): 209-259.
- 1943 Culture element distributions: XXIII, Northern and Gosiute Shoshoni. *University
 of California, Anthropological Records* 8(3): 263-392.
- Stewart, O. C.
 1942 Culture element distributions: XVHI, Ute-Southern Piate. *University of
 California, Anthropological Records* 6(4): 231-354.
- Weimer, Monica
 2009 The Enduring Quest for a Clear Vision of the Past: Interpreting Aboriginal Stone
 Features on Two Archaeological Sites in South Park, Colorado. *Plains
 Anthropologist* 54(212): 333-346.
- 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, California.
- 1987 *Living the Sky: The Cosmos of the American Indian*. University of Oklahoma
 Press, Norman.
- U.S. Department of Agriculture (USDA)
 1981 *Soil Survey of Jackson County Area, Colorado*. Soil Conservation Center.

U.S. National Oceanic and Atmospheric Administration (NOAA), Walden Colorado
for June 21, 2017.

U.S. Naval Observatory, Astronomical Applications Database, for June 21, 2017
(http://aa.usno.navy.mil/cgi-bin/aa_altazw.pl)

Appendix A: Table of Alignments for Site 5JA1100

Appendix B: Site Location Map and OAHP Site Forms