Documenting Domestic Landscapes at Crow Stone Circle Sites in Bighorn Canyon, Southern Montana and Northern Wyoming

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Project Background

Stone circle sites represent one of the single greatest archaeological resources managed by Bighorn Canyon National Recreation Area (BICA) (Figure 1). Stone circles, commonly referred to as "tipi rings," are recognized as one of the few forms of domestic architecture known on the northern High Plains (Kehoe 1958). Prior to the historic use of wooden stakes as tent pegs, Plains Indians primarily used stones as tipi weights. Once moved, stones often stayed in place preserving to some extent the superstructure characteristics of the lodge. Today stone circle studies remain important to archaeological research because they allow researchers to emphasize social and economic organization, use of space, ideology, and daily lives (Banks and Kimball 1995; Oetelaar 2000). While some researchers recognize the potential of stone circles to contribute to larger anthropological research questions (Davis 1983) others dismiss them because of their apparent lack of artifacts and reliable chronological data. Scheiber (1993) found only 1.2% of 2,785 stone circle sites in the state of Wyoming were securely dated through excavation and/or radiocarbon dates. Many researchers dismiss stone circles as a reliable source of archaeological and chronological data. At Bighorn Canyon we find stone circles to be a rich data source that, besides supplying abundant archaeological data, links contemporary Crow Indians to their own history and cosmovision through a vast oral tradition (Tim McCleary 2006 personal communication; McCleary 1997).

From 1968 through 1974, nearly 120 stone circle sites were documented in BICA and the surrounding landscape (Loendorf and Weston 1983). The number of stone circles at individual sites ranges from 1 to 230 with a mean of 7 features per site when the large outliers are excluded from the sample. This study estimated as many as 1,795 stone

circles within the park boundaries, an estimate that grows with each new field season. Loendorf and Weston (1983) found abundant artifact assemblages in secluded, wooded locations and generalized that artifact assemblages at sites near travel routes like the Bad Pass Trail were sparse or absent. They attributed this fact to brief occupational durations along travel corridors. Because modern travel routes follow aboriginal ones, we propose instead that the variation is a product of recreational artifact collection and not aboriginal practice. We have observed "collector's piles" at numerous BICA sites where entire surface assemblages were collected, culled for desirable artifacts, and deposited in piles as refuse. Loendorf and Weston (1983) excavated stone circles at two sites but obtained no chronological data with which to assign ages to occupations.

The primary goal of the WNPA-funded pilot study was to develop and implement a research design that efficiently and effectively collects data from stone circle sites. This research design provides data necessary for management of these abundant yet critical resources while simultaneously advancing a research program. Research results enhance interpretation and visitors' experience of aboriginal domestic life in Bighorn Canyon. In the following sections we detail the methodology employed in our study and discuss the findings of our 2006 field study.

Methodology

Our fieldwork consisted of a three-tiered research design that entailed surface mapping, remote sensing, and controlled test excavations. Surface mapping used close-interval (3 m) pedestrian transects to identify feature and artifact distributions. Hand drawn stone circle planview maps (Figure 2) were created using the "tipi quick" method.

Each feature stone was assigned three-dimensional provenience using a survey-grade (sub-centimeter) global positioning system (GPS). Attribute data (Table 1) was collected at multiple levels including individual feature rocks (length, width, orientation, composition), individual stone circles (maximum inner and outer dimensions, opening presence/absence and direction, internal architecture presence/absence and direction), and associated artifacts (artifact type, size, raw material composition). Data were entered into handheld computers using a pocket version of Microsoft Access. The GPS and attribute data were combined while in the field into a Geographic Information System (GIS) to provide accurate, integrated location and attribute data for every recorded rock, artifact, and feature. Dave Maki of Archaeo-Physics LLC conducted remote sensing surveys at all three sites, primarily flux gradiometry, which is a method that measures the contrast between differential magnetic fields of archaeological features and the surrounding geological matrix (Figure 3). The purpose of the remote sensing survey was to inform and guide subsequent test excavations by identifying subsurface features and anomalies (Jones and Munson 2005). The remote sensing survey blocks were included in the GIS model as an additional layer of information that serves as a subsurface map showing the distribution of potential archaeological features. Sample test excavations were limited to 1-x-3-m units placed along the north radius of a stone circle (Figure 2). Each 1 m^2 unit was subdivided into 50 cm^2 quads that were hand excavated. All artifacts greater than 20 mm maximum diameter, and all feature rocks and charcoal were mapped in situ using a total station electronic distance measurer (EDM). All excavated sediments were screened through 1/8" mesh hardware cloth. Artifacts collected during the surface inventory and excavations will be curated and stored at the BICA curation facility in Lovell, Wyoming.

Results

During two 10-day sessions, 20 stone circles were recorded at three archaeological sites. The 11 stone circles from BICA-06-01 follow a linear, 200 m north-south transect. These large stone circles range from 6-8 m in maximum external diameter and are extremely robust, composed in some cases of >300 individual stones. Multiple courses of stones can be discerned in several examples (Figure 2a), which is typical of tipis with an internal lining. Internal features indicative of fire hearths were also common. The robust nature of the stone circles combined with the presence of fire hearths indicates that BICA-06-01 likely was occupied during winter. Artifacts are not common at the site due to close proximity to the Bad Pass Road and a long history of unauthorized artifact collecting. Remote sensing surveys located two stone circles not identified during pedestrian survey. Both features were nearly buried, and both were targeted for test excavations. A 1-x-3-m test unit was excavated along the north radius of each feature. Only a few artifacts and charcoal samples were recovered from excavations. Two charcoal samples were submitted to Beta Analytic, Inc. for accelerator mass spectrometry (AMS) dating. The sample from Feature 11 was a charred root likely introduced by a surface fire post-dating the feature occupation. Results of AMS analysis from a sample recovered from Feature 9 are forthcoming.

BICA-06-02 included four nearly buried stone circles with good excavation potential. These stone circles range in size from 4-6 m and are significantly smaller than those found at BICA-06-01. These features are simple, single-course rings composed of <75 individual stones. Artifacts were sparse due to proximity to the Bad Pass Road. Three collector's piles were identified as evidence for unauthorized collection. Remote

sensing surveys were not successful at distinguishing stone circles from the surrounding geological matrix but did identify potential buried hearths. Further geophysical surveys using electrical resistivity and ground penetrating radar helped to clarify the subsurface signatures. Test excavations in two of the four stone circles recovered in situ stone tools and artifacts, butchered animal (deer or bighorn sheep) bones, and fire hearths with dateable charcoal. Charcoal samples from both stone circles were submitted to Beta Analytic, Inc. for AMS analysis. BICA-06-02 will be important for future comparisons with other BICA stone circle sites.

The third site investigated consisted of five large (6-8 m diameter) stone circles with robust, single courses of stones. Due to the geomorphic setting of the site, no sediments had accumulated allowing burial of archaeological remains. Remote sensing surveys supported observations of limited potential for buried deposits. No artifacts were recorded on the surface indicating that this site was also likely subject to a long history of unauthorized collection.

Conclusions

The results of the pilot study year developed a methodology for documenting stone circles that is applicable in both research and management contexts. An integrated GPS and GIS methodology provides fine-grained, high-resolution spatial and attribute data that creates an accurate digital model of stone circle distributions in BICA. Stone circles positioned in certain geomorphic settings (i.e., at the base of hillslopes) rapidly accumulate surface sediments that bury artifacts and features. Remote sensing is a valuable guide for identifying buried stone circles and fire hearths and for developing

effective test excavation strategies. Excavations were successful in recovering artifacts and samples to assess domestic life and begin developing site and feature chronologies. While Loendorf and Weston (1983) reported no chronological data from their extensive sample, our pilot study shows that a combination of innovative analytical techniques provides baseline information necessary for establishing site and feature chronologies and artifact distributions that are necessary in understanding the domestic life of nomadic foragers. Of our sample of 20 recorded stone circles, 4 (20%) were tested with controlled excavations. Three of four (75%) stone circles contained materials suitable for AMS dating. Future years' work following the protocol established in this pilot study will contribute to a growing stone circle database at Bighorn Canyon NRA.

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Cover Image: Northern Cheyenne women tanning buffalo hides, mouth of the Yellowstone River, ca. 1878. From stereo card by Stanley J. Morrow. National Anthropological Archives (NAA neg #3701).

Table 1. Major Data Categories Recorded in Each Level of Analysis

Individual Rock Data (ROCK)	
Site Number (Smithsonian)	Elevation
Site Number (BICA)	Maximum Length (cm)
Feature Number	Maximum Width (cm)
UTM Northing	Orientation of Long Axis
UTM Easting	Composition (Material Type)

Individual Stone Circle Data (STONE CIRCLES)	
Site Number (Smithsonian)	Opening Orientation
Site Number (BICA)	Internal Architecture (Present/Absent)*
Feature Number	Internal Architecture Type
UTM Northing (center of feature)	Internal Architecture Maximum Dimension (cm)
UTM Easting (center of feature)	Internal Architecture Minimum Dimension (cm)
Elevation (center of feature)	External Architecture (Present/Absent)*
Maximum Diameter (cm)	External Architecture Type
Minimum Diameter (cm)	External Architecture Maximum Dimension (cm)
Maximum N/S Diameter (cm)	External Architecture Minimum Dimension (cm)
Minimum N/S Diameter (cm)	Buried Stones (Present/Absent)
Number of Courses	Depth of Buried Stones (cm)
Average Stone Diameter	Percent Sodded In
Opening (Present/Absent)	

Individual Artifact Data (ARTIFACTS)	
Site Number (Smithsonian)	Artifact Genus
Site Number (BICA)	Artifact Element
UTM Northing	Artifact Size Grade
UTM Easting	Platform (Present/Absent)
UTM Elevation	Platform Type
Artifact Class	Dorsal Scars

*This variable set is repeated as necessary to account for multiple types of internal/external architecture present.

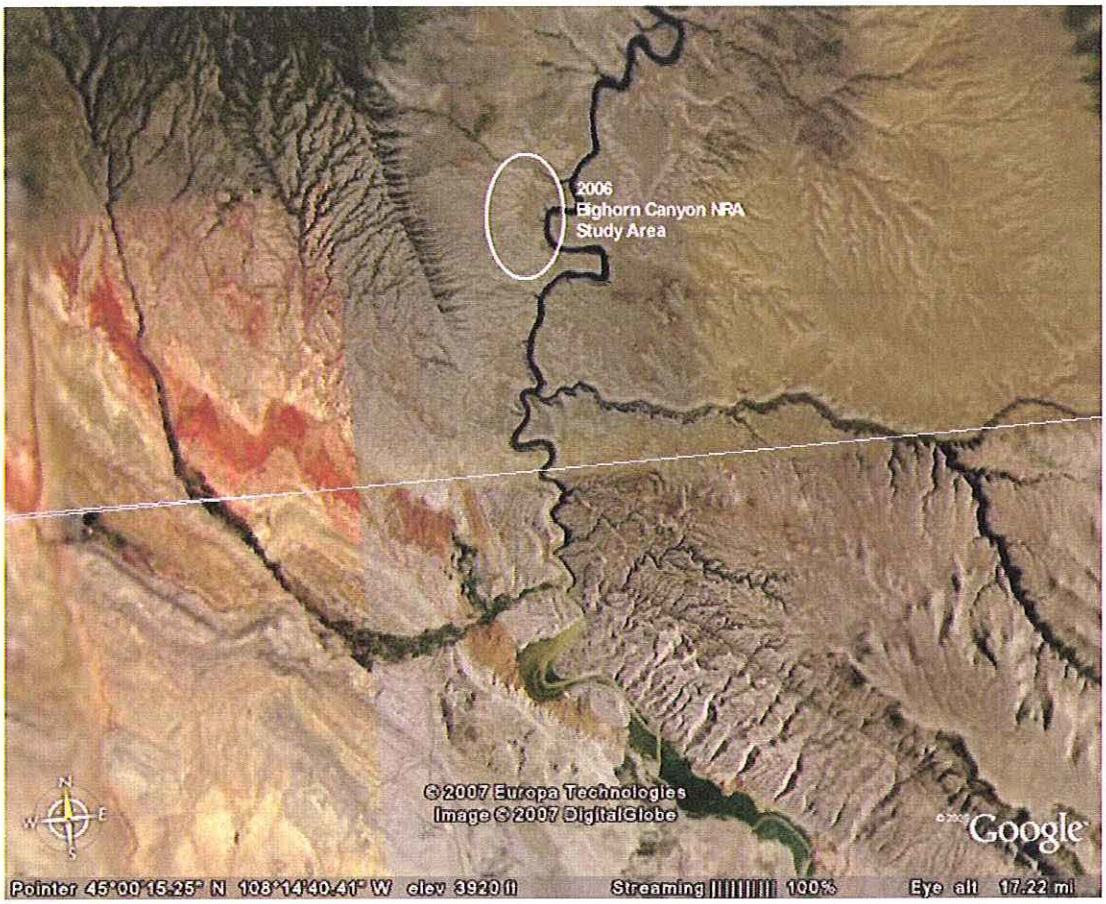
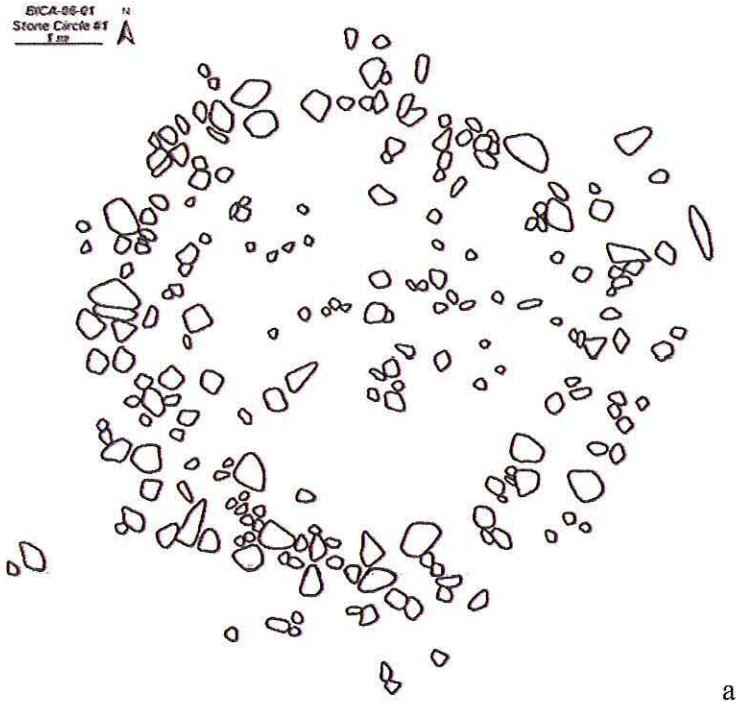
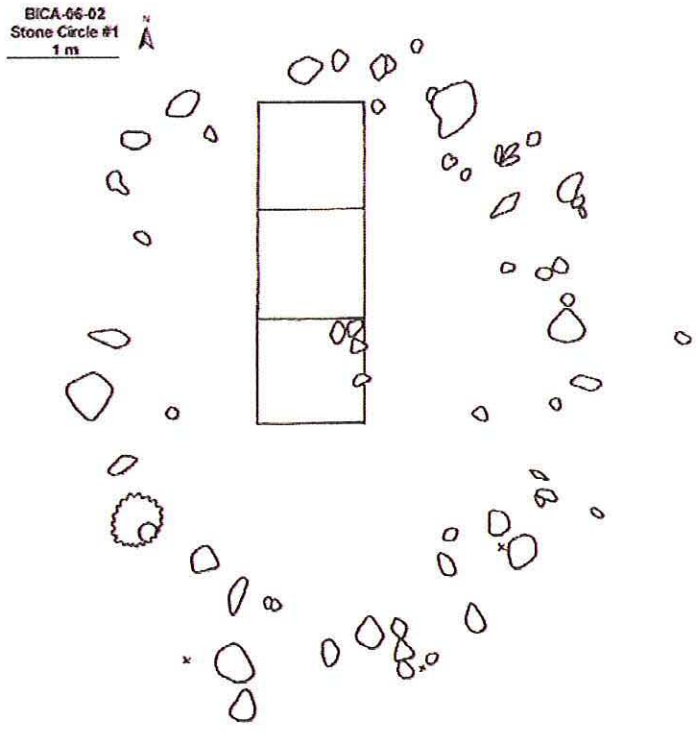


Figure 1. Location of the 2006 Bighorn Canyon NRA study area in south-central Montana.



a



b

Figure 2. Examples of hand drawn "tipi quick" planview maps from BICA-06-01 (a) and BICA-06-02 (b).

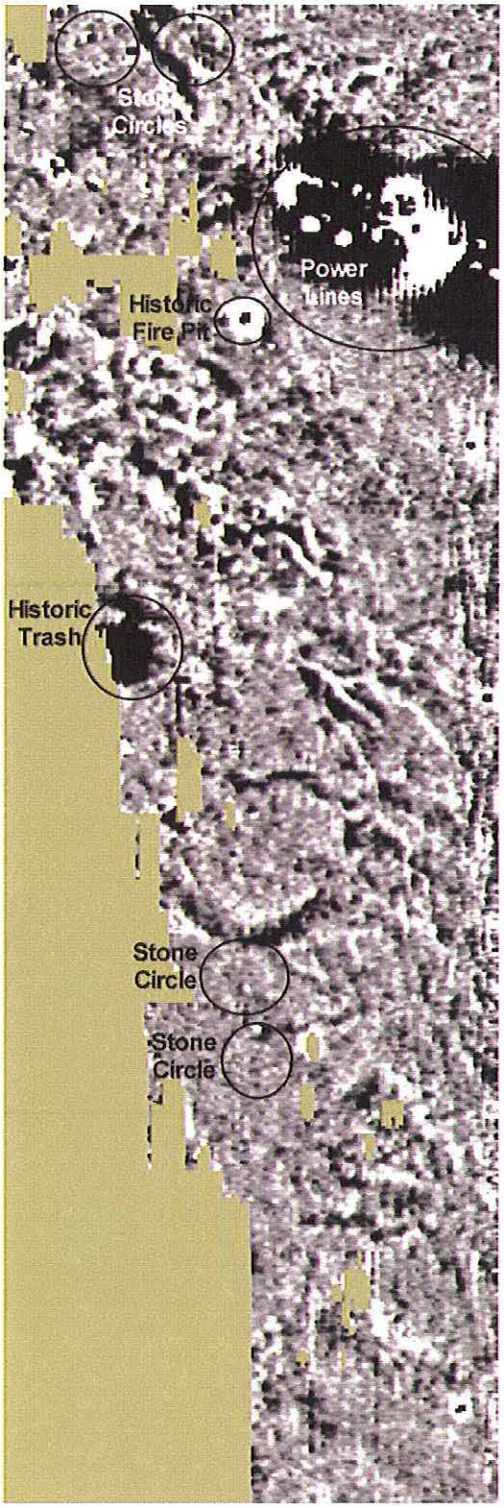


Figure 3. Remote sensing image of BICA-06-01 indicating magnetic high (black) and low (white) anomalies. Stone circles show up faintly as magnetic lows.

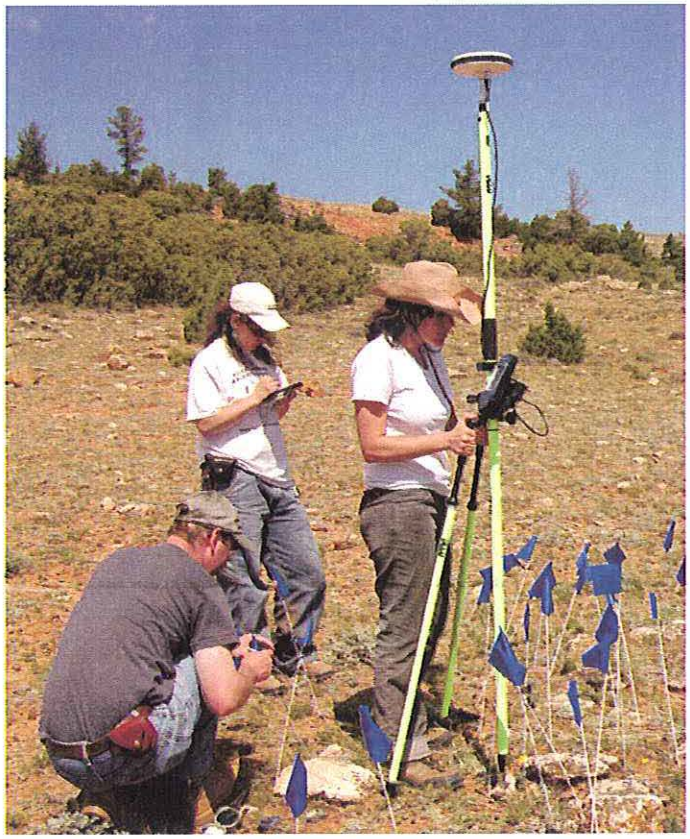


Figure 4. GPS mapping (top) and remote sensing (bottom) at stone circle sites in Bighorn Canyon National Recreation Area, Summer 2006.