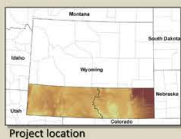


Abstract

From east to west, the ecology of southern Wyoming transitions from classic high plains grasslands to intermountain sagebrush and desert scrub communities flanked by coniferous forests of the Rocky Mountains. This biotic transition affects several aspects of the regional archaeology. This poster uses GIS to interpret the interplay between ecosystem structure and archaeology along this gradient. Major themes include the spatial variability of site types and the influence of energy development on the amount of archaeological sites documented in the various ecosystems of southern Wyoming.



East-West Ecology

Southern Wyoming is characterized by shrublands in the southwest and grasslands in the southeast.



East-West Archaeology

To explore the east-west archaeological gradient, a search of the Wyoming Cultural Records Office (WYCRO) online database was undertaken using custom software developed by SWCA that automates large WYCRO searches.

The search was limited to a strip of land along the southern border of Wyoming using the Sweetwater County north line. The search area encompasses 88 miles north-south by 361 miles east-west, or 31,658 square miles (81,994 square kilometers).

The combined WYCRO searches resulted in the identification over 29,000 prehistoric records. These sites were coded according to the presence or absence of a number of artifact and feature types. These data form the basis of the following analysis.

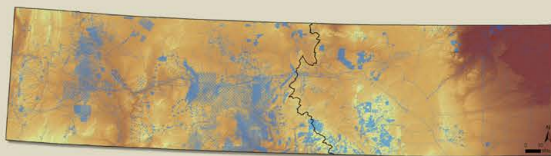
Site centroids were created using another custom software program developed by SWCA. This program interfaces with the BLM geocommunicator.gov website's "find_id" web data service to generate polygon vertices for specified PLSS locations. The coordinates of the resulting polygon vertices were averaged to produce centroid coordinates for each site.

The Wyoming SHPO provided survey shapefiles of the region, which show the survey biases in this area:

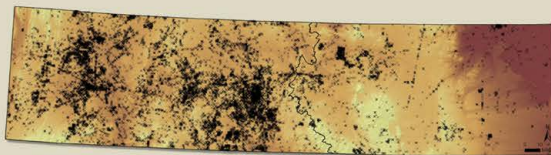
Acreages east and west of the continental divide

Region	Total Acreage	% Acreage	Surveyed Acreage	% of Surveyed Area	% Surveyed of Total Acreage
East	9,091,148	44.9	380,160	29.9	4.2
West	11,170,313	55.1	893,003	70.1	8.0

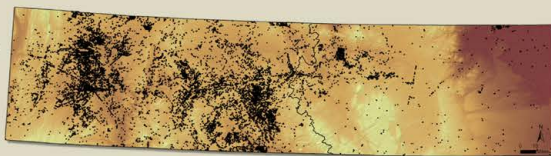
Surveyed areas in southern Wyoming



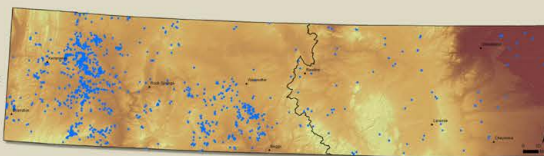
Lithics (n = 18,697)



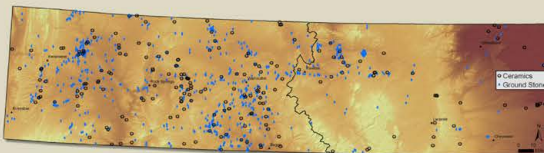
Thermal Features/FCR (n = 18,016)



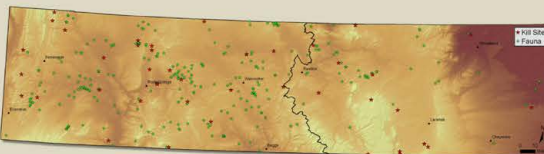
Primary and Secondary Lithic Procurement (n = 1262)



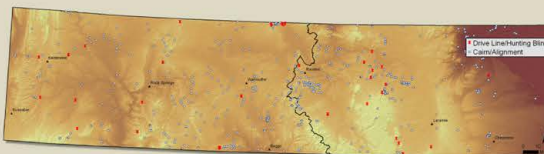
Ceramics (n = 216) and Ground Stone (n = 745)



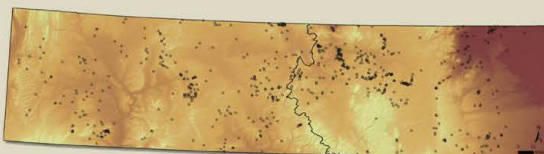
Kill Sites (n = 43) and Faunal Sites (n = 320)



Drive Lines/Hunting Blinds (n = 37) and Cairns/Alignments (n = 571)



Stone Circle Sites (n = 816)



Rockshelters (n = 129) and Housepits (n = 63)



Statistical Analysis

Visual inspection of east/west distribution maps identified eight variables as potential differentiators between the eastern and western areas of southern Wyoming: stone cairns and alignments, ceramics, FCR and thermal features, ground stone, housepits, rock art, stone circles, and steatite artifacts. Rock art and steatite distributions are not depicted to the left due to space limitations.

To assess the statistical significance of these visually-identified differences, a chi-squared analysis was conducted. Ranges were placed into east and west groups, separated by R85W.

Selected site type counts organized by east/west. Locational precision prevented a small number of these sites from being mapped to the left.

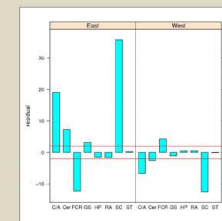
	Stone Circles	Ceramics	Stone	Ground Thermal	FCR Alignments	Rock Art	Housepits	Steatite	Totals
East	426	59	110	1423	213	5	3	2	2241
West	390	158	635	16514	361	86	60	13	18318
Totals	816	217	746	18097	592	91	63	15	20559

The above table contains the counts of the potentially significant feature and artifact types organized into eastern and western groups. Pearson's chi-squared test shows the difference between these two groups to be highly significant ($\chi^2=2083.691$, $df=7$, $p<2.2 \times 10^{-16}$).

Chi-squared residuals provide a measure of the importance of specific variables in distinguishing between the two groups. Values above +2 and below -2 indicate significant deviations from expected values in the contingency table, providing a convenient threshold of statistical significance.

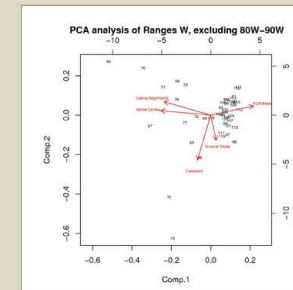
The residuals clearly show that only five of the eight variables meet this threshold of statistical significance:

- cairns and alignments
- ceramics
- FCR and thermal features
- ground stone
- stone circles



Adjusted chi-squared residuals by East vs. West. East/West line placed between Ranges 84W and 85W.

Colors: Cairns/Alignments (CA), ceramics (Cer), FCR/Thermal features (FCR), ground stone (GS), Housepits (HP), rock art (RA), stone circles (SC), and steatite (ST).



Principal Components Analysis of site assemblages, labeled by range.

The principal components analysis shows that the eastern and western groups are completely separated on PC1, which is comprised primarily of:

- cairns/alignments
- stone circles
- FCR/thermal variables.

Ceramics and ground stone are the primary constituents of PC2, and are weak yet statistically significant differentiators of the two groups.

Conclusions

Archaeological patterns in southern Wyoming are strongly separated into distinct eastern and western patterns. The western pattern is characterized by a high frequency of FCR and thermal features, and the eastern pattern by high frequencies of stone circles, cairns, and alignments.

The western pattern is predominant from R91W westward, and the eastern pattern from R79W eastward. The area in R80-90W appears to constitute a transitional zone, where elements of both patterns are combined. This could represent the effect of the ecological gradient between the Plains to the east and the Wyoming Basin to the west.

While bare ground visibility may have elevated the western sample, it is not possible to evaluate this hypothesis at present. However, the fact that there is no significant difference between the two areas in terms of lithic artifact frequencies would suggest that differential site discovery is not the dominant factor structuring archaeological patterning at this large scale. A formal test of the influence of surface visibility is needed, though, before this possibility can be entirely discarded.