INTRODUCTION

The settlement pattern analysis published by Matson, Lipe, and Haase (1988) contributed basic understandings of the distribution of the many small dispersed sites on Cedar Mesa, and of the environmental factors that influenced these settlement behaviors. Haase's initial analysis tested a small number of environmental variables and was restricted to Pueblo II – III habitation and field station sites within the Hardscrabble, Bullet and North Road drainages. Geographic information systems and web-accessible environmental datasets have created an opportunity to supplement this earlier work and provide additional insight into Ancestral Puebloan occupation of the Cedar Mesa area of SE Utah.

Project goals:
- Re-test environmental variables and compare Haase's results with those derived from digital datasets.
- Test additional environmental variables.
- Expand the study area to include all five surveyed drainages.
- Leverage Matson, Lipe, and Haase's (1988) temporal and site classifications to analyze settlement patterns across all occupational periods (Figure 2).

THE DIGITAL DATASETS

A 100 meter buffer zone was established around each of the digitized quadrat survey record's site boundary in an effort to take into account environmental variables in close proximity to the site. Values derived from these 100 meter buffer zones were used as the site data for this study. It is believed that the surveyed quadrats are a representative sample of the surveyed drainages, so random points were created within the bounds of the surveyed drainages rather than the quadrats. Once the random points were established a 100 meter buffer zones was also established and was used as the random point data for this study. An initial 78 random points were created within the Bullet, Hardscrabble and North Road drainages to match the number and span of random points from Haase's study. When the study was expanded to include the entire survey region, new random points (n=100) that spread across all five drainages were created.

Individual digital elevation models (DEM) from USGS were mosaiced into a single DEM that spanned the entire survey region. Where the individual maps did not precisely align the missing cell values were assigned using the averages from the nine neighboring cells. A digital landcover dataset for the Colorado Plateau ecoregion and a Soil Survey Geographic Database dataset were included for land cover and soil data in the survey regions. For variables with nominal categories, the dominant category was assigned. For continuous data, the mean was assigned.

COMPARING STUDIES

Land cover data was pulled for each of the 76 surveyed quadrats and the proportion of cover type by total area per quad was used to correlate Haase and my vegetation classifications. In some instances when there was weak or no correlation, two classes were combined into a single class to produce a stronger correlation. A common name was assigned to each correlated class.

Haase had previously analyzed his test area through construction of binomial confidence intervals from site frequency. A 95% confidence interval is calculated for the frequency of population A. If the frequency of population B falls within the confidence interval it can be assumed that variations between the populations could be the result of chance. Whereas a value that falls outside of the interval is not believed to be a result of chance and is statistically significant at the 0.05 level. For this test, the confidence intervals (95% C.I.) were based on the frequency of the random points (n=78). Random points, P II – III field stations and P II – III habitation sites data values are displaying relative site frequency.

Haase, citing Kane’s (1977) postulation that lower limit for successful dry farming in the four corners region was 1950 meters, hypothesized that the majority of archaeological sites would be above 1950 meters. Results from a Mann-Whitney test (05 level) of P II – III habitation and field station sites and random points supported this hypothesis and found a non-random distribution of archaeological sites above 1950 meters.

EXPANDING THE STUDY

When the study was expanded to encompass all drainages, there still remained a significant preference for dense pinyon-juniper zones and an avoidance of sagebrush. BM II campsites varied from all others in that the proportion of sites within those zones fell within the normal limits established by the random point confidence intervals.

HYPOTHESIS TESTING

Binomial confidence interval testing of soil components revealed a significant (0.05) preference for rino-ban-yarts complex soils for all but BM II campsites. BM II campsites showed a significant lack of sites on rino-bane soils, but had a distinctive preference for the rino-rock outcrop complex. P II – III field stations was the only group that did not have a significant preference against barv very fine sandy loam (barv VFFS) soil.

SOIL

Dense pinyon-juniper rino-ban-yarts complex soils and elevations above 1950 meters were identified as attributes favored by P II – III habitation sites. I hypothesized that P II – III habitation sites would be non-randomly distributed with a preference for areas possessing all three attributes. To test this hypothesis individual rater maps for each of the three variables (Figures 6-8) were created, then the maps were added together, with each attribute weighted equally. The output raster (Figure 9) contained values between 0 and 3 that represent the number of favored attributes present in that area. The number of sites and random points that fell within and outside of the three attribute zones were used to conduct a chi-square test for independence – finding a association between P II – III habitation sites and regions where all three attributes were present.

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WORKS CITED


Human adaption on Cedar Mesa, Southeastern Utah. Under revision.