2006

Exploratory Analyses of Contemporary Human Activity at Prehistoric Sites in Southwest Colorado

Ralph J. Hartley
National Park Service, rhartley4@unl.edu

Anne M. Wolley Vawser
Midwest Archeological Center, anne_vawser@nps.gov

Exploratory Analyses of Contemporary Human Activity at Prehistoric Sites in Southwest Colorado

Ralph J. Hartley, Midwest Archeological Center, National Park Service, Federal Building Room 474, 100 Centennial Mall North, Lincoln, NE 68508, ralph_hartley@nps.gov
Anne M. Wolley Vawser, Midwest Archeological Center, National Park Service, Federal Building Room 474, 100 Centennial Mall North, Lincoln, NE 68508, anne_vawser@nps.gov

ABSTRACT

Prehistoric sites with architectural remains are those most commonly disturbed by contemporary activities in the area surrounding McPhee Reservoir in southwest Colorado. This study used exploratory procedures to (1) assess whether associations exist between a set of characteristics of a prehistoric site and evidence of modern activities at that place; (2) ascertain how evidence of subsurface “looting” varies with site characteristics; and (3) assess the vulnerability of sites to contemporary human activities during exposure after periods of inundation. Four categorical variables reflecting modern activities were used with five prehistoric site descriptors to describe the relationships between the remains of human activities in the past and present at 29 sites. Over half of these sites have been subjected to subsurface digging and eleven of the 32 sites examined have been subjected to inundation at some time since 1986. This study resulted in the construction of testable predictions oriented toward gaining insight into how and where contemporary visitors to the area use places of prehistoric activity. Using a small sample of sites an analytical framework was pursued that can be used with expanded data and with refined categorical variables to enhance management protection as well as further interest in contemporary recreational behavior at those places on the landscape used by humans in prehistory.

The rate at which a place of prehistoric activity incurs change to its material and spatial integrity is enhanced by modern human activities. Change due to processes of the non-human environment can be monitored, measured, and to some extent, made predictable. Use of a place of prehistoric activity by modern humans can, in many cases, alter if not destroy remains that have been assigned public value. It is the assigned socio-economic value to some prehistoric material items that contributes to the probability of non-research oriented illicit digging at these places for the purpose of acquiring artifacts, often called “looting” or “pot-hunting”. Procuring these items for the antiquities market that fluctuates through time and geographically has been a phenomenon in the Four Corners area of the northern Colorado Plateau for over a century. Sites with architectural remains are those most commonly looted. Predicting, however, what particular sites, under what social and economic conditions have been or will be looted is acknowledged to be difficult. Efforts to construct descriptive models of the vulnerability of prehistoric sites to looting have been undertaken in southwest Colorado (Nickens et al. 1981), San Juan County, Utah (Wylie and Nagel 1989), and on Perry Mesa in central Arizona (Ahlstrom et al. 1992). Surface characteristics of sites easily recognized by potential looters were considered as variables “attractiveness” or “richness”. Surface evidence of architecture is considered to be a significant factor in a site’s vulnerability to looting.

For over ten years more than 1600 archaeological sites were recorded along an approximately 15km length of the Dolores River valley in southwest Colorado in preparation for the river’s impoundment as McPhee Reservoir and associated projects. The Dolores Archaeological Program (DAP 1978-1985) resulted in the subsurface testing or excavation of 101 of these sites. Results of intensive research in this area demonstrated that the bulk of

prehistoric occupation and activity occurred between approximately A.D. 650-900, or in traditional Pecos chronology terms, late Basketmaker III through Pueblo I periods. Based on the number and sizes of households discovered approximately 4000 people are believed to have lived along this portion of the river by A.D. 860 (Kane 1986; 1989). This area, currently listed on the National Register of Historic Places as the Anasazi Archaeological District, is managed by the San Juan National Forest.

Change to the landscape surrounding the reservoir has been extensive since the late 1970’s. The increase in human activities in this area has potentially increased the probability of places of prehistoric activity being altered either as a function of their location on the newly sculpted landscape or by the nature of assumed artifactual material embedded in the site.

Archaeologists have invested considerable effort in categorizing prehistoric sites in southwest Colorado based on architectural or situational variables for the purpose of deriving functional generalizations about use of the place prehistorically (Schlanger and Orcutt 1986). To what extent are the fundamental functional descriptions used by professional archaeologists usable in assessing a site’s vulnerability to looting?

In June of 2003 thirty-two sites were relocated, mapped with a Global Positioning System (GPS) and information concerning their condition recorded (Figure 1). These sites were chosen from a list of 56, designated by the U.S. Forest Service under three priority categories relative to their on-going or potential contemporary human impact. The Anasazi Archaeological District constitutes an ideal environment in which to study the effects of diverse contemporary human activities on prehistoric sites that, in addition to being highly dense, vary greatly in the type of material remains and site morphology readily observable to modern visitors.

The purpose of this study was to: (I) assess whether associations exist between a set of characteristics of a prehistoric site observable on the ground surface and evidence of modern human activities at that place; (II) ascertain how evidence of subsurface “looting” varies with characteristics of the site that reflect varied prehistoric activity; and; (III) assess the vulnerability of sites to contemporary human activities during exposure after periods of inundation.

METHODS

Analyses of data compiled from observations made between 1972 and 2003 at 29 of the 32 archaeological sites located was conducted with exploratory procedures that are amenable to establishing predictions susceptible to being evaluated and revised with additional data collection. Three sites were eliminated from quantitative analyses due to the nature of their historic non-Native American occupation and use. This small data set was subjected to what Carr (1985:30-34; 1987:219-224) has called constrained exploratory data analysis. That is, specific behavioral phenomena of interest in the realm of contemporary adverse impact to the integrity of the archaeological remains frame assumptions that underlie the search for patterning. Although the analytic procedures employed may make results appear superfluous the goal of these analyses was to construct testable predictions oriented toward gaining insight into where and how contemporary visitors use prehistoric sites in the environment resulting from and surrounding McPhee Reservoir.

Two sets of categorical variables were used in these analyses. Units of analysis are binary. Evidence of human activity at a site in the contemporary or recent historic period was categorized as:

DEB/TSH – Miscellaneous debris and trash resulting from human activity in proximity of prehistoric features or remains.

FIRE – The remains of fire hearths presumed to having been used during brief visits to the site (Figure 2).

LOOT – Pits hand dug in the site by non-archaeologists for the purpose of acquiring artifacts.

TRAIL – Foot trails or two-track roads used by four-wheel drive or ATV vehicles within a site boundary.

The “Dolores Archaeological Program Site Form” (1982) on which characteristics of the archaeological sites were initially documented, or in some cases re-recorded, during pedestrian survey include a “Site Type” general descriptive checklist (Orcutt and Goulding 1986). Each site recorded was described as being characterized with one or more of the following five descriptors:

RM – Rubble Mound

RS – Rubble Scatter

PS – Pitstructures

AS – Artifact Scatter

RSH – Rockshelter

An additional category, “Other”, was available to field recorders but, given the highly variable content, not applied to analyses used in this study.

Evidence of human activity was also observed in relation to rates of inundation/exposure for sites within the high water line of the reservoir. Ten foot contour maps from the pre-reservoir period of 1984 were obtained from the Bureau of Reclamation and were digitized and used to

create an elevation model of what is currently the lake bottom. Site locations were also compared to the current Digital Raster Graphic which is the georeferenced topographic map of the area showing some elevation data for the lake bottom. These procedures were used to determine site elevations. Measurements of annual high and low pool elevations for the reservoir were obtained from the U.S. Bureau of Reclamation for 1984 through 2003 (Table 1). This data was compared to site elevation to determine rates of exposure and inundation.

RESULTS

Examining questions of association about characteristics of a site that result from prehistoric activities [CHARACTERISTICS] and the observable results of contemporary activity [ACTIVITY] at that place was initially conducted using correspondence analysis as an exploratory relational procedure (SPSS 11.5 and SYSTAT 10.2)[1]. Evaluation of full input data suggests low variation in the data set where total inertia is .028 ($X^2 = 3.88$, $df = 12$, $p = .986$) (Table 2). Figure 3 shows the plot of the correspondence analysis (CA) of the two variables using the symmetrical normalization method. The first two dimensions of the correspondence table explain 96.72% of the 2.8% of the variation explained by the model. Keeping in mind that correspondence is not association and that correlation between site characteristics and contemporary activities is weak some generalizations about the categories of variables can be made nevertheless. Trails and two-track roads [TRAIL] and fire hearths [FIRE] contribute the greatest percent of inertia (variance) to Dimensions 1 and 2 respectively, whereas, not surprisingly given the content of the sample of sites, rockshelters [RSH] account for the greatest inertia of the column points in Dimension 1. The presence of rockshelters in this data set is an

outlier that contributes to the tightly clustered points in the symmetrical normalized plot making interpretation difficult. The existence of observable pit structures (PS) and scattered rubble (RS) are explained best by the principal components model (squared correlation .975 and .973 respectively). The lower left quadrant is defined by "looting" [LOOT], differentiated from observed debris and trash [DEB/TSH] and pit structure [PS] as a site feature in Dimension 2, where 18.3% of the total inertia is represented.

Evidence of subsurface digging for the purpose of looting artifactual material was observed at fifteen (52%) of the 29 sites used in this analysis. Association between characteristics and features of a site and the presence of past looting is presented in Table 3. Sites situated in rockshelters [RSH] are eliminated from these analyses due to their definition as a topographical situation in the landscape rather than a human induced modification to the place. With this information an assessment was conducted using binary logit analyses to establish predictions concerning what site features increase the probability of subsurface looting at a site (Table 4). While Models I and II do not differ significantly they do reflect the results of relational data represented in the correspondence analysis. The existence of rubble scatter [RS] at a site does not appear to contribute to an increase in the probability that a site will undergo subsurface looting.

Eleven of the 32 sites located in 2003 have been subject to inundation as determined by high pool elevations over the twenty year period and site elevation. All of these places have been subjected to human activities during periods of exposure (Table 5; Figure 4). Ten sites showed evidence of foot trail or two-track road use. Nine of the sites contained debris or other trash and five contained modern fire hearths, indicating intensive use of beaches by campers and boaters. Other impacts observed include the use of ATVs and pulling boats or individual

watercraft up on to beach areas (Figure 5). In one case, rubble from a roomblock was being used to anchor boats or was carted off for use in fire rings. Evidence of subsurface looting was not documented at most of these sites and is less likely to be observed due to the redeposition of sand and silt during processes of inundation.

DISCUSSION

Assessment of the condition of archaeological sites in the Anasazi Archaeological District is made, for the most part, relative to observations and information collected by those researchers documenting the site during the pedestrian survey component of the Dolores Archaeological Program. Our knowledge of 95% of the 1600 sites in the District is limited to this information base. Since the DAP period ended in the mid-1980s land-use of the area, although spatially varied, has undergone rapid change relative to the century prior to reservoir and associated development. The threat of illicit digging continues to be a problem, enhanced by the overall increase in use of the area by the broad spectrum of the population attracted to an environment available for public recreation.

This study, like much of the archaeological component of cultural resource management, was an after-the-fact design. Despite the crude measures available however, results suggest that prehistoric sites with architectural remains designated as pitstructures and rubble mounds are most vulnerable to looting in this environment. Such an observation offers little insight to both professional and amateur archaeologists familiar with this area. Nevertheless the approach used here does offer a means by which to not only retrodict behavior but to predict vulnerability to site disturbance through illegal activities. Moreover we suggest that the analytic framework

pursued here can be used with expanded data and with refined categorical variables to construct testable predictions useful to both land managers as well as behavioral scientists. In addition to prehistoric site descriptors, other variables pertinent to evaluating these proposed relationships will be the situation of the site on the landscape, that is, its topographical context as well as its proximity to human induced alterations to the environment such as roads, campgrounds, lakeshore, etc. (cf. Wylie and Nagel 1989; Ahlstrom et al. 1992). It could also be predicted, for example, that an increase in frequency of modern fire hearths and trash at prehistoric sites is associated with proximity to these kinds of landscape variables.

The small number of rockshelters examined in this study affected the utility of the initial phase of the analysis. An expanded data set would benefit from a representative sample of rockshelter sites, especially due to their vulnerability to subsurface looting and potential archaeological significance. Graffiti was also observed at two of these settings. Documenting and analyzing the results of this activity can reveal use of the landscape at an operational scale and under socio-economic conditions not otherwise available (Hartley and Vawser 2002).

Sites denuded of vegetation and exposed by periodic and seasonal drops in reservoir level are subject to various kinds of human activities that contribute to their destruction beyond that of consistent inundation. As the water recedes wave action can enhance erosional processes, a phenomenon well acknowledged at sites along the shores of Lake Mead, Arizona and Lake Powell in Utah. For example, a site that was initially recorded in 1972 in the flood pool as a small artifact scatter eroding from the edge of a knoll has been exposed by erosion of surface deposits. The site was described initially as a small concentration of material on the northwest side of the knoll with few artifacts on top of the knoll. When the site was revisited during low water in 2003 few artifacts were found along the northwest side of the knoll but an abundance of

cultural material was observed on top of the knoll. It is possible that soil from what was the top of the knoll is being redeposited on the side of the knoll, burying cultural material that was once observed there, while materials that were initially buried on the top of the knoll are now being exposed. The opportunity to document this gradual destruction can be of value to land-managing agencies that oversee recreational activities at reservoirs constructed in the second half of the twentieth century throughout the western and plains states. The mapping of features and exposed artifacts in one meter diameter units, subsurface testing, and artifact collection can offer not only the salvage of a doomed cultural resource but also quantitative data with which to make predictions concerning the rate of destruction in reservoir contexts (Chapman et al. 2001).

Several prehistoric sites were found to have mature pinyon or juniper trees growing within architectural features. Due to soil quality and drainage this vegetation was, until recently, thriving. The current drought and beetle (*Dendroctonus ponderosae*) investation has, in some cases, caused these trees to die, leaving a dense fuel load on or within the ruins. In the event of intense fire deadfall concentrated in these features may, according to research conducted by Buenger (2003) and Hough et al. (2005), increase the potential peak temperature and duration of fire resulting in thermal damage to a variety of artifact material types. The integrity of prehistoric architectural sites in pinyon-juniper forest environments may benefit from the clearing of dead brush on these features.

NOTES

[1] Correspondence analysis serves to explore the relational structure of rows and columns of a contingency table. The method, increasingly used in archaeology, allows for the factoring of categorical variables and displaying them in a space that maps their geometric association in two dimensions (Blasius 1994; Baxter 1994; Shennan 1997). The amount of data compiled for this study and the limited number of categories make the visual inspection of the table adequate but the appeal of representing the table graphically in two dimensions enhances comparison with results of subsequent log-linear analysis. These procedures, as noted by Lebart (1994:177), "… are generally intended to discover something, and not to prove anything."

[2] A convenient means by which to compare models is with computation of a pseudo-R^2. Several different measures are available that transform the likelihood-ratio statistic, measuring the strength of association between 0 and 1. McFadden's measure (MFR^2) is deemed one of the more reliable measures (Windmeijer 1995; Long 1997:104-105; Crown 1998:117).

LITERATURE CITED

Ahlstrom, R., V.N. M. Adair, R.T. Euler, and R.C. Euler 1992. Pothunting in Central Arizona: The Perry Mesa Archaeological Site Vandalism Study. Cultural Resource Management Report No. 13. USDA Forest Service, Southwestern Region, Phoenix.

Baxter, M. J. 1994. Exploratory Multivariate Analysis in Archaeology. Edinburgh University Press, Edinburgh.

Blasius, J. 1994. Correspondence Analysis in Social Science Research p. 23-52 In M. Greenacre and J. Blasius (Eds). Correspondence Analysis in the Social Sciences. Academic Press, London.

Buenger, B. A. 2003. The Impact of Wildland and Prescribed Fire on Archaeological Resources. Unpublished Ph.D. Dissertation. University of Kansas, Manhattan.

Carr, C. 1985. Getting into Data: Philosophy and Tactics for the Analysis of Complex Data Structures. p.18-44. In C. Carr (Ed.). For Concordance in Archaeological Analysis. Westport Pub, Inc., Kansas City.

Carr, C. 1987. Removing Discordance from Quantitative Analysis. p. 185-243 In M. S. Aldenderfer (Ed.). Quantitative Research in Archaeology: Progress and Prospects. Sage Pub., Newbury Park, Ca.

Chapman, H. P., W. G. Fletcher, and G. Thomas 2001. Quantifying the effects of erosion on the archaeology of intertidal environments: a new approach and its implications for their management. Conservation and Management of Archaeological Sites 4:233-240.

Crown, W. H. 1998. Statistical Models for Categorical and Limited Dependent Variables. Praeger, Westport, Ct.

Hartley, R. J. and A. M. Wolley Vawser 2002. Marking Places in the Southern Black Hills: A Preliminary Analysis. National Park Service, Midwest Archeological Center, Lincoln, Ne. http://www.cr.nps.gov/mwac/pub.htm

Hough, I., J. De Young, and D. Barr 2005. Fire Effects Research and Preservation Planning at Wuaptki and Walnut Canyon National Monuments, Northeast Arizona p. 333-348. In C. Van Ripper III and D.J. Mattson (Eds). The Colorado Plateau III – Biophysical, Socioeconomic, and Cultural Research. University of Arizona Press, Tucson.

Kane, A. E. 1984. The Prehistory of the Dolores River Valley p. 353-435. In D.A. Breternitz, C.K. Robinson and G.T. Gross (Comp). Dolores Archaeological Program: Final Synthetic Report. Bureau of Reclamation, Denver.

Kane, A. E. 1989 Did the Sheep Look Up? Sociopolitical Compexity in Ninth Century Dolores Society p. 307-361. In S. Upham, K.G. Lightfoot, and R. A Jewett (Eds). The Sociopolitical Structure of Prehistoric Southwestern Societies. Westview Press, Boulder.

Lebart, L. 1994. Complementary Use of Correspondence Analysis and Cluster Analysis p. 162-178 In M. Greenacre and J. Blasius (Eds). Correspondence Analysis in the Social Sciences, Academic Press, London.

Long J. S. 1997. Regression Models for Categorical and Limited Dependent Variables. Sage Pub., Thousand Oaks, Ca.

Nickens, P.R., S. L. Larralde, and G.C. Tucker, Jr. 1981. A Survey of Vandalism to Archaeological Resources in Southwestern Colorado. Cultural Resource Series No. 11. Bureau of Land Management, Denver

Orcutt, J. D. and D. A. Goulding 1986. Archaeological Survey of the McPhee Reservoir p.185-378 In A. E. Kane, W. B. Lipe, T. A. Kohler and C. Robinson (Eds). Dolores Archaeological Program: Research Designs and Initial Survey Results. Bureau of Reclamation, Denver, Co.

Shennan, S. 1997. Quantifying Archaeology. 2nd Ed. University of Iowa Press, Iowa City.

Schlanger, S. and J. D. Orcutt 1986. Site Surface Characteristics and Functional Inferences. American Antiquity 51:296-312.

Windmeijer, F. A.G. 1995. Goodness-of-Fit Measures in Binary Choice Models. Econometric Reviews 14:101-116.

Wylie, J. and B. Nagel 1989. Forest Service and State of Utah: Utah Interagency GIS Report. Federal Archeology Report 2 (3): 9-12.

Table 1. Annual high and low pool elevation and content, McPhee Reservoir, Colorado. Data provided by US Bureau of Reclamation, 2004.

Date	High Elevation (feet)	High Elevation (meters)	Live Storage (acre-feet)	Low Elevation (feet)	Low Elevation (meters)	Live Storage (acre-feet)
2003	6890.16	2100.12	248,654	6858.41	2090.44	159,461
2002	6879.53	2096.88	214,719	6856.55	2089.88	155,336
2001	6914.39	2107.51	339,777	6876.33	2095.91	205,330
2000	6921.95	2109.81	372,009	6880.33	2097.12	217,120
1999	6924.46	2110.58	383,150	6894.84	2101.55	264,865
1998	6924.18	2110.49	381,896	6892.24	2100.75	255,773
1997	6924.35	2110.54	382,657	6892.46	2100.82	256,533
1996	6921.12	2109.56	368,441	6888.56	2099.63	243,335
1995	6924.25	2110.51	382,282	6895.79	2101.84	268,308
1994	6924.32	2110.53	382,595	6895.00	2101.60	265,496
1993	6924.20	2110.50	382,058	6905.59	2104.82	304,670
1992	6924.38	2110.55	382,864	6903.71	2104.25	297,471
1991	6921.05	2109.54	368,616	6888.03	2099.47	241,458
1990	6906.97	2105.24	309,911	6887.11	2099.19	238,423
1989	6924.25	2110.51	382,167	6899.40	2102.94	281,262
1988	6923.82	2110.38	379,380	6909.60	2106.05	320,280
1987	6923.40	2110.25	378,375	6902.64	2103.92	293,310
1986	6902.84	2103.99	294,065	6857.39	2090.13	157,098
1985	6857.34	2090.12	156,987	6775.44	2065.15	39,182
1984	6782.06	2067.17	44,933	6698.00	2041.55	1,426

Table 2. Correspondence diagnostics for CHARACTERISTICS and ACTIVITY.

	Quality[a]	Mass[b]	Inertia[c]	Dimen.1[d]	Dimen.2[d]
DEB/TSH	.923	.307	.005	.802	.121
FIRE	.993	.095	.010	.745	.248
LOOT	.738	.299	.002	.048	.690
TRAIL	.997	.299	.012	.917	.080
RM	.728	.328	.001	.722	.006
RS	.973	.109	.003	.000	.973
PS	.975	.175	.003	.207	.768
AS	.693	.358	.002	.691	.002
RSH	.999	.029	.020	.996	.003

[a] A proportion of variance statistic indicating how well a point is represented by the first two dimensions.

[b] Marginal proportion of the variable used to weight the point profile when computing point distance.

[c] A variance measure of the distance from the average weighted by its mass.

[d] Proportion of inertia accounted for by each axis as a squared correlation.

Table 3. Relationship between subsurface looting and site characteristics.

	χ^2	df	p	Cramer's V
RM	8.62	1	.003	.545
RS	.109	1	.742	.061
PS	10.31	1	.001	.596
AS	3.72	1	.054	.358

Table 4. Logit Models of Contribution of Site Features to Subsurface Looting.

	Model I		Model II		Model III	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
RM	2.050	1.661	2.079	1.692	2.079	1.722
RS	-0.267	-0.193	-	-	-	-
PS	15.985	.023	15.915	.022	16.203	.023
AS	1.176	.904	1.204	.928	-	-
	LR=18.254, *df*=4, *p*=.001 MFR^2=.454 Total Correct=.756		LR=18.216, *df*=3, *p*=.000 MFR^2=.453 Total Correct=.757		LR=17.254, *df*=2, *p*=.000 MFR^2=.430 Total Correct=.732	

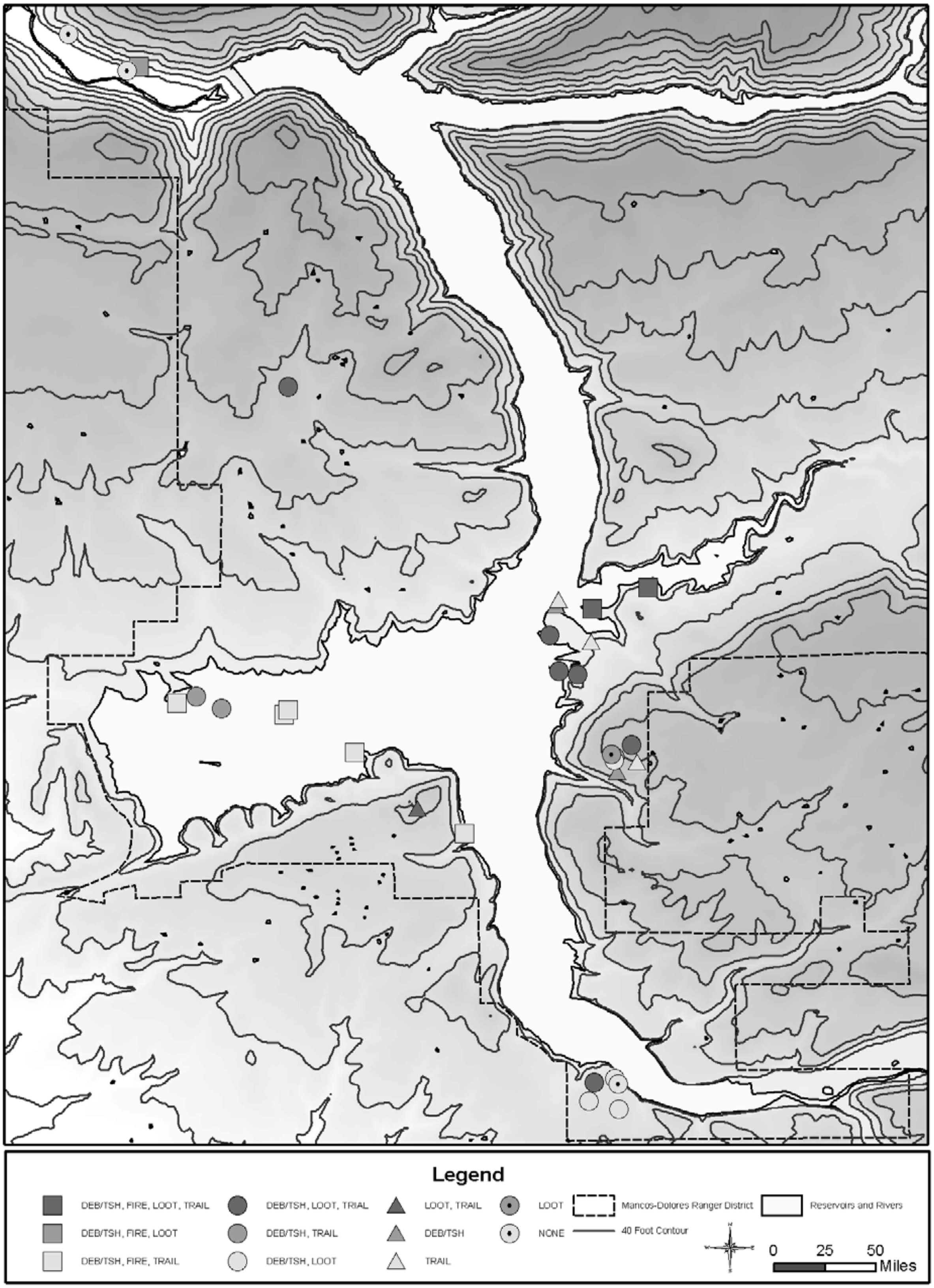
Note: Dependent Variable = LOOT
LR = Likelihood-ratio statistic
MFR^2=McFadden's rho squared^2
Total Correct = Proportion successfully predicted as a ratio of the sum of the diagonal elements to the total number of observations

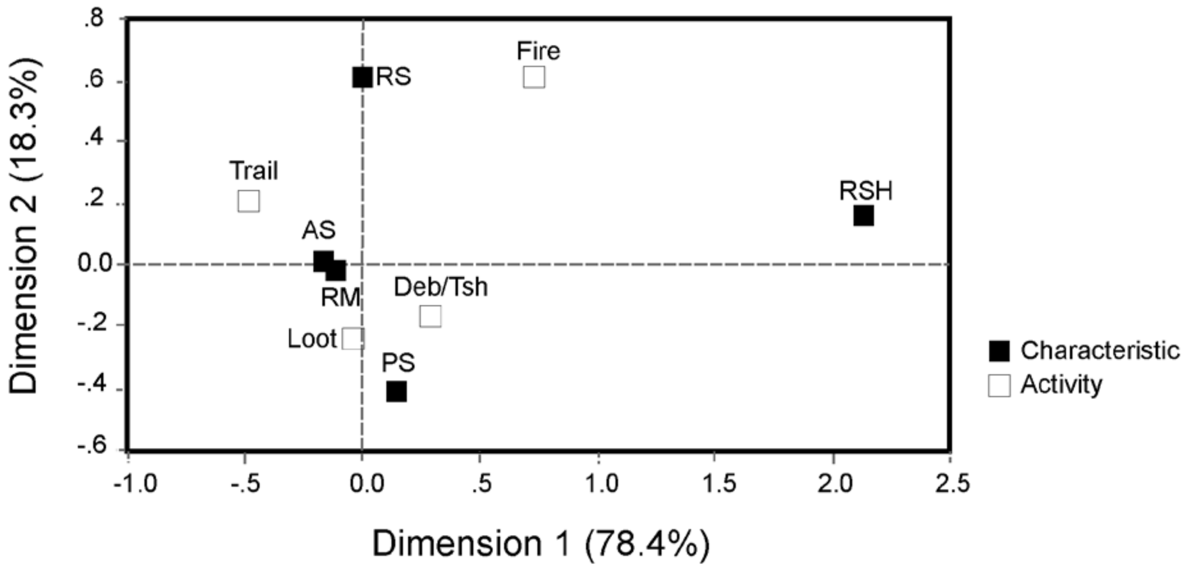
Table 5. Sites visited during 2003 that have been inundated, first inundation, frequency of exposure, and impacts.

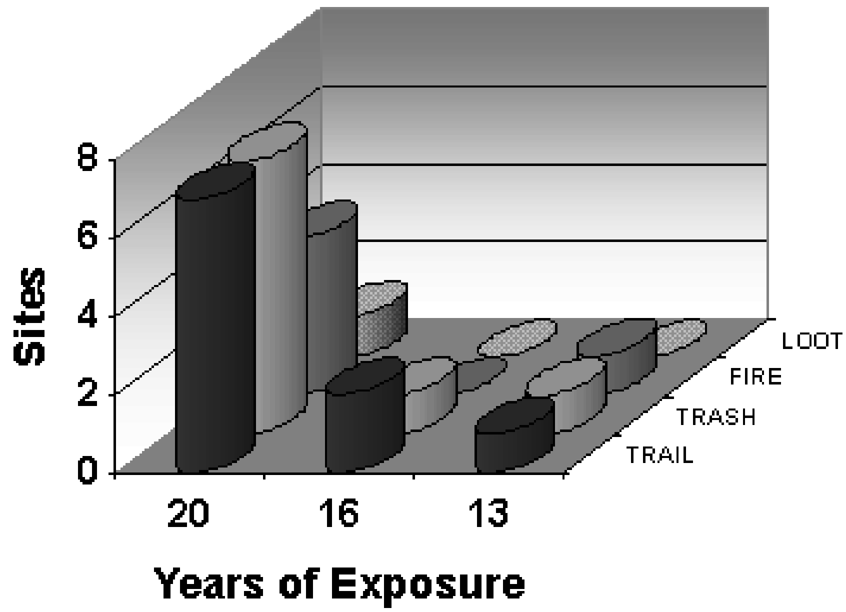
Site	Elevation of Site	Year of first inundation	Number of years inundated[a]	Number of years exposed[b]	Impacts
5MT2190	6910	1987	14	20	DEB/TSH, FIRE, TRAIL
5MT2202	6910	1987	14	20	DEB/TSH, TRAIL
5MT2204	6900	1986	16	16	DEB/TSH, TRAIL
5MT2215	6900	1986	16	16	TRAIL
5MT2246	6895	1986	16	13	DEB/TSH, FIRE, TRAIL
5MT4514	6890	1986	17	20	DEB/TSH, FIRE, TRAIL
5MT4546	6880	1986	17	20	DEB/TSH, FIRE, TRAIL
5MT4564	6922	1987	10	20	DEB/TSH, FIRE, TRAIL
5MT5072	6920	1987	13	20	DEB/TSH
5MT5154	6920	1987	13	20	TRAIL
5MT7499	6921	1987	13	20	DEB/TSH, LOOT, TRAIL

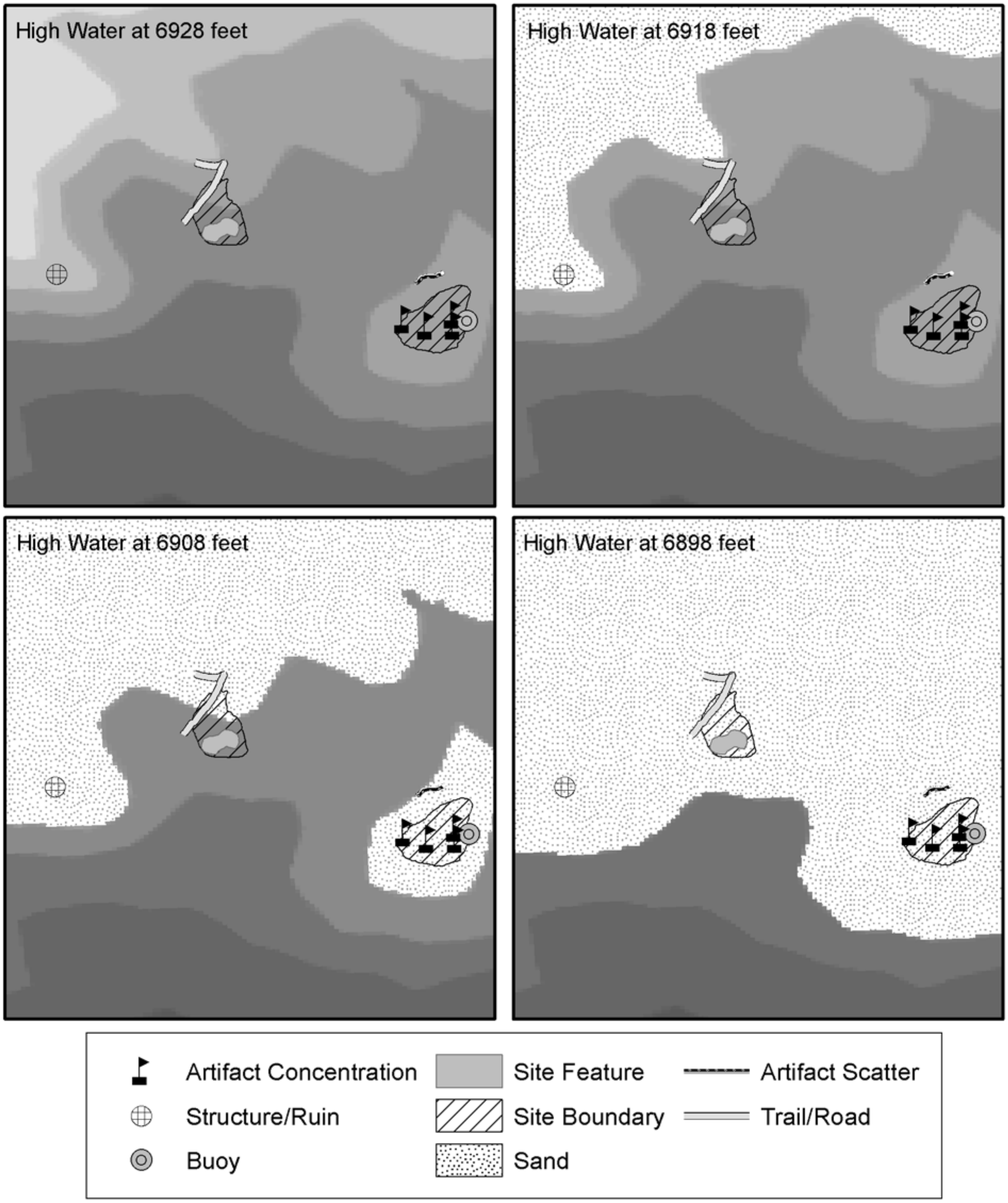
[a] The number of years in which the site was covered by water for some portion of a given year, 1984 through 2003.

[b] The number of years that the site was exposed above water at some time during a given year, 1984 through 2003.


Legend
DEB/TSH, FIRE, LOOT, TRAIL
DEB/TSH, FIRE, LOOT
DEB/TSH, FIRE, TRAIL
DEB/TSH, LOOT, TRIAL
DEB/TSH, TRAIL
DEB/TSH, LOOT
LOOT, TRAIL
DEB/TSH
TRAIL
LOOT
NONE
Mancos-Dolores Ranger District
40 Foot Contour
Reservoirs and Rivers
0 25 50
Miles


Dimension 2 (18.3%)
Dimension 1 (78.4%)
.8
.6
.4
.2
0.0
-.2
-.4
-.6
-1.0
-.5
0.0
.5
1.0
1.5
2.0
2.5
Fire
RS
Trail
RSH
AS
RM
Deb/Tsh
Loot
PS
Characteristic
Activity


8
6
4
2
0
Sites
LOOT
FIRE
TRASH
TRAIL
20
16
13
Years of Exposure



High Water at 6928 feet
High Water at 6918 feet
High Water at 6908 feet
High Water at 6898 feet
Artifact Concentration
Structure/Ruin
Buoy
Site Feature
Site Boundary
Sand
Artifact Scatter
Trail/Road

Figure 1. Overview of the McPhee Reservoir area and the Anasazi Archeological District. Sites examined are coded by the types of impacts observed.

Figure 2. Example of a recent hearth.

Figure 3. Correspondence analysis of prehistoric site characteristics with recent human activities (1^{st} and 2^{nd} axis).

Figure 4. Number of sites with impacts by years of exposure.

Figure 5. As the reservoir pool elevation drops, sites are exposed along beach areas that are popular for camping and shore use by boaters. While ATV use is not permitted on these exposed beaches, there was extensive evidence that vehicles had been in these beach areas. At the site on the far right, the double circle indicates the location of an anchored buoy used to warn boats of shallow water.