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ARTIFACT ASSEMBLAGE COMPOSITION AND THE HUNTING CAMP INTERPRETATION OF HIGH PLAINS UPPER REPUBLICAN SITES

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Upper Republican as an archaeological culture was designated in the 1930s by Strong (1933:278) for sites characterized as small villages "along the upper Republican river and its branches" in southwest Nebraska. Excavations in the valleys of Medicine Creek, other Republican River tributaries, and the Republican River proper were even then sufficient to define the salient characteristics of Upper Republican material culture. Considered to be Upper Republican hallmarks were square house remains, storage pits, generous quantities of distinctive pottery, chipped stone, ground stone, bone tools in some quantity and diversity, ornaments of shell and bone, floral remains (including corn), and quantities of bone (including bison bone) (Strong 1933:278–279, 1935:245–250; Wedel 1934:204–208).

Upper Republican pottery had already been recognized prior to the 1930s at the stratified Signal Butte site and other sites in the Nebraska panhandle and eastern Colorado. Strong (1933:278) therefore also noted that "Judging from the imperfectly known distribution of the ceramic type found at these sites, the culture extends in various phases as far west as eastern Colorado and Wyoming. . . ." The nature of the western sites and their relation to the house sites of the Republican River drainage was not known in the early 1930s. Bell and Cape (1936), however, soon reported investigations at seven rockshelters in the Nebraska panhandle. Recognizing that the makers of the shelter material "seem to have been related culturally to those who lived in semisubterranean houses along the Platte and Republican Rivers farther to the east [that is, to the Upper Republican peoples]," they suggested that the makers "may have been hunting parties of those people" (Bell and Cape 1936:385).

Few investigators over the next few decades presented an interpretation of the High Plains Upper Republican sites, even though many such sites were

recognized and reported. Withers (1954:2) defined the Buick focus for sites in northeast Colorado but did not consider the functional interrelationships of those sites with the southwest Nebraska sites. Nor did Irwin and Irwin (1957) consider the nature of the Agate Bluff sites in Colorado, or J. J. Wood (1967) the relations between the northeast Colorado Upper Republican sites and the southwest Nebraska sites. Only Lehmer and Wedel considered the matter. Lehmer (1954:145–146) believed the High Plains sites were evidence for an extension into prehistory of the historically documented practice of extended hunting by the village tribes. Wedel (1961:102) acknowledged the possibility but added two other alternatives, each of which involved population movement out of the eastern Upper Republican sites. Each reference was in a broad-area synthetic work, the format of which does not allow full documentation of interpretations.

The matter thus rested without substantial consideration until the late 1960s when Wood (1969:104) concluded that the Mowry Bluff site in the Medicine Creek valley was not occupied in the summer. He then extended this interpretation to Upper Republican house sites in general and suggested that the High Plains Upper Republican sites provided clues that the southwest Nebraska Upper Republican people were hunting on the High Plains during the summer. Wedel immediately countered this interpretation. Although he regarded the passage of Upper Republican hunting parties on the High Plains as a "legitimate inference," he considered as "conjectural" the origins of those hunting parties in southwest Nebraska and their presence on the High Plains as a signal of abandonment of the house sites for the summer (Wedel 1970:7). He further felt that the abundance of bison in southwest Nebraska made such a practice unnecessary (Wedel 1970:7–10). He did not propose an alternative interpretation.

Reher (1973:119), too, found problems with the hunting camp identification of the sites. Writing from the perspective of southeast Wyoming, he, echoing Wedel, thought it unreasonable "that hunting parties would travel 200 miles across some of the best buffalo country on the plains just so they could hunt other buffalo in some place like Goshen Hole." More concretely, he felt that the sites were too numerous and some too extensive to be hunting camps, and that "a hunting party preparing large quantities of meat for transport to a home base should leave different types of debris than would an indigenous group hunting for daily subsistence" (Reher 1973:119). Unfortunately, he did not further elaborate, nor did he propose an alternative identification.

Wood has further considered the matter in two papers. In the first, a report of materials from two Upper Republican sites in northeast Colorado, he concluded that such sites are either "the results of penetration by hunting parties from the east" or that they resulted from occupation "by local and permanent western residents" (Wood 1971:80). In the second paper, a recent summary of the supporting evidence for these alternatives, he concluded that the local and permanent residents' interpretation may be slightly better supported, but that neither interpretation can be accepted on present evidence (Wood 1990).

Wood's further conclusion that new data are needed is, of course, a valid point. However, the issue will not be resolved by new data alone if those data are interpreted within an old framework. It is therefore the purpose of this paper to propose an alternative approach to understanding the relations between the High Plains sites and the southwest Nebraska sites, and to reevaluate existing data using that approach.

TOWARD A REEVALUATION OF THE SITES

The Problem

The framework under which the High Plains sites currently are evaluated employs the direct historic approach, using historic data on Plains economies, as recorded in the rich documentary and ethnological record of the region. Presence of houses is presumed evidence of village dwelling. The assumption is made that prehistoric subsistence was identical to and the economy was organized in a manner analogous to that of the historic villages. The historic villages are contrasted with the historic mobile hunters of the High Plains. The assumption is made that prehistoric subsistence on the High Plains was identical to and the economy was organized in a manner analogous to that of historic mobile hunters. The problem for the High Plains Upper Republican sites, then, revolves not so much around determining the form of economy used by the people who left those sites, because it is assumed that it is one or the other of the historically documented forms, as around the criteria for identifying which form of economy was used. This is complicated by the further assumption that villages (either historic or prehistoric) hunting seasonally away from their villages organized their hunting in a manner analogous to that of the mobile hunters (historic or prehistoric). The presumption thus is that sites of villages hunting away from home and sites of mobile hunters may be difficult to distinguish.

An alternative framework for approaching the High Plains sites recognizes that the Upper Republican people of southwest Nebraska lived in houses and probably lived a reasonably sedentary lifeway. It does not, however, grant that such a form of residence implies that the houses were collected into villages—with the interhousehold interactions that this implies—or that subsistence was identical to that of later house dwellers on the Central Plains (for example, the Pawnee), or that economy was organized in a manner analogous to that of the historic villagers. It does, of course, recognize that houses, cache pits, and other items are absent from the High Plains Upper Republican sites and that the people who left them were not living a sedentary lifeway. In short, it begins by proposing that the subsistence practices and general economic organization of prehistoric populations on the Plains may *not* have had analogues in the historic period, or, at the very least, requires that such continuity be demonstrated rather than assumed a priori.

Such a proposal does not mean that the direct historic approach is not viable, or that the documentary and ethnological record cannot be used for interpreting prehistoric sites. It simply considers the documentary record as a source of *propositions* about the identification of phenomena observed in the prehistoric archaeological record and requires the demonstration of the validity of the proposed identification. Demonstration of the validity of the proposition, in turn, requires the establishment of criteria for the acceptance of the identification and, more important, the establishment of criteria for not accepting the identification.

The work of Bell and Cape, Lehmer, W. R. Wood (especially 1969, 1971) and others can be regarded as having identified the High Plains sites as hunting camps of house dwellers from further east by a priori assumption rather than by demonstration. Converting this identification to a proposed identification and establishing criteria for its acceptance or nonacceptance is a short step, however. An important criterion is, and always has been, assemblage composi-

tion. Wood (1990) was the most explicit about this when he phrased his expectation that cultural inventories on hunting camps should be more limited than on house sites, and in this he is correct. That cultural inventories from the High Plains sites *are* more limited than on the house sites was taken as supporting the "hunting parties from the east" alternative. However, Wood (1990) continued by noting that the assemblages from the High Plains sites also resemble what would be expected on sites left by local hunter-gatherers. Because his purpose was to attempt to determine whether the sites represented hunting camps of house dwellers from the east or local hunter-gatherers and because his cultural inventories expectation basically was the same for both classes of sites—that is, more limited than on the house sites—his finding that assemblages are more limited than on the house sites does not so much support the hunting camps as it does lead to a rejection of a house site identification. This, of course, was not the issue—it already was established that the High Plains sites were not house sites. The actual identity of the sites remains ambiguous.

Wood simply did not go far enough with his cultural inventories expectation. What his expectation did not do was specify the degree of limitation of cultural inventories or, better yet, the varying configurations of debris expected on the various types of sites and particularly of the various types of non-house sites. Such expectations are not out of reach, and it is here that the documentary record is of value. The remainder of this paper is devoted to a reevaluation of existing data against a more detailed set of assemblage expectations. Emphasis is placed on supporting or not supporting the hunting camps of house dwellers from the east alternative by presenting a set of specific hunting camp assemblage expectations that were developed using documentary accounts of seasonal hunting by the Pawnee. The fundamental proposition is that Upper Republican economic organization, most particularly hunting, anticipated that of the Pawnee. The assemblage expectations, then, are proposed identifications of the High Plains sites. The analysis will allow for either acceptance or nonacceptance of various non-house identifications.

Assemblage Expectations

The documentary record for the late eighteenth- and, especially, early nineteenth-century Pawnee clearly reflects a well-ordered variability among hunting sites. A particularly important document is the journal kept by the missionary John Dunbar when he accompanied the Chawi (Grand Pawnee) on their 1834–1835 winter hunt (Dunbar 1918:602–613). The data within this journal are sufficiently comprehensive that an ethnohistoric representation of the hunt can be built from it and transformed to a set of expectations for hunting camp assemblages. The details of the journal, the ethnohistoric representation of the hunt, and the derivation of assemblage predictions are described elsewhere (Roper 1990) and are far too lengthy to repeat here. The important points are overviewed, however.

A central point of the model is the recognition of the variability among the camps used during a hunt. Variability is manifest in duration of occupation and in activity structure. Five types of hunting camps (all five are independently varifiable from other accounts) are definable: *overnight stops,* which were just what their name implies; *hunting bases,* camps occupied for a number of days, from which hunting parties dispersed and to which they returned with meat,

hides, and other usable animal parts; *hunting bases at kill sites,* camps that were essentially the same as hunting bases but were established at kill sites and would have the structure of both types of sites; *kill sites,* which were places where surrounds were made and animals were killed, but at which no activities other than killing and butchering were conducted; and *winter quarters,* temporary tipi villages occupied during the winter after hunting was concluded but before the group returned to the permanent village.

The range of activities conducted at these sites was somewhat limited, and the specific activities varied at each site type. Domestic activities, such as eating and sleeping, were conducted at all but the kill sites. Killing, skinning, and butchering of bison were conducted at kill sites and in the kill portions of hunting base/kill sites. Meat and hide processing, hunting tool kit maintenance, and certain ceremonial activities were conducted at hunting bases, both away from kill sites and at kill sites. Other forms of manufacture were conducted at winter quarters. Ceremonial and recreational activities also occupied some time at winter quarters. Table 1 summarizes the general activity structure of each of the five site types and reflects the variability among them.

TABLE 1. Hunting camp activity structure.

Activity	Overnight Stop	Hunt Base	Hunt Base at Kill	Kill	Winter Quarters
Eating	×	×	×	—	×
Sleeping	×	×	×	—	×
Meat processing	—	×	×	—	—
Hide processing	—	×	×	—	—
Tool kit maintenance	—	×	×	—	—
Bison killing	—	—	×	×	—
Skinning	—	—	×	×	—
Butchering	—	—	×	×	—
Miscellaneous manufacture	—	—	—	—	×
Ceremonies	—	×	×	—	×
Recreation	—	—	—	—	×

A transformation of the ethnohistorically documented activity structure of Pawnee hunting camps to predictions about the archaeological record may be effected by inferring the types of tools used to conduct the various major activities and then placing them within general functional artifact categories such as those defined by Winters (1969:32–87). Six such categories are applicable to Pawnee hunting assemblages: (1) general utility tools—of a general nature that could be used for a variety of activities; (2) weapons—used for killing or procuring fauna; (3) fabricating tools—used in the manufacture or maintenance of other tools or goods; (4) domestic equipment—used in connection with food preparation, maintenance of clothing or dwelling, or similar household equipment; (5) ceremonial equipment—used in communal or personal rituals; and

(6) recreational equipment—used in games. Table 2 presents assemblage predictions, in terms of these categories, for the five hunting site types. The information in this table constitutes a predictive model of the assemblage structure of extended hunting sites (a full exposition of this model and how it is developed is found in Roper 1990).

TABLE 2. Expectations for hunting site assemblages.

	Artifacts[1]					
Site Type	**GU**	**We**	**Do**	**Fa**	**Ce**	**Re**
Overnight stop	0	—	0	—	—	—
Hunt base	X	X	X	0	—	—
Hunt base at kill	X	X	X	0	—	—
Kill	0	X	—	—	—	—
Winter quarters	X	0	X	X	?	X

[1]GU = General utility tools
We = Weapons
Do = Domestic equipment
Fa = Fabricating tools
Ce = Ceremonial equipment
Re = Recreational equipment

EVALUATING THE PROPOSITION

Data

Evaluating the High Plains Upper Republican sites against the model poses the research proposition that the Upper Republican peoples engaged in extralocal hunting organized similarly to that of the historic Pawnee. This, as noted earlier, is precisely the proposition advanced by Lehmer and Wood. The predictive model represents identification criteria for sites created during historic hunts.

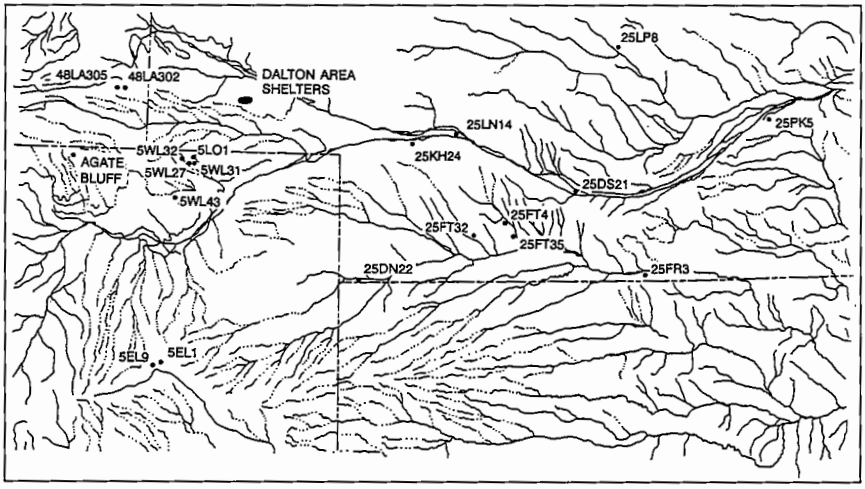

FIGURE 1. Upper Republican sites and Lower Loup hunting camps used in the analysis.

TABLE 3. Sites used in the analysis.

Site Name	Site Number	Component	Reference
Upper Republican house sites			
Dooley	25FR3	House 1	Strong 1935:69–101
Medicine Creek 4	25FT4	House 1	Wedel 1934
	25FT32	House 1	Grange 1980:49–70
Mowry Bluff	25FT35	House 1	W. R. Wood 1969
High Plains sites			
Buick	5EL1	All	W.R. Wood 1971:66–74
Smiley Shelter	5EL9	All	W.R. Wood 1971:61–66
Peavy	5LO1	All	J.J. Wood 1967:213–283
Biggs	5WL27	All	J.J. Wood 1967:340–383
McEndaffer	5WL31	Trench 1, Undist.	J.J. Wood 1967:283:340
Uhl	5WL32	Zones B and C	J.J. Wood 1967:54–189
	5WL43	All	J.J. Wood 1967:417:434
Agate Bluff I–III		All	Irwin & Irwin 1957
Gurney Peak Bench	48LA302	All	Reher 1973:35–55
Gurney Peak	48LA305	All	Reher 1973:73–83
	25DN22	All	Steinacher and Carlson 1984:127
Dalton area shelters		All	Bell and Cape 1936
Lower Loup hunting sites			
	25DS21	All	Garrett 1965:75–76
	25KH24	All	Carlson 1978:86–88
Birdwood	25LN14	All	Garrett 1965:74–75
Royel Goodenow	25LP8	All	Roper 1989
	25PK5	All	Steinacher and Carlson 1984:127

If the Upper Republican data also conform to the predictions of the model, then the identification of the sites as hunting camps and the behavioral proposition are supported. If, however, the data do not conform to the predictions, then the identification and the proposition will be refuted, *or* the model will be shown to be in error. In the case of noncongruence of data and predictions, an effort will be made to determine which situation obtains. If the model appears to be deficient, then the Upper Republican hunting proposition may remain viable. At the very least, the matter will remain open. Should the model be felt sound, however, the identification of the High Plains Upper Republican sites as hunting camps may be rejected.

The evaluation described here uses published data from 21 sites (Table 3) in Nebraska, Colorado, and Wyoming (Figure 1). This number includes two "sites" that actually are site aggregates: Bell and Cape (1936) described the

collections from the Dalton, Nebraska, area rockshelters as an aggregate and contents of individual shelters cannot be determined from the report; the same overall is true of the Agate Bluff, Colorado, shelters (Irwin and Irwin 1957). The majority of the sites (12 of 21) are Upper Republican sites in western Nebraska, northeast Colorado, or southeast Wyoming. Several southwest Nebraska house sites are included for comparative purposes. Reasonably good data are available for four sites, all of which represent single and complete house excavations. Finally, a comparison of the High Plains sites with hunting camps is critical to the evaluation. The most direct comparisons are with protohistoric sites, at which assemblages are comprised of native artifacts. A number of Nebraska sites recently have been identified as Lower Loup (protohistoric Pawnee) hunting sites, and Holen (1983:89–82) has argued convincingly that the Birdwood culture (Garrett 1965) sites are actually Lower Loup hunting camps. Five Lower Loup hunting sites are described in sufficient detail in the literature that they can be used in this analysis.

The data needs of the model are really no more rigorous than presence-absence tabulations of artifacts assignable to the functional categories used in the presentation of hunting site assemblage predictions. This is not the way the data are presented in the literature. Rather, Upper Republican artifacts

TABLE 4. Artifact classes and functional categories.

Artifact Class	Functional Category
Pottery	Domestic (Do)
Projectile point	Weapon (We)
Drill	Fabricating (Fa)
End scraper	Fabricating (Fa)
Celt	General utility (GU)
Side scraper/knife	General utility (GU)
Mano	Domestic (Do)
Metate	Domestic (Do)
Pipe	Ceremonial (Ce)
Abrader	Fabricating (Fa)
Hammerstone	General utility (GU)
Pendant	Ornament (Or)
Bone awl	Fabricating (Fa)
Needle	Fabricating (Fa)
Bone/shell bead/tube	Ornament (Or)
Ulna pick	Fabricating (Fa)
Scapula tool	Agricultural (Ag)
Fishhook	Weapon (We)
Bracelet/bow guard	Ornament (Or)
Flaker	Fabricating (Fa)
Shaft straightener	Fabricating (Fa)

are described within a series of types that have a fairly high degree of comparability from one report to another or which can be correlated with some confidence. Tabulating the occurrence of specimens of the functional categories at each site therefore required first the tabulation of tool types. Upper Republican sites, particularly the house sites, yield any number of miscellaneous, idiosyncratic artifacts. The vast majority of the specimens, however, fall within classes that are recognized at all or most sites. A list of 22 such classes was used for tabulating the artifacts from the 21 sites. Each class is presumed to have functional coherence—in several cases, morphological or raw material variants were combined to achieve this coherence (for example, bone beads and shell beads were placed within the same class). Two functional categories not recognized in the hunting model are represented in full Upper Republican assemblages: agricultural implements, tools used in tilling fields and tending crops; and ornaments, items worn on the body or on clothing. No recreational items were included in the artifact class list. All artifact classes used here and their functional category assignments are shown in Table 4.

A First Look: Basic Assemblage Composition

The simplist comparison of the sites, and that which most directly addresses the predictions of the model, is the presence-absence comparison of the assemblages of the High Plains sites with the predicted assemblages. This comparison is presented in Table 5. Even at this level it is easy to see why the High Plains sites have so frequently been interpreted as hunting camps. Their assemblages, as pointed out by Wood and others, do not contain various tool categories represented at most house sites. There are also some undeniable similarities with the predictions of the hunting model and with the assemblages of the Lower Loup hunting sites.

Even at this level of analysis, however, there are some important discrepancies between the predictions of the hunting model and the assemblages of the High Plains sites. Most notable is the fact that ornaments, not predicted for hunting sites, are found at five of the twelve sites, and the fact that an agricultural tool was found at one site. These divergences from the assemblage predictions may not seem major, but what they amount to is that half of the High Plains sites have items that are not predicted to occur on hunting sites. Only one hunting site in this analysis yielded such an item, and this was, in fact, an item (a pipe) presumed used on such a site but carefully curated and rarely lost or discarded.

Also disturbing is the fact that virtually all of the High Plains sites yielded specimens assignable to all functional categories predicted for hunting camps. This is not true of the Lower Loup hunting sites, which, even with the small number of cases used in this analysis, show three different functional category configurations (all of which conform to various assemblage configurations predicted by the model). Thus, while the High Plains do in fact have more limited assemblages than the house sites, they also seem to have more varied assemblages than sites created by villagers hunting away from the villages. The conclusion is unmistakable: either the model must be adjusted, or, more likely, the High Plains Upper Republican sites simply do not fit it. A closer look at the data will resolve the dilemma.

A Closer Look

The functional category coding masks some differences among the site groups in actual composition of the functional categories. A closer look will do well to use the full data set, shown in Table 6. The penultimate line of the table shows each site's artifact total, a number that at first glance seems incorrect, especially because frequencies of artifacts of certain classes were unknown for some sites. These totals were derived as follows. Actual debris frequencies are uncertain only for two house sites, and then they are unknown only for some artifact classes. A value of one was assigned to each class reported as represented but for which frequencies were not presented. This was done even when it was virtually certain that the actual frequency was greater than one. This does little violence to this particular analysis; in fact, it is a conservative estimate of assemblage size.

TABLE 5. Assemblages, by functional category.

	Artifacts[1]						
Site Type	**GU**	**We**	**Fa**	**Do**	**Ag**	**Or**	**Ce**
25FR3	X	X	X	X	X	X	X
25FT4	X	X	X	X	X	X	X
25FT32	X	X	X	X	X	—	—
25FT35	X	X	X	X	X	X	X
5EL1	X	X	X	X	—	X	—
5EL9	X	X	X	X	—	X	—
5LO1	X	X	X	X	—	X	—
5WL27	X	X	X	—	—	—	—
5WL31	X	X	X	X	—	X	—
5WL32	X	X	X	X	—	—	—
5WL43	X	X	X	X	X	—	—
Agate Bluff	X	X	X	X	—	—	—
48LA302	X	X	X	X	—	—	—
48LA305	X	X	X	X	—	—	—
25DN22	X	X	X	X	—	—	—
Dalton	X	X	X	X	—	X	—
25DS21	X	X	X	X	—	—	X
25KH24	X	—	—	—	—	—	—
25LN14	X	—	X	X	—	—	—
25LP8	X	X	X	—	—	—	—
25PK5	X	—	X	X	—	—	—

[1]GU = General utility tools
We = Weapons
Fa = Fabricating tools
Do = Domestic equipment
Ag = Agricultural tool
Or = Ornament
Ce = Ceremonial equipment

Ceramics was the single most problematic class. The number of sherds is large and, of course, a single sherd is not equivalent, for this purpose, to a single projectile point, for example. In any event, the number of body sherds was not reported in all instances and assignment of a value of one to this class is not at all reasonable. The best ceramic count would have been minimum number of vessels, but this was available for only a few cases. It finally was decided to use the number of rim sherds, a value available for all cases (the ratio of rim sherds to minimum number of vessels in reported instances ranged from 1:1 to over 3:1, making a regression estimate of the number of vessels from number of rim sherds a poor approximation).

The last line of Table 6 shows the number of artifact classes of the 22 on the list actually represented at each site. This value is nothing other than a measure of the diversity or, more accurately, that component of diversity usually referred to as the richness of the assemblage. It is a value that frequently has been used in comparing assemblages for settlement system interpretation, but it is a value that must be carefully interpreted. Jones et al. (1983) showed that artifact class richness frequently is highly correlated with sample size, and Thomas (1989) has shown that site function interpretations may be heavily influenced by how much debris is available for use in functional interpretation. It will be productive to examine the relation between these variables here; in fact, such an analysis is definitive for the problem at hand.

Figure 2 plots the number of artifact classes against the natural logarithm of the number of artifacts at each site. It is obvious that sample sizes for sites in the three subgroups thoroughly overlap (see also Table 6). Artifact class frequencies, however, show very little overlap among the site classes. The eye shows

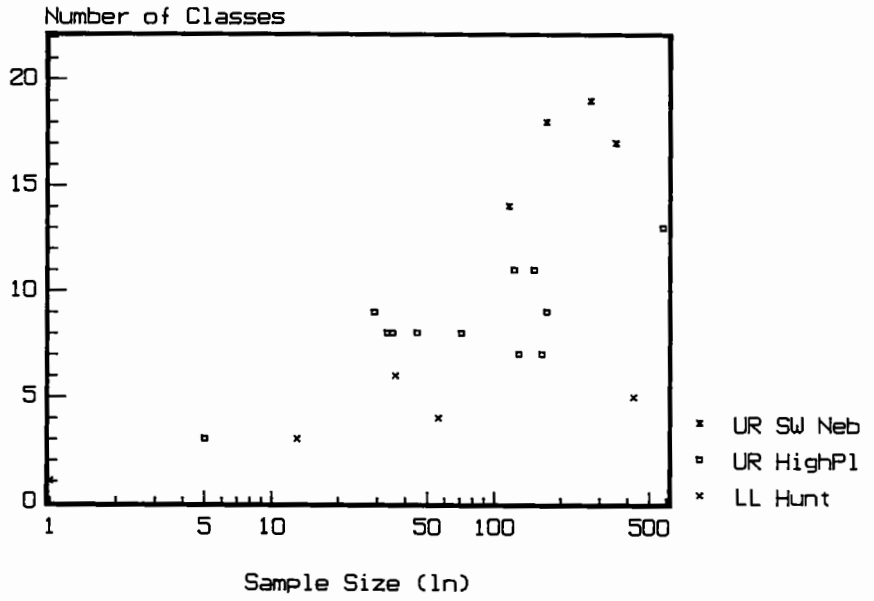

FIGURE 2. Natural logarithm of sample size vs. number of classes.

TABLE 6. Assemblages, by artifact classes.

Artifact Class	Category	25FR3	25FT4	25FT32	25FT35	5EL1	5EL9	5L01	5WL27	5WL31	5WL32
Pottery (rims)	Do	58	87	42	50	31	4	5	—	3	5
Projectile point	We	32	41	1	28	26	2	76	2	10	37
Drill	Fa	—	1	1	2	1	—	4	1	1	1
Other bifaces/knives	GU	49	4+	9	41	13	2	—	—	—	—
End scraper	Fa	20	+	15	12	12	2	20	—	4	4
Celt	GU	80	+	—	34	—	—	—	—	—	—
Side scraper/knife	GU	14	+	25	29	34	8	33	2	10	20
Mano	Do	—	—	1	1	2	1	3	—	1	1
Metate	Do	+?	—	3	10	1	—	3	—	2	1
Pipe	Ce	4	1+?	—	5	—	—	—	—	—	—
Abrader	Fa	16	Frags	5	20	—	—	1	—	—	2
Hammerstone	GU	5	—	4	3	1	—	1	—	—	—
Pendant	Or	—	1	—	1	—	—	—	—	—	—
Bone awl	Fa	26	20	3	8	1	14	4	—	—	—
Needle	Fa	—	1	—	2	—	—	—	—	—	—
Bone/shell bead/tube	Or	9	1+	—	15	1	2	1	—	2	—
Ulna pick	Fa	—	2	2	1	—	—	—	—	—	—
Scapula tool	Ag	25	+	4	8	—	—	—	—	—	—
Fishhook	We	4	—	—	—	—	—	—	—	—	—
Bracelet/bow guard	Or	3	3	—	1	—	—	—	—	—	—
Flaker	Fa	5	1	—	—	—	—	—	—	—	—
Shaft straightener	Fa	1	3	1	—	—	—	—	—	—	—
Number of artifacts		352	171	116	271	123	35	151	5	33	71
Number of classes		17	18	14	19	11	8	11	3	8	8

Artifact Class	Category	5WL43	Agate Bluff	48LA302	48LA305	25DN22	Dalton	25DS21	25KH24	25LN14	25LP8	25PK5
Pottery (rims)	Do	10	20	10	80	5	+	11	—	36	190	4
Projectile point	We	2	109	12	20	7	261	3	—	—	108	—
Drill	Fa	1	4	3	4	1	3	—	—	—	—	—
Other bifaces/knives	GU	—	3	8	6	3	29	5	—	1	66	4
End scraper	Fa	—	5	10	5	2	211	7	1	16	52	5
Celt	GU	—	—	—	—	—	—	—	—	—	—	—
Side scraper/knife	GU	6	26	83	44	25	48	9	—	3	8	—
Mano	Do	5	1	—	—	—	1	—	—	—	—	—
Metate	Do	1	3	3	5	—	4	—	—	—	—	
Pipe	Ce	—	—	—	—	—	—	1	—	—	—	—
Abrader	Fa	1	—	—	—	1	6	—	—	—	—	—
Hammerstone	GU	2	1	—	—	1	—	—	—	—	—	—
Pendant	Or	—	—	—	—	—	3	—	—	—	—	—
Bone awl	Fa	—	—	—	—	—	5	—	—	—	—	—
Needle	Fa	—	—	—	—	—	—	—	—	—	—	—
Bone/shell bead/tube	Or	—	—	—	—	—	4	—	—	—	—	—
Ulna pick	Fa	—	—	—	—	—	—	—	—	—	—	—
Scapula tool	Ag	—	—	—	—	—	—	—	—	—	—	—
Fishhook	We	—	—	—	—	—	—	—	—	—	—	—
Bracelet/bow guard	Or	—	—	—	—	—	1	—	—	—	—	—
Flaker	Fa	—	—	—	—	—	—	—	—	—	—	—
Shaft straightener	Fa	—	—	—	—	—	—	—	—	—	—	—
Number of artifacts		29	172	129	164	45	578	36	1	56	424	13
Number of classes		9	9	7	7	8	13	6	1	4	5	3

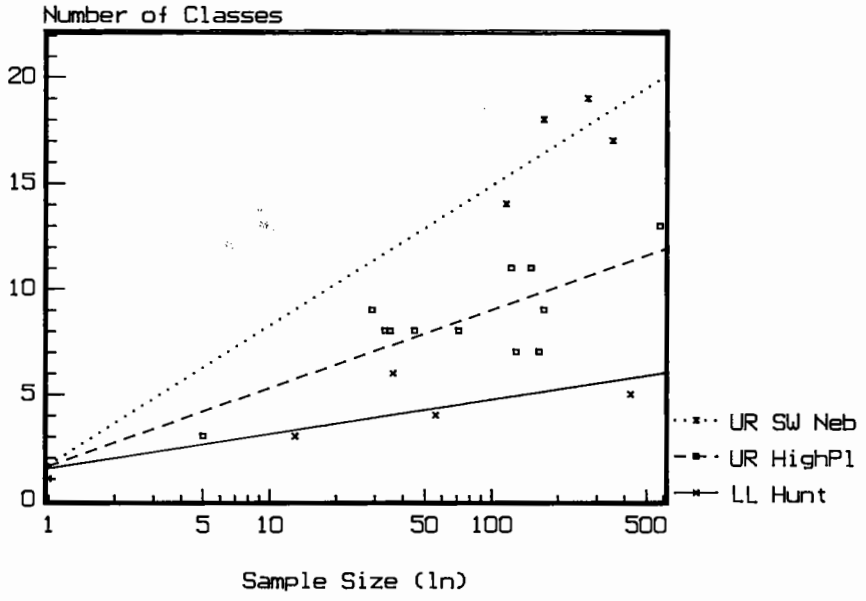

FIGURE 3. Regression lines for the three site groups.

that the swarm of points is somewhat dispersed, but that the correlation probably is significant, and in fact, it is: $r^{ln(x)y} = .681$, $r^2 = .464$, $p < .01$. The separation of the three site classes, however, is an indication that the aggregate is comprised of several discrete groups of sites that should not be lumped for analysis.

Thomas (1989:90) suggests that the use of the regression coefficient is a means of assessing relative assemblage diversity when sample size and richness are correlated. That is, the coefficient b in the sample linear regression equation $y = a + bx$, or an equivalent equation with logarithmic transformation, is a measure of expected relative diversity among assemblages, once sample sizes are known. Different site classes should have different regression coefficients, and it is the difference among these coefficients that monitors the nature of the differences among the site classes.

Regression equations of the form $y = a + b*ln(x)$ were calculated for each site. The regression lines representing the three equations are superimposed on the scatterplot in Figure 3. Table 7 shows the equations, correlations, and probability of the correlations occurring by chance. The correlations for the subgroups of the High Plains sites and the hunting sites are higher than for all sites as an aggregate. The probabilities of these correlations occurring by chance are low. Only the house site subgroup correlation is not as high as that for the entire site aggregate; however, the conservative estimate of sample size for 25FT4 in particular affects this value. If values of 50 and of 100 are added to the sample size (values that perhaps are near the opposite ends of a range of reasonableness, given the classes that are underestimated) the correlations rise to .763 and .812, respectively. Although not significant at the .05 level (very

TABLE 7. Statistics of the regression analysis.

All Sites			
$y = -0.40 + 2.22*1n(x)$	$r = .681$	$r^2 = .464$	$p < .01$
House Sites			
$y = -1.67 + 2.87*1n(x)$	$r = .654$	$r^2 = .428$	$p < .05$
High Plains Upper Republican Sites			
$y = -1.62 + 1.61*1n(x)$	$r = .780$	$r^2 = .608$	$p < .01$
Hunting Sites			
$y = -1.50 + .71*1n(x)$	$r = .816$	$r^2 = .666$	$p < .05$

few values are with a sample size of 4), they suggest a relation that may be borne out when more house site data from southwest Nebraska become available.

The three regression lines are sharply divergent and suggest much about the assemblages of the three subgroups of sites. A regression line paralleling the X-axis indicates an assemblage in which the second artifact found is in the same class as the first artifact found, and all subsequent artifacts also are in the same class as the first artifact found—in other words, class richness does not increase no matter how large the collection. The line for hunting sites does not parallel the X-axis, but the angle between the line and the X-axis is very acute, indicating that artifact class richness increases very slowly as sample size increases. The regression line for the High Plains Upper Republican sites forms a considerably less acute angle with the X-axis. This means that artifact class richness increases more rapidly as sample size increases. Importantly, this richness surpasses that of the hunting camps, even when sample sizes range as high as 424 specimens, yet, using the regression estimate, six artifact classes are predicted for High Plains Upper Republican sites with collections as small as 16 artifacts. This constitutes a strong argument against identifying the High Plains sites as hunting camps analogous to those established during the protohistoric and historic periods. It is notable, of course, that the predicted number of artifact classes at house sites is still higher, even for small samples. This is simply a numerical expression of observations made initially by Bell and Cape and subsequently by everyone who has since considered the nature of the High Plains Upper Republican sites.

DISCUSSION

The analysis presented here does not support the identification of the High Plains Upper Republican sites as hunting camps and, therefore, does not support the proposition that Upper Republican people conducted extralocal hunting organized in a manner similar to that of the Pawnee (or other Central Plains tribes). Presence-absence data for general functional categories do not conform to the Pawnee hunting model. Simply put, even at a very general level of analysis, the High Plains sites, although they do not have assemblages as diverse as those of the southwest Nebraska house sites, nevertheless appear to have consistently richer assemblages than do protohistoric Pawnee hunting sites. The analysis of the fully quantified data set confirms this. Hunting sites do not con-

tain diverse assemblages, and no amount of collection of additional debris seems to make such a site appear as diverse as does even a fairly small collection from a High Plains Upper Republican site. The conformity of the Lower Loup hunting sites with the model and the well-ordered difference between these and the High Plains Upper Republican sites suggest that lack of conformity is not a product of a difficulty with the model. Rather, it is an indication that the High Plains sites are not hunting sites on the historic model.

This, of course, begs the question as to what the High Plains sites do represent. If the sites are not the results of penetration by hunting parties from the east, and it is here argued that they are not, then as Wood (1971:80; 1990) suggested, they must represent some sort of occupation by full-time High Plains residents. Their way of life is elusive, however. Wedel (1961:102) suggested that these could have been semi-permanent settlements where small-scale crop raising was attempted or sites occupied by people attempting the transition from a food-producing economy in the east to a bison-hunting economy in the west, but these alternatives do not exhaust the possibilities. Both, in fact, suggest we can account for the sites as site unit intrusions from the east. This is not necessary. Moreover, both seem to imply that we must account for them as site unit intrusions. This is not true.

It is time to reject the implicit assumption that the Upper Republican subsistence base was identical to that of the historic Pawnee, which is to say that it was focused on corn and bison. It simply is not so. Every analysis of faunal remains from Upper Republican house sites on Medicine Creek (Falk 1969; Mick 1982, 1983; Scott 1990) has shown a high species diversity, even when the collections resulted from biased recovery. It makes no sense to interpret this as use of emergency foods in lean years. It is far more reasonable to see Upper Republican peoples as subsistence generalists, foraging within all biotic zones of the valley and adjacent uplands, and, when and where possible, growing some corn in the stream bottoms. Their sedentary lifeway in the Medicine Creek valley and elsewhere in southwest Nebraska is a function of the close spacing of those resource zones, all zones appearing within a few kilometers of any given site.

A useful thing about a generalized diet is that a society using it can operate in many different places. The lesson of, for example, the Great Basin Shoshone (Steward 1938) is that *peoples of the same cultural tradition may inhabit a region of greatly varying resource zonation, but that varying combinations of resources may be used and varying settlement organization may be required in structurally dissimilar parts of the region.* It is therefore also time to reject the assumptions that all peoples with an Upper Republican material culture had a single settlement system and that this system resembled that of the historic Central Plains village tribes. We then can view Upper Republican as the material culture of people or peoples who were generalized hunter-gatherers and sometimes horticulturalists, organized at a family level, spread through a broad area from the base of the Rocky Mountains to the eastern limits of the mixed grass prairies of the Central Plains, and differentially interacting with localized settings according to the potentials of those settings. The Central Plains village economy of protohistoric and historic times is the result of an as yet poorly understood and incompletely dated intensification of a subset of the earlier economic strategies, namely those operating in Medicine Creek and other perennial stream valleys of the mixed grass prairies. The

western Upper Republican people likely were permanent populations on the High Plains, pursuing a wide range of plant and animal foods using some form of residentially mobile foraging strategy in the less differentiated High Plains setting. This strategy was not analogous to that of historic villagers conducting seasonal hunts away from the villages and perhaps not even analogous to that of historic mobile hunters. For whatever reason, it did not persist into historic times, at least among the tribes with a derivative material culture. The problem now is to document that strategy from the archaeological record.

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