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Distribution Archaeology: Survey, Mapping, and Analysis of Surface Archaeological Materials in the Green River Basin, Wyoming

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INTRODUCTION

Archaeology in America today is in a quandary. This is especially true for that portion of the profession responsible for investigating and managing the surface archaeology of large tracts of land. The quandary concerns how to maximize the amount of information about the archaeology of an area given finite budgets. Predictive modeling, a technique for projecting knowledge derived from a sample to its universe, has been proposed as one response to this dilemma. We shall present another response, distributional archaeology, which is designed to collect quality information about the archaeological record and is consistent with the formation and structure of that data base.

Inherent in all archaeological modeling attempts are assumptions about the nature of the archaeological record. These assumptions must be questioned in light of the formation processes that are responsible for the archaeology potentially available to us. Before examining how the archaeological record is formed, we briefly examine some of the prejudgments archaeologists make about their data.

CONCEPTUAL BIASES

Most archaeological work done throughout the world today revolves around the concept of the site. Just what a "site" is is rarely explicitly discussed, but generally, most archaeologists believe that sites exist and that they are useful analytic units for assessing prehistoric behavior. That is, sites mean something in terms of past cultures and this something is knowable to the archaeologist. Associated with the concept of the site are ancillary concepts of site function and site significance. Most archaeologists also believe that by carefully considering the content of a site and by comparing it to sites produced by contemporary aboriginal groups, an archaeologist can assign to it one or several discrete functions. Significance refers to how much information a given site, within the constructs of regional research, contributes to the archaeological community (James, et al 1983). Generally, a site which is rare, very old, very large, or very complex is interpreted by the archaeologist as significant. Conversely, a non- significant site is either common, small, diffuse, or of a single-component.

METHODOLOGICAL BIASES

Concomittant with assumptions about what the archaeological records consists of are assumptions about how to best "see" it. *Given that archaeologists believe sites to be useful carriers of information about prehistoric behavior, methodologies designed to find sites are developed. This is not always explicit even in the mind of the archaeologist, we believe, but is still a methodological* fact. If the goal is to locate all "significant" sites in an area, and if significant sites are of size y, then transect intervals of f(y) are used to find them. The concept of the site guides how archaeological survey is conducted and also defines the description of surface archaeology.

As discussed by Plog et al (1978), however, both site recognition criteria and site description conventions are rarely consistent within or between survey projects. It becomes very possible then that interpretations of prehistoric behavior derived from the archaeological record most likely result from how we have trained ourselves to "see" the archaeology to as great an extent as what is really there on or in the ground.

Below we shall discuss how the formation of the archaeological record, a complex process at best, demands that we question the concept of site and its utility for helping us understand the past. Further, while certainly we can recognize differences in the contents of sites, it is unclear, given the nature of the archaeological record, that simple functional assignments can be made. Lastly, once we consider how the archaeological record is formed and how it can be translated into information about the past, the concept of the assessment of the significance of portions of the archaeological record becomes completely reversed.

These considerations entail the realization that present methodologies for finding and describing surface archaeology are inadequate. The Seedskadee Cultural Resource Assessment Project was designed to record the surface archaeology of a sample of Bureau of Reclamation land surrounding the Seedskadee National Wildlife Refuge (Lincoln and Sweetwater Counties, southwestern Wyoming) in a manner consistent with the structure of the archaeological record. Our perception of the formation processes responsible for the archaeological record, and the sort of survey methodologies necessary to properly record these, is the focus of the next sections of this paper.

EPISODIC BEHAVIOR VS. THE ARCHAEOLOGICAL RECORD

It is almost universally assumed by anthropologists - whether implicitly or explicitly - that the archaeological record and archaeological sites are reflections of past activities or activity sets. In approaching and designing the Seedskadee survey, we chose not to make these assumptions. We feel that in most if not all cases, *the archaeological record exists on a different level than that* of episodic human behavior. *These different levels can be brought* to bear upon one another only through middle-range theoretical arguments relating the statics of the archaeological record with a number of different sorts of dynamic processes responsible for the creation of that record. These processes include:

1. The systemic processes of human organization, particularly mobility and the activities which are the causes of mobility;
2. The behavioral processes of discard, loss, and abandonment that produce the material consequences of activities, creating a record of discard rather than of the sum of all human activities;
3. The interacting processes of discard and deposition, separated by phase differences which result in the overlap of the products of discard through time within depositional units, causing the archaeological record to differ from human behavioral events in the time-scale of its representation; and
4. Post-depositional natural and cultural processes which affect the preservation, integrity, and visibility of the archaeological record.

At the risk of sounding overly "theoretical," we would like to discuss each of these processes briefly. This is extremely important in making a case for undertaking distributional survey, for the results of these processes and the ways they cause the fragmentation, superimposition, and differential preservation and visibility of the archaeological record between and within "sites" constitute a strong argument that the site concept is difficult (at best) to operationalize. Archaeologists simply do not know what "sites" in the archaeological record are, how they are bounded or defined, or how they relate to human behavior, and the only way to approach an understanding of these problems is to carefully study what is contained in "sites" and between them using an unbiased methodology. We feel that one of the only ways to arrive at such an unbiased methodology is to ignore "sites" entirely in the recording and analysis of the archaeological record, a methodology we shall call distributional archaeology.

THE SYSTEMIC ORGANIZATION OF HUMAN BEHAVIOR

The places that people do things, the ways that they move between these places, and the different things that they do at different places are organized systemically rather than simply internally. In other words, the same people do different things at different places and times. The ways that they organize what they do at which places varies, of course, with strategies which groups use to either most efficiently or perhaps just passably meet the challenges of feeding and provisioning themselves. In extremely diverse and "even" environmental settings, for instance the jungles of Southeast Asia and South America, there are human groups that tend to do just about their entire repertoire of activities everywhere, and who use the environment surrounding their residential camps in the manner of nearly perfect generalists. Resource procurement trips are taken outwards from the residential camp each day, and collectors return at night. This sort of adaptation has recently been referred to as foraging (Binford 1982), and in such an adaptation the debris discarded at each residence - the single kind of "site" produced - will all be essentially the same. The amount and variety of site contents will depend primarily on how many people occupied these residences for how long (Yellen 1977).

In most of North America, however, it is probably safe to assume that the people responsible for the archaeological record we find today were not perfect generalists. The environment here, particularly west of the Mississippi, is not diverse or even enough to permit the survival of generalists of the sort represented by Bushmen or Tassaday. Prehistoric Americans were to at least some extent specialists - that is, they exploited the resources in their environment by targeting in on those resources which could be most efficiently procured (efficiency, here, should be understood in systemic terms and not necessarily simply calories per unt time). Specialists organize their mobility differently than do foragers, having a logistic organization (Binford 1982) in which activities are carried out at a number of functionally differentiated locations: residential camps, hunting camps, blinds or stands, and other special-purpose locations which are inhabited and used by subgroups staying away from the residence, in some cases, for substantial periods. Different sorts of simultaneously-used and -occupied sites in such a system look different. More important, however, in "confusing" the archaeological record left by logistically organized systems is the fact that when residences are moved, special-purpose sites and the old residence are re-used as activity locations, both often for different activities than before. Patterning within and between sites is the result of ". . .long-term repetitive patterns in the 'positioning' of adaptive systems in geographic space. Site patterning derives from repetition, or lack thereof, in spatial positioning of systems" (Binford 1982:6). If it could be viewed synchronically at one time, the regional archaeological record left by a single group of people organized in a logistical way would probably be interpreted by most archaeologists today as being "sites" made by several different cultures (on the basis of "diagnostic" artifacts being different with different site functions, sizes, and types). When viewed over even a short time period, this record will be even more confusing because of the overlap of different functions - residential and hunting-camp, for instance - at the same places. This may well be the situation within the later Plains Archaic, for instance.

DISCARD BEHAVIOR AND THE ARCHAEOLOGICAL RECORD

Discard behavior and the fact that the archaeological record is formed when items are discarded, lost or abandoned is acknowledged explicitly by recent "behavioral" and "garbage" archaeologists. Unfortunately, these archaeologists still seem to think that everything that people use is dropped where and when tasks are completed or at some other location in a simple way, resulting in a "frozen" archaeological record which provides a direct reflection of past events. Artifacts can be discarded in the context of their use, but probably far more often they were not. Instead, especially within specialized, logistically-organized systems with planned procurement activities at known, sequential locations, artifacts would have been produced at one place, curated for use at another, and maintained to be used multiple times. When this is the case, one would expect artifacts to be found in the contexts of their maintenance and replacement. More realistically, one would expect to find parts of artifacts and their by-products at different places: debitage from point shaping and thinning at a quarry where the point was made; resharpening flakes where the point was used expediently as a knife; a point tip as an "isolated occurrence" where it was broken against a rock; and the broken base of the point at a residential camp where the point was replaced in its haft. The "pieces" found at different places needn't necessarily be literally from one artifact, either. They might be "pieces" of assemblages (sets of artifacts), or even attributes of artifacts and their combinations in assemblages. The archaeological record in a curated technology can be expected to be composed of sets of things that do not necessarily occur together at the same places in all cases.

This poses great problems for the archaeologist, who must be able to put all of these pieces back together again. While the solution to this problem will not be discussed here, it is clear that to measure and "piece together" such distributions, we must keep track of where each artifact or item is found both within sites and between them, or better yet across a landscape. Methods are required which allow the archaeologist to analyze the entire range of complex discards that track individual artifacts, toolkits, and planned activities through the system.

DEPOSITIONAL VS. BEHAVIORAL EVENTS AND PROCESSES

When items are discarded, lost or abandoned they leave the cultural realm and are subjected to depositional processes which transform them into part of the archaeological record. Depositional processes may be cultural, as in the case of burial of materials in pits; more often, however, they are natural processses consisting of fluvial, aeolian, lacustrine, or residual aggradation. These natural processes of deposition may or may not coincide with episodes of cultural discard of materials. Materials may lie on the surface for long periods of time without being buried, or may be quickly covered as they are disposed of. In some situations, particularly in arid environments, materials may never be buried and may remain forever on the surface of the ground, forming a palimpsest. Archaeologists almost universally assume that materials buried in layers or "levels" are the undisturbed reflection of single occupational episodes. In reality, materials from sealed sites may well have been disturbed while they lay on the surface awaiting deposition, and subsequent episodes of occupation or activity superimposed atop previously-discarded materials may be sealed into a single discernible stratum as well.

The nature of the deposited archaeological record is not simply the result of discard, but rather of the "tempo" (Binford 1982:16) of the occupation or use of a place and its relationship to the periodicity of depositional processes. At a riverside logistic site which is re-used in the course of a year for several episodes with the same or different functions, for instance, one might expect episodes of discard to be more frequent than deposition caused by the rise of spring floodwaters. This would result in single-layer "assemblages" composed of materials from more than one occupation and very probably more than one function. As a result, ". . .demonstrably associated things may never have occurred together as an organized body of material during any given occupation" (Binford 1982:17-18).

Looking for and lumping the materials from buried "cultural layers" is not the way to sort out the wholly or partially superimposed patterning resulting from phase differences in the occurrence of depositional and discard events. New methods of recording and analyzing the exact relationships between the items which compose the archaeological record are required in order to "pick apart" this kind of patterning. It has been suggested that one analytical technique that might be used in the analysis of subtly overlapping patterning is digital filtering of distributions across space (Carr 1982). Such analysis virtually requires the collection of point data. In addition, the difficulty of defining "site" boundaries which might in many cases blur the distinctions between the edges of partially overlapping patterns argues for discarding the relatively meaningless site concept in measurement and analysis of such distributions.

NATURAL PROCESSES AFFECTING THE DEPOSITED ARCHAEOLOGICAL RECORD

Once the archaeological record is deposited, another set of processes begins to act upon it. These can be thought of as post-depositional processes, although it should be kept in mind that they can act to alter or destroy archaeological materials and patterning prior to deposition as well. Nearly all of the processes which affect the surface of the earth also act upon the archaeological materials upon or within it: biological processes such as "faunalturbation" and "floralturbation" (Wood and Johnson 1978); chemical and physical processes such as freeze/thaw cycles, mass wasting, salt crystallization, swelling and shrinking of clays, volcanism and tectonism, and disturbances caused by the action of gas, air, wind, water, and pedogenesis (Wandsnider and Ebert 1983). These natural processes can alter the spatial patterning of artifacts on the land surface, can act to differentially preserve and destroy culturally-deposited items, and can cause exposure of buried deposits and subsequent reburial of either wholly or only partially altered materials. While one might be tempted to think of post-depositional processes as destructive, at least some are vitally

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important to archaeology because in many cases, *buried materials* are also invisible and unknown to the archaeologist. Even using expensive and time-consuming geophysical or chemical discovery methods, only a small portion of the subsurface archaeological record is even likely to be found. Natural processes must make part or all of buried deposits visible before these can be dealt with. It is only on the very narrow threshold between exposure and disturbance that most archaeological materials are valuable to archaeologists.

Natural processes which bury, expose and sometimes rebury and expose (ad infinitum?) archaeological materials are usually a combination of more than one of the types listed above. For instance, the lowering of artifacts contained within a sand dune to an interdunal surface has both aeolian and gravitational components. These processes are affected drastically by small differences in topography, soils, and the like and for this reason are often highly localized in space. This introduces complexities which are often at a scale much smaller than that of assumed "sites." In a dune environment, for example, portions of the material record resulting from two separately-deposited but subsequently deflated activity episodes might be mixed at one place while only a few feet away they will be separately stratified or unexposed and invisible. Much of what is thought to be "site boundaries" during survey is very likely the result of just such localized, differential exposure of materials. Methods of measuring and analyzing the archaeological record which allow the recognition of the parts of the record we do not see as well as those we do are required if the effects of natural processes and their differential effects are to be "filtered out" of what archaeologists record prior to thinking about the past behavioral patterning responsible for the archaeological record.

CONTINUOUS ARCHAEOLOGY - VIEWS OF FUNCTION AND SIGNIFICANCE

The systemic nature of human mobility, the effects of curation and the anticipatory manufacture and use of components of technical systems, disparities between the tempo of episodes of discard vs. episodes of deposition, and the post-depositional action of natural processes on deposited materials all combine to insure that the archaeological record in most if not all places is complex. It exists on a "level" quite different from that of specific episodes of human behavior. What is more, the complicated overlayering brought about by these processes results in an archaeological record that, at least in many places, does not exist as discrete "sites" or activity sets, but is rather of a dispersed, continuous nature (Dunnell and Dancey 1983; Foley 1980, 1981a, 1981b; Isaac and Harris 1975; Thomas 1975).

All archaeologists who have done surface survey have encountered situations in which it was difficult to decide where sites ended and where other sites began. We would suggest that this is because of the sort of implicit, unstated, and vague internalized notions that archaeologists have held concerning the equivalence between behavioral episodes in the past and "sites" as they exist in the present. Specific, single, ongoing ("real life") human occupations may be bounded in space and time, and can be thought of as sites if one wants to call them that. In the archaeological record, however, "sites" are not bounded, they do not begin nor do they end, and in fact they do not exist as the counterpart of behavioral episodes, activities, occupations, strategies, organization, adaptations, or any other reconstructional or theoretical entity.

Further, is is clear that different nodes on the landscape will assume many different functions through time. Rather than discussing what function a "site" had, it is more meaningful to look at variability in occurrence and co-occurrence of attributes and of artifacts through space.

When the above considerations are taken into account, the significance of the archaeological record assumes a wholly different emphasis. It should be clear that we need to begin to work on unravelling the distributions that are the most comprehensible to us given the complexity of archaeological formation processes and the current state of development of archaeological methodology. Information about the past can best be extracted from those parts of the archaeology of an area which are redundant and easily analyzed. We can only begin to find patterns in the surface archaeology if there exists some amount of redundancy in that data. In essence, then, the parts of the archaeological record which can contribute the most information at present, and which thus must be considered highly significant, are low-density, redundant distributions. These are the materials that are sparse, simple, and common.

THE SEEDSKADEE PROJECT SURVEY DESIGN

Given that the archaeological record assumes the form described above, the behavioral level entities which are the actual end point of archaeological and cultural resource studies must be measured at a nonsite level. The Seedskadee survey was designed as an experiment in systematic survey methodology toward this end.

Two propositions were kept in mind in designing the survey: that units of analysis (which here include units of discovery as well) structure not only what is written about after the survey is over but indeed what is found during fieldwork (Binford and Sabloff 1982); and that very little is known about what the archaeological record means or about what it looks like. Consequently, the units of analysis employed during the survey had to be units with little or no meaning already attached. Therefore attributes of artifacts were chosen as the units of mapping and data recording, and artifacts were chosen as the unit of discovery. The survey was designed for maximum data recovery of these units of discovery and analysis.

We recognized that results of the survey would be influenced first by what is found, i.e. strictures about what is recognized as an artifact plus bias inherent in the discovery procedure; secondly, by what is considered to be appropriate to record; and thirdly by how it is recorded - the format of data recording. An attempt was made to control each of these three influences in a self-conscious explicit manner. This was done by planning and executing the survey in three ways that differ from the ways that traditional surveys are usually conducted.

Despite the profuse lip service paid to the importance of preparing research designs before going into the field, it is clear from many CRM survey reports that the planning phase of surveys is usually given short shrift. The reason for this lies partly in the straight-jacket structure of RFP's, which specify results and often also the means of arriving at them; and with the firmly entrenched methodology of CRM archaeological survey, based as it is on the belief that fieldwork is 95% of archaeology and that the data are self-evident. In contrast a proportionately large amount of preparation time was spent on this survey, mainly in defining the survey goals and the means we were going to use to achieve those goals. Secondly, tasks usually handled by one traditional survey crew were divided up so that three crews, each with an internally consistent and redundant job to do, were responsible for accomplishing a sector of the survey goals. Thirdly, it was necessary to maintain a flexible attitude about trying new methods and changing methods in the field when they didn't yield the results we wanted.

Initially, a random sampling design was employed to choose a number of 500 x 500 meter sample units in the Seedskadee Project Area (Ebert 1983). The sample was not stratified by environmental zones, although geomorphological and vegetation data from aerial photographs and Landsat space imagery were examined earlier to assess the feasibility of stratification (Wandsnider and Ebert 1983).

The environmental zonation thus derived is thought to better represent zones of differential surface geomorphological processes than past natural conditions, and will be employed in later stages of the analysis of the Seedskadee data in an attempt to "factor out" the affects of these processes on the behaviorally-formed archaeological record. Sample units were prioritized by the order in which they were chosen so as to maintain the randomness of the sample, since little information was available prior to the fieldwork about the time frame necessary for doing this kind of survey. Twenty-five of the units were completed. Emphasis throughout the survey was on the quality of information recorded within the units rather than on using the units as a basis for extrapolating to hugh surrounding areas. The spatial analysis of data from these units will not assume that this data base is a "sample," but will instead concentrate on internal patterning and be directed toward interpreting the systemic components of the composite, overlayered archaeological record.

THE FIELD METHODOLOGY IN ACTION

Responsibility for data recovery was delegated to three separate crews, a discovery crew, a mapping crew and a data recording crew. The success of the survey depended to a large extent on crew cooperation, but there was little overlap in crew tasks (Ebert 1983, Ingbar, Larralde and Wandsnider 1983). The fact that each crew was able to carry out their respective activities apart from the other crews contributed greatly to the information yield of this project, a subject that we will discuss later in this paper.

The five members of the discovery crew were responsible for finding artifacts and for maintaining even ground coverage. To insure that they did this in a controlled, systematic way, sample units were located and laid out prior to the discovery phase. The corners of the units were staked and flagged, and the opposite ends of the unit in the direction that it would be walked were pin-flagged at 25 meter intervals. This assured that even if one sweep went awry, it could be immediately corrected without affecting the accuracy of the remainder of the sweeps to be done, because the exact end point of each sweep was set in advance. Since the discovery crew surveyed at 5 meter intervals, this level of sweep precision was essential; a Brunton compass is not precise enough to guide sweeps under these specifications.

The discovery crew was equipped with tally counters and orange pin flags. They flagged artifacts as encountered and kept track of artifact totals per sweep with the counters. Sweep position was maintained by each person for the duration of the survey. At the end of a sweep, the crew chief recorded the number of artifacts found by every crew member during the sweep. Also recorded on a sweep-by-sweep basis were beginning and ending times and weather conditions, as well as other conditions that had an impact on the crew, the most severe of which was probably density of insects. The crew was directed not to go back to areas they had already covered during a sweep. Although it is probably impossible to control for all of the real-time contingencies of field survey, we feel that this methodology approximates an unbiased discovery scheme far better than most previously-applied designs.

The mapping crew was responsible for provenience control of artifacts, all of which were mapped except under very high density conditions when one meter grids became the provenience unit. The crew consisted of a crew chief who operated the electronic distance meter and a rod person who walked from flagged artifact to artifact with a prism and relayed artifact numbers back to the crew chief via radio.

The data recording crew consisted of a core of three individuals who numbered pin flags in cooperation with the mapping crew and recorded artifact attribute data using artifact code sheets and fortran computer coding forms. Data was recorded in a format designed for easy computer input after the fieldwork phase of the project was completed, a necessity due to the enormous database generated.

When additional artifacts were found, they were flagged with red pin flags. The structure of these red-flagged distributions approximates the results of traditional "site" survey. These data are not internally comparable nor are they comparable to orange-flagged distributions in intensity of ground coverage. As a rule, artifact concentrations received more attention than interlying areas, as is the case with traditional survey methods. Red-flagged areas often doubled or tripled the number of artifacts recorded in a sample unit.

The end product of these procedures is a data base with maximum flexibility for looking for patterns among attributes in space. This consists of some 170,000 attributes, predominately locational data and lithics descriptors. It is presently being entered into the University of New Mexico computer system. A series of pattern-finding mechanisms will be used to find redundancy in the data - that is, to find groups of attributes that consistently co-occur. It is also anticipated that digital filtering and power-spectrum or Fourier analyses will be utilized to "sort out"

overlapping activity patterning in the data. Such approaches are impossible without point-provenienced data for artifacts over relatively large, contiguous areas such as those dealt with in this project.

INITIAL SURVEY RESULTS

In this post-fieldwork phase of the project the effectiveness of our survey methodology can be evaluated. Although exhaustive data analysis remains to be done, impressions distilled from the prehistoric data base can be summarized:

1. There are prehistoric artifacts everywhere, i.e. in all environmental zones, in differing (but usually unexpectedly high) densities and in many different kinds of distributions that appear to vary by both spatial configuration and content. It seems that the kinds of distributions encountered at Seedskadee would confound the usual methods of doing predictive modeling (i.e. defining environmental parameters for site location) because the data base is gradational.

2. The harder one looks, the more one finds. Although this is a simple observation, its repercussions for management of archaeological resources are profound, since RFP's generally emphasize acreage surveyed per dollar spent rather than cultural resources located. It is our impression that the perception archaeologists have of the archaeological record is a direct function of the context of discovery: survey interval, time spent on sweeps or on flagging concentrations or on recording contents of grid squares, external and internal crew conditions. Thus our data, although certainly more complete than most, must be viewed as a sample of artifacts from a constantly changing unknown universe.

We also observe that "surface" and "subsurface" are relative dynamic terms. This point is easily illustrated in areas like dunes where the act of discovery, mapping and data recording changes the surface archaeology: artifacts are buried and uncovered through scuffling and trampling during the course of survey itself. Non-collecting survey is not necessarily (and perhaps is never) non-destructive of the archaeological record. Although survey such as we undertook at Seedskadee disturbs the location of artifacts, it is likely that a far more important destructive force is alteration of the soil's surface and of vegetation which will affect the rates and nature of local natural processes in the future in the area impacted.

3. You can't make a silk purse out of a sow's ear. Error, variability and sources of bias in methodology and results must be evaluated and explained. Researchers pretend that these do not

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exist at the expense of the reliability of their data and the aptne and utility of their results. To address such problems, two "contr experiments were introduced into the project to help evaluate da reliability. In the first, a sample unit was seeded wi "pseudofacts": nails and washers painted to approximate the color the ground and natural lithic materials occurring in the area. Thes were flagged and recorded by the discovery crew, yieldin information about accuracy of the discovery procedures Approximately 75% of the seeded "pseudofacts" were recovere these results will be discussed at length in a future paper. In second methodological experiment, a single manufactured lithi assemblage was independently coded by the three principal dat recorders. This will provide information as to the consistency o coding procedures and possible data skew due to the idiosyncracie of the coders.

4. A systematically organized, multi-component survey crew allows portions of the crew to complete their tasks at thei own speed and under ideal conditions. The use of three crew (discovery, mapping and analysis) which could essentially work "on their own" in this survey facilitated greatly the yield of actua product (in terms of information) per person-hour worked. In a period of approximately seven ten-person weeks, some 170,000 attributes were recorded for artifacts. This is the information equivalent of more than 3,300 IMACS prehistoric site forms (the site coding form currently being used in Wyoming - see University of Utah 1983). Although the amount of ground "covered" (625ha or 1544.35 acres) during this time may be less than for most traditional, 15-30m transect spacing surface site surveys, the information yield is staggeringly greater. This, we feel, is due not only to the objectives and methodology employed in fieldwork in general, but also to the modular crew organization used.

The information-yield argument is very important, we feel, when considering the cost-effectiveness of any field data collection program. What is to determine the "effectiveness" part of this equation - amount of "ground covered" about which virtually nothing is known, or the amount of useful archaeological data recovered? We feel that the latter criterion is obviously the most important, and must not be given short shrift in determining what survey methods and intensities should be employed. We are obliged as archaeological scientists to get something of value from even a very small amount of land rather than getting little if anything from "100%" of an area to be impacted in the future.

5. Although data are not yet computerized for extensive spatial manipulation, our impression is that we are finding far more sites" (using definitions of "site" applied in other surveys having taken place in the last few years in the immediate project area) than are found during traditional surveys. This is true even if allowance is made for the intensity of our survey. Our survey was -6 times as intensive as 15-30m transect interval surveys done recently in the area; our impression is that, using others' empirical definitions of what "sites" are constituted by, we are probably finding from 10 to more than 50 times as many "sites" as they did. This means that linear or sinusoidal intensity-to-yield models of surface survey results such as that presented by Judge (1981) are either unwarranted, or that we did not reach the hypothetical "falloff" point even at a 5m transect interval. Are even smaller transect intervals necessary in certain situations?

6. Field observation during the course of the Seedskadee summer 1983 field season revealed that the scale of patterning of the natural processes which affect the visibility, preservation and integrity of the archaeological record are of a very local nature. These processes are controlled by local topography and other small-scale factors, and are thus often of an even smaller scale than might be assumed to fall within the boundaries of culturally-caused clusters of artifacts. As discussed above, it is important to "factor out" the effects of natural depositional and post-depositional processes before one can decide what cultural patterning looks like. This means that extremely localized, small-scale geomorphological mapping and process measurements over time may be absolutely necessary before any "predictive model" of artifact or site distributions can be arrived at. The implications for contemporary regional-scale predictive modeling are quite clear: that simplistic, gross "environmental" zones are inappropriate and insufficient for describing the distribution of the archaeological record.

SUMMARY AND CONCLUSIONS

Predictive modeling as it is employed by archaeologists today seeks to make accurate statements about the nature of the archaeological record throughout a large area. That is, it attempts to maximize the amount of information about the archaeology of a specific region. However, as we have detailed, the formation processes responsible for the archaeology potentially visible to us is structurally inconsistent with a site-oriented record as produced by most contemporary archaeological surface surveys. Because of conceptual and complementary methodological biases, the full information content of the archaeological record has not yet been broached.

Through distributional archaeology, a methodological approach we feel is consistent with the structure of surface archaeology, we argue that both quality and quantity of information about the past is maximized.

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