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Analysis of prehistoric land use patterns in the Tongue River Valley, north of Decker, Montana

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AN ANALYSIS OF PREHISTORIC LAND USE PATTERNS IN THE TONGUE RIVER VALLEY, NORTH OF DECKER, MONTANA

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Beginning in the early 1970's and continuing into the mid-1980's, cultural resource (CR) inventories were conducted north of Decker, MT in compliance with Section 106 of the National Historic Preservation Act. Surveys evaluated the adverse affects of coal mining in the area, and have created an extensive data base of archaeological sites. This research is a synthetic analysis of prehistoric site patterning over an 82 km² region of southeast Montana, using a Geographic Information System (GIS) and data base compiled from the CR inventory reports. The research was accomplished in two steps involving both 'manual' and 'automated' data capture.

In step one, I compiled archaeological site and environmental data from the inventory reports, site forms, and environmental impact statements prepared for the study area. Documents were acquired from the State Historic Preservation Office, located in Helena, MT, the University of Montana's Archaeological Records Office, and Historical Research Associates of Missoula, MT. Archaeological site locations were plotted on 7.5' topographic quadrangles. As each site was plotted, artifacts and features recorded at the locations were entered on a data form used to classify site types.

Step two involved 'automated' data capture and merging of site locations with environmental values using the GIS constructed for the analysis. Site locations were digitized from the base maps and associated with the values of slope, aspect, and distance to nearest water. Environmental values for each location were extracted from land surface images created using the GIS program IDRISI. Distributions of archaeological sites and site types were then analyzed with the SPSS statistical program. The analysis was designed to investigate the environmental characteristics preferred by prehistoric peoples.

Cultural resource surveys are usually conducted with preconceived ideas of where archaeological sites will be found. Using variables such as slope, aspect and distance to water, specific areas are classified as having either a high or low probability of containing archaeological sites. As a result, north of Decker, MT., the same areas had to be surveyed more than once. Examination of site distribution on a regional scale using a GIS demonstrates a mistaken faith in long standing beliefs about archaeological site patterning.

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CHAPTER ONE

INTRODUCTION

This research will synthesize archaeological data recorded during cultural resource surveys conducted in southeastern Montana. By using a Geographic Information System (GIS) to gather and sort data compiled from nine inventory reports, this research analyzes archaeological site distributions over a large region (82 km^2).

Southeastern Montana lies in the northern portion of the Great Plains physiographic region (Frison 1978). The study area, located northwest of Decker, Montana, includes large portions of Townships 8 and 9 South, Ranges 39, 40, and 41 East. Boundaries of coal mine permits define the area were the best sample of archaeological sites is recorded. Throughout the 1970's, archaeological surveys were conducted in this area to identify effects of mining the extensive coal deposits in the region.

Several archaeological survey inventory reports completed for the undertakings, include limited attempts at explaining the locations of sites (Gregg 1977a, 1977b, 1977c, 1979; Greiser 1981). However, none synthesize data from all the prehistoric archaeological sites and artifact locations recorded in the Tongue River region. The final data base created for this project, includes 460 archaeological sites and artifact locations distributed over 85 square kilometers. Slope, aspect and distance to water values were derived from U.S.G.S. Digital

Elevation Models for the survey area after site location was plotted. By analyzing the distribution of artifacts over each of the three environmental/geographic variables, I identify preferences involved in prehistoric selection of site location.

SURFACE FEATURES AND DRAINAGES

Two major rivers, the Missouri and Yellowstone, drain this region. The Musselshell River is the only permanent tributary of the Missouri River draining southeastern Montana. Both the Redwater River and Big Dry Creek flow only during the spring and early summer months (Deaver and Deaver 1988). The Big Horn, Tongue, Powder, and Little Missouri rivers are all tributaries of the Yellowstone that flow through southeastern Montana. Because they originate in the more mountainous areas of Wyoming, Montana, and South Dakota, all these streams are permanent and larger than the Missouri River tributaries (Deaver and Deaver 1988).

The Tongue River has its headwaters in northern Wyoming, along the eastern foothills of the Big Horn Mountains. The river flows east, approximately seventy-five miles, before turning north and entering Montana. From the Montana-Wyoming border, its northern course takes the river approximately one hundred twenty-five miles to its confluence with the Yellowstone River. The entire length of the Tongue River is characterized by a sinuous meandering course. Through the study area, the river's floodplain ranges from

0.5 to 1.0 miles in width. Once in Montana, numerous perennial and intermittent streams feed the Tongue River. To the west, Squirrel Creek and Spring Creek (including the North and South Forks) drain the Wolf and Rosebud mountains. East of the river, Deer Creek and several unnamed intermittent tributaries flow out of the Badger Hills.

Study area elevations range from 1030 meters (msl) along the banks of the Tongue River, to 1260 meters (msl) in the ridges to the southwest. More durable sandstone bedrock strata have provided variable relief in the area (Deaver and Deaver 1988). A series of broad, relatively flat ridges, trending northwest to southeast characterize the topography west of the river. Steep, narrow drainages separate the long finger-like ridges. East of the Tongue River relief occurs as narrow ridges with only isolated, irregularly shaped buttes. Drainage patterns in this portion of the study area are more dendritic, less linear than those to the west of the Tongue River.

CLIMATE

This region of the Great Plains is characterized by a dry continental type climate. Northern Great Plains climate results from alternating dominance of three air masses; Pacific, Arctic and Tropical Maritime (Borchert 1950).

During the Winter months the area is dominated by a dry, mild Pacific flow. Containing only limited amounts of precipitation, the Pacific air masses bring fronts and strong winds that drop their moisture in the mountains to the west (e.g., the Rocky and the Big Horn mountains). Occasionally, Arctic air masses intrude into the area, bringing cold, dry air from the north. These cold, dry winds may last for days or even weeks. But they are soon followed by a renewed dominance of the Pacific air masses (Borchert 1950) bringing warm chinook winds from the west.

Most of the precipitation for the study area occurs as rain during the spring and early summer months. At this time, all three air masses influence the weather patterns of the region. The Pacific and Arctic fronts still produce dry winds, but now the Tropical Maritime fronts from the Gulf of Mexico and California bring in moisture laidened air. Southern fronts dominate during spring and early summer months, producing the wettest part of the year (Borchert 1950).

During late summer, the Pacific air mass dominates the region. Tropical Maritime air still intrudes from the south, however because the Pacific air is dominant, the flow is shifted to the west. As a result, the area of the Plains in North and South Dakota receives this moisture, which overall has a greater annual precipitation. In the study area, the fall months see little or no precipitation due to a weakening of the moist Tropical Maritime flow (Borchert 1950).

Although precipitation amounts throughout the Great Plains are highly variable, the entire area is considered semi-arid. Annual rainfall in the mountains west of the Tongue River average 15 to 20 inches per year (BLM

1979, 1986; Borchert 1950). Temperatures in the Tongue River valley, near Decker, Montana range from -45° F to 107° F. The growing season lasts from 100 to 130 days (Gregg 1979). Changing climatic conditions have influenced the pattern of archaeological sites in the region. First, by creating the land surface over which artifacts are distributed. And second, by establishing patterns of vegetation and wildlife habitat, that provided subsistence for local inhabitants.

GEOLOGY

The most important geologic feature of the study area is the Fort Union formation. During the Paleocene (66-57 million years ago), the entire area of southeastern Montana was a series of low-lying basins, swamps, and river deltas, with only small amounts of dry land. A series of stratified sandstones, siltstones, shales, and coal beds laid down at this time characterize the Fort Union formation. Being resistant to erosion, the durable sandstone deposits now form ridges that cap more erosive materials. Temporary aquifers contained by more porous sandstone strata support narrow strips of pine (Deaver and Deaver 1988). Within the study area, the Fort Union formation is approximately 3400 feet thick. Known as the Tongue River Member, the upper 1600 feet of the formation contains the coal beds currently being mined (Gregg 1979).

Substantial tectonic activity began in the late Cretaceous and continued through the Cenozoic Periods (Eocene, Oligocene, and Miocene, 57-10 million years ago). It was during this time that major uplifting took place in the region surrounding the study area. Outwash materials began to enter the area via the river ancestral to the Tongue. The ancestral river and its tributaries shifted their courses repeatedly, forming large deposits of sorted gravels, sands and silts. The Rosebud Mountains and Long Pine Hills are the result of more consolidated materials forming erosion-resistant caps over looser materials (BLM 1979,1986).

The drainage systems we see today began to develop during the Pliocene and Pleistocene. Although they changed course many times, the ancestral Missouri and Yellowstone Rivers were becoming the major drainages for the area of southeastern Montana. Gravel deposits dating to the Pleistocene epoch occur as raised terraces situated between the present river course and the upland slopes (Deaver and Deaver 1988).

Geologic activity has influenced the prehistory of the study area in two significant ways. First, tectonic uplift and substantial erosion of landforms provides the environment in which prehistoric peoples lived (Deaver and Deaver 1988). The resistant strata of the Fort Union formation and consolidated Cenozoic gravels now occur as linear ridges west of the Tongue River and as isolated, terraced buttes to the east. A majority of the archaeological sites associated with hunting, gathering, and general occupation, are found on these elevated areas (Deaver and Deaver 1988; Gregg 1979).

The second, and possibly most significant attribute of the Fort Union formation to the prehistoric peoples of the study area was the supply of workable lithic material. The geologic strata provided several types of useful lithic raw material. Porcellanite is the most common, and widely used form of lithic material (Gregg 1976, 1979). Porcellanite is a metamorphosed siltstone formed when burning subterranean coal seams (Fredlund 1976) heated and fused the overriding strata. The flaking quality of the material depends on the amount of heat generated and the purity of the silt deposits at the time of heating (Deaver and Deaver 1988). A second source of workable material, formed by the same process, was non-volcanic natural glass. Areas being heated to extreme temperatures, for example near vents or fissures, also caused a fussing of sandstone strata (Fredlund 1976).

Although porcellanite and non-volcanic glass were the most common types of stone used in the manufacture of tools, there are various other kinds found in the Fort Union formation. These other materials occur at several sites throughout the study area, but in very low percentages (Fredlund 1977; Gregg 1976, 1979). The most interesting of these materials is known as Tongue River Silicified Sediment (TRSS) (Deaver and Deaver 1988). Generally, TRSS is grey in color and has a grainy texture, with small plant impressions. TRSS has been described in a number of ways, including: a quartzite, a Silicified sandstone, and as arenaceous or sandy chert. It was apparently not a material preferred in making fine tools like drills and projectile points. Artifacts manufactured from TRSS are all large cutting and chopping tools (Deaver and Deaver 1988). Petrified wood occurs as branches and stumps in the lower beds of the Fort

Union formation. This silicified wood is very rare and generally of poor flaking quality. Only limited amounts of tan or brown banded specimens are of good flaking quality (Fredlund 1977; Deaver and Deaver 1988).

Workable material is also found in the Middle and Late Cenozoic Gravel strata (Deaver and Deaver 1988). The mountainous regions all contain deposits of cherts, chalcedonies and quartzites washed down as cobbles and gravels. Gravels of the Wasatch formation, located in Big Horn County, contain a particularly fine grained chert, ranging in color from orange to maroon. Deposited by the ancestral Tongue River, these gravels are from the Big Horn Mountains to the west of the study area (Fredlund 1977; Deaver and Deaver 1988). Distribution and use of lithic materials is important in the region because over 90% of the archaeological sites recorded in this area contain only stone tools, or the waste debitage left from their manufacture.

VEGETATION

Depending on the source consulted, this area of southeastern Montana can be described as either a short grass prairie or a mixed grass prairie (USGS 1979; Deaver and Deaver 1988). This may be true of large areas of the southeast Montana, but it does not give an accurate portrait of the environmental variability in the region. Michael Beckes (1976), conducting archaeological surveys on the Ashland and Fort Howes Districts of the Custer National Forest 100 miles north, used several independent variables to devise a set of nine separate ecological associations. Variables such as slope, exposure, aspect, altitude, soil type and dominant vegetation were used to define the associations (Beckes 1976).

For the purposes of this research, a simple classification of four vegetation zones will be used. The classification system was constructed using data gathered from final and draft environmental impact statements (EIS) (BLM 1978; USGS 1979,1986) prepared for the coal mine permits. The quality of vegetation data is variable in each (EIS). Depending on the method of classification used in the report, the vegetation zones are either portrayed as a complex mosaic with poor provenience (USGS 1979), or a simple pattern of generalized zones with adequate provenience (BLM 1978, 1986). It was found that by applying the generalized classification of riparian, sage brush steppe, grassland, and ponderosa pine savannah to the data, each of the vegetation zones could be plotted on 7.5' topographic quadrangles. These zones represent a consolidation of the data presented in the EIS's (BLM 1978,1986; USGS 1979) and the ecosystems presented by Beckes (1976).

1) The riparian (BLM 1979,1986) or creek-side (USGS 1979) zone includes deciduous trees and an understory of dominant shrubs: snow berry, rose, skunkbush, and chokecherry. The zone occurs on generally flat, subirrigated soils of silty clay loams. This zone also supports a greater diversity of wildlife compared with the other zones (USGS 1979).

2) The grasslands (USGS 1979) or short-grass prairie (BLM 1979,1986)

zone includes several species of sage brush: big, silver, skunkbush. However, these areas are dominated by grass types: blue bunch wheatgrass-junegrass or needle and thread-western wheatgrass, depending on the soil type. The zone occurs on flat to steep slopes of stony to sandy loam, including all aspects.

3) The sage brush steppes (BLM 1979,1986) or shrub (USGS 1979) zone is dominated by shrubs such as skunkbush, silver sage, and big sage. These areas do include an understory of grass species, including; needle and thread, blue gama, threadleaf sedge, and needlegrass. These zones occur on flat to steep south facing slopes of various soil types (USGS 1979). Most of these zones are associated with the northern portion of the study area.

4) The ponderosa pine savannah (USGS 1979, BLM 1979, 1986) zone includes forested areas with various phases of understory vegetation: juniper, shrub or blue bunch wheatgrass. Dominant understory type is determined by the canopy cover (BLM 1986). Occurring on flat to steep north facing slopes, this zone includes various soil types (USGS 1979).

PREHISTORY

The purpose of this study is not to examine temporal change in the distribution of prehistoric sites within the study area. Holding time as a constant, my thesis will examine the preference prehistoric peoples showed for specific locations (i.e., base camp sites, hunting sites, etc.) by analyzing site distribution over three environmental dimensions of the landscapes. For purposes of discussion, a brief background in Plains prehistory will be presented in this section.

Three separate cultural chronologies have been proposed for the Northwest region of the Great Plains. The first, was the chronology presented by archaeologist William Mulloy (1958). Eleven years later, Brian Reeves (1969) attempted to refine Mulloy's classification based on information obtained from sites in Southern Alberta. Using data from archaeologic sites over a larger area than either Mulloy or Reeves, George Frison (1978) presented the final cultural chronology discussed here.

All three of these systems attempt to place formally defined categories within a temporal scale. Mulloy (1958) based his chronology on excavations of Pictograph Cave, located in south-central Montana. Reeves and Frison use sites and components from throughout the northern Plains to classify cultural attributes in an ordered time scale (Foor 1985). The two later attempts at classification follow slightly different approaches. Frison (1978) uses information from numerous stratified sites. Reeves (1969) incorporates data from surface collections or shallowly deposited sites distributed over a large area. Because they include more sites and their components, Frison and Reeves systems are much more detailed attempts at classification. Although Mulloy recognizes variations in horizon styles, his classification remains the one closest to a true temporal classification (Foor 1985).

Mulloy's (1958) classification system includes the Early, Middle and Late

Prehistoric periods. The Early Prehistoric period is characterized by a subsistence system based primarily on big game hunting and the use of large lancelot spear points. Frison (1978) refers to this time as the Paleoindian period and divides it into nine cultural complexes including; Clovis, Goshen, Folsom, Agate Basin, Hellgap, Alberta, Cody, Frederick, and the Lancelot Lateral Flaked Point complexes. Very few Paleoindian sites have been recorded in the study area. However, several Lancelot Lateral Flaked complex sites have been recorded further south, in the headwaters region of the Tongue River (Big Horn Mountains) (Frison 1978; Platt 1992).

A greater reliance on plant resources and a shift from big game to smaller game species marks the beginning of the Middle Prehistoric period (Mulloy 1958). Frison (1978) calls this the Archaic, and subdivides the period into the Early, Middle, and Late. A number of Early Archaic sites, containing "Early Side-Notched" points have been recorded in the study area (Gregg 1976, 1979). In time these ambiguously named points are replaced by the McKean complex (Frison 1978). The Duncan and Hannah variation of McKean points are more prevalent in the study area (Deaver and Deaver 1983). These points are characteristically large, lancelot with bifurcate bases (Platt 1992).

The change to corner-notched variants of lancelot points marks the end of the Middle Prehistoric (Mulloy 1958). Frison (1978) however, places corner-notched points in the Late Archaic period. Included in this group are the Pelican Lake and Besant types. All of the points placed in the Middle Prehistoric Period are associated with the atlatl. The most notable site located in the study area from this period is the Kobold site (24BH406). The earliest occupation at Kobold represents a Late Middle period campsite, which has produced a number of Yonkee points (Frison 1978).

The Late Prehistoric period is thought to demonstrate a shift from generalized subsistence, to a renewed emphasis on hunting bison, using communal drives and jumps (Frison 1978). Late Prehistoric sites are quite common in the study area (Deaver and Deaver 1988). During this period Frison (1978) has documented a continual use of the Kobold site as a bison jump. Late period sites are marked by small side-notched point variations associated with the bow and arrow technology. Point types include Avonlea, Plains Side-Notched and Prairie Side-Notched (Frison 1978).

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

It is often assumed that the term geographic information system (GIS) refers to a single piece of hardware, software or system of analysis. In fact, there are over 100 different geographic information systems operating today, developed by private companies, university departments, and government agencies. Each GIS helps organize, overlay, display, and query a spatial data base. In the simplest terms, Kvamme and Kohler (1988:494), have noted that, "A working GIS consists of a software (computer program), the hardware on which that software operates, and a spatial data base (Kvamme and Kohler

1988:495)." The spatial data base contains any variable continuously distributed over a landscape (ie., elevation, vegetation, temperature, soil type, etc.). Organization of individual variables or coverages (Kvamme 1989: 149) into map layers allows rapid attribute query, and the flexibility to reorganize or combine attribute information (Eastman 1992:24). A complete GIS includes:

> a cartographic display system, to view and compose map layers; a map digitizing system, to perform automated data capture; a data base management system, for organization of data files; a geographic analysis system, which performs map algebra and various data transformations; an image processing system, allowing the importation of remote sensing data such as that from satellites; and a statistical analysis system, which allows the exploration of variable correlations (Eastman 1992:18).

Geographic data describes real-world phenomena in terms of their attributes (eg., color, weight, size) and spatial location in a coordinate system (eg., Longitude, Latitude or Universal Transverse Mercator) (Kvamme 1989:151). Facilitating the use of GIS, geographical data can be represented in graphic form as points, lines, or areas along with a label describing what it is (eg., site number, or an arbitrary identification number). Data is handled in two ways; as rasters or as vectors. Raster or cell-based GIS are organized on a grid of cells, much like a spreadsheet format of columns and rows (Eastman 1992:23). A vector or arc-node GIS (Kvamme 1989:150) organizes map layers as points, lines or polygons (Eastman 1992:22). Selection of a particular type of GIS is based primarily on whether cartographic output is an important consideration in the research. Vector GIS are able to produce high quality pen-plot compositions. In contrast, raster GIS are primarily designed for analysis (Eastman 1992:23), and are not well suited for map production as output (Kvamme 1989:152-153).

This research project is designed to extract environmental/geographic values from map layers, and examine a particular landscape's role in archaeological site patterning. Therefore, a raster GIS was used to handle the data base created from archaeological site forms, inventory reports, and environmental impact statements.

The hardware chosen to support the software used in the study is an IBM compatible personal computer with a 66-MHZ CPU, 500 MB hard drive, 3.5" floppy drive, and 16 MB of RAM. The program selected to import, separate then extract attribute values is a raster GIS software designed by the Graduate School of Geography at Clark University called IDRISI. IDRISI is a raster or grid-based GIS and image processing system that includes a collection of over 100 program modules linked by a common menu system (Eastman 1992:3). Although the IDRISI system includes a digitizing module known as TOSCA, a separate program called ROOTS, developed by Harvard Graphics, was used for automated data entry. Because the program is able to export IDRISI format data files, including documentation files, ROOTS is an excellent choice for use with IDRISI. The identification number, artifact counts and site type information used as the bases for the attribute data were entered in the QUATTRO PRO for

WINDOWS spreadsheet program. As a raster GIS, IDRISI can perform a variety of statistical analysis techniques. However, because of faster response times and better quality chart printout, the SPSS for WINDOWS statistical package was used for analysis and output. The following chapters provide more detail about how the data base was created and the role of each program.

CHAPTER TWO

METHODOLOGY

MANUAL DATA CAPTURE

The geologic strata of the Fort Union formation have played a role in the prehistory of southeast Montana in two important ways. First, the aboriginal population found a ready source of workable lithic material in eroded exposures and outwash gravels. Second, compliance with Section 106 of the National Historic Preservation Act has generated volumes of inventory reports and site forms, recording the archaeology of large coal mining leases.

The first step in compiling the archaeological and environmental data was to contact the State Historic Preservation Office (SHPO), in Helena, Montana. The SHPO provided a list of all inventory reports on file for Township 8 and 9 South, Ranges 38, 39, 40 East. I also obtained a list of all archaeological sites issued a Smithsonian Trinomial Number in those legal locations. A review of the inventory reports produced a list of documents (See Figure 1) that could be used in constructing a data base. One of the most important prerequisites for inclusion of an inventory report was adequate site location information. In cases were location information was not adequate in an inventory report, individual site forms were examined at the University of Montana's Archaeological Records office. Often, sites are revisited during later projects and site forms are updated.

For this research, each site and artifact location had to be directly transferable to a 7.5' topographic base map. Each location had to have either a photocopied portion of the topographic quadrangle with the site location labeled clearly, or Universal Transverse Mercator (UTM) reference coordinates. The presence of specific artifacts and features recorded on the site forms, were transferred to a spreadsheet data form (See Appendix A). As information was entered on the data table, sites and artifacts were plotted on one of the two base maps (Pearl School and Decker, Mt). The data base includes all of the archaeological remains recorded in the survey areas. Numerical identifiers are either Smithsonian Trinomial site numbers, or an arbitrary sequential number for 'isolates' and 'minimum activity loci'.

List of Survey Reports used in the Study:

Data Recovery in the Spring Creek Archaeological District (Taylor 1984)

CX Ranch Project (Grieser 1981)

Decker-Pearson Creek (Gregg 1979)

Spring Creek Mine (Fox 1977)

Decker: East and North Extension (L. Fredlund 1977)

Holmes-Decker (Gregg 1977)

CX Decker (Gregg 1977)

Original Decker (D. Fredlund 1972)

Shell-Pearl (Gregg 1977)

Figure 1

After completing the data form and plotting artifact locations, a simple classification of site types was constructed. The classification system was based on information compiled from several of the inventory reports (Gregg 1977a, 1977b, 1977c, 1979; Deaver and Deaver 1988). Archaeological sites and artifact locations are classified into one of six types, based on all of the artifacts (debitage, tools, etc.) and features (tipi rings, hearths, ect.) present at the location;

1) Base camps are characterized by a relatively large number and variety of tool types, sometimes large quantities of late-stage reduction debris or possibly tipi rings and hearths associated with lesser quantities of debitage. It is assumed that base camps represent an area frequented repeatedly, used for long periods (Gregg 1977a, 1977b, 1977c; Deaver and Deaver 1988). The name also implies a location from which surrounding resources could be exploited efficiently.

2) Chipping stations or lookouts (Gregg 1977a, 1977b, 1977c; Fredlund 1977; Deaver and Deaver 1988) include isolated scatters of lithic debitage, usually late-stage reduction with limited quantity (<50 flakes). These sites are generally associated with prominent locations, affording a wide view of an area (Gregg 1977a, 1977b, 1977c; Deaver and Deaver 1988).

3) Hunting sites is a type I use to incorporate numerous 'minimal activity loci' recorded, but not given a Smithsonian Trinomial Number. These sites include isolated projectile points, alone, or in association limited amounts of late-

stage reduction material (<50 flakes). These locations can also contain scraping tools (end-scraper, side-scraper, or modified flake).

4) Other activity sites is a second type I created, that allows the inclusion of the remaining 'minimal activity loci', in this analysis. These sites include isolated scraping tools, also possibly associated with limited amounts of late-stage reduction debitage (<50 flakes).

5) Lithic workshop sites are characterized by scatters of primary and secondary debitage and possibly biface blanks and cores (Gregg 1977a, 1977b, 1977c; Fredlund 1977; Greiser 1981). The sites differ from quarry sites in that there is no apparent source of lithic material in the vicinity.

6) Quarry sites are areas of lithic procurement (Gregg 1977a, 1977b, 1977c; Fredlund 1977; Deaver and Deaver 1988). These sites are associated with source outcrops of lithic material, usually porcellanite, and can include dense concentrations of primary and secondary debitage. At some quarry sites, biface blanks of various stages and cores may also be present (Gregg 1977a, 1977b, 1977c; Fredlund 1977; Greiser 1981).

Site types and numbers of artifacts present at each location were entered on a data form (See Appendix A). Once the site type for each location was determined, base maps were prepared. Each base map includes the site location and numeric identifier. The data form containing the numeric identifier and site type was then ready to be combined with a digitized file of site locations (See Appendix B, columns A-E).

Archaeological sites and artifact locations were plotted as points, representing 30 X 30 meter areas. This grid is the standard pixel resolution used by the IDRISI program (Eastman 1992:30). A majority (80%) of the locations are recorded on site forms as points. The remaining (20%) of the sites, represented by polygons, were also plotted as points. The centers of the polygons were chosen to represent the site area. This process maintained consistency in the data, aiding in the extraction of a single attribute value for each location and the eventual construction of the SPSS data file. Classification of artifact location resulted in the following distribution of types;

SITE TYPE FREQUENCY AND PROPORTION OF SAMPLE

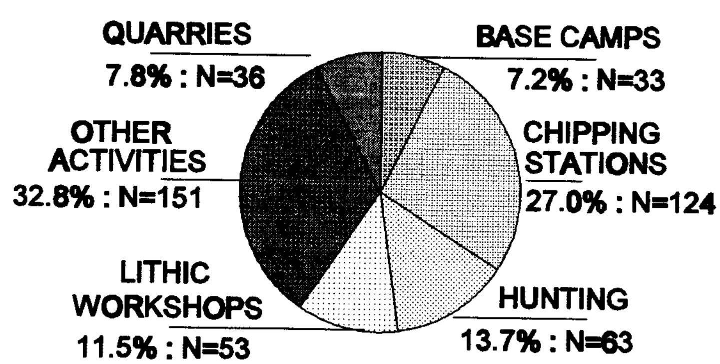

FIGURE 2

Wildlife ranges and vegetation zone information were obtained from environmental impact statements prepared for coal mine permits (BLM 1978, 1986; USGS 1979). Deer and antelope ranges were directly transferable to the 7.5' topographic quadrangle base maps. The information plotted includes both summer and winter ranges, and also travel routes between major use areas. Vegetation zones had to be simplified because of problems plotting the areas of specific species contained in the impact statements. Plotting the information involved classifying areas into four vegetation types (See Chapter 1, Vegetation). After compiling all of this data on the base maps, the next phase of the research involved importing the data into the GIS.

Originally I intended to include archaeological survey data from both the west and east sides of Tongue River reservoir. However, after plotting all of the sites recorded on both sides of the reservoir, I decided that the intensity of survey and the percentage of area surveyed, did not give an adequate indication of the artifacts and sites present on the east side (Gregg 1977c; Fredlund 1977). Areas to the west were not only surveyed more intensively, but also had the benefit of being surveyed more than once. As a result, many sites were relocated several times and site forms updated. In addition, previously unrecorded sites and artifacts were located and recorded during each survey. The study area, represents a composite map of all the areas surveyed. Considering all of the time spent on the west side surveys, the inventories provide an excellent sample of the prehistoric cultural resources in the area.

Two topics that will not be addressed in this project are chronology, and the specific number of artifacts at each location. Dating sites or artifacts found in the region is based on projectile point style. Descriptions of projectile points however, are highly variable between reports and often none existent. Debitage counts or estimations are the most ambiguous data in archaeological site forms. Numbers of flakes are most often recorded as rough estimates, using terms such as 'lots', 'many', 'hundreds', or 'thousands'. An attempt was made to quantify debitage data and entries were made on the data form (See Appendix B, columns B, C, and D). However, the data are extremely poor, and a presence or absence classification had to be used. I found it ironic that the best quantitative data is associated with isolated finds, or 'minimum activity loci', evidence that is generally thought to have little analytical value.

AUTOMATED DATA CAPTURE

Surface geography for the area was obtained from the United States Geologic Survey as digital elevation models (DEMs). In the case of 7.5' topographic quadrangles at 1:24,000 scale, DEMs are image files with elevation data stored as the center of a 30-meter grid cell. Topographic maps and DEM image files are both referenced on the Universal Transverse Mercator (UTM) coordinate system. DEM files corresponding to the Pearl School and Decker, MT topographic quadrangles were copied on to a 3.5" floppy disk, then imported into the IDRISI GIS using a module called DEMIDRIS (Eastman 1992b: 53-54). To format the elevation data for use in IDRISI, a second module VAR2FIX (Eastman 1992b: 193) was used to create a 1024 byte, fixed length file, and the documentation file required by IDRISI modules. A third module, CONCAT (Eastman 1992b: 30-31) created a single image by merging both the Pearl School and Decker, MT DEMs (See Appendix C).

As mentioned earlier, ROOTS was selected as the digitizing program for this project. To avoid confusion during the digitizing process, two sets of base maps were made. The first set of base maps contains all of the archaeological site and artifact locations and the survey coverage boundaries. The second set of base maps, contains both wildlife ranges and vegetation zones. The information from the base maps was digitized with ROOTS as either points, lines or polygons. For example, sites were entered as points, including their numeric identifier; drainages were entered as lines; and vegetation and wildlife ranges were entered as polygons or areas. Registration was maintained by using the same UTM reference coordinates for three corners on the topographic maps. After all of the information was digitized, each file was exported from ROOTS as an IDRISI vector file. In essence, this process created separated 'map layers' for each of the geographic definition features: archaeological sites, hydrology, and vegetation zones (See Appendix C).

As vector files in IDRISI, the 'map layers' can only be displayed as an overlay on an image or printed out in crude map form. Any analysis or derivative mapping requires that each of the vector files be converted into an IDRISI image file (raster form). As with the DEMs, this process involves several steps. Depending on the form of the data (points, lines, or polygons), the base map files were converted using one of three IDRISI modules designed for this purpose. POINTRAS (Eastman 1992b: 145-146) is a vector-to-raster conversion module that handles point vector information. Similar modules LINERAS (Eastman 1992b: 100-101) and POLYRAS (Eastman 1992b: 147-148) are conversion modules that process line and polygon information respectively. This conversion procedure was used on each of the vector feature definition files. A single image covering both topographic maps (Pearl School and Decker, MT) was then created for each of the feature definition or 'map layers' (ie., sites, hydrology, vegetation, etc.) using the module CONCAT (Eastman 1992b: 30-31) (See Appendix C).

Various IDRISI modules were then used to create derivative value maps using the definition images. For example, using the elevation image, SURFACE (Eastman 1992b: 181-182) created image representing both slope (in degrees) and aspect (azimuth) values for each of the 30-meter grid cells. The DISTANCE module (Eastman 1992b: 59) was used to create a number of images based on the various geographic feature definition files (ie., hydrology, vegetation zones, etc.). Using the hydrology image as the geographic definition variable, an image was created with the distance to nearest water (in meters) contained in each of the 30-meter grid cells. This process was then undertaken for each of the vegetation zones and both deer and antelope ranges (See Appendix C). The next step was to extract the values contained in the images for site and artifact locations and the survey area for statistical analysis.

Extraction of values for individual environmental/geographic variables was accomplished with two IDRISI modules (See Figure 3). First, using the image representing site and artifact locations as a mask or filter, values for the individual points were entered into a file via the EXTRACT module (Eastman 1992b: 76-77). These files are in a two-column format. Where the first column contains the point identification number, and the second column contains the value of the particular variable. A second set of values files were created using the entire survey area as a mask. In this process, the QUERY module (Eastman 1992b: 157) extracts a single column of data representing the value of the environmental/geographic variable for every 30-meter grid cell within the surveyed area. Both file formats were then exported directly into the SPSS statistical program (See Appendix C).

The file serving as the foundation for the SPSS data base was entered in the spreadsheet program Quattro Pro. The file contains the basic information for each site and artifact location; identification number, number of flakes, number of scraping tools, number of projectile points and the site type. This file was initially exported into IDRISI for the purpose of creating images of site and artifact distributions, however it was found that output was crude and difficult to interpret. Instead, the decision was made to transfer all data to the SPSS program. SPSS offers a wider range of statistical techniques and produces high quality output, much easier to interpret.

Two SPSS files were created to facilitate analysis of the archaeological

ILLUSTRATION OF VALUE EXTRACTION USING IDRISI MODULES

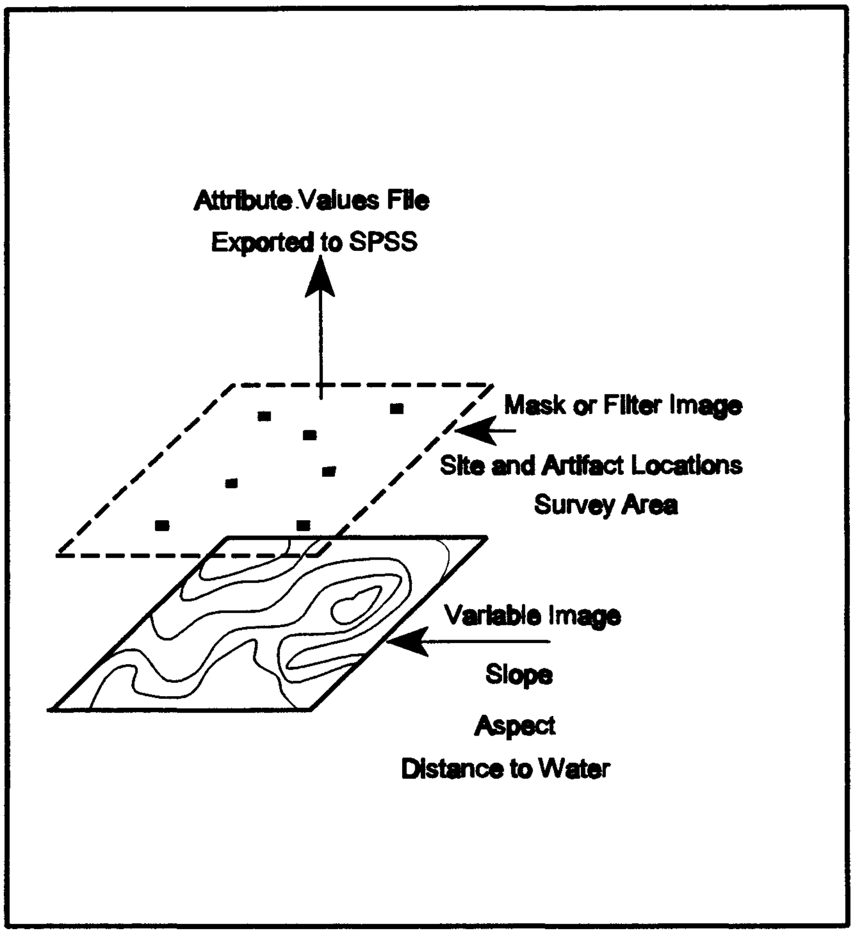

FIGURE 3

data. All of the environmental/geographic variable values associated with site locations were merged into a single file. As each of the two column attribute values files were imported into SPSS format, they were merged with the base file described above. Once the numeric identifier was double-check against the first column of the base file, it was deleted. The resulting SPSS data file contains the values for the 3 environmental/geographic variables associated with 460 archaeological site and artifact locations (See Appendix B, columns F, G, and H). The second SPSS file contains all of the attribute values for every 30-meter grid cell in the surveyed area. The column of values for each variable was merged into a single file. This file was not printed because of its enormous size (95,049 data points). In order to understand the patterns of prehistoric land used, this file will be used to compare the distribution of values for each site and artifact location against the distribution of values for the entire survey area.

CHAPTER THREE

ANALYSIS

Archaeologist believe that prehistoric peoples considered factors such as surface slope, distance to water and aspect before choosing a location for their activities (Deaver and Deaver 1988). In order to test this hypothesis, I first calculated a frequency distribution for each variable based on the 30 X 30 meter DEM grid for the study area. Next, I calculated corresponding frequency distributions using site values for each variable. If the variables influenced prehistoric people's decisions, then I would expect the site distributions to be independent of the study area-wide distributions. For example, we might find that while most sites are near water, only a small percent of the study area is judged to be near water. In this case, I would suspect that prehistoric people preferred to position their activities near water. Conversely, I could conclude that they apparently did not distribute their activities randomly across the landscape. The existence of any relationship between site location and the variables being examined (ie., slope and distance to water) can be identified with a simple chi-square test. In the case of site aspect or orientation a similar test which allows for the periodic nature of this variable is used.

CHI-SQUARE ANALYSIS

The chi-square test of 'goodness of fit' (Spatz and Johnston 1989:236-

237), offers a conservative approach to identifying relationships between variables (Bernard 1988:383). Before testing for specific patterns or preferences in the archaeological record, I will test the basic hypothesis that archaeological sites are not randomly distributed over the environmental/ geographic landscape. The null hypothesis used here is stated as:

> H(o) = Archaeological sites and artifact locations are distributed randomly over any given environmental/ geographic landscape, with respect to slope, aspect, and distance to water.

Acceptance or rejection of the null hypothesis (Bernard 1988:382-383; Shennan 1988:76-77) is based on a chi-square test of goodness of fit between observed and expected frequencies of archaeological sites. Printouts of summary statistics for site types provided frequency and cumulative percent information (See Appendix D).

The variables (slope, aspect, and distance to water) were divided into interval classes. Slope values for all archaeological sites, measured in degrees, range from 0.00° to 87.23°. Slope values were divided into eight classes, with an interval width of 2.99° (See Figure 4). The first class includes flat areas. The final class includes all values over 20.99°. Distance to water values range from 0.00 to 767.40 meters (See Figure 5). Because of IDRISI's pixel resolution (30 X 30 meter), distance values were divided into eighteen classes, using an interval of 29.99 meters. The final class includes all areas over 510.00 meters from water. Aspect values for all archaeological sites, computed as azimuths by

SLOPE (DEGREES) EXPECTED / OBSERVED FREQUENCIES

SLOP_INT	% AREA	All (EX)OB	BC (EX)OB	CS (EX)OB	O (EX)OB	H (EX)OB	LW (EX)OB	Q (EX)OB
0.00-2.99	28	(128.8)98	(9.24)7	(34.72)32	(42.28)33	(17.64)14	(14.84)9	(10.08)3
3.00-5.99	33.3	(153.18)132	(10.99)12	(41.29)39	(50.28)44	(20.98)16	(17.65)16	(11.99)5
6.00-8.99	19.6	(90.16)128	(6.47)7	(24.3)32	(29.6)43	(12.35)17	(10.39)16	(7.06)14
9.00-11.99	9.3	(42.78)61	(3.07)6	(11.53)13	(14.04)21	(5.86)8	(4.93)6	(3.35)7
12.00-14.99	4.8	(22.08)24	(1.58)0	(5.95)6	(7.25)5	(3.02)5	(2.54)3	(1.73)5
15.00-17.99	2.6	(11.96)9	(0.86)0	(3.22)2	(3.93)4	(1.64)0	(1.38)1	(0.94)2
18.00-20.99	1.1	(5.06)0	(0.36)0	(1.36)0	(1.66)0	(0.69)0	(0.58)0	(0.4)0
OVER 21.00	1.3	(5.98)7	(0.43)1	(1.61)0	(1.96)1	(0.82)3	(0.69)2	(0.47)0

FIGURE 4

DISTANCE TO WATER EXPECTED / OBSERVERED FREQUENCIES

DIST_INT	% AREA	ALL(EX)OB	BC(EX)OB	CS(EX)OB	O(EX)OB	H(EX)OB	LW(EX)OB	Q(EX)OB
0.00-29.99	11.9	(54.74)28	(3.93)0	(14.76)14	(17.97)7	(7.5)6	(6.31)1	(4.28)0
30.00-59.99	8.9	(40.94)40	(2.94)2	(11.04)11	(13.44)14	(5.61)8	(4.72)4	(3.2)1
60.00-89.99	10.5	(48.3)61	(3.47)5	(13.02)15	(15.86)19	(6.62)8	(5.57)7	(3.78)7
90.00-119.99	8	(36.8)38	(2.64)4	(9.92)10	(12.08)12	(5.04)6	(4.24)3	(2.88)3
120.00-149.99	9.8	(45.08)62	(3.23)5	(12.15)20	(14.8)19	(6.17)4	(5.19)6	(3.53)6
150.00-179.99	7.1	(32.66)31	(2.34)1	(8.8)10	(10.72)8	(4.47)5	(3.76)5	(2.56)2
180.00-209.99	6.3	(28.98)28	(2.08)3	(7.81)6	(9.51)10	(3.97)1	(3.34)3	(2.27)5
210.00-239.99	6.8	(31.28)31	(2.24)1	(8.43)9	(10.27)11	(4.28)5	(3.6)2	(2.45)3
240.00-269.99	6.1	(28.06)31	(2.01)2	(7.56)5	(9.21)12	(3.84)8	(3.23)2	(2.2)2
270.00-299.99	5.2	(23.92)34	(1.72)4	(6.45)6	(7.85)12	(3.28)4	(2.76)5	(1.87)3
300.00-329.99	3.8	(17.48)18	(1.25)1	(4.71)4	(5.74)9	(2.39)0	(2.01)4	(1.37)0
330.00-359.99	3.2	(14.72)13	(1.06)3	(3.97)2	(4.83)5	(2.02)1	(1.7)1	(1.15)1
360.00-389.99	3.3	(15.18)12	(1.09)0	(4.09)3	(4.98)3	(2.08)3	(1.75)2	(1.19)1
390.00-419.99	2.3	(10.58)8	(0.76)0	(2.85)2	(3.47)1	(1.45)0	(1.22)4	(0.83)1
420.00-449.99	1.9	(8.74)13	(0.63)2	(2.36)2	(2.87)5	(1.2)2	(1.01)2	(0.68)0
450.00-479.99	1.3	(5.98)5	(0.43)0	(1.61)2	(1.96)2	(0.82)0	(0.69)0	(0.47)1
480.00-509.99	1.1	(5.06)2	(0.36)0	(1.36)0	(1.66)2	(0.69)0	(0.58)0	(0.4)0
OVER510.00	2.5	(11.50)5	(0.83)0	(3.10)3	(3.78)0	(1.58)2	(1.33)0	(0.9)0

FIGURE 5

IDRISI, range from -1.00 to 359.99°. Values of -1.00 are given to areas with a slope of 0.00°, and are considered to encompass all aspects. During analysis, each location's aspect value was considered a separate class (See Appendix D).

The goal was to see if differences between observed and expected frequencies were too great to be due to mere sampling vagaries. Once the class intervals were set, a series of chi-square tests were conducted for each slope and distance to water variables. Goodness of fit was evaluated for all archaeological sites and for each of the six site types (base camps, chipping stations, other activity, hunting, lithic workshops, and quarries). The chi-square formula used was:

$$X^2 = \sum (E-O)^2/E$$

Where (E) equals the expected frequency of sites in each interval and (O) equals the observed frequency of sites in each interval (Bernard 1988: 384; Shennan 1988: 67; Spatz and Johnston 1989: 236).

The expected frequency of sites for each of the variable classes was calculated by multiplying the proportion of total area represented by each class, by the total number of sites in each type (See Figures 4 and 5). One of the advantages of GIS is the ability to analyze information over a large area. Using IDRISI, I was able to extract the value of each variable from every 30 X 30 meter area contained in the 85 square kilometer study area. The observed frequencies for each variable class were obtained from distribution summaries created with the SPSS program (See Appendix D). The values used in the chi-square tests can be found in Appendix B, columns F and H.

The critical value of chi-square for the analysis was set at a (0.05) level of significance, the customary level used in the social sciences (Bernard 1988: 386). This means that in comparing the chi-square values, this study will accept as significant any relationship not likely to occur by chance more than five times in a hundred (Bernard 1988: 386; Shennan 1988: 68-69). Because this study placed more than the usual single restriction on the expected frequencies for each class, by limiting the interval width (Spatz and Johnston 1989: 248), the degrees of freedom used for each variable does not equal the usual:

$$df = (r-1)(c-1)$$

Where (r) equals the number of rows, and (c) equals the number of columns (Bernard 1988: 384-385; Shennan 1988: 68-69; Spatz and Johnston 1989: 240-241). This study also requires that the mean and standard deviation of expected frequencies equals the mean and standard deviation of the observed frequencies (Spatz and Johnston 1989: 248). As a result, the degrees of freedom used to obtain the critical value of chi-square was calculated as:

$$df = (r-3)$$

Where (r) equals the number of rows, or in this case, the number of classes used for each variable (Spatz and Johnston 1989: 248). Critical values of chi-square were obtained from statistical tables (Bernard 1988: 481-482; Shennan 1988: 336-337; Spatz and Johnston 1989: 309).

At this point in the analysis, chi-square values only show whether the probability of a relationship exists (ie., whether observed versus expected frequencies are noticeably different for each class) (Shennan 1988: 74). Neither the strength of the relationship nor how the variables are related is expressed in the chi-square value (Shennan 1988: 74; Spatz and Johnston 1989: 235-237). If the calculated value of chi-square is larger than the critical value for each of the cases then we can assume that the differences are to great to be related to sampling vagaries and conclude there is a relationship between site locations and the variable being studied (Spatz and Johnston 1989: 234). Examination of the expected versus observed frequencies in each interval, provides a way to interpret the preference for locations in cases were the null hypothesis is rejected.

VECTOR METHOD/RALEIGH TEST

Because aspect is a periodic, rather than linear variable such as slope and distance to water, the standard Chi-square test is not appropriate for analyzing its significance. Both slope and distance to water have an origin (ie., 0). However, aspect, ranging from 0° to 359° has no origin which allows for the division of the circular distribution into a linear frequency curve. Even a small change of a few degrees in the choice of the origin of class intervals will cause considerable differences in the calculated mean and variance (Curray 1958: 117-118). Using a method of analysis which treats each orientation as a vector having both direction and magnitude, allows for the consideration of individual location aspects independent of a class interval origin (Curray 1958: 118).

The north-south and east-west components of each observation vector (ie., aspect of site location) are calculated by multiplying the magnitude (number of observations) by the sine and cosine of the azimuth:

$$\text{N-S component} = \sum n\cos\Theta$$
$$\text{E-W component} = \sum n\sin\Theta$$

$$\tan\theta = \sum n\cos\Theta / \sum n\sin\Theta$$

$$r = \sqrt{[(\sum n\cos\Theta)^2 + (\sum n\sin\Theta)^2]}$$

$$L = (r/\sum n)(100)$$

Where (Θ) = the azimuth of each observation (0°-359°); (θ) =azimuth of the resultant vector; (n) = the number of observations; (r) = the magnitude of the resultant vector; (L) = magnitude of the resultant vector (in percent).

Because the components of each observation are summed in the process, the vector direction (θ) can be interpreted as a measure of the central tendency of the distribution (Curray 1958: 118). In the case of this analysis, the central tendency is interpreted as the preferred orientation of locations for each site type. The vector direction (θ) is comparable to the mean, however, this method of calculation is independent of the reference direction or orientation (Curray 1958: 119).

Vector magnitudes vary from 0 to 100 percent. Random orientations give a vector magnitude of 0 percent, because each of the components cancel each other during summation. A 'perfect' orientation of 100 percent means that all observations lie in the same azimuth group. This technique is a sensitive measure of dispersion and is comparable to standard deviation or variance independent of the choice of origin (Curray 1958: 120-125).

In the late 1800's, the Raleigh test, a method of describing random phases in sound waves was developed and has been adapted for testing the significance of the vector magnitude calculations described above (Curray 1958: 125). The method of calculating significance is:

$$p = e^{(-Ln)(.0001)}$$

Where (p) = the probability of a given vector magnitude being due to chance variations; (L) = the vector magnitude (in percent); and (n) = the number of observations. For evaluating each vector magnitude, a 0.05 level of significance is used.

CORRELATION BETWEEN VARIABLES (PEARSON'S (r) AND (t) TEST)

After completing the chi-square analysis for each of the site types, the SPSS program was used to examine the correlation coefficients between slope, aspect, and distance to water. Correlation coefficients provide a way to express the degree of relationship between to variables (Bernard 1988: 407; Spatz and Johnston 1989: 77). However, before considering the Pearson's (r) values, scatter-plots were generated for each of the variable combinations; slope versus aspect, aspect versus distance to water, and distance to water versus slope.

Examination of the scatter-plots helps to insure that the Pearson's value is an appropriate technique for analyzing variable relationships (Bernard 1988: 408).

Because the scatter-plots do not indicate a non-linear relationship between any of the variables, Pearson's (r) and the coefficient of determination are used to illustrate any relationships between the variables. Correlation coefficients were calculated for all archaeological sites, and for each of the site types. The raw scores contained in columns F, G, and H of Appendix B were entered into the SPSS program and the Pearson's (r) value for each combination calculated using the formula:

$$r = N(\Sigma XY) - (\Sigma X)(\Sigma Y) / \sqrt{[N\Sigma X^2-(\Sigma X)^2][N\Sigma Y^2-(\Sigma Y)^2]}$$

Where N = the number of pairs of X and Y values (Bernard 1988: 403; Shennan 1988: 128; Spatz and Johnston 1989: 78).

The coefficient of determination (r^2) is used to quantify the amount of variance each of the variables has in common (Bernard 1988: 404; Shennan 1988: 147-150; Spatz and Johnston 1989: 83-85). Then, both these values are used to calculate a (t) test score for the three combinations, showing whether the relationship is significant. The (t) test scores were calculated as follows:

$$(t) = (r)\sqrt{N-2 / 1-r^2}$$

Where N= the number of X and Y pairs, and (df) = N - 2 (Spatz and Johnston 1989: 185). Critical values of (t) were obtained for a two-tail test, at a (.05) level of significance (Spatz and Johnston 1989: 308). If the calculated value of (t) is less than the critical value, then that relationship's Pearson's (r) would be expected to occur, by chance alone, more than 5 times in 100 (Spatz and Johnston 1989: 185).

Cross-Tabulation

Cross-tabulation tables were constructed as a means to further examine the significant relationships between variable combinations, demonstrated by (t) test scores for various site types. The cells of each table represent the frequency of specific interval pairs generated by comparing the variables. By comparing the distribution of interval pairs in cross-tabulation form, it is possible to see how the variables are related (Bernard 1988: 422-435; Eastman 1992b: 45). The patterns of interval pair covariance can then be used to infer preferences involved in site selection.

The first step in constructing the cross-tabulation tables involved two IDRISI modules, RECLASS (Eastman 1992: 162-164) and EXTRACT (Eastman 1992b: 76-77). Values for each of the landscape variable images were reclassified to nominal values that represent the interval classes used in the chi-square tests (See Figures 4, 5 and Appendix D). For example, RECLASS was used to change all of the values in the aspect image into nominal values representing 45° intervals (ie., 1 = 0°-44.99°, 2 = 45.00°-89.99°,......9 = 315.00°-359.99°). This process was also done using the distance to water and slope images (See Appendix C). Two column values files were created for each variable using the EXTRACT module and the archaeological sites file as a filter. the first column of each file represents the location's numeric identifier. The second column represents the nominal interval value (ie., 1, 2, 3, etc.). The IDRISI system also has a CROSSTAB module (Eastman 1992b: 45-47) that can produce cross-tabulation tables and statistics. However, because of better presentation of results, the SPSS program was used to generate the tables used in this analysis. The data used to construct the tables are summarized in appendix E.

CHAPTER FOUR

RESULTS AND CONCLUSIONS

To maintain continuity throughout this analysis, the results of the statistical tests are evaluated separately for each variable and variable pair. The results of chi-square and vector method tests summarized first. Expected and observed frequencies for each class are examined to illustrate the nature of the relationship. Then, correlation coefficients and coefficients of determination as well as (t) test and cross-tabulation tables are used to explore the relationships between each of the landscape variable pairs. This approach allows for consideration of any merits or deficiencies on a case by case basis within the data set.

CHI-SQUARE TEST RESULTS

SLOPE (DEGREES)

The null hypothesis for the slope variable is rejected in four of the seven cases considered; all archaeological sites, other activity sites, hunting sites, and quarry sites (See Figure 6).

All archaeological case sites suggest a non-significant distribution relative to slope, because the null hypothesis is rejected. Slopes for all archaeological site ranges from 0.00° to 87.23°. Examination of the observed versus expected frequencies illustrates the nature of selective preference for certain slope

CHI SQUARE TEST RESULTS TABLE

SITE TYPE	df = 5						df = 15		
	LANDSCAPE = SLOPE IN DEGREES			LANDSCAPE = ASPECT (AZIMUTH)			LANDSCAPE = DISTANCE TO WATER		
	Critical X^2	Calc. X^2	Null Hypoth	L (%)	Prob. of Significance	'Preferred' Orientation	Critical X^2	Calc. X^2	Null Hypoth
All Sites	11.07	40.03	**R**	20.0	0.00	**125°**	25.00	36.76	**R**
Base Camps	11.07	6.60	**A**	38.3	0.01	**164°**	25.00	21.51	**A**
Chipping Stations	11.07	4.07	**A**	25.39	0.00	**89°**	25.00	10.06	**A**
Other Activities	11.07	15.16	**R**	22.61	0.00	**163°**	25.00	22.17	**A**
Hunting	11.07	13.90	**R**	38.51	0.00	**130°**	25.00	16.71	**A**
Lithic Workshop	11.07	8.97	**A**	18.98	0.15	**NS**	25.00	22.47	**A**
Quarries	11.07	28.09	**R**	16.53	0.38	**NS**	25.00	18.51	**A**

-Critical X^2 @ (0.05) Level of Significance
-Calculated X^2 = (Expected vs. Observed Frequencies)
-Null Hypothesis.....(R) = Reject Null
.....(A) = Accept Null
-(NS) = Not Significant

FIGURE 6

classes. Site locations show a strong selective preference for mid-range slopes between 6.00° and 14.99°. Slopes below 6.00° are under represented, with only 230 observed versus 281.98 expected. Slopes over 15.00° are similarly under represented, with 16 observed and 23.00 expected. As a whole, archaeological sites are significantly over represented for mid-range slopes, 213 observed versus 155.02 expected. It appears, for the distribution of all archaeological sites, there is a definite preference for slopes greater than 6.00°, but less than 14.99° (See Figure 4).

Classification of sites by type further explains the relationship between land surface slope and specific behavioral activities (ie., site types). To examine the relationship more fully, each of the site types and their goodness of fit chi-square results must be considered. Chi-square results indicate differential preference for slopes, depending on site type.

Slopes at 'other activity' locations range from 0.00° to 21.87°. Sample size for this type is the largest (n=151) (See Figure 6). These sites also suggest preference for mid-range slopes between 6.00° and 11.99°. Slopes below 6.00° are under represented, with 77 observed versus 92.56 expected. Slopes above 12.00° are also under represented, with 10 observed versus 14.8 expected. The narrow interval of slopes between 6.00° and 11.99° is significantly over represented, with 64 observed versus only 43.64 expected (See Figure 4). It appears that prehistoric peoples preferred to conduct general activities, on relatively gentle slopes less than 12.00° but not completely flat.

Hunting site slopes range from 0.00° to 87.23°. The sample size is rather small (n=63), however, the chi-square tests indicate a mild preference for a broad range of slopes (See Figure 6). These locations are also under represented on slopes less than 6.00°, with 30 observed versus 38.44. Over representation of sites on mid-range and steep slopes, 33 observed versus 24.38 expected, seems to display a more general preference of slopes. The data suggest that hunting activities were conducted on any surface over 6.00° in slope. There is apparently only a slight preference for slopes between 6.00° and 8.99°, with 17 sites observed versus 12.35 expected (See Figure 4).

The final site type that shows a significantly different distribution over slope is quarry sites (See Figure 6). Slopes for quarry sites range from 0.00° to 17.68°. The sample size for this type is one of the smallest (n=36), however, the chi-square test indicates a relationship. Examination of observed and expected frequencies demonstrate a preference similar to hunting sites. Slopes below 6.00° are extremely under represented, with only 8 observed and 22.07 expected. While slopes over 6.00° are extremely over represented, with 28 observed versus 13.95 expected. This relationship is possibly explained by the association of eroded outcrops of suitable lithic material with steeper slopes along terrace edges. One of the problems with this relationship stems from having to explain why the slopes are so low (≤18.0°). Possibly, an explanation for this derives from the fact that the outcrop exploited for raw material is not recorded as the archaeological site. Rather, the area of discarded debitage nearby, is most often recorded.

The chi-square tests resulted in the acceptance of the null hypothesis in three cases (See Figure 6). Sample sizes for each type are highly variable; base camps (n=33), chipping station (n=124), and lithic workshops (n=53). Expected versus observed frequencies indicates that the distribution of slope values for these site types do not differ greatly from a random population (See Figure 4). Because no preference is demonstrated, specific frequencies are not discussed.

DISTANCE TO WATER (METERS)

Distance to water with in the survey area ranges from 0.00 to 767.54 meters. Chi-square test results for this variable also illustrate the importance of not relying on the aggregate sample (all archaeological sites) when attempting to describe site locations (See Figure 6). When considered as a group, there appears to be a significant difference between expected and observed frequencies. However, when considered separately, there does not appear to be a significant difference. Examination of observed versus expected frequencies for all archaeological sites helps to illustrate how sites are distributed with respect to drainage patterns.

Distance to the nearest water source for all sites range from 0.00 to 617.43 meters. Observed frequencies are under represented for most of the intervals. However, two intervals have an over representation of sites. The

60.00-149.99 meter interval is over represented with 161 observed versus 130.18 expected. The 240.00-329.99 meter interval is over-represented with 83 observed where 69.46 are expected (See Figure 5). Preference indicated for all sites is most likely weak. If archaeological survey designs considered distance to water source to be a important site location factor, a majority of sites would be recorded. While it is true that site density increases as one approaches a stream, there is no power to this prediction because such a large proportion of the area is relatively close to water. Without examining the relationship for each of the site types, the minor relationship between all site locations and distance to water might be over-emphasized.

RESULTS OF VECTOR METHOD/RALEIGH TEST

ASPECT

The vector analysis and Raleigh test indicate a significant relationship or preferred orientation in five of the seven cases considered; all archaeological sites, base camps, chipping stations, other activity sites and hunting sites (See Figure 6). These results indicate the drawbacks of viewing all archaeological sites as a single behavioral manifestation. By considering all sites as an aggregate, the various preferred orientations of each site type are 'masked'. Examination of each site type using the Raleigh test indicates associations which are contrary to the commonly held belief of a universal southern orientation of all archaeological sites.

As an aggregate, all archaeological sites demonstrate a preferred orientation of 125° (See Figure 6). Because the Raleigh test and vector analysis use a summation of components, this azimuth represents the true overall orientation (Curray 1958: 126) of all archaeological sites. Although this vector does have a slight southern tendency, the orientation is not the definitive 'southern aspect' used to guide archaeological surveys in the area. In fact, the azimuth (125°) more closely approximates the overall trend of the ridges and drainages (130°) throughout the study area.

Base camps and other activity sites have azimuths of 164° and 163° respectively (See Figure 6). Both of these site types do indicate a preference for what could be considered a southern aspect. This relationship lends the most support to the proposition that sites will be found on south facing slopes. The model most often used in the study area holds that archaeological sites will be found on slopes which receive a greater amount of solar radiation (Deaver and Deaver 1988, Fredland 1972, 1977, Gegg 1977a,1977c). The fact that base camps or more permanent habitation areas are located on these slopes seems quite logical. These areas tend to be drier and warmer. However, the apparent preferred location of more temporary activity sites on south facing slopes is more difficult to explain. It is likely that the location of other activity sites on south facing slopes is due to the presence of specific vegetation or other resource on these slopes.

Chipping station sites show a preference for slopes with an aspect of 89°, basically east (See Figure 6). Archaeologists who have worked in the area consider these sites to be 'lookouts' were persons waited for game to pass (Deaver and Deaver 1988, Fredlund 1972, 1977, Gregg 1977a,1977c). This fact seems to supported by the eastern orientation of these sites. East facing slopes do afford an excellent view of the drainages and ridge tops throughout the study area. However, archaeological surveys conducted in the region did not consider this fact (Deaver and Deaver 1988, Fredlund 1972, 1977, Gregg 1977a,1977c).

Hunting sites indicate a preferred orientation of 130° (See Figure 6). As in the case of all archaeological sites, this aspect approximates the orientation of the ridges and drainages of the study area. In both instances, it is likely that the relationship does not show a true preference, but rather a mimicking of the predominant aspect of the region. This relationship is not and indication of site preference.

RESULTS OF CORRELATION BETWEEN VARIABLES

SLOPE VS. ASPECT

Comparison of the slope and aspect values result in low Pearson's (r) scores for each site type. Scores range from (r=0.21) for hunting sites to (r=0.09) for quarry sites. Further examination of this combination using coefficients of determination (r^2) and (t) tests, indicates a significant relationship between the values for all archaeological sites and chipping stations. The relationships between slope and aspect values for all of the remaining cases (ie., base camps, other activity, hunting, lithic workshops, and quarries) are not significant (See Figures 7 and 8).

The (t) tests indicates a significant relationship (t=2.15) between slope and aspect for all archaeological sites (n=460) in general. However, the coefficient of determination (r^2=0.01), reveals that very little variation is shared by the variables. This is a significant but weak relationship, with a very small amount of covariation (1%). A cross-tabulation table was created to examine the relationship more closely (See Figure 9). The highest frequencies of sites occur in cells less than 12.00° (91%) and between the azimuths of 0.00° and 224.99° (83.1%).

The (t) test results also indicate a significant relationship (t=2.04) in the case of chipping station sites (n=124). The coefficient of determination is also very low in this case (r^2=0.03). Slope explains only 3% of the variation in aspect. Again, this is a significant but extremely weak relationship. The cross-tabulation table shows an interesting distribution of interval pairs (See Figure 10). There are almost no sites with all aspects and no sites over 18.00°. Highest site frequencies are below 12.00° (93.6%), with aspects having an eastern component (0.00°-179.99°).

ASPECT VS. DISTANCE TO WATER

Pearson's (r) values range from (r=0.14) for chipping stations, to (r=-0.04) for lithic workshops (See Figure 7). The (t) tests for all site types

SUMMARY OF CORRELATION COEFFICIENTS

Data Set	Pearson's (r)			Coefficient of Determination (r^2)		
	Slope vs. Aspect	Aspect vs. Dist. to Water	Dist. to Water vs. Slope	Slope vs. Aspect	Aspect vs. Dist. to water	Dist. to Water vs. Slope
Survey Area	0.09	0.01	0.04	0.01	0.00	0.00
All Arch Sites	0.10	0.07	0.10	0.01	0.01	0.01
Base Camp Sites	0.13	0.07	0.39	0.02	0.01	0.15
Chipping Station Sites	0.18	0.14	0.02	0.03	0.02	0.00
Other Activity Sites	0.09	0.04	0.05	0.01	0.00	0.00
Hunting Sites	0.21	0.05	0.16	0.04	0.00	0.03
Lithic Workshop Sites	0.20	-0.04	-0.16	0.04	0.00	0.03
Quarry Sites	-0.09	0.13	0.11	0.01	0.02	0.01

FIGURE 7

SUMMARY OF (t) TEST RESULTS

Data Set	Slope vs. Aspect				Aspect vs. Distance to Water				Distance to Water vs. Slope			
	(r^2)	Calc. (t)	Critical (t)	S/NS	(r^2)	Calc. (t)	Critical (t)	S/NS	(r^2)	Calc. (t)	Critical (t)	S/NS
All Arch Sites	0.01	2.15	1.96	**S**	0.01	1.51	1.96	**NS**	0.01	2.16	1.96	**S**
Base Camp Sites	0.02	0.74	2.04	**NS**	0.01	0.39	2.04	**NS**	0.15	2.55	2.04	**S**
Chipping Station Sites	0.03	2.04	1.98	**S**	0.02	1.58	1.98	**NS**	0.00	0.22	1.98	**NS**
Other Activity Sites	0.01	1.11	1.98	**NS**	0.00	0.49	1.98	**NS**	0.00	0.61	1.98	**NS**
Hunting Sites	0.04	1.71	2.00	**NS**	0.00	0.39	2.00	**NS**	0.03	1.29	2.00	**NS**
Lithic Workshop Sites	0.04	1.49	1.68	**NS**	0.00	-0.29	1.68	**NS**	0.03	1.18	1.68	**NS**
Quarry Sites	0.01	-0.53	2.04	**NS**	0.02	0.77	2.04	**NS**	0.01	0.65	2.04	**NS**

S= Significant
NS= Not Significant

FIGURE 8

CROSS TABULATION
ALL ARCHAEOLOGICAL SITES

Column: Slope Interval
Row: Aspect Interval

	0.00- 2.99	3.00- 5.99	6.00- 8.99	9.00- 11.99	12.00- 14.99	15.00- 17.99	OVER 21.00	Row Total
All Aspects	7							7 1.5
0.00- 44.99	24	18	26	12	9	1		90 19.6
45.00- 89.99	4	17	15	7	4	2		49 10.7
90.00- 134.99	19	24	18	5	3			69 15.0
135.00- 179.99	12	23	13	8	1		1	58 12.6
180.00- 224.99	22	29	28	18	6	4	2	109 23.7
225.00- 269.99	1	7	13	2	1	2	3	29 6.3
270.00- 314.99	4	8	7	6			1	26 5.7
315.00- 359.99	5	6	9	3				23 5.0
Column Total	98 21.3	132 28.7	129 28.0	61 13.3	24 5.2	9 2.0	7 1.5	460 100.0

FIGURE 9

CROSS TABULATION
CHIPPING STATION SITES

Column: Slope Interval
Row: Aspect Interval

	0.00-2.99	3.00-5.99	6.00-8.99	9.00-11.99	12.00-14.99	15.00-17.99	Row Total
All Aspect	2						2 1.6
0.00-44.99	8	5	5	5	3		26 21.0
45.00-89.99	3	8	4	1			16 12.9
90.00-134.99	10	6	4	2			22 17.7
135.00-179.99	3	8	3	2	1		17 13.7
180.00-224.99	4	7	5	2	2	1	21 16.9
225.00-269.99		3	1			1	5 4.0
270.00-314.99	1	1	4				6 4.8
315.00-359.99	1	1	6	1			9 7.3
Column Total	32 25.8	39 31.5	32 25.8	13 10.5	6 4.8	2 1.6	124 100.0

FIGURE 10

indicate no significant correlation between an archaeological site location's aspect and distance to nearest water source (See Figure 8). Three cases, other activity, hunting, and lithic workshops have 0.00% covariation. Examination of scatter-plots, also illustrates no relationship between the variables. All of the plots for aspect versus distance to water have no apparent pattern and slightly heteroscedastic distribution along the regression line.

DISTANCE TO WATER VS. SLOPE

Comparing the distance to water and slope variables results in Pearson's (r) values ranging from (r=0.39) for base camp sites, to (r=-0.16) for lithic workshops. Correlation coefficients and coefficients of determination indicate significant relationships in the case of all archaeological sites in general, and base camp sites. All other instances, chipping stations, other activity, hunting, lithic workshop, and quarry sites, show no significant relationship between their distance to nearest water and slope values (See Figures 7 and 8).

The (t) test score of (t=2.16) for all archaeological sites indicates that the relationship between distance to water and slope is significant. However, the coefficient of determination (r^2=0.01) is very small. Although only 1% of the covariation is accounted for by this relationship, the cross-tabulation table of interval pairs (See Figure 11) was created from data in appendix E. Comparison of interval combinations reveals that cells with high frequencies (>10), occur on slopes less than 9.00° that are within 240 meters of water. While, 91.3% of all

CROSS TABULATION
ALL ARCHAEOLOGICAL SITES

Column: Slope Interval
Row: Distance to Water Interval

	0.00- 2.99	3.00- 5.99	6.00- 8.99	9.00- 11.99	12.00- 14.99	15.00- 17.99	OVER 21.00	Row Total
0.00- 29.99	15	5	7	1				28 6.1
30.00- 59.99	9	16	11	4				40 8.7
60.00- 89.99	14	17	19	5	4	1	1	61 13.3
90.00- 119.99	4	14	13	4	1	1	1	38 8.3
120.00- 149.99	10	18	16	8	3	5	2	62 13.5
150.00- 179.99	5	7	11	8				31 6.7
180.00- 209.99	4	11	8	5				28 6.1
210.00- 239.99	7	9	10	2	3			31 6.7
240.00- 269.99	8	6	8	4	3	1	1	31 6.7
270.00- 299.99	5	9	8	6	5	1		34 7.4
300.00- 329.99	3	4	6	2	3			18 3.9
330.00- 359.99	4	2	1	5	1			13 2.8
360.00- 389.99	2	2	4	3			1	12 2.6
390.00- 419.99	1	3	3	1				8 1.7
420.00- 449.99	2	5	2	3			1	13 2.8
450.00- 479.99	2	2			1			5 1.1
480.00- 509.99	1		1					2 0.4
OVER 510.00	2	2	1					5 1.1
Column Total	98 21.3	132 28.7	129 28.0	61 13.3	24 5.2	9 2.0	7 1.5	460 100.0

FIGURE 11

archaeological sites are locations with slopes less than 12.00° that are within 360.00 meters of water.

Base camp sites also have a (t) test score (t=2.55) that indicates a significant relationship between distance to water and slope. The coefficient of determination (r^2=0.15) means that 15% of the covariation is accounted for by the relationship (See Figures 7 and 8). This result is most interesting because it is the largest amount of covariation found in this study. The base camp sample sizes the smallest of all site types (n=33 or 7.2%). Interpretation of the cross-tabulation tables is made difficult by the low frequency of all the interval pairs. Over 70% of all the high frequency combinations occur at locations having slopes less than 9.00° and that are within 210.00 meters of water. There are no base camp sites over 450.00 meters from water. In fact, 97% of base camp sites are found on slopes less than 12.00° that are within 360.00 meters of water (See Figure 12).

CONCLUSIONS

The results of this study show that three of the environmental variables archaeologist have perceived to be primary considerations in describing the location of prehistoric sites, are not powerful predictors for this area of southeastern Montana. By compiling the results of surveys conducted on a regional scale, it is possible to test which variables were important considerations for prehistoric peoples site selection. This study does not

CROSS TABULATION
BASE CAMP SITES

Column: Slope Interval
Row: Distance to Water Interval

	0.00- 2.99	3.00- 5.99	6.00- 8.99	9.00- 11.99	OVER 21.00	Row Total
30.00- 59.99		2				2 6.1
60.00- 89.99	2	1	2			5 15.2
90.00- 119.99	1	2	1			4 12.1
120.00- 149.99	1	1	2	1		5 15.2
150.00- 179.99		1				1 3.0
180.00- 209.99			2	1		3 9.1
210.00- 239.99				1		1 3.0
240.00- 269.99		1		1		2 6.1
270.00- 299.99	2	2				4 12.1
300.00- 329.99		1				1 3.0
330.00- 359.99	1	1		1		3 9.1
420.00- 449.99				1	1	2 6.1
Column Total	7 21.2	12 36.4	7 21.2	6 18.2	1 3.0	33 100.0

FIGURE 12

support the idea that slope, aspect and distance to nearest water are efficient predictors of where sites will or will not be found. Artifacts representing the remains of various behaviors are differentially distributed with respect to these variables.

In general, the archaeological sites considered in this study (n=460), do show associations with all three of the variables. Both expected versus observed frequencies and cross-tabulation of variable intervals indicate preference for locations with gentle (<12.00°) but not flat slopes, within 360.00 meters of water. It is not likely that the relationship between slope and aspect represents preference for locations with east facing aspects. There also appears to be a relationship between aspect alone and the location of all archaeological sites in general. The preferred aspect indicated by the Raleigh test (See Figure 6), does not support the proposition that sites will be found on south facing slopes. The ridges and drainages of the region trend to the southeast, with the result that there is a large number of east and southeast facing slopes. The lack of association demonstrated by the chi-square test also suggests this is the case.

Base camps sites represent the smallest sample (n=33) of site type, but show a definite association with aspect, and the greatest amount of covariation between slope and distance to water. These sites show a broad preference for locations with gentle (9.00°) slopes, within 360.00 meters of water. Because there is no relationship between either aspect and slope, or aspect and distance to water, it is likely aspect is independent of both these concerns. Base camp sites appear to favor locations with south facing aspects, whether or not they meet slope and distance to water requirements.

By considering the distribution of individual site types, the association between base camps and locations with southern aspects is evident. However, the relationship is obfuscated when evaluated across all archaeological sites. The other site types which do show a relationship with aspect (ie., all archaeological sites, other activity sites, hunting sites and chipping stations) do not fit the model proposed for the area. With base camps representing only 7.2% of archaeological sites in the region, aspect would not be a particularly good predictor of site locations in general. Considering the relatively small amount of covariation (r=15%) between slope and distance to water, these variables do not appear to be strong indicators of site locations.

Chipping station sites do show an association with aspect. These sites appear to fit the pattern of location on slopes which afford a good view of a large area. However, they are contrary to the general idea that sites will be found on south facing slopes. Chipping stations demonstrate a tendency to be found on east facing slopes (89°). There is a relationship suggested between a chipping station location's aspect and slope. However, explanation is limited by the small amount of covariation (1%). This relationship is also made less significant by the predominance of east facing locations and slopes <12.00° throughout the study area. Cross-tabulation tables suggest a selection for slopes below

<12.00°, that face east. 90% of the study area has slopes <12.00°, and 68% of the area faces east. The weak relationship and high proportion of sites having the most commonly occurring values in the study area, indicates how limited these variables are in predicting chipping station locations.

The distribution of other activity, hunting, lithic workshop, and quarry sites all are related to specific slope values. Distribution of other activity and hunting sites suggests a slight preference for slopes between 6.00° and 12.00°. Quarry sites differ in that they show a preference for slopes greater than 12.00°. However, the predictive value of these associations are also limited by the large proportion (90%) of the survey area less than 12.00°. All of the remaining site types demonstrate no relationship between any of the variable combinations. These facts suggest that there is no preference for these locations based on slope, aspect or distance to water.

Taken as a whole these results suggested that slope, aspect and distance to water are not powerful predictors of site locations, for this study area. Survey designs that over emphasize the importance of these variables will fail to explain a large portion of the region's archaeology. The surveys conducted in the early 1970's (Loendorf and Barnett 1972; Fredlund 1972) tended to do just that. As a result, the same permit area had to be surveyed again in the late-1970's (Carmichael and Eklund 1979; Gregg 1977a; 1977c; Fredlund 1977) and yet again in the early 1980's (Greiser and Newell 1981). During each of the subsequent surveys, additional sites and artifact locations were recorded.

Cultural resource surveys that used research designs based on these three variables (ie., all archaeological sites are close to water source, on flat slopes, with southern aspects) have two common characteristics, meandering survey transects, and few recorded sites (Fredlund 1977; Gregg 1977c; Loendorf and Barnett 1972). Individually, these surveys do not provide an adequate representation of the region's archaeology. Evidence of this fact is provided by comparing site density on the west and east sides of the river. The data base compiled for this research contained 460 archaeological sites recorded over an 82 km^2 area, an average of 5.6 sites per km^2 (See Figure 2). In contrast, surveys on the east side of the Tongue River found a total of 14 archaeological sites over a 21 km^2, an average of 0.67 sites per km^2 (Fredlund 1977; Gregg 1977c; Loendorf and Barnett 1972).

By analyzing archaeological remains, it is possible to determine whether prehistoric peoples had preferences for specific site locations. Using a simple Geographic Information System, environmental and physiographic values can be measured over large areas. Three variables (ie., slope, aspect and distance to water) archaeologists use to guide cultural resource surveys in southeast Montana were tested using a GIS. All three of these variables are found to be very weak indicators of site locations. Fortunately the GIS is flexible, and will allow a more indepth exploration of site distribution. I am confident that by using this approach the environmental and logistic concerns that influenced archaeological patterning will eventually be identified.

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APPENDIX A

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	1020				X											
24BH	1574				X	X	X									
24BH	1573				X	X										
24BH	1579				X			X	X				X			
24BH	1578				X			X								
24BH	1577				X				X							
24BH	1576				X											
24BH	1582				X				X					X		
24BH	1566				X											
24BH	1575				X		X		X							
24BH	1571				X		X									
24BH	1605				X	X		X	X							
24BH	1625				X	X	X									
24BH	1626				X				X		X					
24BH	1597				X											
24BH	1602								X							
24BH	1609	X							X		X					

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	1610	X						X	X		X					
24BH	511				X		X		X							
24BH	512				X		X									
24BH	513				X			X	X							
24BH	514				X				X							
24BH	515				X											
24BH	516				X	X		X			X					
24BH	517				X						X					
24BH	518				X	X					X					
24BH	519				X											
24BH	520				X	X										
24BH	521				X		X		X							
24BH	522				X			X								
24BH	523				X			X								
24BH	524				X	X			X					X		X
24BH	525				X	X										
24BH	526				X	X	X									

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	527			X					X							
24BH	528			X	X											
24BH	529				X			X								
24BH	530				X	X		X								
24BH	531				X			X	X							
24BH	536				X	X										
24BH	537				X											
24BH	538				X	X			X							
24BH	539				X			X								
24BH	540				X		X									
24BH	541			X	X		X		X							
24BH	542				X			X	X							
24BH	544				X				X							
24BH	545				X											
24BH	533				X											
24BH	1046					X			X						X	
24BH	546				X											X

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	547				X	X										
24BH	548				X				X							
24BH	550				x				X							
24BH	551			X			X	X	X							
24BH	553				X	X			X							
24BH	554				X	X										
24BH	555	X	X	X	X	X		X								
24BH	556				X				X							
24BH	557				X	X		X	X							
24BH	568				X				X							
24BH	559			X					X							
24BH	560				X											
24BH	1051				X	X		X								
24BH	1052					X	X		X							
24BH	1045				X	X	X		X							
24BH	1041				X	X	X	X	X							
24BH	562				X	X	X	X	X							

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	565				X											
24BH	566				X	X		X			X					
24BH	567				X				X							
24BH	569				X			X								
24BH	570				X			X	X		X					
24BH	571				X			X								
24BH	572				X			X			X					
24BH	573				X			X			X					
24BH	574				X			X	X							
24BH	575				X											
24BH	576				X			X			X			X		
24BH	577				X	X	X		X							
24BH	578				X				X							
24BH	579				X	X		X	X							
24BH	580				X	X	X		X							
24BH	581				X	X			X							
24BH	582				X	X		X	X							

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Caim	Stone Rings	Picto-Petro-	Hearth
24BH	583				X											
24BH	584				X			X	X							
24BH	585				X	X			X	X						
24BH	586				X	X	X	X	X							
24BH	587				X	X		X								
24BH	590				X		X							X		
24BH	592				X				X				X			
24BH	589				X	X										
24BH	591				X	X	X	X	X	X	X		X	X		
24BH	1001				X	X	X									
24BH	1013	X				X		X								
24BH	1014				X											
24BH	1030				X	X	X	X	X		X					X
24BH	1053				X	X	X		X				X			
24BH	1056	X						X			X					
24BH	1060				X		X			X					X	X
24BH	1942				X	X									X	X

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	1943				X		X	X			X					
24BH	1944	X			X			X			X					
24BH	1945	X				X			X							
24BH	1946	X						X			X					
24BH	1947				X			X	X							
24BH	1948				X	X		X								
24BH	1949				X	X										
24BH	1950				X	X									X	
24BH	1951				X	X			X							
24BH	1952				X				X							
24BH	1953				X	X										
24BH	1954				X	X	X		X							
24BH	1955				X	X										X
24BH	1956				X		X		X							
24BH	1957	X	X		X				X							
24BH	1958				X	X										
24BH	1959				X	X			X				X	X		

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	1960	X									X					
24BH	1962				X		X		X					X		
24BH	1963				X		X									X
24BH	1964				X									X		X
24BH	1966					X			X							
24BH	1967				X	X		X								
24BH	1968				X	X		X	X							
24BH	1969				X	X			X							
24BH	1970	X			X	X		X								
24BH	1971				X	X			X							
24BH	1973				X											
24BH	1974				X											
24BH	1975					X	X		X							
CX	1					X										
CX	3				X											
CX	4					X										
CX	5					X										

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
CX	6					X	X									
CX	7					X										
CX	14						X									
CX	15					X										
CX	16								X							
CX	17					X										
CX	18				X											
CX	19				X											
CX	20				X											
CX	21									X						
CX	22							X								
CX	23						X									
CX	24				X											
CX	25				X			X	X							
CX	26				X											
CX	27					X		X								
CX	28							X								

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
CX	30				X											
CX	31						X									
CX	33				X											
CX	34				X											
CX	35					X										
CX	36				X											
CX	37					X										
CX	38				X											
CX	39				X											
CX	41					X										
CX	42				X											
CX	43				X											
CX	45				X	X										
CX	46				X											
CX	47				X											
CX	48				X			X								
CX	49							X								

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
CX	50					X	X			X						
CX	51				X											
CX	52				X			X								
CX	53				X											
CX	54				X											
CX	55				X	X			X							
CX	56				X											
CX	57				X											
CX	58				X	X										
CX	59				X											
CX	60				X											
CX	62								X							
CX	63				X	X										
CX	64				X											
CX	65				X	X										
CX	66							X								
CX	68				X											

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
CX	69				X											
CX	70				X											
CX	71					X										
CX	72				X											
CX	73				X											
CX	74					X										
CX	75					X										
CX	76				X				X							
CX	77								X							
CX	78				X											
CX	79							X								
CX	80				X	X										
CX	81							X								
CX	82				X											
CX	83						X									
CX	84				X	X			X							
CX	85					X		X								

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
CX	86				X			X								
CX	88							X								
CX	89					X										
CX	90								X							
CX	91				X											
CX	92				X	X										
24BH	1003	X	X	X		X	X	X		X				X		
24BH	1641		X		X	X	X		X							X
24BH	2004				X		X		X							X
24BH	2005				X	X	X		X							
24BH	2016				X	X		X	X					X		
24BH	2007		X		X		X	X	X							
24BH	2012				X									X		X
24BH	2013				X	X								X		
24BH	2025				X	X			X							
24BH	2014				X						X					
24BH	2006				X	X	X	X	X							X

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	2008				X				X			X				
PC	1				X											
PC	2					X										
PC	3				X											
PC	4				X											
PC	5								X							
PC	7				X											
PC	8						X									
PC	9				X											
PC	10				X				X							
PC	11						X									
PC	20				X											
PC	21				X											
PC	22				X											
PC	23				X				X							
PC	24				X								X			
PC	100				X				X							

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
PC	102				X	X			X							
PC	103				X											
PC	106				X	X	X									
PC	107				X	X		X								
PC	108							X								
PC	110				X											
PC	111				X											
PC	112				X											
PC	113				X	X										
PC	114				X			X	X							
PC	115					X										
PC	116				X											
PC	118				X											
PC	120				X	X										
PC	121				X											
PC	122				X											
PC	123				X											

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
PC	201				X											
PC	202				X											
PC	203								X							
PC	204				X					X						
PC	209				X											
PC	211				X				X							
PC	212				X											
PC	213				X											
PC	216				X											
PC	218				X		X									
PC	223				X				X							
PC	300							X								
PC	301				X											
PC	302				X											
PC	303					X										
PC	304				X				X							
PC	305				X											

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
PC	307				X		X	X								
PC	308				X	X										
PC	309				X											
PC	310				X											
PC	311				X	X										
PC	313					X										
PC	314				X	X	X	X	X							
PC	315				X											
PC	316					X	X									
PC	317				X	X										
PC	318				X											
PC	319				X											
24BH	1510				X				X					X		
24BH	1511				X	X			X							
24BH	1512				X	X		X	X							
24BH	1513				X											
24BH	1514				X	X										

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	1515	X				X			X							
24BH	1516					X										
24BH	1517				X	X	X		X							
24BH	1518				X	X	X	X								
24BH	1519				X	X	X		X				X			
24BH	1520				X								X			
24BH	1521				X	X										
24BH	1523				X	X		X			X					
24BH	1017				X	X					X					
24BH	1524				X	X		X	X							
24BH	1976											X				
24BH	1977				X	X			X							
24BH	1978				X	X			X							
24BH	1980				X	X										
D	1						X									
D	2						X									
D	3								X							

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
D	4						X									
D	5						X									
D	6						X									
D	7				X											
D	8					X										
D	9						X									
D	10								X							
D	11							X								
D	12				X											
D	13							X								
D	14					X										
D	18				X											
D	19				X											
D	21				X											
D	22				X											
24BH	1068				X	X	X		X							
24BH	1039				X	X		X	X	X						

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	1067				X	X	X	X	X							
24BH	2530	X	X			X	X		X							
24BH	2533	X			X	X			X							
24BH	2531				X			X	X							
24BH	2534				X				X		X					
24BH	2527				X			X								
24BH	2526				X			X	X		X					
24BH	2525	X		X							X					
24BH	1619	X	X	X			X									
24BH	2523	X	X				X		X	X						X
24BH	2532	X			X			X			X					
24BH	2521				X	X			X							X
24BH	2516	X	X		X				X							
24BH	2535				X			X	X	X	X					
24BH	2518				X											
24BH	1048				X				X							
24BH	1049				X											

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	2517				X				X	X						
24BH	2519				X	X			X							X
24BH	2520				X				X							
L	1				X											
L	2				X						X					
L	3				X						X					
L	4				X						X					
L	5				X											
L	7				X											
L	8				X											
L	9						X									
L	10								X							
L	11								X							
L	12						X									
L	14				X											
L	15				X											
L	16				X						X					

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
L	17				X											
L	18				X						X					
L	19				X											
L	20						X									
L	21				X						X					
L	22				X											
24BH	2524				X		X		X							
24BH	2244	X	X	X	X			X	X							
24BH	2236	X	X	X	X	X	X		X							
24BH	2237	X	X		X				X	X						
24BH	2238		X		X				X	X						
24BH	2239	X	X		X	X	X		X							
24BH	2240	X	X		X			X								X
24BH	2241	X						X		X						
24BH	2242	X						X		X						
24BH	2243				X		X	X								
24BH	2245	X							X							

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	2246	X	X	X												
24BH	2247	X									X					
24BH	2248	X	X	X	X			X			X					
24BH	2139				X		X									
24BH	2140				X			X			X					
24BH	2141				X		X	X	X							
24BH	2142	X	X		X											
24BH	2143	X	X		X						X					
24BH	2144	X	X		X				X		X					
24BH	2145	X	X	X	X	X		X								
24BH	2146	X	X		X				X		X					
24BH	2147	X	X	X	X			X								
24BH	2148	X	X	X	X	X										
24BH	2149	X	X		X											
24BH	2150	X	X	X	X			X	X							
24BH	2151	X	X		X				X							
24BH	2152		X	X	X	X	X			X						

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	2153		X	X	X											
24BH	2154	X	X		X	X										
24BH	2085	X	X		X				X							
24BH	2086	X	X		X											
24BH	2090		X					X								
24BH	2091		X			X		X					X			
24BH	2092				X	X										
24BH	2093	X	X		X											
24BH	2094	X														
24BH	2095		X			X										
24BH	2096				X	X			X							
24BH	2097				X	X	X	X	X							
24BH	2098				X				X					X		
24BH	2099	X	X	X	X				X							
24BH	2100		X	X	X				X							
24BH	2102				X				X							
24BH	2103	X	X		X				X		X					

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	2104	X						X	X							
24BH	2106				X	X			X							
24BH	2107				X	X			X							
24BH	2108		X	X	X			X								
24BH	2109	X						X			X					
24BH	2111		X					X	X							
24BH	2112				X	X		X								
24BH	2113	X	X	X	X		X	X	X							
24BH	2114	X	X	X	X			X	X							
24BH	2115	X	X	X	X		X	X	X							
24BH	2116	X	X	X	X			X								
24BH	2117				X	X		X								
24BH	2118				X		X		X							
24BH	2119				X	X										
24BH	2120				X			X								
24BH	1034		X			X	X		X							
LDL	1				X											

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
LDL	2				X											
LDL	3				X											
LDL	4				X			X								
LDL	5				X				X							
LDL	6				X				X							
LDL	7				X											
LDL	8				X			X								
LDL	9				X			X								
LDL	10				X											
HRA	1								X							
HRA	2						X									
HRA	3								X							
HRA	4								X							
HRA	5								X							
HRA	6								X							
HRA	7								X							
HRA	8								X							

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
24BH	2089		X			X			X							
HRA	9								X							
HRA	10						X		X							
HRA	11								X							
HRA	12						X									
HRA	13				X											
HRA	14				X											
HRA	15								X							
HRA	16					X										
HRA	17								X							
HRA	18							X								
HRA	19						X									
HRA	20					X										
HRA	21						X									
HRA	22						X									
HRA	23				X				X							
HRA	24						X									

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
HRA	25					X										
HRA	26						X									
HRA	27					X										
HRA	28								X							
HRA	29								X							
HRA	30								X							
HRA	31					X										
HRA	32						X									
HRA	33								X							
HRA	34				X											
HRA	35								X							
HRA	36				X											
HRA	37				X											
HRA	38				X											
HRA	39				X											
24BH	1640				X	X	X									
P	16						X									

SITE DATA FORM
SUMMARY OF ARTIFACTS AND FEATURES

Report ID	Data Base ID	Debitage				Scrape-ing Tools	PPT's	Other Lithics			Features					
		1st	2nd	3rd	Flks			Core	Biface	Other Tools	Lithic Source	Drive-Lines	Rock Cairn	Stone Rings	Picto-Petro-	Hearth
P	17						X									
P	19						X									
P	27						X									

APPENDIX B

LANSCAPE VARIABLE VALUES

LANDSCAPE VARIABLE VALUES

A	B	C	D	E	F	G	H
ID	DEB	SCR	PPT	TYPE	SLOPE	ASPECT	D TO WAT
1	0	1	0	O	.96	180.00	120.00
3	1	0	0	CS	3.44	33.63	94.69
4	0	1	0	O	.96	180.00	90.00
5	0	1	0	O	2.14	206.52	29.94
6	0	2	1	H	14.63	63.39	217.98
7	0	1	0	O	11.81	28.56	294.94
13	1	0	0	CS	9.38	44.94	179.62
14	0	0	1	H	12.23	67.34	66.97
15	0	1	0	O	21.82	272.39	149.89
16	0	1	0	O	5.14	338.24	119.75
17	0	1	0	O	4.77	323.19	234.02
18	1	0	0	CS	6.10	321.40	276.56
19	1	0	0	CS	3.94	165.99	295.36
21	0	1	0	O	6.10	38.60	429.38
22	0	1	0	O	8.06	44.94	59.87
23	0	0	1	H	7.66	119.80	29.94
24	1	0	0	CS	10.76	105.29	84.76
25	2	1	0	O	11.04	249.98	271.65
26	1	0	0	CS	13.28	224.94	257.89
27	0	2	0	O	9.75	151.00	350.49
28	0	1	0	O	4.77	306.93	182.47
30	1	0	0	CS	9.53	354.30	365.94
31	0	0	1	H	1.35	44.94	216.19
33	1	0	0	CS	6.93	164.09	241.36
34	1	0	0	CS	7.67	352.89	174.66
35	0	1	0	O	8.12	20.52	323.02
36	1	0	0	CS	2.14	116.61	423.82
37	0	1	0	O	5.56	210.91	216.02
38	1	0	0	CS	2.14	116.61	179.62
39	1	0	0	CS	10.41	.00	349.31
41	0	2	0	O	6.10	231.28	120.00
42	1	0	0	CS	2.14	63.39	29.94
43	1	0	0	CS	6.10	128.72	67.05
45	1	2	0	O	6.10	231.28	211.91
46	1	0	0	CS	1.35	224.94	322.52
47	1	0	0	CS	7.61	180.00	174.66
48	2	0	0	CS	2.70	135.06	123.68
49	1	0	0	CS	2.86	270.00	617.43
50	0	1	2	H	11.36	221.57	150.00

LANDSCAPE VARIABLE VALUES

A	B	C	D	E	F	G	H
ID	DEB	SCR	PPT	TYPE	SLOPE	ASPECT	D TO WAT
51	1	0	0	CS	4.77	233.07	308.72
52	1	0	0	CS	5.55	301.02	209.56
53	1	0	0	CS	8.94	302.06	59.87
54	2	0	0	CS	8.11	290.60	108.01
55	3	2	0	O	6.10	231.28	209.56
56	1	0	0	CS	2.14	63.39	94.69
57	1	0	0	CS	2.14	206.52	29.94
58	3	2	0	O	1.91	90.00	89.81
59	1	0	0	CS	2.14	26.52	.00
60	1	0	0	CS	3.44	146.37	.00
62	0	1	0	O	8.75	220.54	169.53
63	2	1	0	O	9.75	209.00	30.00
64	1	0	0	CS	7.42	129.87	66.97
65	2	1	0	O	7.43	320.25	201.16
66	2	0	0	CS	3.44	56.25	161.26
68	1	0	0	CS	.96	.00	211.91
69	1	0	0	CS	5.39	315.06	127.14
70	1	0	0	CS	3.93	75.94	29.94
71	0	1	0	O	8.11	110.60	67.05
72	1	0	0	CS	5.13	68.16	123.68
73	1	0	0	CS	11.33	180.00	322.52
74	0	1	0	O	13.44	24.73	318.61
75	0	1	0	O	6.38	116.61	84.76
76	1	1	0	O	9.47	53.07	123.45
77	0	1	0	O	6.03	18.40	324.02
78	3	0	0	CS	3.44	56.25	361.86
79	1	0	0	CS	6.02	71.53	271.09
80	1	1	0	O	3.94	14.01	149.68
81	1	0	0	CS	16.80	263.65	149.89
82	1	0	0	CS	9.67	11.29	59.87
83	0	0	1	H	7.66	119.80	211.91
84	3	2	0	O	9.67	191.29	161.26
85	2	2	0	O	6.02	71.53	323.02
86	3	0	0	CS	3.02	251.53	180.00
88	1	0	0	CS	6.72	81.85	108.01
89	0	1	0	O	6.39	153.48	149.80
90	0	1	0	O	4.26	63.39	84.76
91	2	0	0	CS	11.36	41.57	349.31
92	1	2	0	O	10.41	180.00	123.68
100	12	1	0	O	3.82	180.00	42.38

LANDSCAPE VARIABLE VALUES

A	B	C	D	E	F	G	H
ID	DEB	SCR	PPT	TYPE	SLOPE	ASPECT	D TO WAT
102	4	2	0	O	2.14	153.48	255.85
103	11	0	0	CS	6.74	188.11	161.26
106	100	2	1	BC	4.87	191.29	42.38
107	12	2	0	O	6.39	206.52	84.76
108	1	0	0	CS	1.91	.00	474.02
110	1	0	0	CS	1.91	90.00	59.87
111	1	0	0	CS	1.91	90.00	123.45
112	1	0	0	CS	5.71	90.00	234.10
113	12	1	0	O	7.65	82.86	228.07
114	6	1	0	O	.00	-1.00	334.72
115	0	1	0	O	3.81	90.00	66.97
116	50	0	0	LW	3.81	270.00	123.68
118	10	0	0	CS	14.53	14.90	67.05
120	24	1	0	O	5.79	260.52	211.91
121	13	0	0	CS	4.05	44.94	239.49
122	30	0	0	CS	8.95	211.95	120.00
123	50	0	0	LW	8.49	206.52	42.38
124	7	0	0	CS	4.27	153.48	66.97
125	0	1	0	O	2.14	153.48	161.26
126	1	0	0	CS	1.91	90.00	119.75
127	5	0	0	CS	.00	-1.00	239.49
128	0	1	0	O	8.75	192.50	108.10
129	1	0	0	CS	10.45	174.82	123.45
130	0	0	1	H	3.02	198.40	191.85
131	1	0	0	CS	3.02	71.53	59.87
132	3	1	0	O	3.82	.00	59.87
133	0	0	1	H	4.77	323.19	30.00
134	4	0	0	CS	9.74	60.89	182.47
135	30	0	0	CS	12.25	202.58	89.81
136	2	0	0	CS	3.44	146.37	268.21
137	20	0	0	CS	12.80	162.93	254.29
138	40	0	0	CS	9.38	224.94	123.68
139	0	0	1	H	2.87	.00	29.94
140	0	0	1	H	2.14	153.48	179.62
141	0	1	0	O	3.44	236.25	30.00
142	0	0	1	H	.00	-1.00	241.86
143	0	0	1	H	4.05	135.06	161.26
144	1	0	0	CS	4.77	180.00	299.37
145	0	1	0	O	.96	180.00	246.89

LANDSCAPE VARIABLE VALUES

A ID	B DEB	C SCR	D PPT	E TYPE	F SLOPE	G ASPECT	H D TO WAT
146	0	1	0	O	.96	180.00	241.36
147	1	0	0	CS	2.14	333.48	522.88
148	25	0	0	CS	3.44	146.37	445.47
149	25	0	0	CS	3.44	56.25	234.02
150	100	0	0	LW	3.82	180.00	29.94
151	200	0	0	Q	13.93	132.33	66.97
152	200	0	0	Q	9.53	185.70	66.97
153	200	0	0	Q	7.84	194.01	84.76
154	50	0	0	CS	16.75	213.63	123.45
155	50	0	0	CS	2.14	63.39	67.05
156	50	0	0	CS	7.67	352.89	84.76
157	0	0	1	H	8.17	35.48	108.01
158	0	1	0	O	1.35	135.06	29.94
159	0	1	0	O	.00	-1.00	29.94
160	0	0	1	H	.00	-1.00	.00
161	50	0	0	LW	7.25	336.85	84.76
162	50	0	0	LW	10.77	52.07	84.76
163	100	0	0	Q	8.75	12.50	191.94
164	50	0	0	LW	3.44	33.63	42.38
165	100	0	0	Q	7.67	29.69	182.47
166	50	0	0	LW	6.73	44.94	240.00
167	0	0	1	H	6.39	26.52	67.05
168	100	0	0	Q	6.03	18.40	108.10
169	50	0	0	LW	10.57	26.52	276.56
201	1	0	0	CS	5.72	180.00	241.86
202	3	0	0	CS	4.77	143.19	29.94
203	0	1	0	O	2.86	90.00	59.87
204	25	0	0	CS	7.25	203.15	94.69
209	2	0	0	CS	6.67	180.00	66.97
211	5	1	0	O	5.14	158.24	67.05
212	5	0	0	CS	5.56	149.09	134.11
213	10	0	0	CS	6.03	161.60	149.80
216	22	0	0	CS	5.79	80.52	149.68
218	2	0	1	H	4.27	26.52	59.87
223	6	1	0	O	9.34	203.92	149.89
224	7	0	0	CS	5.55	238.98	120.00
225	11	0	0	LW	.00	-1.00	276.34
226	11	0	0	LW	1.35	44.94	211.91
227	9	0	0	CS	.96	.00	30.00

LANDSCAPE VARIABLE VALUES

A ID	B DEB	C SCR	D PPT	E TYPE	F SLOPE	G ASPECT	H D TO WAT
228	3	2	0	O	4.26	243.39	191.85
229	5	2	0	O	4.26	116.61	428.79
230	8	0	0	CS	13.19	4.08	276.03
231	10	0	0	CS	.00	-1.00	161.51
232	6	0	0	CS	9.34	156.08	149.68
233	5	0	0	CS	6.38	296.61	228.40
234	0	1	0	O	3.44	56.25	216.19
235	0	0	1	H	3.02	161.60	445.88
236	0	1	0	O	1.35	135.06	342.00
237	0	1	0	O	3.94	345.99	149.80
238	0	1	0	O	8.75	220.54	30.00
239	0	1	0	O	10.19	201.76	30.00
240	0	1	0	O	11.91	108.47	90.00
241	0	1	0	O	10.69	224.94	89.81
242	0	1	0	O	8.60	186.33	149.80
243	0	1	1	H	8.17	35.48	90.00
244	0	1	0	O	7.84	345.99	169.53
245	0	0	1	H	9.87	253.27	30.00
246	1	0	0	CS	7.65	277.14	169.53
247	1	0	0	CS	6.39	333.48	191.85
248	0	1	0	O	1.35	224.94	29.94
249	0	1	0	O	4.86	281.33	90.00
250	0	1	0	O	6.10	231.28	210.00
251	1	0	0	CS	6.02	251.53	512.45
252	0	0	1	H	10.41	180.00	351.05
253	0	1	0	O	6.38	243.39	322.52
254	0	0	1	H	4.87	191.29	42.38
255	0	0	1	H	6.03	161.60	29.94
256	1	1	0	O	4.05	224.94	240.00
257	0	0	1	H	.96	180.00	149.68
258	0	1	0	O	2.70	315.06	211.91
259	0	0	1	H	2.14	63.39	42.38
260	0	1	0	O	4.77	216.81	255.85
261	0	1	0	O	17.58	198.40	276.25
262	0	1	0	O	8.74	77.45	59.87
263	0	1	0	O	3.02	71.53	313.15
264	0	1	0	O	5.71	270.00	474.24
265	0	0	1	H	6.38	116.61	365.94
266	0	1	0	O	3.02	108.47	468.03

LANDSCAPE VARIABLE VALUES

A ID	B DEB	C SCR	D PPT	E TYPE	F SLOPE	G ASPECT	H D TO WAT
267	1	0	0	CS	2.14	26.52	42.38
268	0	1	0	O	2.14	153.48	487.80
269	1	0	0	CS	2.14	206.52	30.00
270	1	0	0	CS	4.87	191.29	271.09
271	1	0	0	CS	6.86	56.25	149.80
272	1	0	0	CS	4.27	26.52	324.29
273	0	0	1	H	12.54	103.02	271.65
274	0	0	1	H	12.25	22.58	299.77
275	0	0	1	H	2.14	206.52	299.59
276	0	0	1	H	1.91	.00	241.74
300	1	0	0	CS	6.10	38.60	29.94
301	20	0	0	CS	4.76	90.00	108.01
302	4	0	0	CS	6.10	321.40	29.94
303	0	1	0	O	7.43	219.75	94.69
304	1	1	0	O	3.44	213.63	296.67
305	2	0	0	CS	8.60	173.67	119.75
307	10	0	1	H	4.77	180.00	108.01
308	2	1	0	O	3.94	165.99	108.01
309	2	0	0	CS	2.86	90.00	.00
310	3	0	0	CS	2.86	90.00	66.97
311	2	1	0	O	7.25	23.15	133.94
313	0	1	0	O	5.56	30.91	133.94
314	3	3	1	H	5.55	121.02	123.68
315	3	0	0	CS	3.02	108.47	42.38
316	0	1	1	H	3.44	146.37	94.69
317	10	3	0	O	7.25	23.15	29.94
318	4	0	0	CS	6.93	15.91	119.75
319	1	0	0	CS	6.67	.00	174.83
511	100	0	2	H	4.86	101.33	84.76
512	40	0	1	H	.95	90.00	29.94
513	40	0	0	LW	2.87	.00	149.68
514	7	0	0	CS	6.03	18.40	29.94
515	11	0	0	CS	3.02	71.53	59.87
516	15	1	0	O	4.87	11.29	60.00
517	15	0	0	CS	5.14	21.76	149.80
518	15	1	0	O	1.91	.00	60.00
519	25	0	0	CS	2.87	180.00	66.97
520	2	1	0	O	9.87	73.27	189.70

LANDSCAPE VARIABLE VALUES

A	B	C	D	E	F	G	H
ID	DEB	SCR	PPT	TYPE	SLOPE	ASPECT	D TO WAT
521	25	0	1	H	1.35	224.94	60.00
522	20	0	0	CS	3.44	123.75	228.07
523	13	0	0	CS	9.46	90.00	169.53
524	7	1	0	O	2.14	243.39	30.00
525	10	2	0	O	7.67	150.31	508.92
526	17	1	1	H	3.02	108.47	569.59
527	50	0	0	CS	.95	90.00	456.13
528	20	0	0	CS	8.16	125.60	360.49
529	24	0	0	CS	3.82	180.00	417.08
530	13	1	0	O	9.34	156.08	428.67
531	32	0	0	LW	7.42	230.13	360.49
536	2	1	0	O	14.78	214.64	211.69
537	1	0	0	CS	4.05	224.94	216.19
538	60	2	0	O	6.10	231.28	30.00
539	15	0	0	CS	2.14	153.48	134.11
540	25	0	1	H	6.10	231.28	60.00
541	17	0	1	H	6.86	56.25	59.87
542	105	0	0	LW	3.02	161.60	66.97
544	10	0	0	CS	13.67	15.91	133.94
545	3	0	0	CS	2.70	44.94	29.94
546	3	0	0	CS	1.35	44.94	29.94
547	5	1	0	O	8.48	63.39	123.68
548	1	0	0	CS	6.86	326.37	42.38
550	30	0	0	LW	7.43	39.75	120.00
551	68	0	1	H	3.81	90.00	30.00
553	3	2	0	O	6.02	71.53	94.69
554	50	1	0	O	1.91	180.00	42.38
555	25	3	0	O	4.05	224.94	67.05
556	72	0	0	LW	5.80	9.44	161.26
557	10	2	0	O	8.60	186.33	59.87
559	40	0	0	CS	3.02	108.47	66.97
560	7	0	0	CS	4.27	26.52	209.56
562	40	1	4	BC	11.91	288.47	334.72
565	14	0	0	CS	5.56	210.91	80.00
566	2000	2	0	Q	6.86	33.63	296.67
567	30	0	0	CS	8.94	57.94	120.00
568	12	0	0	CS	8.95	31.95	42.38
569	50	0	0	LW	8.17	35.48	42.38
570	50	0	0	Q	10.06	41.13	152.96

LANDSCAPE VARIABLE VALUES

A ID	B DEB	C SCR	D PPT	E TYPE	F SLOPE	G ASPECT	H D TO WAT
571	15	0	0	CS	8.58	96.35	29.94
572	50	0	0	Q	10.57	26.52	191.85
573	100	0	0	Q	12.28	32.42	94.69
574	300	0	0	LW	9.33	65.99	200.91
575	250	0	0	LW	4.77	53.07	134.11
576	200	0	0	Q	7.43	39.75	84.76
577	1000	1	1	BC	2.14	116.61	89.81
578	25	0	0	CS	4.87	191.29	67.05
579	200	4	0	O	8.49	153.48	127.14
580	150	1	1	BC	7.67	209.69	120.00
581	400	1	0	O	8.74	130.66	239.49
582	21	5	0	O	2.87	180.00	89.81
583	70	0	0	LW	2.86	270.00	390.33
584	200	2	0	O	1.91	180.00	191.94
585	32	1	0	O	10.06	221.13	308.37
586	63	4	2	BC	2.70	44.94	119.75
587	50	5	0	O	.95	90.00	29.94
588	20	2	1	BC	4.87	348.71	89.81
589	25	3	0	O	5.39	44.94	94.69
590	50	0	1	BC	4.26	116.61	94.85
592	28	0	0	CS	11.06	19.94	394.57
1001	1001	1	9	H	5.80	189.44	510.25
1003	500	4	4	BC	11.37	175.25	216.02
1013	101	1	0	O	2.14	26.52	241.86
1014	101	0	0	LW	4.77	53.07	401.81
1030	101	1	1	BC	4.86	101.33	339.05
1034	50	2	1	H	4.86	78.67	123.68
1039	500	10	0	O	15.40	194.01	149.80
1041	100	2	4	BC	.96	.00	282.59
1045	100	3	1	BC	.96	180.00	127.14
1046	0	1	0	O	6.74	171.89	308.37
1048	50	4	0	O	4.87	11.29	119.75
1049	100	0	0	LW	3.02	198.40	59.87
1051	25	4	0	O	9.75	331.00	268.21
1052	0	13	5	H	7.66	240.20	84.76
1053	101	1	2	BC	6.03	198.40	189.70
1056	1001	0	0	Q	13.45	192.07	341.78
1060	1000	0	4	BC	4.86	281.33	174.83
1067	500	12	2	BC	2.87	180.00	271.09

LANDSCAPE VARIABLE VALUES

A ID	B DEB	C SCR	D PPT	E TYPE	F SLOPE	G ASPECT	H D TO WAT
1068	500	10	1	BC	3.02	198.40	282.59
1510	500	4	0	BC	4.87	168.71	133.94
1511	2	7	0	O	2.14	116.61	331.36
1512	42	10	0	O	6.02	71.53	341.78
1513	250	0	0	LW	3.44	123.75	432.03
1514	50	4	0	O	2.70	315.06	60.00
1515	50	5	0	O	7.25	156.85	67.05
1517	25	10	1	H	6.74	188.11	246.89
1518	25	15	1	H	1.35	224.94	89.81
1566	50	0	0	LW	5.13	291.84	161.51
1571	15	0	1	H	87.18	180.09	365.68
1573	50	2	0	O	7.67	172.89	381.43
1574	50	1	2	H	87.23	269.54	269.43
1575	20	0	2	H	87.07	180.29	108.01
1576	60	0	0	LW	6.92	74.02	94.69
1577	50	0	0	LW	1.91	90.00	174.83
1578	25	0	0	LW	2.14	153.48	364.22
1579	25	0	0	LW	5.14	201.76	200.91
1582	101	0	0	BC	6.03	198.40	189.38
1597	50	0	0	LW	7.25	156.85	150.00
1602	0	1	0	O	3.93	104.06	42.38
1609	1001	0	0	Q	4.77	233.07	60.00
1610	1001	0	0	Q	4.87	191.29	67.05
1619	25	0	1	H	10.57	153.48	240.00
1625	50	1	1	H	9.74	119.11	174.83
1626	101	0	0	LW	4.77	216.81	60.00
1640	300	1	3	H	10.41	180.00	161.51
1641	50	9	3	BC	6.92	105.98	60.00
1942	100	2	0	O	8.17	215.48	210.00
1943	1000	0	1	Q	10.39	270.00	381.43
1944	2000	0	0	Q	8.75	220.54	417.08
1945	250	2	1	BC	10.58	190.28	247.36
1946	1000	0	0	Q	6.86	303.75	240.00
1947	50	2	0	O	7.24	113.24	256.25
1948	50	1	0	O	3.02	161.60	108.01
1949	500	1	3	BC	3.44	56.25	284.06
1950	500	3	2	BC	5.71	90.00	241.48
1951	50	1	0	O	10.76	285.29	282.59
1952	6	0	0	CS	.96	.00	66.97

LANDSCAPE VARIABLE VALUES

A	B	C	D	E	F	G	H
ID	DEB	SCR	PPT	TYPE	SLOPE	ASPECT	D TO WAT
1953	50	3	0	CS	.95	90.00	234.02
1954	200	7	1	BC	6.73	44.94	89.81
1955	100	2	0	O	8.53	90.00	267.87
1956	100	0	1	H	8.75	40.54	228.40
1957	75	0	0	LW	12.27	237.47	300.00
1958	50	3	0	O	3.02	108.47	299.77
1959	50	1	0	O	6.10	231.28	284.54
1960	500	0	0	Q	5.14	158.24	127.14
1962	150	0	1	BC	3.93	104.06	318.52
1963	100	0	5	BC	10.06	318.87	182.11
1964	150	0	0	BC	10.23	213.63	445.15
1966	0	16	0	O	4.86	281.33	407.26
1967	64	4	0	O	4.77	180.00	120.00
1968	26	4	0	O	2.14	116.61	241.36
1969	64	6	0	O	5.14	201.76	271.65
1970	75	7	0	O	3.81	90.00	174.83
1971	17	1	0	O	9.89	196.67	420.00
1973	25	0	0	CS	1.91	90.00	134.11
1974	14	0	0	CS	3.94	165.99	180.00
1975	0	5	2	H	3.02	161.60	29.94
1978	25	4	0	O	1.91	270.00	449.39
1980	10	2	0	O	2.87	.00	209.56
2004	100	0	4	H	3.02	108.47	59.87
2005	175	5	2	BC	2.87	.00	60.00
2006	42	3	1	BC	3.82	180.00	108.01
2007	16	5	1	BC	6.02	108.47	127.14
2008	50	1	0	O	5.80	170.56	169.53
2012	100	0	0	BC	9.67	191.29	149.80
2013	150	1	0	BC	3.94	194.01	42.38
2014	1001	0	0	Q	8.17	35.48	211.69
2016	75	4	0	O	3.44	146.37	200.91
2025	75	2	0	O	4.27	26.52	189.38
2085	100	0	0	LW	8.75	139.46	271.65
2086	100	0	0	LW	8.94	57.94	66.97
2089	75	2	0	O	15.86	40.18	66.97
2090	100	0	0	LW	11.46	99.48	133.94
2091	75	4	0	O	1.35	135.06	361.86
2092	175	2	0	O	11.35	274.77	257.89
2093	50	0	0	LW	4.76	90.00	123.68

LANDSCAPE VARIABLE VALUES

A	B	C	D	E	F	G	H
ID	DEB	SCR	PPT	TYPE	SLOPE	ASPECT	D TO WAT
2094	20	0	0	LW	24.71	226.41	123.68
2095	25	4	0	O	1.91	270.00	284.06
2096	40	4	0	O	7.67	187.11	284.06
2097	40	2	2	BC	86.89	179.95	421.07
2098	25	1	0	O	2.70	224.94	123.45
2099	3000	1	0	LW	11.91	288.47	234.02
2100	80	1	0	O	6.65	270.00	169.53
2102	70	1	0	O	2.87	180.00	133.94
2103	50	0	0	Q	3.44	146.37	149.68
2104	75	0	0	LW	6.67	180.00	84.76
2106	300	10	0	O	10.77	52.07	299.37
2107	30	3	0	O	13.45	192.07	282.85
2108	40	0	0	LW	5.80	189.44	428.79
2109	125	0	0	Q	8.75	192.50	84.76
2111	200	2	0	O	5.56	30.91	89.81
2112	100	1	0	O	14.93	90.00	329.30
2113	1000	15	5	BC	7.67	187.11	108.01
2114	300	0	0	LW	8.74	229.34	407.75
2115	150	2	1	H	10.43	84.79	375.29
2116	250	0	0	LW	12.06	38.60	123.45
2117	50	1	0	O	2.70	44.94	66.97
2118	150	2	1	H	14.79	198.40	257.71
2119	50	1	0	O	3.44	33.63	89.81
2120	200	0	0	CS	4.86	101.33	94.69
2139	14	0	1	H	6.03	198.40	425.84
2140	750	0	0	Q	12.25	22.58	456.13
2141	100	1	2	H	11.36	41.57	90.00
2142	20	0	0	LW	8.94	57.94	296.67
2143	75	0	0	Q	8.74	130.66	189.38
2144	30	0	0	Q	8.99	288.47	228.07
2145	100	2	0	O	12.26	85.59	120.00
2146	40	0	0	Q	1.35	44.94	182.11
2147	25	0	0	LW	1.35	44.94	305.32
2148	200	1	0	LW	6.86	33.63	417.08
2149	20	0	0	LW	27.05	231.57	84.76
2150	1000	1	0	LW	1.91	90.00	191.94
2151	300	1	0	LW	6.86	146.37	174.66
2152	250	3	2	BC	.96	180.00	339.05
2153	100	0	0	LW	10.57	206.52	94.69

LANDSCAPE VARIABLE VALUES

A ID	B DEB	C SCR	D PPT	E TYPE	F SLOPE	G ASPECT	H D TO WAT
2154	30	2	0	O	6.02	251.53	174.83
2236	250	4	1	H	8.99	108.47	254.29
2237	75	0	0	Q	16.23	256.73	123.45
2238	1000	0	0	Q	3.44	56.25	284.54
2239	40	4	1	H	6.74	188.11	276.34
2240	500	0	0	LW	.96	.00	312.60
2241	200	0	0	Q	8.94	122.06	120.00
2242	100	0	0	Q	10.39	270.00	270.00
2243	200	0	2	H	7.65	97.14	149.80
2244	60	1	0	O	9.53	174.30	84.76
2245	11	0	0	LW	6.93	195.91	308.72
2246	75	0	0	LW	15.19	47.43	241.48
2247	75	0	0	Q	14.18	7.58	239.49
2248	75	0	0	Q	8.75	220.54	149.80
2516	250	0	0	LW	5.39	135.06	94.69
2517	3000	0	0	LW	3.94	165.99	334.84
2518	50	0	0	CS	2.70	135.06	.00
2519	100	4	0	O	3.44	56.25	191.85
2520	42	1	0	O	16.76	183.1	7119.75
2521	100	6	0	O	10.78	164.78	29.94
2523	30	6	1	H	6.38	63.39	241.36
2524	200	3	1	H	2.14	333.48	67.05
2525	75	0	0	Q	17.68	47.06	120.00
2526	150	0	0	Q	11.81	28.56	119.75
2527	100	0	0	LW	12.78	53.91	299.37
2530	75	4	1	H	1.35	135.06	216.19
2531	400	4	0	O	5.39	44.94	371.03
2532	500	0	0	Q	11.06	19.94	161.51
2533	50	4	0	O	4.76	90.00	240.00
2534	100	0	0	Q	2.70	315.06	256.25
2535	20	0	0	Q	2.70	44.94	30.00

APPENDIX C

IDRISI IMAGE HISTORIES

JOB HISTORY for **DECKER.IMG**

STEPS:

(1) The Digital Elevation Model (DEM) was downloaded from the 9-track tape sent by USGS, using the U of M mainframe (Lewis). The file (**DECKER.DEM**) was placed on a 3.5" diskette and copied into C:\THESIS on my hard drive.

(2) *VAR2FIX* was used to create a fixed length 1024 byte format ASCII file which can be imported into IDRISI.
(DECKER.DEM------>DECKER.FIX)

(3) *DEMIDRIS* was then used to convert the above fixed length USGS DEM into an IDRISI format image, with the corresponding Documentation file.
(DECKER.FIX------>DECKER.IMG)

(4) Modifications made to the X,Y and Z values in the documentation file (**DECKER.DOC**), associated with **DECKER.IMG**.

a) The numeric output option of *HISTO* was used to get the actual minimum Z value of the DEM (Z=1032). *DOCUMENT* was then used to edit the value (0 changed to 1030).

b) A UTM Grid template was used to find the minimum and maximum X and Y values from the Topo sheet. *DOCUMENT* was then used to change the values to correspond to the actual map boundaries.

Values from DEM file	Value from Topo sheet
Min. X: 352216.906250	352220.000000
Max. X: 362369.437500	362360.000000
Min. Y: 4984208.000000	4984220.000000
Max. Y: 4998344.500000	4998320.000000

COMMENTS:

JOB HISTORY for **PEARLSCH.IMG**

STEPS:

(1) The Digital Elevation Model (DEM) was downloaded from the 9-track tape sent by USGS, using the U of M mainframe (Lewis). The file (**PEARLSCH.DEM**) was placed on a 3.5" diskette and copied into C:\THESIS on my hard drive.

(2) *VAR2FIX* was used to create a fixed length 1024 byte format ASCII file which can be imported into IDRISI.
(PEARLSCH.DEM------>PEARLSCH.FIX)

(3) *DEMIDRIS* was then used to convert the above fixed length USGS DEM into an IDRISI format image, with the corresponding Documentation file.
(PEARLSCH.FIX------>PEARLSCH.IMG)

(4) Modifications made to the X,Y and Z values in the documentation file (**PEARLSCH.DOC**), associated with **PEARLSCH.IMG**.

a) The numeric output option of *HISTO* was used to get the actual minimum Z value of the DEM (Z=1055). *DOCUMENT* was then used to edit the value (0 changed to 1050).

b) A UTM Grid template was used to find the minimum and maximum X and Y values from the Topo sheet. *DOCUMENT* was then used to change the values to correspond to the actual map boundaries.

Values from DEM file	Value from Topo sheet
Min. X: 342364.718750	342360.000000
Max. X: 352538.718750	352540.000000
Min. Y: 4984428.500000	4984440.000000
Max. Y: 4998580.000000	4998560.000000

COMMENTS:

JOB HISTORY for **<u>RELIEF.IMG</u>**

Objective: Create a relief file (image), which encompasses all of the study area and archaeological sites.

STEPS:

(1) *CONCAT* was used to "merge" the two image files containing geographic information (**DECKER.IMG** and **PEARLSCH.IMG**).
a) **DECKER.IMG** was used as the reference file.
b) **PEARLSCH.IMG** was used as the paste image.
c) The bottom-right corner of **PEARLSCH.IMG** was selected, and pasted on the point of **DECKER.IMG** represented by COLUMN=10, ROW=461.

DECKER.IMG ------>
(plus) -------> **RELIEF.IMG**
PEARLSCH.IMG ------>

COMMENTS: The column and row information was obtained from the **DECKER.IMG** using the cursor function as the image was displayed in *COLOR A*.

JOB HISTORY for **DRELIEF.IMG**

Objective: Create an image which represents the slopes of surfaces on the **RELIEF.IMG**, which can be used to examine correlations with sites.

STEPS:

(1) *SURFACE* was used, with the [1] Slope option being chosen.

COMMENTS: Slope surfaces were calculated in degrees (Option 1).

JOB HISTORY for **<u>ARELIEF.IMG</u>**

Objective: **Create an image which represents the aspect of surfaces on the RELIEF.IMG, which can be used to examine correlations with sites.**

STEPS:

(1) ***SURFACE*** **was used, with the [2] Aspect option being chosen.**

COMMENTS: **Aspects are displayed as azimuths.**

JOB HISTORY for **DSITES.IMG**

Objective: Create an IDRISI image file containing all archaeological sites digitized from the Decker Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the site location information from and **DXSITE.VEC**.
a) New image created named **DSITES.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **DECKER.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *POINTRAS* was used to update **DSITES.IMG** with the point information contained in **DXSITE.VEC**.
a) Points in the blank image were updated using the identifier numbers assigned when they were digitized.

(3) *POLYRAS* was then used to update **DSITES.IMG** with the polygon site information contained in **DPSITE.VEC**.

(DSITES.IMG	**------>**	**DSITES.IMG)**
blank		all Decker sites

COMMENTS: This file will be used in conjunction with **PSITES.IMG** to create a geographic definition file, which can be combined with the artifact attribute values files. See Job History for **SITES.IMG**.

JOB HISTORY for **PSITES.IMG**

Objective: Create an IDRISI image file containing all archaeological sites digitized from the Decker Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the site location information from and **PXSITE.VEC**.
a) New image created named **PSITES.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **PEARLSCH.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *POINTRAS* was used to update **PSITES.IMG** with the point information contained in **PXSITE.VEC**.
a) Points in the blank image were updated using the identifier numbers assigned when they were digitized.

(3) *POLYRAS* was then used to update **PSITES.IMG** with the polygon site information contained in **PPSITE.VEC**.

(PSITES.IMG ------> PSITES.IMG)
blank all Pearl School sites

COMMENTS: This file will be used in conjunction with **DSITES.IMG** to create a geographic definition file, which can be combined with the artifact attribute values files. See Job History for **SITES.IMG**.

JOB HISTORY for **<u>SITES.IMG</u>**

Objective: Create a geographic definition file (image), which encompasses all of the study area and archaeological sites.

STEPS:

(1) *CONCAT* was used to "merge" the two image files containing archaeological site information (**DSITES.IMG** and **PSITES.IMG**).
a) **DSITES.IMG** was used as the reference file.
b) **PSITES.IMG** was used as the paste image.
c) The bottom-right corner of **PSITES.IMG** was selected, and pasted on the point of **DSITES.IMG** represented by COLUMN=10, ROW=461.

DSITES.IMG ----->
(plus) ------> **SITES.IMG**
PSITES.IMG ------>

COMMENTS: The column and row information was obtained from the **DECKER.IMG** using the cursor function as the image was displayed in *COLOR A*.

JOB HISTORY for **SITESM.IMG**

Objective: Create an image which can be used as a mask for all archaeological sites when doing statistical analysis.

STEPS:

(1) *RECLASS* was used to change all of the site numbers in **SITES.IMG** to one value (Value=1).

(2) *CONVERT* was used to change the data type from Integer to Byte, so the image can be used as a Boolean Mask.

COMMENTS:

JOB HISTORY for **DSTR.IMG**

Objective: Create an IDRISI image file containing all horology information digitized from the Decker Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the stream information from **DSTR.VEC**.
a) New image created named **DSTR.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **DECKER.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *LINERAS* was used to update **DSTR.IMG** with the line information contained in **DSTR.VEC**.
a) Lines in the blank image were updated using the identifier numbers assigned when the streams were digitized (ID=1).

(DSTR.IMG ------> DSTR.IMG)
blank all Decker streams

COMMENTS: This file will be used in conjunction with **PSTR.IMG** to create an image that will cover both topographic quadrangles.

JOB HISTORY for **PSTR.IMG**

Objective: Create an IDRISI image file containing all horology information digitized from the Decker Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the stream information from **PSTR.VEC**.
a) New image created named **PSTR.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **PEARLSCH.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *LINERAS* was used to update **PSTR.IMG** with the line information contained in **PSTR.VEC**.
a) Lines in the blank image were updated using the identifier numbers assigned when the streams were digitized (ID=1).

(PSTR.IMG ------> PSTR.IMG)
blank all Pearl School streams

COMMENTS: This file will be used in conjunction with **DSTR.IMG** to create an image that will cover both topographic quadrangles.

JOB HISTORY for **STREAMS.IMG**

Objective: Create an image file which contains all hydrology information from both quadrangles used in the study.

STEPS:

(1) *CONCAT* was used to "merge" the two image files containing hydrology information (**DSTR.IMG** and **PSTR.IMG**).
a) **DSTR.IMG** was used as the reference file.
b) **PSTR.IMG** was used as the paste image.
c) The bottom-right corner of **PSTR.IMG** was selected, and pasted on the point of **DSTR.IMG** represented by COLUMN=10, ROW=461.

DSTR.IMG ------>
(plus) ------> **STREAMS.IMG**
PSTR.IMG ------>

COMMENTS: The column and row information was obtained from the **DECKER.IMG** using the cursor function as the image was displayed in *COLOR A*.

JOB HISTORY for **DSTREAM.IMG**

Objective: Create an image that represents the distance to water for any point on the **RELIEF.IMG**, to be used in analyzing the correlation of sites to water.

STEPS:

(1) *DISTANCE* was used with **STREAMS.IMG** as the reference file.

STREAMS.IMG ----------> DSTREAM.IMG

(2) *RECLASS* was used in to create an image with five distance categories.

(3) *DOCUMENT* was then used to create the legend.

Category 1: 0-250 m
Category 2: 250-500 m
Category 3: 500-750 m
Category 4: 750-1000 m
Category 5: 1000-1250 m

DSTREAM.IMG ---------> KSTREAM.IMG

COMMENTS: Furthest distance to water for any point on **RELIEF.IMG** is just over 1085 meters.

JOB HISTORY for **DSURV.IMG**

Objective: Create an IDRISI image file containing all survey area information digitized from the Decker Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the survey area information from **DSURV.VEC**.
a) New image created named **DSURV.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **DECKER.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *LINERAS* was used to update **DSURV.IMG** with the line information contained in **DSURV.VEC**.
a) Lines in the blank image were updated using the identifier numbers assigned when the areas were digitized (ID=1).

(DSURV.IMG ------> **DSURV.IMG)**
blank all Decker Survey Areas

COMMENTS: This file will be used in conjunction with **PSURV.IMG** to create an image that will cover both topographic quadrangles.

JOB HISTORY for **PSURV.IMG**

Objective: Create an IDRISI image file containing all survey area information digitized from the Pearl School Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the survey area information from **PSURV.VEC**.
a) New image created named **PSURV.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **PEARLSCH.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *LINERAS* was used to update **PSURV.IMG** with the line information contained in **PSURV.VEC**.
a) Lines in the blank image were updated using the identifier numbers assigned when the areas were digitized (ID=1).

(PSURV.IMG ------> PSURV.IMG)
blank all Pearl School Survey Areas

COMMENTS: This file will be used in conjunction with **DSURV.IMG** to create an image that will cover both topographic quadrangles.

JOB HISTORY for **SURVEY.IMG**

Objective: Create an image file which contains all survey area information from both quadrangles used in the study.

STEPS:

(1) *CONCAT* was used to "merge" the two image files containing suvey area information (**DSURV.IMG** and **PSURV.IMG**).
a) **DSURV.IMG** was used as the reference file.
b) **PSURV.IMG** was used as the paste image.
c) The bottom-right corner of **PSURV.IMG** was selected, and pasted on the point of **DSURV.IMG** represented by COLUMN=10, ROW=461.

DSURV.IMG ------>
(plus) ------> **SURVEY.IMG**
PSURV.IMG ------>

COMMENTS: The column and row information was obtained from the **DECKER.IMG** using the cursor function as the image was displayed in *COLOR A*.

JOB HISTORY for **DSURVM.IMG**

Objective: Create an IDRISI image file which can be used as a mask, containing all survey area information digitized from the Decker Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the survey area information from **DSURVP.VEC**.
a) New image created named **DSURVM.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **DECKER.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *POLYRAS* was used to update **DSURVM.IMG** with the polygon information contained in **DSURVP.VEC**.
a) The blank image was updated using the identifier numbers assigned when the areas were digitized (ID=1).

(DSURVM.IMG ------> DSURVP.IMG)
blank — all Decker Survey Areas

COMMENTS: This file will be used in conjunction with **PSURVM.IMG** to create an image that will cover both topographic quadrangles.

JOB HISTORY for **PSURVM.IMG**

Objective: Create an IDRISI image file which can be used as a mask, containing all survey area information digitized from the Pearl School Quadrangle.

STEPS:

(1) *INITIAL* was used to create a blank image, which could be updated with the survey area information from **PSURVP.VEC**.
a) New image created named **PSURVM.IMG**.
b) Image values set at (0).
c) Reference parameters were copied from **PEARLSCH.IMG** (ie. number of Rows, Columns, ref. system).

(2) Once the blank image was created, *POLYRAS* was used to update **PSURVM.IMG** with the polygon information contained in **PSURVP.VEC**.
a) The blank image was updated using the identifier numbers assigned when the areas were digitized (ID=1).

(PSURVM.IMG ------> PSURVP.IMG)
blank all Pearl School Survey Areas

COMMENTS: This file will be used in conjunction with **DSURVM.IMG** to create an image that will cover both topographic quadrangles.

JOB HISTORY for **<u>SURVEYM.IMG</u>**

Objective: Create an image file to be used as a mask which contains all survey area information from both quadrangles used in the study.

STEPS:

(1) *CONCAT* was used to "merge" the two image files containing suvey area information (**DSURVM.IMG** and **PSURVM.IMG**).
a) **DSURVM.IMG** was used as the reference file.
b) **PSURVM.IMG** was used as the paste image.
c) The bottom-right corner of **PSURVM.IMG** was selected, and pasted on the point of **DSURVM.IMG** represented by COLUMN=10, ROW=461.

DSURVM.IMG ------>
(plus) -------> **SURVEYM.IMG**
PSURVM.IMG ------>

(2) *CONVERT* was then used to change the data type from integer to byte, so that the image can be used as a Boolean Mask.

COMMENTS: The column and row information was obtained from the **DECKER.IMG** using the cursor function as the image was displayed in *COLOR A*.

JOB HISTORY for **ALL ATTRIBUTE VALUES FILES**

Objective: Create attribute values files in IDRISI format for each of the artifact classes used in study.

List of Attribute Values Files:

ATIFACTS.PRN ...Spreadsheet with identifiers and all artifact classes

FLAKES.VAL ....Two column file with identifiers and debitage totals

SCRAPERS.VAL ...Two column file with identifiers and scraper totals

POINTS.VAL ....Two column file with identifiers and projectile point totals

TYPE.VAL ....Two column file with identifiers and site type classification

STEPS:

(1) *QUATTRO PRO for WINDOWS* was used to create a spreadsheet with 5 columns: 1- Identifier, 2- Flakes, 3- Scrapers, 4- Points, 5- Type.
a) Totals for each of the artifact classes were entered for all of the 460 map location identifiers.

(2) Using *QUATTRO PRO's* Print\File option each of the above two column ASCII format files (.prn) were created by selecting the identifier column and the appropriate artifact class column.

(3) Each of the (.prn) files was edited using *WORD PERFECT 6.0a.*
a) Any extra pages created when the files were printed to files were deleted. Column headers were also deleted at this time.
b) File extensions were changed from (.prn) to the IDRISI format (.val).

(4) Documentation files (.dvl) were created for each of the values files (.val) using the IDRISI module *DOCUMENT.*

COMMENTS: Using *ASSIGN* each of the attribute values files can now be used in conjunction with **SITES.IMG** to create images of the artifact distributions for individual classes.

JOB HISTORY for **ALL VECTOR FILES**

Objective: Digitize and create IDRISI vector files for all information compiled for the thesis study area.

List of Vector files:

DSTR.VEC .... Decker Quadrangle Hydrology (chains)
PSTR.VEC .... Pearl School Quadrangle Hydrology (chains)

DVEG.VEC .... Vegetation areas from Decker Quad. (polygons)
PVEG.VEC .... Vegetation areas from Pearl School Quad. (polygons)

DSURV.VEC .... Survey areas from Decker Quad. (chains)
PSURV.VEC .... Survey areas from Pearl School Quad. (chains)

PXSITE.VEC .... Arch sites from Pearl School Quad. (points)
DXSITE.VEC .... Arch sites from Decker Quad. (points)

DANT.VEC .... Antelope major use areas, Decker Quad. (polygons)
DDEER.VEC .... Deer major use areas, Decker Quad. (polygons)

PANT.VEC .... Antelope major use areas, Pearl School Quad. (polygons)
PDEER.VEC .... Deer major use areas, Pearl School Quad. (polygons)

STEPS:

(1) The files listed above were first digitized using the program ROOTS as polygons, points, or chains. The artifact locations were also assigned a numerical ID (Smithsonian sequence, or inventory report number) at this time.

(2) Using the import/export module of the digitizing program, each 'layer' was saved as a ROOTS (.rts) file, then exported in IDRISI vector format (.vec), including the documentation file (.dvc).

COMMENTS: The vector files can then be 'overlaid' on image files for display using *COLOR A*, or converted into image files themselves, using *INITIAL*, *POINTRAS*, *LINERAS*, and *POLYRAS*.

GETTING DEM FILES FROM 9-TRACK TAPE ONTO THE LEWIS SYSTEM

When you submit a tape to CIS it will be given a name or number (referred to as a volume ID). In our case, the volume ID is **Glen**. The volume ID must be used when you mount the tape to perform any operations on it (such as writing or reading files, on or off the tape).

When you submit the tape for the first time, CIS will ask if you want the tape internally labeled. If the tape comes from another computer system, **DO NOT** have it labeled on the system. If you label it, the information on the tape will be destroyed.

First Log on to Lewis, then change to the Directory in which you want to download the files.

Mounting the tape:

Use a command in the following form:

$ mount mu mydata rls /foreign/comment="tape ID mydata"

"mount mu" indicates that you want to mount a tape on the device "mu" (which refers to a tape drive, i.e. magnetic unit).

"mydata" is the volume ID.

The phrase "rls" is referred to as a logical definition. It is an abbreviation you assign to the tape drive; it is helpful to use your initials. In our case the "rls" was **vp**, having been assigned by Vicki Pengelly.

The qualifier "/foreign" is required because we are using what they consider to be a foreign tape.

The "/comment" qualifier sends a comment to the computer operator. The "/foreign" qualifier prevents the operator from determining the volume ID; therefore a comment is required to tell the operator which tape to mount.

Once you issue the mount command, you should see a message on the screen indicating that the request has been sent to the operator. Before proceeding, wait for another message indicating that the tape has been mounted successfully. If there are any problems you will receive an error message.

Reading the files from a tape using the Foreign Tape Program (FTP):

Start the FTP program with the command shown below. After you start the program, it will ask you for your device name (the logical definition you assigned to the tape when you mounted it).

$ run um$lib:ftp

DEVICE: rls

The FTP program will give you the "FTP>" prompt.

On the 9-Track tape, each DEM contains three files; a header, the elevation data, and a trailer. This is because the FTP program was used to write the files on the tape by USGS. If the headers and trailers are needed, they can be appended back onto the data file. For our purposes we only need the elevation data file. The way the FTP program works, the tape must be read from beginning to end, with each file being downloaded in sequence.

The command for retreiving a file is as follows:

FTP> read /rec=1024/block=8192 filename

The qualifier "rec=" specifies the record size. For DEM's, the proper record size is 1024.

"block=" specifies the block size. 8192 is the maximum byte length of a DEM file.

"filename" In practice any file name recognized by the VMS system can be used. I used file names such as: one.dat, two.dat, three.dat, ect., in order to keep track of were I was in the file sequence.

A message something like "no more files processed" will appear, after the last file has been downloaded.

When you are finished downloading the files, **EXIT** the FTP program.

After returning to Lewis, be sure to dismount the tape before you log out. For example:

$ dismount rls

APPENDIX D

SITE TYPE SUMMARY STATISTICS

SUMMARY STATISTICS

TYPE: Base Camp Sites

ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	.00	2	6.1	6.1	6.1
	44.94	2	6.1	6.1	12.1
	56.25	1	3.0	3.0	15.2
	90.00	1	3.0	3.0	18.2
	101.33	1	3.0	3.0	21.2
	104.06	1	3.0	3.0	24.2
	105.98	1	3.0	3.0	27.3
	108.47	1	3.0	3.0	30.3
	116.61	2	6.1	6.1	36.4
	168.71	1	3.0	3.0	39.4
	175.25	1	3.0	3.0	42.4
	179.95	1	3.0	3.0	45.5
	180.00	4	12.1	12.1	57.6
	187.11	1	3.0	3.0	60.6
	190.28	1	3.0	3.0	63.6
	191.29	2	6.1	6.1	69.7
	194.01	1	3.0	3.0	72.7
	198.40	3	9.1	9.1	81.8
	209.69	1	3.0	3.0	84.8
	213.63	1	3.0	3.0	87.9
	281.33	1	3.0	3.0	90.9
	288.47	1	3.0	3.0	93.9
	318.87	1	3.0	3.0	97.0
	348.71	1	3.0	3.0	100.0
	Total	33	100.0	100.0	

Mean	161.909	Std err	14.370	Median	180.000
Mode	180.000	Std dev	82.548	Variance	6814.127
Kurtosis	.154	S E Kurt	.798	Skewness	.029
S E Skew	.409	Range	348.713	Minimum	.000
Maximum	348.713	Sum	5343.004		
Valid cases	33	Missing cases	0		

SUMMARY STATISTICS

TYPE: Base Camp Sites

DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	42.38	2	6.1	6.1	6.1
	60.00	2	6.1	6.1	12.1
	89.81	3	9.1	9.1	21.2
	94.85	1	3.0	3.0	24.2
	108.01	2	6.1	6.1	30.3
	119.75	1	3.0	3.0	33.3
	120.00	1	3.0	3.0	36.4
	127.14	2	6.1	6.1	42.4
	133.94	1	3.0	3.0	45.5
	149.80	1	3.0	3.0	48.5
	174.83	1	3.0	3.0	51.5
	182.11	1	3.0	3.0	54.5
	189.38	1	3.0	3.0	57.6
	189.70	1	3.0	3.0	60.6
	216.02	1	3.0	3.0	63.6
	241.48	1	3.0	3.0	66.7
	247.36	1	3.0	3.0	69.7
	271.09	1	3.0	3.0	72.7
	282.59	2	6.1	6.1	78.8
	284.06	1	3.0	3.0	81.8
	318.52	1	3.0	3.0	84.8
	334.72	1	3.0	3.0	87.9
	339.05	2	6.1	6.1	93.9
	421.07	1	3.0	3.0	97.0
	445.15	1	3.0	3.0	100.0
		-------	-------	-------	
	Total	33	100.0	100.0	

Mean	191.563	Std err	19.274	Median	174.831
Mode	89.810	Std dev	110.719	Variance	12258.708
Kurtosis	-.543	S E Kurt	.798	Skewness	.611
S E Skew	.409	Range	402.765	Minimum	42.382
Maximum	445.146	Sum	6321.594		
Valid cases	33	Missing cases	0		

SUMMARY STATISTICS

TYPE: Base Camp Sites

SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	.96	3	9.1	9.1	9.1
	2.14	1	3.0	3.0	12.1
	2.70	1	3.0	3.0	15.2
	2.87	2	6.1	6.1	21.2
	3.02	1	3.0	3.0	24.2
	3.44	1	3.0	3.0	27.3
	3.82	1	3.0	3.0	30.3
	3.93	1	3.0	3.0	33.3
	3.94	1	3.0	3.0	36.4
	4.26	1	3.0	3.0	39.4
	4.86	2	6.1	6.1	45.5
	4.87	3	9.1	9.1	54.5
	5.71	1	3.0	3.0	57.6
	6.02	1	3.0	3.0	60.6
	6.03	2	6.1	6.1	66.7
	6.73	1	3.0	3.0	69.7
	6.92	1	3.0	3.0	72.7
	7.67	1	3.0	3.0	75.8
	7.67	1	3.0	3.0	78.8
	9.67	1	3.0	3.0	81.8
	10.06	1	3.0	3.0	84.8
	10.23	1	3.0	3.0	87.9
	10.58	1	3.0	3.0	90.9
	11.37	1	3.0	3.0	93.9
	11.91	1	3.0	3.0	97.0
	86.89	1	3.0	3.0	100.0
	Total	33	100.0	100.0	

Mean	7.989	Std err	2.521	Median	4.867
Mode	.957	Std dev	14.482	Variance	209.736
Kurtosis	29.919	S E Kurt	.798	Skewness	5.355
S E Skew	.409	Range	85.930	Minimum	.957
Maximum	86.887	Sum	263.652		
Valid cases	33	Missing cases	0		

SUMMARY STATISTICS

TYPE: Chipping Station Sites
ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	-1.00	2	1.6	1.6	1.6
	.00	6	4.8	4.8	6.5
	4.08	1	.8	.8	7.3
	11.29	1	.8	.8	8.1
	14.90	1	.8	.8	8.9
	15.91	2	1.6	1.6	10.5
	18.40	1	.8	.8	11.3
	19.94	1	.8	.8	12.1
	21.76	1	.8	.8	12.9
	26.52	4	3.2	3.2	16.1
	31.95	1	.8	.8	16.9
	33.63	1	.8	.8	17.7
	38.60	1	.8	.8	18.5
	41.57	1	.8	.8	19.4
	44.94	4	3.2	3.2	22.6
	56.25	4	3.2	3.2	25.8
	57.94	1	.8	.8	26.6
	60.89	1	.8	.8	27.4
	63.39	3	2.4	2.4	29.8
	68.16	1	.8	.8	30.6
	71.53	3	2.4	2.4	33.1
	75.94	1	.8	.8	33.9
	80.52	1	.8	.8	34.7
	81.85	1	.8	.8	35.5
	90.00	11	8.9	8.9	44.4
	96.35	1	.8	.8	45.2
	101.33	1	.8	.8	46.0
	105.29	1	.8	.8	46.8
	108.47	2	1.6	1.6	48.4
	116.61	2	1.6	1.6	50.0
	123.75	1	.8	.8	50.8
	125.60	1	.8	.8	51.6
	128.72	1	.8	.8	52.4
	129.87	1	.8	.8	53.2
	135.06	2	1.6	1.6	54.8
	143.19	1	.8	.8	55.6

SUMMARY STATISTICS

TYPE: Chipping Station Sites
ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	146.37	3	2.4	2.4	58.1
	149.09	1	.8	.8	58.9
	153.48	2	1.6	1.6	60.5
	156.08	1	.8	.8	61.3
	161.60	1	.8	.8	62.1
	162.93	1	.8	.8	62.9
	164.09	1	.8	.8	63.7
	165.99	2	1.6	1.6	65.3
	173.67	1	.8	.8	66.1
	174.82	1	.8	.8	66.9
	180.00	7	5.6	5.6	72.6
	188.11	1	.8	.8	73.4
	191.29	2	1.6	1.6	75.0
	202.58	1	.8	.8	75.8
	203.15	1	.8	.8	76.6
	206.52	2	1.6	1.6	78.2
	210.91	1	.8	.8	79.0
	211.95	1	.8	.8	79.8
	213.63	1	.8	.8	80.6
	224.94	4	3.2	3.2	83.9
	233.07	1	.8	.8	84.7
	238.98	1	.8	.8	85.5
	251.53	2	1.6	1.6	87.1
	263.65	1	.8	.8	87.9
	270.00	1	.8	.8	88.7
	277.14	1	.8	.8	89.5
	290.60	1	.8	.8	90.3
	296.61	1	.8	.8	91.1
	301.02	1	.8	.8	91.9
	302.06	1	.8	.8	92.7
	315.06	1	.8	.8	93.5
	321.40	2	1.6	1.6	95.2
	326.37	1	.8	.8	96.0
	333.48	2	1.6	1.6	97.6
	352.89	2	1.6	1.6	99.2
	354.30	1	.8	.8	100.0

SUMMARY STATISTICS

TYPE: Chipping Station Sites

ASPECT

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Total	124	100.0	100.0

Mean	134.393	Std err	8.706	Median	120.180
Mode	90.000	Std dev	96.948	Variance	9398.967
Kurtosis	-.583	S E Kurt	.431	Skewness	.541
S E Skew	.217	Range	355.301	Minimum	-1.000
Maximum	354.301	Sum	16664.705		

Valid cases 124 Missing cases 0

SUMMARY STATISTICS

TYPE: Chipping Station Sites

DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	.00	4	3.2	3.2	3.2
	29.94	10	8.1	8.1	11.3
	30.00	2	1.6	1.6	12.9
	42.38	4	3.2	3.2	16.1
	59.87	5	4.0	4.0	20.2
	60.00	1	.8	.8	21.0
	66.97	7	5.6	5.6	26.6
	67.05	4	3.2	3.2	29.8
	84.76	2	1.6	1.6	31.5
	89.81	1	.8	.8	32.3
	94.69	4	3.2	3.2	35.5
	108.01	3	2.4	2.4	37.9
	119.75	3	2.4	2.4	40.3
	120.00	3	2.4	2.4	42.7
	123.45	3	2.4	2.4	45.2
	123.68	3	2.4	2.4	47.6
	127.14	1	.8	.8	48.4
	133.94	1	.8	.8	49.2
	134.11	3	2.4	2.4	51.6
	149.68	2	1.6	1.6	53.2
	149.80	3	2.4	2.4	55.6
	149.89	1	.8	.8	56.5
	161.26	2	1.6	1.6	58.1
	161.51	1	.8	.8	58.9
	169.53	2	1.6	1.6	60.5
	174.66	2	1.6	1.6	62.1
	174.83	1	.8	.8	62.9
	179.62	2	1.6	1.6	64.5
	180.00	2	1.6	1.6	66.1
	182.47	1	.8	.8	66.9
	191.85	1	.8	.8	67.7
	209.56	2	1.6	1.6	69.4
	211.91	1	.8	.8	70.2
	216.19	1	.8	.8	71.0
	228.07	1	.8	.8	71.8
	228.40	1	.8	.8	72.6

SUMMARY STATISTICS

TYPE: Chipping Station Sites
DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	234.02	2	1.6	1.6	74.2
	234.10	1	.8	.8	75.0
	239.49	2	1.6	1.6	76.6
	241.36	1	.8	.8	77.4
	241.86	1	.8	.8	78.2
	254.29	1	.8	.8	79.0
	257.89	1	.8	.8	79.8
	268.21	1	.8	.8	80.6
	271.09	2	1.6	1.6	82.3
	276.03	1	.8	.8	83.1
	276.56	1	.8	.8	83.9
	295.36	1	.8	.8	84.7
	299.37	1	.8	.8	85.5
	308.72	1	.8	.8	86.3
	322.52	2	1.6	1.6	87.9
	324.29	1	.8	.8	88.7
	349.31	2	1.6	1.6	90.3
	360.49	1	.8	.8	91.1
	361.86	1	.8	.8	91.9
	365.94	1	.8	.8	92.7
	394.57	1	.8	.8	93.5
	417.08	1	.8	.8	94.4
	423.82	1	.8	.8	95.2
	445.47	1	.8	.8	96.0
	456.13	1	.8	.8	96.8
	474.02	1	.8	.8	97.6
	512.45	1	.8	.8	98.4
	522.88	1	.8	.8	99.2
	617.43	1	.8	.8	100.0
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	Total	124	100.0	100.0	

Mean	167.883	Std err	11.389	Median	134.107
Mode	29.937	Std dev	126.825	Variance	16084.455
Kurtosis	1.023	S E Kurt	.431	Skewness	1.113
S E Skew	.217	Range	617.430	Minimum	.000
Maximum	617.430	Sum	20817.526		
Valid cases	124	Missing cases	0		

SUMMARY STATISTICS

TYPE: Chipping Station Sites
SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	.00	2	1.6	1.6	1.6
	.95	2	1.6	1.6	3.2
	.96	3	2.4	2.4	5.6
	1.35	2	1.6	1.6	7.3
	1.91	4	3.2	3.2	10.5
	1.91	1	.8	.8	11.3
	2.14	5	4.0	4.0	15.3
	2.14	6	4.8	4.8	20.2
	2.70	3	2.4	2.4	22.6
	2.86	3	2.4	2.4	25.0
	2.87	1	.8	.8	25.8
	3.02	5	4.0	4.0	29.8
	3.44	4	3.2	3.2	33.1
	3.44	4	3.2	3.2	36.3
	3.82	1	.8	.8	37.1
	3.93	1	.8	.8	37.9
	3.94	2	1.6	1.6	39.5
	4.05	2	1.6	1.6	41.1
	4.27	3	2.4	2.4	43.5
	4.76	1	.8	.8	44.4
	4.77	1	.8	.8	45.2
	4.77	1	.8	.8	46.0
	4.77	1	.8	.8	46.8
	4.86	1	.8	.8	47.6
	4.87	2	1.6	1.6	49.2
	5.13	1	.8	.8	50.0
	5.14	1	.8	.8	50.8
	5.39	1	.8	.8	51.6
	5.55	2	1.6	1.6	53.2
	5.56	2	1.6	1.6	54.8
	5.71	1	.8	.8	55.6
	5.72	1	.8	.8	56.5
	5.79	1	.8	.8	57.3
	6.02	2	1.6	1.6	58.9
	6.03	2	1.6	1.6	60.5
	6.10	1	.8	.8	61.3

SUMMARY STATISTICS

TYPE: Chipping Station Sites
SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	6.10	3	2.4	2.4	63.7
	6.38	1	.8	.8	64.5
	6.39	1	.8	.8	65.3
	6.67	2	1.6	1.6	66.9
	6.72	1	.8	.8	67.7
	6.74	1	.8	.8	68.5
	6.86	1	.8	.8	69.4
	6.86	1	.8	.8	70.2
	6.93	2	1.6	1.6	71.8
	7.25	1	.8	.8	72.6
	7.42	1	.8	.8	73.4
	7.61	1	.8	.8	74.2
	7.65	1	.8	.8	75.0
	7.67	2	1.6	1.6	76.6
	8.11	1	.8	.8	77.4
	8.16	1	.8	.8	78.2
	8.58	1	.8	.8	79.0
	8.60	1	.8	.8	79.8
	8.94	2	1.6	1.6	81.5
	8.95	2	1.6	1.6	83.1
	9.34	1	.8	.8	83.9
	9.38	2	1.6	1.6	85.5
	9.46	1	.8	.8	86.3
	9.53	1	.8	.8	87.1
	9.67	1	.8	.8	87.9
	9.74	1	.8	.8	88.7
	10.41	1	.8	.8	89.5
	10.45	1	.8	.8	90.3
	10.76	1	.8	.8	91.1
	11.06	1	.8	.8	91.9
	11.33	1	.8	.8	92.7
	11.36	1	.8	.8	93.5
	12.25	1	.8	.8	94.4
	12.80	1	.8	.8	95.2
	13.19	1	.8	.8	96.0
	13.28	1	.8	.8	96.8
	13.67	1	.8	.8	97.6

SUMMARY STATISTICS

TYPE: Chipping Station Sites

SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	14.53	1	.8	.8	98.4
	16.75	1	.8	.8	99.2
	16.80	1	.8	.8	100.0
	Total	124	100.0	100.0	

Mean	5.672	Std err	.319	Median	5.134
Mode	2.138	Std dev	3.554	Variance	12.633
Kurtosis	.533	S E Kurt	.431	Skewness	.882
S E Skew	.217	Range	16.797	Minimum	.000
Maximum	16.797	Sum	703.310		

Valid cases 124 Missing cases 0

SUMMARY STATISTICS

TYPE: Hunting Sites
ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	-1.00	2	3.2	3.2	3.2
	.00	2	3.2	3.2	6.3
	22.58	1	1.6	1.6	7.9
	26.52	2	3.2	3.2	11.1
	35.48	2	3.2	3.2	14.3
	40.54	1	1.6	1.6	15.9
	41.57	1	1.6	1.6	17.5
	44.94	1	1.6	1.6	19.0
	56.25	1	1.6	1.6	20.6
	63.39	3	4.8	4.8	25.4
	67.34	1	1.6	1.6	27.0
	78.67	1	1.6	1.6	28.6
	84.79	1	1.6	1.6	30.2
	90.00	2	3.2	3.2	33.3
	97.14	1	1.6	1.6	34.9
	101.33	1	1.6	1.6	36.5
	103.02	1	1.6	1.6	38.1
	108.47	3	4.8	4.8	42.9
	116.61	1	1.6	1.6	44.4
	119.11	1	1.6	1.6	46.0
	119.80	2	3.2	3.2	49.2
	121.02	1	1.6	1.6	50.8
	135.06	2	3.2	3.2	54.0
	146.37	1	1.6	1.6	55.6
	153.48	2	3.2	3.2	58.7
	161.60	3	4.8	4.8	63.5
	180.00	4	6.3	6.3	69.8
	180.09	1	1.6	1.6	71.4
	180.29	1	1.6	1.6	73.0
	188.11	2	3.2	3.2	76.2
	189.44	1	1.6	1.6	77.8
	191.29	1	1.6	1.6	79.4
	198.40	3	4.8	4.8	84.1
	206.52	1	1.6	1.6	85.7
	221.57	1	1.6	1.6	87.3
	224.94	2	3.2	3.2	90.5

SUMMARY STATISTICS

TYPE: Hunting Sites

ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	231.28	1	1.6	1.6	92.1
	240.20	1	1.6	1.6	93.7
	253.27	1	1.6	1.6	95.2
	269.54	1	1.6	1.6	96.8
	323.19	1	1.6	1.6	98.4
	333.48	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

Mean	132.092	Std err	10.024	Median	121.017
Mode	180.000	Std dev	79.564	Variance	6330.478
Kurtosis	-.357	S E Kurt	.595	Skewness	.254
S E Skew	.302	Range	334.483	Minimum	-1.000
Maximum	333.483	Sum	8321.802		

Valid cases 63 Missing cases 0

SUMMARY STATISTICS

TYPE: Hunting Sites
DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	.00	1	1.6	1.6	1.6
	29.94	5	7.9	7.9	9.5
	30.00	3	4.8	4.8	14.3
	42.38	2	3.2	3.2	17.5
	59.87	3	4.8	4.8	22.2
	60.00	2	3.2	3.2	25.4
	66.97	1	1.6	1.6	27.0
	67.05	2	3.2	3.2	30.2
	84.76	2	3.2	3.2	33.3
	89.81	1	1.6	1.6	34.9
	90.00	2	3.2	3.2	38.1
	94.69	1	1.6	1.6	39.7
	108.01	3	4.8	4.8	44.4
	123.68	2	3.2	3.2	47.6
	149.68	1	1.6	1.6	49.2
	149.80	1	1.6	1.6	50.8
	150.00	1	1.6	1.6	52.4
	161.26	1	1.6	1.6	54.0
	161.51	1	1.6	1.6	55.6
	174.83	1	1.6	1.6	57.1
	179.62	1	1.6	1.6	58.7
	191.85	1	1.6	1.6	60.3
	211.91	1	1.6	1.6	61.9
	216.19	2	3.2	3.2	65.1
	217.98	1	1.6	1.6	66.7
	228.40	1	1.6	1.6	68.3
	240.00	1	1.6	1.6	69.8
	241.36	1	1.6	1.6	71.4
	241.74	1	1.6	1.6	73.0
	241.86	1	1.6	1.6	74.6
	246.89	1	1.6	1.6	76.2
	254.29	1	1.6	1.6	77.8
	257.71	1	1.6	1.6	79.4
	269.43	1	1.6	1.6	81.0
	271.65	1	1.6	1.6	82.5
	276.34	1	1.6	1.6	84.1

SUMMARY STATISTICS

TYPE: Hunting Sites

DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	299.59	1	1.6	1.6	85.7
	299.77	1	1.6	1.6	87.3
	351.05	1	1.6	1.6	88.9
	365.68	1	1.6	1.6	90.5
	365.94	1	1.6	1.6	92.1
	375.29	1	1.6	1.6	93.7
	425.84	1	1.6	1.6	95.2
	445.88	1	1.6	1.6	96.8
	510.25	1	1.6	1.6	98.4
	569.59	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

Mean	172.856	Std err	16.427	Median	149.797
Mode	29.937	Std dev	130.383	Variance	16999.687
Kurtosis	.554	S E Kurt	.595	Skewness	.960
S E Skew	.302	Range	569.586	Minimum	.000
Maximum	569.586	Sum	10889.922		

Valid cases 63 Missing cases 0

SUMMARY STATISTICS

TYPE: Hunting Sites
SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	.00	2	3.2	3.2	3.2
	.95	1	1.6	1.6	4.8
	.96	1	1.6	1.6	6.3
	1.35	4	6.3	6.3	12.7
	1.91	1	1.6	1.6	14.3
	2.14	1	1.6	1.6	15.9
	2.14	3	4.8	4.8	20.6
	2.87	1	1.6	1.6	22.2
	3.02	2	3.2	3.2	25.4
	3.02	3	4.8	4.8	30.2
	3.44	1	1.6	1.6	31.7
	3.81	1	1.6	1.6	33.3
	4.05	1	1.6	1.6	34.9
	4.27	1	1.6	1.6	36.5
	4.77	1	1.6	1.6	38.1
	4.77	1	1.6	1.6	39.7
	4.86	2	3.2	3.2	42.9
	4.87	1	1.6	1.6	44.4
	5.55	1	1.6	1.6	46.0
	5.80	1	1.6	1.6	47.6
	6.03	2	3.2	3.2	50.8
	6.10	1	1.6	1.6	52.4
	6.38	2	3.2	3.2	55.6
	6.39	1	1.6	1.6	57.1
	6.74	2	3.2	3.2	60.3
	6.86	1	1.6	1.6	61.9
	7.65	1	1.6	1.6	63.5
	7.66	3	4.8	4.8	68.3
	8.17	2	3.2	3.2	71.4
	8.75	1	1.6	1.6	73.0
	8.99	1	1.6	1.6	74.6
	9.74	1	1.6	1.6	76.2
	9.87	1	1.6	1.6	77.8
	10.41	2	3.2	3.2	81.0
	10.43	1	1.6	1.6	82.5
	10.57	1	1.6	1.6	84.1

SUMMARY STATISTICS

TYPE: Hunting Sites

SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	11.36	2	3.2	3.2	87.3
	12.23	1	1.6	1.6	88.9
	12.25	1	1.6	1.6	90.5
	12.54	1	1.6	1.6	92.1
	14.63	1	1.6	1.6	93.7
	14.79	1	1.6	1.6	95.2
	87.07	1	1.6	1.6	96.8
	87.18	1	1.6	1.6	98.4
	87.23	1	1.6	1.6	100.0
	Total	63	100.0	100.0	

Mean	9.861	Std err	2.244	Median	6.029
Mode	1.352	Std dev	17.809	Variance	317.159
Kurtosis	15.785	S E Kurt	.595	Skewness	4.051
S E Skew	.302	Range	87.230	Minimum	.000
Maximum	87.230	Sum	621.213		

Valid cases 63 Missing cases 0

SUMMARY STATISTICS

TYPE: Lithic Worhshop Sites
ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	-1.00	1	1.9	1.9	1.9
	.00	2	3.8	3.8	5.7
	9.44	1	1.9	1.9	7.5
	26.52	1	1.9	1.9	9.4
	33.63	2	3.8	3.8	13.2
	35.48	1	1.9	1.9	15.1
	38.60	1	1.9	1.9	17.0
	39.75	1	1.9	1.9	18.9
	44.94	3	5.7	5.7	24.5
	47.43	1	1.9	1.9	26.4
	52.07	1	1.9	1.9	28.3
	53.07	2	3.8	3.8	32.1
	53.91	1	1.9	1.9	34.0
	57.94	2	3.8	3.8	37.7
	65.99	1	1.9	1.9	39.6
	74.02	1	1.9	1.9	41.5
	90.00	3	5.7	5.7	47.2
	99.48	1	1.9	1.9	49.1
	123.75	1	1.9	1.9	50.9
	135.06	1	1.9	1.9	52.8
	139.46	1	1.9	1.9	54.7
	146.37	1	1.9	1.9	56.6
	153.48	1	1.9	1.9	58.5
	156.85	1	1.9	1.9	60.4
	161.60	1	1.9	1.9	62.3
	165.99	1	1.9	1.9	64.2
	180.00	2	3.8	3.8	67.9
	189.44	1	1.9	1.9	69.8
	195.91	1	1.9	1.9	71.7
	198.40	1	1.9	1.9	73.6
	201.76	1	1.9	1.9	75.5
	206.52	2	3.8	3.8	79.2
	216.81	1	1.9	1.9	81.1
	226.41	1	1.9	1.9	83.0
	229.34	1	1.9	1.9	84.9
	230.13	1	1.9	1.9	86.8

SUMMARY STATISTICS

TYPE: Lithic Worhshop Sites

ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	231.57	1	1.9	1.9	88.7
	237.47	1	1.9	1.9	90.6
	270.00	2	3.8	3.8	94.3
	288.47	1	1.9	1.9	96.2
	291.84	1	1.9	1.9	98.1
	336.85	1	1.9	1.9	100.0
	Total	53	100.0	100.0	

Mean	128.411	Std err	12.432	Median	123.746
Mode	44.939	Std dev	90.504	Variance	8191.052
Kurtosis	-1.008	S E Kurt	.644	Skewness	.366
S E Skew	.327	Range	337.845	Minimum	-1.000
Maximum	336.845	Sum	6805.806		

* Multiple modes exist. The smallest value is shown.

Valid cases 53 Missing cases 0

SUMMARY STATISTICS

TYPE: Lithic Workshop Sites
DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	29.94	1	1.9	1.9	1.9
	42.38	3	5.7	5.7	7.5
	59.87	1	1.9	1.9	9.4
	60.00	1	1.9	1.9	11.3
	66.97	2	3.8	3.8	15.1
	84.76	4	7.5	7.5	22.6
	94.69	3	5.7	5.7	28.3
	120.00	1	1.9	1.9	30.2
	123.45	1	1.9	1.9	32.1
	123.68	3	5.7	5.7	37.7
	133.94	1	1.9	1.9	39.6
	134.11	1	1.9	1.9	41.5
	149.68	1	1.9	1.9	43.4
	150.00	1	1.9	1.9	45.3
	161.26	1	1.9	1.9	47.2
	161.51	1	1.9	1.9	49.1
	174.66	1	1.9	1.9	50.9
	174.83	1	1.9	1.9	52.8
	191.94	1	1.9	1.9	54.7
	200.91	2	3.8	3.8	58.5
	211.91	1	1.9	1.9	60.4
	234.02	1	1.9	1.9	62.3
	240.00	1	1.9	1.9	64.2
	241.48	1	1.9	1.9	66.0
	271.65	1	1.9	1.9	67.9
	276.34	1	1.9	1.9	69.8
	276.56	1	1.9	1.9	71.7
	296.67	1	1.9	1.9	73.6
	299.37	1	1.9	1.9	75.5
	300.00	1	1.9	1.9	77.4
	305.32	1	1.9	1.9	79.2
	308.72	1	1.9	1.9	81.1
	312.60	1	1.9	1.9	83.0
	334.84	1	1.9	1.9	84.9
	360.49	1	1.9	1.9	86.8
	364.22	1	1.9	1.9	88.7

SUMMARY STATISTICS

TYPE: Lithic Workshop Sites

DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	390.33	1	1.9	1.9	90.6
	401.81	1	1.9	1.9	92.5
	407.75	1	1.9	1.9	94.3
	417.08	1	1.9	1.9	96.2
	428.79	1	1.9	1.9	98.1
	432.03	1	1.9	1.9	100.0
	Total	53	100.0	100.0	

Mean	199.890	Std err	16.418	Median	174.657
Mode	84.763	Std dev	119.522	Variance	14285.536
Kurtosis	-.999	S E Kurt	.644	Skewness	.450
S E Skew	.327	Range	402.097	Minimum	29.937
Maximum	432.033	Sum	10594.189		

Valid cases 53 Missing cases 0

SUMMARY STATISTICS

TYPE: Lithic Workshop Sites
SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	.00	1	1.9	1.9	1.9
	.96	1	1.9	1.9	3.8
	1.35	2	3.8	3.8	7.5
	1.91	2	3.8	3.8	11.3
	2.14	1	1.9	1.9	13.2
	2.86	1	1.9	1.9	15.1
	2.87	1	1.9	1.9	17.0
	3.02	2	3.8	3.8	20.8
	3.44	1	1.9	1.9	22.6
	3.44	1	1.9	1.9	24.5
	3.81	1	1.9	1.9	26.4
	3.82	1	1.9	1.9	28.3
	3.94	1	1.9	1.9	30.2
	4.76	1	1.9	1.9	32.1
	4.77	2	3.8	3.8	35.8
	4.77	1	1.9	1.9	37.7
	5.13	1	1.9	1.9	39.6
	5.14	1	1.9	1.9	41.5
	5.39	1	1.9	1.9	43.4
	5.80	2	3.8	3.8	47.2
	6.67	1	1.9	1.9	49.1
	6.73	1	1.9	1.9	50.9
	6.86	2	3.8	3.8	54.7
	6.92	1	1.9	1.9	56.6
	6.93	1	1.9	1.9	58.5
	7.25	2	3.8	3.8	62.3
	7.42	1	1.9	1.9	64.2
	7.43	1	1.9	1.9	66.0
	8.17	1	1.9	1.9	67.9
	8.49	1	1.9	1.9	69.8
	8.74	1	1.9	1.9	71.7
	8.75	1	1.9	1.9	73.6
	8.94	2	3.8	3.8	77.4
	9.33	1	1.9	1.9	79.2
	10.57	2	3.8	3.8	83.0
	10.77	1	1.9	1.9	84.9

SUMMARY STATISTICS

TYPE: Lithic Workshop Sites

SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	11.46	1	1.9	1.9	86.8
	11.91	1	1.9	1.9	88.7
	12.06	1	1.9	1.9	90.6
	12.27	1	1.9	1.9	92.5
	12.78	1	1.9	1.9	94.3
	15.19	1	1.9	1.9	96.2
	24.71	1	1.9	1.9	98.1
	27.05	1	1.9	1.9	100.0
	Total	53	100.0	100.0	

Mean	7.117	Std err	.701	Median	6.728
Mode	1.352	Std dev	5.103	Variance	26.037
Kurtosis	5.481	S E Kurt	.644	Skewness	1.916
S E Skew	.327	Range	27.048	Minimum	.000
Maximum	27.048	Sum	377.209		

* Multiple modes exist. The smallest value is shown.

Valid cases 53 Missing cases 0

SUMMARY STATISTICS

TYPE: Other Activity Sites
ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	-1.00	2	1.3	1.3	1.3
	.00	3	2.0	2.0	3.3
	11.29	2	1.3	1.3	4.6
	14.01	1	.7	.7	5.3
	18.40	1	.7	.7	6.0
	20.52	1	.7	.7	6.6
	23.15	2	1.3	1.3	7.9
	24.73	1	.7	.7	8.6
	26.52	2	1.3	1.3	9.9
	28.56	1	.7	.7	10.6
	30.91	2	1.3	1.3	11.9
	33.63	1	.7	.7	12.6
	38.60	1	.7	.7	13.2
	40.18	1	.7	.7	13.9
	44.94	4	2.6	2.6	16.6
	52.07	1	.7	.7	17.2
	53.07	1	.7	.7	17.9
	56.25	2	1.3	1.3	19.2
	63.39	2	1.3	1.3	20.5
	71.53	4	2.6	2.6	23.2
	73.27	1	.7	.7	23.8
	77.45	1	.7	.7	24.5
	82.86	1	.7	.7	25.2
	85.59	1	.7	.7	25.8
	90.00	8	5.3	5.3	31.1
	104.06	1	.7	.7	31.8
	108.47	3	2.0	2.0	33.8
	110.60	1	.7	.7	34.4
	113.24	1	.7	.7	35.1
	116.61	4	2.6	2.6	37.7
	130.66	1	.7	.7	38.4
	135.06	3	2.0	2.0	40.4
	146.37	1	.7	.7	41.1
	150.31	1	.7	.7	41.7
	151.00	1	.7	.7	42.4
	153.48	5	3.3	3.3	45.7

SUMMARY STATISTICS

TYPE: Other Activity Sites
ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	156.08	1	.7	.7	46.4
	156.85	1	.7	.7	47.0
	158.24	1	.7	.7	47.7
	161.60	1	.7	.7	48.3
	164.78	1	.7	.7	49.0
	165.99	1	.7	.7	49.7
	170.56	1	.7	.7	50.3
	171.89	1	.7	.7	51.0
	172.89	1	.7	.7	51.7
	174.30	1	.7	.7	52.3
	180.00	11	7.3	7.3	59.6
	183.17	1	.7	.7	60.3
	186.33	2	1.3	1.3	61.6
	187.11	1	.7	.7	62.3
	191.29	1	.7	.7	62.9
	192.07	1	.7	.7	63.6
	192.50	1	.7	.7	64.2
	194.01	1	.7	.7	64.9
	196.67	1	.7	.7	65.6
	198.40	1	.7	.7	66.2
	201.76	2	1.3	1.3	67.5
	203.92	1	.7	.7	68.2
	206.52	2	1.3	1.3	69.5
	209.00	1	.7	.7	70.2
	210.91	1	.7	.7	70.9
	213.63	1	.7	.7	71.5
	214.64	1	.7	.7	72.2
	215.48	1	.7	.7	72.8
	216.81	1	.7	.7	73.5
	219.75	1	.7	.7	74.2
	220.54	2	1.3	1.3	75.5
	221.13	1	.7	.7	76.2
	224.94	5	3.3	3.3	79.5
	231.28	6	4.0	4.0	83.4
	236.25	1	.7	.7	84.1
	243.39	3	2.0	2.0	86.1

SUMMARY STATISTICS

TYPE: Other Activity Sites

ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	249.98	1	.7	.7	86.8
	251.53	1	.7	.7	87.4
	260.52	1	.7	.7	88.1
	270.00	4	2.6	2.6	90.7
	272.39	1	.7	.7	91.4
	274.77	1	.7	.7	92.1
	281.33	2	1.3	1.3	93.4
	285.29	1	.7	.7	94.0
	306.93	1	.7	.7	94.7
	315.06	2	1.3	1.3	96.0
	320.25	1	.7	.7	96.7
	323.19	1	.7	.7	97.4
	331.00	1	.7	.7	98.0
	338.24	1	.7	.7	98.7
	345.99	2	1.3	1.3	100.0
	Total	151	100.0	100.0	

Mean	155.643	Std err	7.247	Median	170.557
Mode	180.000	Std dev	89.058	Variance	7931.364
Kurtosis	-.823	S E Kurt	.392	Skewness	.011
S E Skew	.197	Range	346.992	Minimum	-1.000
Maximum	345.992	Sum	23502.113		

Valid cases 151 Missing cases 0

SUMMARY STATISTICS

TYPE: Other Activity Sites
DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	29.94	7	4.6	4.6	4.6
	30.00	6	4.0	4.0	8.6
	42.38	3	2.0	2.0	10.6
	59.87	5	3.3	3.3	13.9
	60.00	3	2.0	2.0	15.9
	66.97	3	2.0	2.0	17.9
	67.05	4	2.6	2.6	20.5
	84.76	4	2.6	2.6	23.2
	89.81	5	3.3	3.3	26.5
	90.00	3	2.0	2.0	28.5
	94.69	3	2.0	2.0	30.5
	108.01	2	1.3	1.3	31.8
	108.10	1	.7	.7	32.5
	119.75	3	2.0	2.0	34.4
	120.00	4	2.6	2.6	37.1
	123.45	2	1.3	1.3	38.4
	123.68	2	1.3	1.3	39.7
	127.14	1	.7	.7	40.4
	133.94	3	2.0	2.0	42.4
	149.68	1	.7	.7	43.0
	149.80	4	2.6	2.6	45.7
	149.89	2	1.3	1.3	47.0
	161.26	2	1.3	1.3	48.3
	169.53	4	2.6	2.6	51.0
	174.83	2	1.3	1.3	52.3
	182.47	1	.7	.7	53.0
	189.38	1	.7	.7	53.6
	189.70	1	.7	.7	54.3
	191.85	2	1.3	1.3	55.6
	191.94	1	.7	.7	56.3
	200.91	1	.7	.7	57.0
	201.16	1	.7	.7	57.6
	209.56	2	1.3	1.3	58.9
	210.00	2	1.3	1.3	60.3
	211.69	1	.7	.7	60.9
	211.91	3	2.0	2.0	62.9

SUMMARY STATISTICS

TYPE: Other Activity Sites
DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	216.02	1	.7	.7	63.6
	216.19	1	.7	.7	64.2
	228.07	1	.7	.7	64.9
	234.02	1	.7	.7	65.6
	239.49	1	.7	.7	66.2
	240.00	2	1.3	1.3	67.5
	241.36	2	1.3	1.3	68.9
	241.86	1	.7	.7	69.5
	246.89	1	.7	.7	70.2
	255.85	2	1.3	1.3	71.5
	256.25	1	.7	.7	72.2
	257.89	1	.7	.7	72.8
	267.87	1	.7	.7	73.5
	268.21	1	.7	.7	74.2
	271.65	2	1.3	1.3	75.5
	276.25	1	.7	.7	76.2
	282.59	1	.7	.7	76.8
	282.85	1	.7	.7	77.5
	284.06	2	1.3	1.3	78.8
	284.54	1	.7	.7	79.5
	294.94	1	.7	.7	80.1
	296.67	1	.7	.7	80.8
	299.37	1	.7	.7	81.5
	299.77	1	.7	.7	82.1
	308.37	2	1.3	1.3	83.4
	313.15	1	.7	.7	84.1
	318.61	1	.7	.7	84.8
	322.52	1	.7	.7	85.4
	323.02	2	1.3	1.3	86.8
	324.02	1	.7	.7	87.4
	329.30	1	.7	.7	88.1
	331.36	1	.7	.7	88.7
	334.72	1	.7	.7	89.4
	341.78	1	.7	.7	90.1
	342.00	1	.7	.7	90.7
	350.49	1	.7	.7	91.4

SUMMARY STATISTICS

TYPE: Other Activity Sites

DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	361.86	1	.7	.7	92.1
	371.03	1	.7	.7	92.7
	381.43	1	.7	.7	93.4
	407.26	1	.7	.7	94.0
	420.00	1	.7	.7	94.7
	428.67	1	.7	.7	95.4
	428.79	1	.7	.7	96.0
	429.38	1	.7	.7	96.7
	449.39	1	.7	.7	97.4
	468.03	1	.7	.7	98.0
	474.24	1	.7	.7	98.7
	487.80	1	.7	.7	99.3
	508.92	1	.7	.7	100.0
	Total	151	100.0	100.0	

Mean	187.959	Std err	9.648	Median	169.526
Mode	29.937	Std dev	118.558	Variance	14055.936
Kurtosis	-.367	S E Kurt	.392	Skewness	.609
S E Skew	.197	Range	478.985	Minimum	29.937
Maximum	508.922	Sum	28381.754		

Valid cases 151 Missing cases 0

SUMMARY STATISTICS

TYPE: Other Activity Sites
SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	.00	2	1.3	1.3	1.3
	.95	1	.7	.7	2.0
	.96	4	2.6	2.6	4.6
	1.35	4	2.6	2.6	7.3
	1.91	3	2.0	2.0	9.3
	1.91	3	2.0	2.0	11.3
	2.14	3	2.0	2.0	13.2
	2.14	5	3.3	3.3	16.6
	2.70	4	2.6	2.6	19.2
	2.86	1	.7	.7	19.9
	2.87	3	2.0	2.0	21.9
	3.02	3	2.0	2.0	23.8
	3.02	1	.7	.7	24.5
	3.44	3	2.0	2.0	26.5
	3.44	3	2.0	2.0	28.5
	3.81	2	1.3	1.3	29.8
	3.82	2	1.3	1.3	31.1
	3.93	1	.7	.7	31.8
	3.94	3	2.0	2.0	33.8
	4.05	2	1.3	1.3	35.1
	4.26	3	2.0	2.0	37.1
	4.27	1	.7	.7	37.7
	4.76	1	.7	.7	38.4
	4.77	1	.7	.7	39.1
	4.77	2	1.3	1.3	40.4
	4.77	1	.7	.7	41.1
	4.86	2	1.3	1.3	42.4
	4.87	2	1.3	1.3	43.7
	5.14	3	2.0	2.0	45.7
	5.39	2	1.3	1.3	47.0
	5.56	3	2.0	2.0	49.0
	5.71	1	.7	.7	49.7
	5.79	1	.7	.7	50.3
	5.80	1	.7	.7	51.0
	6.02	4	2.6	2.6	53.6
	6.03	1	.7	.7	54.3

SUMMARY STATISTICS

TYPE: Other Activity Sites
SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	6.10	6	4.0	4.0	58.3
	6.10	1	.7	.7	58.9
	6.38	2	1.3	1.3	60.3
	6.39	2	1.3	1.3	61.6
	6.65	1	.7	.7	62.3
	6.74	1	.7	.7	62.9
	7.24	1	.7	.7	63.6
	7.25	3	2.0	2.0	65.6
	7.43	2	1.3	1.3	66.9
	7.65	1	.7	.7	67.5
	7.67	1	.7	.7	68.2
	7.67	2	1.3	1.3	69.5
	7.84	1	.7	.7	70.2
	8.06	1	.7	.7	70.9
	8.11	1	.7	.7	71.5
	8.12	1	.7	.7	72.2
	8.17	1	.7	.7	72.8
	8.48	1	.7	.7	73.5
	8.49	1	.7	.7	74.2
	8.53	1	.7	.7	74.8
	8.60	2	1.3	1.3	76.2
	8.74	1	.7	.7	76.8
	8.74	1	.7	.7	77.5
	8.75	2	1.3	1.3	78.8
	8.75	1	.7	.7	79.5
	9.34	2	1.3	1.3	80.8
	9.47	1	.7	.7	81.5
	9.53	1	.7	.7	82.1
	9.67	1	.7	.7	82.8
	9.75	3	2.0	2.0	84.8
	9.87	1	.7	.7	85.4
	9.89	1	.7	.7	86.1
	10.06	1	.7	.7	86.8
	10.19	1	.7	.7	87.4
	10.41	1	.7	.7	88.1
	10.69	1	.7	.7	88.7

SUMMARY STATISTICS

TYPE: Other Activity Sites

SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	10.76	1	.7	.7	89.4
	10.77	1	.7	.7	90.1
	10.78	1	.7	.7	90.7
	11.04	1	.7	.7	91.4
	11.35	1	.7	.7	92.1
	11.81	1	.7	.7	92.7
	11.91	1	.7	.7	93.4
	12.26	1	.7	.7	94.0
	13.44	1	.7	.7	94.7
	13.45	1	.7	.7	95.4
	14.78	1	.7	.7	96.0
	14.93	1	.7	.7	96.7
	15.40	1	.7	.7	97.4
	15.86	1	.7	.7	98.0
	16.76	1	.7	.7	98.7
	17.58	1	.7	.7	99.3
	21.82	1	.7	.7	100.0
	Total	151	100.0	100.0	

Mean	6.217	Std err	.314	Median	5.789
Mode	6.096	Std dev	3.859	Variance	14.892
Kurtosis	1.480	S E Kurt	.392	Skewness	1.021
S E Skew	.197	Range	21.819	Minimum	.000
Maximum	21.819	Sum	938.752		

Valid cases 151 Missing cases 0

SUMMARY STATISTICS

TYPE: Quarry Sites

ASPECT

Value Label	Value	Freq	%	Valid %	Cum %
	7.58	1	2.8	2.8	2.8
	12.50	1	2.8	2.8	5.6
	18.40	1	2.8	2.8	8.3
	19.94	1	2.8	2.8	11.1
	22.58	1	2.8	2.8	13.9
	26.52	1	2.8	2.8	16.7
	28.56	1	2.8	2.8	19.4
	29.69	1	2.8	2.8	22.2
	32.42	1	2.8	2.8	25.0
	33.63	1	2.8	2.8	27.8
	35.48	1	2.8	2.8	30.6
	39.75	1	2.8	2.8	33.3
	41.13	1	2.8	2.8	36.1
	44.94	2	5.6	5.6	41.7
	47.06	1	2.8	2.8	44.4
	56.25	1	2.8	2.8	47.2
	122.06	1	2.8	2.8	50.0
	130.66	1	2.8	2.8	52.8
	132.33	1	2.8	2.8	55.6
	146.37	1	2.8	2.8	58.3
	158.24	1	2.8	2.8	61.1
	185.70	1	2.8	2.8	63.9
	191.29	1	2.8	2.8	66.7
	192.07	1	2.8	2.8	69.4
	192.50	1	2.8	2.8	72.2
	194.01	1	2.8	2.8	75.0
	220.54	2	5.6	5.6	80.6
	233.07	1	2.8	2.8	83.3
	256.73	1	2.8	2.8	86.1
	270.00	2	5.6	5.6	91.7
	288.47	1	2.8	2.8	94.4
	303.75	1	2.8	2.8	97.2
	315.06	1	2.8	2.8	100.0
	Total	36	100.0	100.0	

SUMMARY STATISTICS

TYPE: Quarry Sites

ASPECT

Mean	126.799	Std err	16.852	Median	126.361
Mode	44.939	Std dev	101.114	Variance	10224.115
Kurtosis	-1.345	S E Kurt	.768	Skewness	.392
S E Skew	.393	Range	307.482	Minimum	7.579
Maximum	315.061	Sum	4564.759		

Valid cases 36 Missing cases 0

SUMMARY STATISTICS

TYPE: Quarry Sites

DISTWAT

Value Label	Value	Freq	%	Valid %	Cum %
	30.00	1	2.8	2.8	2.8
	60.00	1	2.8	2.8	5.6
	66.97	2	5.6	5.6	11.1
	67.05	1	2.8	2.8	13.9
	84.76	3	8.3	8.3	22.2
	94.69	1	2.8	2.8	25.0
	108.10	1	2.8	2.8	27.8
	119.75	1	2.8	2.8	30.6
	120.00	2	5.6	5.6	36.1
	123.45	1	2.8	2.8	38.9
	127.14	1	2.8	2.8	41.7
	149.68	1	2.8	2.8	44.4
	149.80	1	2.8	2.8	47.2
	152.96	1	2.8	2.8	50.0
	161.51	1	2.8	2.8	52.8
	182.11	1	2.8	2.8	55.6
	182.47	1	2.8	2.8	58.3
	189.38	1	2.8	2.8	61.1
	191.85	1	2.8	2.8	63.9
	191.94	1	2.8	2.8	66.7
	211.69	1	2.8	2.8	69.4
	228.07	1	2.8	2.8	72.2
	239.49	1	2.8	2.8	75.0
	240.00	1	2.8	2.8	77.8
	256.25	1	2.8	2.8	80.6
	270.00	1	2.8	2.8	83.3
	284.54	1	2.8	2.8	86.1
	296.67	1	2.8	2.8	88.9
	341.78	1	2.8	2.8	91.7
	381.43	1	2.8	2.8	94.4
	417.08	1	2.8	2.8	97.2
	456.13	1	2.8	2.8	100.0
	Total	36	100.0	100.0	

SUMMARY STATISTICS

TYPE: Quarry Sites

DISTWAT

Mean	181.479	Std err	17.435	Median	157.233
Mode	84.763	Std dev	104.610	Variance	10943.206
Kurtosis	.439	S E Kurt	.768	Skewness	.938
S E Skew	.393	Range	426.131	Minimum	30.000
Maximum	456.131	Sum	6533.234		

Valid cases 36 Missing cases 0

SUMMARY STATISTICS

TYPE: Quarry Sites

SLOPED

Value Label	Value	Freq	%	Valid %	Cum %
	1.35	1	2.8	2.8	2.8
	2.70	2	5.6	5.6	8.3
	3.44	1	2.8	2.8	11.1
	3.44	1	2.8	2.8	13.9
	4.77	1	2.8	2.8	16.7
	4.87	1	2.8	2.8	19.4
	5.14	1	2.8	2.8	22.2
	6.03	1	2.8	2.8	25.0
	6.86	1	2.8	2.8	27.8
	6.86	1	2.8	2.8	30.6
	7.43	1	2.8	2.8	33.3
	7.67	1	2.8	2.8	36.1
	7.84	1	2.8	2.8	38.9
	8.17	1	2.8	2.8	41.7
	8.74	1	2.8	2.8	44.4
	8.75	2	5.6	5.6	50.0
	8.75	2	5.6	5.6	55.6
	8.94	1	2.8	2.8	58.3
	8.99	1	2.8	2.8	61.1
	9.53	1	2.8	2.8	63.9
	10.06	1	2.8	2.8	66.7
	10.39	2	5.6	5.6	72.2
	10.57	1	2.8	2.8	75.0
	11.06	1	2.8	2.8	77.8
	11.81	1	2.8	2.8	80.6
	12.25	1	2.8	2.8	83.3
	12.28	1	2.8	2.8	86.1
	13.45	1	2.8	2.8	88.9
	13.93	1	2.8	2.8	91.7
	14.18	1	2.8	2.8	94.4
	16.23	1	2.8	2.8	97.2
	17.68	1	2.8	2.8	100.0
	Total	36	100.0	100.0	

SUMMARY STATISTICS

TYPE: Quarry Sites

SLOPED

Mean	8.743	Std err	.637	Median	8.750
Mode	2.702	Std dev	3.823	Variance	14.613
Kurtosis	-.096	S E Kurt	.768	Skewness	.182
S E Skew	.393	Range	16.327	Minimum	1.352
Maximum	17.679	Sum	314.738		

Valid cases 36 Missing cases 0

SUMMARY STATISTICS
ASPECT (AZIMUTH)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	-1.00	7	1.5	1.5	1.5
	.00	15	3.3	3.3	4.8
	4.08	1	.2	.2	5.0
	7.58	1	.2	.2	5.2
	9.44	1	.2	.2	5.4
	11.29	3	.7	.7	6.1
	12.50	1	.2	.2	6.3
	14.01	1	.2	.2	6.5
	14.90	1	.2	.2	6.7
	15.91	2	.4	.4	7.2
	18.40	3	.7	.7	7.8
	19.94	2	.4	.4	8.3
	20.52	1	.2	.2	8.5
	21.76	1	.2	.2	8.7
	22.58	2	.4	.4	9.1
	23.15	2	.4	.4	9.6
	24.73	1	.2	.2	9.8
	26.52	10	2.2	2.2	12.0
	28.56	2	.4	.4	12.4
	29.69	1	.2	.2	12.6
	30.91	2	.4	.4	13.0
	31.95	1	.2	.2	13.3
	32.42	1	.2	.2	13.5
	33.63	5	1.1	1.1	14.6
	35.48	4	.9	.9	15.4
	38.60	3	.7	.7	16.1
	39.75	2	.4	.4	16.5
	40.18	1	.2	.2	16.7
	40.54	1	.2	.2	17.0
	41.13	1	.2	.2	17.2
	41.57	2	.4	.4	17.6
	44.94	16	3.5	3.5	21.1
	47.06	1	.2	.2	21.3
	47.43	1	.2	.2	21.5
	52.07	2	.4	.4	22.0
	53.07	3	.7	.7	22.6
	53.91	1	.2	.2	22.8

SUMMARY STATISTICS
APSECT (AZIMUTH)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	56.25	9	2.0	2.0	24.8
	57.94	3	.7	.7	25.4
	60.89	1	.2	.2	25.7
	63.39	8	1.7	1.7	27.4
	65.99	1	.2	.2	27.6
	67.34	1	.2	.2	27.8
	68.16	1	.2	.2	28.0
	71.53	7	1.5	1.5	29.6
	73.27	1	.2	.2	29.8
	74.02	1	.2	.2	30.0
	75.94	1	.2	.2	30.2
	77.45	1	.2	.2	30.4
	78.67	1	.2	.2	30.7
	80.52	1	.2	.2	30.9
	81.85	1	.2	.2	31.1
	82.86	1	.2	.2	31.3
	84.79	1	.2	.2	31.5
	85.59	1	.2	.2	31.7
	90.00	25	5.4	5.4	37.2
	96.35	1	.2	.2	37.4
	97.14	1	.2	.2	37.6
	99.48	1	.2	.2	37.8
	101.33	3	.7	.7	38.5
	103.02	1	.2	.2	38.7
	104.06	2	.4	.4	39.1
	105.29	1	.2	.2	39.3
	105.98	1	.2	.2	39.6
	108.47	9	2.0	2.0	41.5
	110.60	1	.2	.2	41.7
	113.24	1	.2	.2	42.0
	116.61	9	2.0	2.0	43.9
	119.11	1	.2	.2	44.1
	119.80	2	.4	.4	44.6
	121.02	1	.2	.2	44.8
	122.06	1	.2	.2	45.0
	123.75	2	.4	.4	45.4
	125.60	1	.2	.2	45.7
	128.72	1	.2	.2	45.9

SUMMARY STATISTICS
APECT (AZIMUTH)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	129.87	1	.2	.2	46.1
	130.66	2	.4	.4	46.5
	132.33	1	.2	.2	46.7
	135.06	8	1.7	1.7	48.5
	139.46	1	.2	.2	48.7
	143.19	1	.2	.2	48.9
	146.37	7	1.5	1.5	50.4
	149.09	1	.2	.2	50.7
	150.31	1	.2	.2	50.9
	151.00	1	.2	.2	51.1
	153.48	10	2.2	2.2	53.3
	156.08	2	.4	.4	53.7
	156.85	2	.4	.4	54.1
	158.24	2	.4	.4	54.6
	161.60	6	1.3	1.3	55.9
	162.93	1	.2	.2	56.1
	164.09	1	.2	.2	56.3
	164.78	1	.2	.2	56.5
	165.99	4	.9	.9	57.4
	168.71	1	.2	.2	57.6
	170.56	1	.2	.2	57.8
	171.89	1	.2	.2	58.0
	172.89	1	.2	.2	58.3
	173.67	1	.2	.2	58.5
	174.30	1	.2	.2	58.7
	174.82	1	.2	.2	58.9
	175.25	1	.2	.2	59.1
	179.95	1	.2	.2	59.3
	180.00	28	6.1	6.1	65.4
	180.09	1	.2	.2	65.7
	180.29	1	.2	.2	65.9
	183.17	1	.2	.2	66.1
	185.70	1	.2	.2	66.3
	186.33	2	.4	.4	66.7
	187.11	2	.4	.4	67.2
	188.11	3	.7	.7	67.8
	189.44	2	.4	.4	68.3
	190.28	1	.2	.2	68.5

SUMMARY STATISTICS
ASPECT (AZIMUTH)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	191.29	7	1.5	1.5	70.0
	192.07	2	.4	.4	70.4
	192.50	2	.4	.4	70.9
	194.01	3	.7	.7	71.5
	195.91	1	.2	.2	71.7
	196.67	1	.2	.2	72.0
	198.40	8	1.7	1.7	73.7
	201.76	3	.7	.7	74.3
	202.58	1	.2	.2	74.6
	203.15	1	.2	.2	74.8
	203.92	1	.2	.2	75.0
	206.52	7	1.5	1.5	76.5
	209.00	1	.2	.2	76.7
	209.69	1	.2	.2	77.0
	210.91	2	.4	.4	77.4
	211.95	1	.2	.2	77.6
	213.63	3	.7	.7	78.3
	214.64	1	.2	.2	78.5
	215.48	1	.2	.2	78.7
	216.81	2	.4	.4	79.1
	219.75	1	.2	.2	79.3
	220.54	4	.9	.9	80.2
	221.13	1	.2	.2	80.4
	221.57	1	.2	.2	80.7
	224.94	11	2.4	2.4	83.0
	226.41	1	.2	.2	83.3
	229.34	1	.2	.2	83.5
	230.13	1	.2	.2	83.7
	231.28	7	1.5	1.5	85.2
	231.57	1	.2	.2	85.4
	233.07	2	.4	.4	85.9
	236.25	1	.2	.2	86.1
	237.47	1	.2	.2	86.3
	238.98	1	.2	.2	86.5
	240.20	1	.2	.2	86.7
	243.39	3	.7	.7	87.4
	249.98	1	.2	.2	87.6
	251.53	3	.7	.7	88.3

SUMMARY STATISTICS
ASPECT (AZIMUTH)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	253.27	1	.2	.2	88.5
	256.73	1	.2	.2	88.7
	260.52	1	.2	.2	88.9
	263.65	1	.2	.2	89.1
	269.54	1	.2	.2	89.3
	270.00	9	2.0	2.0	91.3
	272.39	1	.2	.2	91.5
	274.77	1	.2	.2	91.7
	277.14	1	.2	.2	92.0
	281.33	3	.7	.7	92.6
	285.29	1	.2	.2	92.8
	288.47	3	.7	.7	93.5
	290.60	1	.2	.2	93.7
	291.84	1	.2	.2	93.9
	296.61	1	.2	.2	94.1
	301.02	1	.2	.2	94.3
	302.06	1	.2	.2	94.6
	303.75	1	.2	.2	94.8
	306.93	1	.2	.2	95.0
	315.06	4	.9	.9	95.9
	318.87	1	.2	.2	96.1
	320.25	1	.2	.2	96.3
	321.40	2	.4	.4	96.7
	323.19	2	.4	.4	97.2
	326.37	1	.2	.2	97.4
	331.00	1	.2	.2	97.6
	333.48	3	.7	.7	98.3
	336.85	1	.2	.2	98.5
	338.24	1	.2	.2	98.7
	345.99	2	.4	.4	99.1
	348.71	1	.2	.2	99.3
	352.89	2	.4	.4	99.8
	354.30	1	.2	.2	100.0
	Total	460	100.0	100.0	

SUMMARY STATISTICS
ASPECT (AZIMUTH)

All Archaeological Sites

Mean	141.744	Std err	4.249	Median	146.366
Mode	180.000	Std dev	91.140	Variance	8306.580
Kurtosis	-.802	S E Kurt	.227	Skewness	.257
S E Skew	.114	Range	355.301	Minimum	-1.000
Maximum	354.301	Sum	65202.188		

Valid cases 460 Missing cases 0

SUMMARY STATISTICS
DISTANCE TO WATER

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	.00	5	1.1	1.1	1.1
	29.94	23	5.0	5.0	6.1
	30.00	12	2.6	2.6	8.7
	42.38	14	3.0	3.0	11.7
	59.87	14	3.0	3.0	14.8
	60.00	10	2.2	2.2	17.0
	66.97	15	3.3	3.3	20.2
	67.05	11	2.4	2.4	22.6
	84.76	15	3.3	3.3	25.9
	89.81	10	2.2	2.2	28.0
	90.00	5	1.1	1.1	29.1
	94.69	12	2.6	2.6	31.7
	94.85	1	.2	.2	32.0
	108.01	10	2.2	2.2	34.1
	108.10	2	.4	.4	34.6
	119.75	8	1.7	1.7	36.3
	120.00	11	2.4	2.4	38.7
	123.45	7	1.5	1.5	40.2
	123.68	10	2.2	2.2	42.4
	127.14	5	1.1	1.1	43.5
	133.94	6	1.3	1.3	44.8
	134.11	4	.9	.9	45.7
	149.68	6	1.3	1.3	47.0
	149.80	10	2.2	2.2	49.1
	149.89	3	.7	.7	49.8
	150.00	2	.4	.4	50.2
	152.96	1	.2	.2	50.4
	161.26	6	1.3	1.3	51.7
	161.51	4	.9	.9	52.6
	169.53	6	1.3	1.3	53.9
	174.66	3	.7	.7	54.6
	174.83	6	1.3	1.3	55.9
	179.62	3	.7	.7	56.5
	180.00	2	.4	.4	57.0
	182.11	2	.4	.4	57.4
	182.47	3	.7	.7	58.0
	189.38	3	.7	.7	58.7

SUMMARY STATISTICS
DISTANCE TO WATER

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	189.70	2	.4	.4	59.1
	191.85	5	1.1	1.1	60.2
	191.94	3	.7	.7	60.9
	200.91	3	.7	.7	61.5
	201.16	1	.2	.2	61.7
	209.56	4	.9	.9	62.6
	210.00	2	.4	.4	63.0
	211.69	2	.4	.4	63.5
	211.91	6	1.3	1.3	64.8
	216.02	2	.4	.4	65.2
	216.19	4	.9	.9	66.1
	217.98	1	.2	.2	66.3
	228.07	3	.7	.7	67.0
	228.40	2	.4	.4	67.4
	234.02	4	.9	.9	68.3
	234.10	1	.2	.2	68.5
	239.49	4	.9	.9	69.3
	240.00	5	1.1	1.1	70.4
	241.36	4	.9	.9	71.3
	241.48	2	.4	.4	71.7
	241.74	1	.2	.2	72.0
	241.86	3	.7	.7	72.6
	246.89	2	.4	.4	73.0
	247.36	1	.2	.2	73.3
	254.29	2	.4	.4	73.7
	255.85	2	.4	.4	74.1
	256.25	2	.4	.4	74.6
	257.71	1	.2	.2	74.8
	257.89	2	.4	.4	75.2
	267.87	1	.2	.2	75.4
	268.21	2	.4	.4	75.9
	269.43	1	.2	.2	76.1
	270.00	1	.2	.2	76.3
	271.09	3	.7	.7	77.0
	271.65	4	.9	.9	77.8
	276.03	1	.2	.2	78.0
	276.25	1	.2	.2	78.3
	276.34	2	.4	.4	78.7

SUMMARY STATISTICS
DISTANCE TO WATER

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	276.56	2	.4	.4	79.1
	282.59	3	.7	.7	79.8
	282.85	1	.2	.2	80.0
	284.06	3	.7	.7	80.7
	284.54	2	.4	.4	81.1
	294.94	1	.2	.2	81.3
	295.36	1	.2	.2	81.5
	296.67	3	.7	.7	82.2
	299.37	3	.7	.7	82.8
	299.59	1	.2	.2	83.0
	299.77	2	.4	.4	83.5
	300.00	1	.2	.2	83.7
	305.32	1	.2	.2	83.9
	308.37	2	.4	.4	84.3
	308.72	2	.4	.4	84.8
	312.60	1	.2	.2	85.0
	313.15	1	.2	.2	85.2
	318.52	1	.2	.2	85.4
	318.61	1	.2	.2	85.7
	322.52	3	.7	.7	86.3
	323.02	2	.4	.4	86.7
	324.02	1	.2	.2	87.0
	324.29	1	.2	.2	87.2
	329.30	1	.2	.2	87.4
	331.36	1	.2	.2	87.6
	334.72	2	.4	.4	88.0
	334.84	1	.2	.2	88.3
	339.05	2	.4	.4	88.7
	341.78	2	.4	.4	89.1
	342.00	1	.2	.2	89.3
	349.31	2	.4	.4	89.8
	350.49	1	.2	.2	90.0
	351.05	1	.2	.2	90.2
	360.49	2	.4	.4	90.7
	361.86	2	.4	.4	91.1
	364.22	1	.2	.2	91.3
	365.68	1	.2	.2	91.5
	365.94	2	.4	.4	92.0

SUMMARY STATISTICS
DISTANCE TO WATER

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	371.03	1	.2	.2	92.2
	375.29	1	.2	.2	92.4
	381.43	2	.4	.4	92.8
	390.33	1	.2	.2	93.0
	394.57	1	.2	.2	93.3
	401.81	1	.2	.2	93.5
	407.26	1	.2	.2	93.7
	407.75	1	.2	.2	93.9
	417.08	3	.7	.7	94.6
	420.00	1	.2	.2	94.8
	421.07	1	.2	.2	95.0
	423.82	1	.2	.2	95.2
	425.84	1	.2	.2	95.4
	428.67	1	.2	.2	95.7
	428.79	2	.4	.4	96.1
	429.38	1	.2	.2	96.3
	432.03	1	.2	.2	96.5
	445.15	1	.2	.2	96.7
	445.47	1	.2	.2	97.0
	445.88	1	.2	.2	97.2
	449.39	1	.2	.2	97.4
	456.13	2	.4	.4	97.8
	468.03	1	.2	.2	98.0
	474.02	1	.2	.2	98.3
	474.24	1	.2	.2	98.5
	487.80	1	.2	.2	98.7
	508.92	1	.2	.2	98.9
	510.25	1	.2	.2	99.1
	512.45	1	.2	.2	99.3
	522.88	1	.2	.2	99.6
	569.59	1	.2	.2	99.8
	617.43	1	.2	.2	100.0
	Total	460	100.0	100.0	

SUMMARY STATISTICS
DISTANCE TO WATER

All Archaeological Sites

Mean	181.605	Std err	5.639	Median	150.000
Mode	29.937	Std dev	120.945	Variance	14627.794
Kurtosis	.064	S E Kurt	.227	Skewness	.786
S E Skew	.114	Range	617.430	Minimum	.000
Maximum	617.430	Sum	83538.219		

Valid cases 460 Missing cases 0

SUMMARY STATISTICS
SLOPE (DEGREES)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	.00	7	1.5	1.5	1.5
	.95	4	.9	.9	2.4
	.96	12	2.6	2.6	5.0
	1.35	13	2.8	2.8	7.8
	1.91	9	2.0	2.0	9.8
	1.91	5	1.1	1.1	10.9
	2.14	10	2.2	2.2	13.0
	2.14	15	3.3	3.3	16.3
	2.70	10	2.2	2.2	18.5
	2.86	5	1.1	1.1	19.6
	2.87	8	1.7	1.7	21.3
	3.02	10	2.2	2.2	23.5
	3.02	7	1.5	1.5	25.0
	3.44	10	2.2	2.2	27.2
	3.44	10	2.2	2.2	29.3
	3.81	4	.9	.9	30.2
	3.82	5	1.1	1.1	31.3
	3.93	3	.7	.7	32.0
	3.94	7	1.5	1.5	33.5
	4.05	5	1.1	1.1	34.6
	4.26	4	.9	.9	35.4
	4.27	5	1.1	1.1	36.5
	4.76	3	.7	.7	37.2
	4.77	5	1.1	1.1	38.3
	4.77	5	1.1	1.1	39.3
	4.77	3	.7	.7	40.0
	4.86	7	1.5	1.5	41.5
	4.87	9	2.0	2.0	43.5
	5.13	2	.4	.4	43.9
	5.14	6	1.3	1.3	45.2
	5.39	4	.9	.9	46.1
	5.55	3	.7	.7	46.7
	5.56	5	1.1	1.1	47.8
	5.71	3	.7	.7	48.5
	5.72	1	.2	.2	48.7
	5.79	2	.4	.4	49.1
	5.80	4	.9	.9	50.0

SUMMARY STATISTICS
SLOPE (DEGREES)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	6.02	7	1.5	1.5	51.5
	6.03	8	1.7	1.7	53.3
	6.10	8	1.7	1.7	55.0
	6.10	4	.9	.9	55.9
	6.38	5	1.1	1.1	57.0
	6.39	4	.9	.9	57.8
	6.65	1	.2	.2	58.0
	6.67	3	.7	.7	58.7
	6.72	1	.2	.2	58.9
	6.73	2	.4	.4	59.3
	6.74	4	.9	.9	60.2
	6.86	3	.7	.7	60.9
	6.86	4	.9	.9	61.7
	6.92	2	.4	.4	62.2
	6.93	3	.7	.7	62.8
	7.24	1	.2	.2	63.0
	7.25	6	1.3	1.3	64.3
	7.42	2	.4	.4	64.8
	7.43	4	.9	.9	65.7
	7.61	1	.2	.2	65.9
	7.65	3	.7	.7	66.5
	7.66	3	.7	.7	67.2
	7.67	3	.7	.7	67.8
	7.67	5	1.1	1.1	68.9
	7.84	2	.4	.4	69.3
	8.06	1	.2	.2	69.6
	8.11	2	.4	.4	70.0
	8.12	1	.2	.2	70.2
	8.16	1	.2	.2	70.4
	8.17	5	1.1	1.1	71.5
	8.48	1	.2	.2	71.7
	8.49	2	.4	.4	72.2
	8.53	1	.2	.2	72.4
	8.58	1	.2	.2	72.6
	8.60	3	.7	.7	73.3
	8.74	1	.2	.2	73.5
	8.74	3	.7	.7	74.1
	8.75	6	1.3	1.3	75.4

SUMMARY STATISTICS
SLOPE (DEGREES)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	8.75	3	.7	.7	76.1
	8.94	5	1.1	1.1	77.2
	8.95	2	.4	.4	77.6
	8.99	2	.4	.4	78.0
	9.33	1	.2	.2	78.3
	9.34	3	.7	.7	78.9
	9.38	2	.4	.4	79.3
	9.46	1	.2	.2	79.6
	9.47	1	.2	.2	79.8
	9.53	3	.7	.7	80.4
	9.67	3	.7	.7	81.1
	9.74	2	.4	.4	81.5
	9.75	3	.7	.7	82.2
	9.87	2	.4	.4	82.6
	9.89	1	.2	.2	82.8
	10.06	3	.7	.7	83.5
	10.19	1	.2	.2	83.7
	10.23	1	.2	.2	83.9
	10.39	2	.4	.4	84.3
	10.41	4	.9	.9	85.2
	10.43	1	.2	.2	85.4
	10.45	1	.2	.2	85.7
	10.57	4	.9	.9	86.5
	10.58	1	.2	.2	86.7
	10.69	1	.2	.2	87.0
	10.76	2	.4	.4	87.4
	10.77	2	.4	.4	87.8
	10.78	1	.2	.2	88.0
	11.04	1	.2	.2	88.3
	11.06	2	.4	.4	88.7
	11.33	1	.2	.2	88.9
	11.35	1	.2	.2	89.1
	11.36	3	.7	.7	89.8
	11.37	1	.2	.2	90.0
	11.46	1	.2	.2	90.2
	11.81	2	.4	.4	90.7
	11.91	3	.7	.7	91.3
	12.06	1	.2	.2	91.5

SUMMARY STATISTICS
SLOPE (DEGREES)

All Archaeological Sites

Value Label	Value	Freq	%	Valid %	Cum %
	12.23	1	.2	.2	91.7
	12.25	3	.7	.7	92.4
	12.26	1	.2	.2	92.6
	12.27	1	.2	.2	92.8
	12.28	1	.2	.2	93.0
	12.54	1	.2	.2	93.3
	12.78	1	.2	.2	93.5
	12.80	1	.2	.2	93.7
	13.19	1	.2	.2	93.9
	13.28	1	.2	.2	94.1
	13.44	1	.2	.2	94.3
	13.45	2	.4	.4	94.8
	13.67	1	.2	.2	95.0
	13.93	1	.2	.2	95.2
	14.18	1	.2	.2	95.4
	14.53	1	.2	.2	95.7
	14.63	1	.2	.2	95.9
	14.78	1	.2	.2	96.1
	14.79	1	.2	.2	96.3
	14.93	1	.2	.2	96.5
	15.19	1	.2	.2	96.7
	15.40	1	.2	.2	97.0
	15.86	1	.2	.2	97.2
	16.23	1	.2	.2	97.4
	16.75	1	.2	.2	97.6
	16.76	1	.2	.2	97.8
	16.80	1	.2	.2	98.0
	17.58	1	.2	.2	98.3
	17.68	1	.2	.2	98.5
	21.82	1	.2	.2	98.7
	24.71	1	.2	.2	98.9
	27.05	1	.2	.2	99.1
	86.89	1	.2	.2	99.3
	87.07	1	.2	.2	99.6
	87.18	1	.2	.2	99.8
	87.23	1	.2	.2	100.0
	Total	460	100.0	100.0	

SUMMARY STATISTICS
SLOPE (DEGREES)

All Archaeological Sites

Mean	6.998	Std err	.395	Median	5.910
Mode	2.138	Std dev	8.479	Variance	71.891
Kurtosis	67.510	S E Kurt	.227	Skewness	7.435
S E Skew	.114	Range	87.230	Minimum	.000
Maximum	87.230	Sum	3218.875		

Valid cases 460 Missing cases 0

APPENDIX E

CROSS-TABULATION DATA
VARIABLE CATEGORIES

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
1	6.00	1.00	5.00
3	2.00	2.00	4.00
4	6.00	1.00	4.00
5	6.00	1.00	1.00
6	3.00	5.00	8.00
7	2.00	4.00	10.00
13	2.00	4.00	6.00
14	3.00	5.00	3.00
15	8.00	8.00	5.00
16	9.00	2.00	4.00
17	9.00	2.00	8.00
18	9.00	3.00	10.00
19	5.00	2.00	10.00
21	2.00	3.00	15.00
22	2.00	3.00	2.00
23	4.00	3.00	1.00
24	4.00	4.00	3.00
25	7.00	4.00	10.00
26	6.00	5.00	9.00
27	5.00	4.00	12.00
28	8.00	2.00	7.00
30	9.00	4.00	13.00
31	2.00	1.00	8.00
33	5.00	3.00	9.00
34	9.00	3.00	6.00
35	2.00	3.00	11.00
36	4.00	1.00	15.00
37	6.00	2.00	8.00
38	4.00	1.00	6.00
39	2.00	4.00	12.00
41	7.00	3.00	5.00
42	3.00	1.00	1.00
43	4.00	3.00	3.00
45	7.00	3.00	8.00
46	6.00	1.00	11.00
47	6.00	3.00	6.00
48	5.00	1.00	5.00
49	8.00	1.00	18.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
50	6.00	4.00	6.00
51	7.00	2.00	11.00
52	8.00	2.00	7.00
53	8.00	3.00	2.00
54	8.00	3.00	4.00
55	7.00	3.00	7.00
56	3.00	1.00	4.00
57	6.00	1.00	1.00
58	4.00	1.00	3.00
59	2.00	1.00	1.00
60	5.00	2.00	1.00
62	6.00	3.00	6.00
63	6.00	4.00	2.00
64	4.00	3.00	3.00
65	9.00	3.00	7.00
66	3.00	2.00	6.00
68	2.00	1.00	8.00
69	9.00	2.00	5.00
70	3.00	2.00	1.00
71	4.00	3.00	3.00
72	3.00	2.00	5.00
73	6.00	4.00	11.00
74	2.00	5.00	11.00
75	4.00	3.00	3.00
76	3.00	4.00	5.00
77	2.00	3.00	11.00
78	3.00	2.00	13.00
79	3.00	3.00	10.00
80	2.00	2.00	5.00
81	7.00	6.00	5.00
82	2.00	4.00	2.00
83	4.00	3.00	8.00
84	6.00	4.00	6.00
85	3.00	3.00	11.00
86	7.00	2.00	7.00
88	3.00	3.00	4.00
89	5.00	3.00	5.00
90	3.00	2.00	3.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
91	2.00	4.00	12.00
92	6.00	4.00	5.00
100	6.00	2.00	2.00
102	5.00	1.00	9.00
103	6.00	3.00	6.00
106	6.00	2.00	2.00
107	6.00	3.00	3.00
108	2.00	1.00	16.00
110	4.00	1.00	2.00
111	4.00	1.00	5.00
112	4.00	2.00	8.00
113	3.00	3.00	8.00
114	1.00	1.00	12.00
115	4.00	2.00	3.00
116	8.00	2.00	5.00
118	2.00	5.00	3.00
120	7.00	2.00	8.00
121	2.00	2.00	8.00
122	6.00	3.00	5.00
123	6.00	3.00	2.00
124	5.00	2.00	3.00
125	5.00	1.00	6.00
126	4.00	1.00	4.00
127	1.00	1.00	8.00
128	6.00	3.00	4.00
129	5.00	4.00	5.00
130	6.00	2.00	7.00
131	3.00	2.00	2.00
132	2.00	2.00	2.00
133	9.00	2.00	2.00
134	3.00	4.00	7.00
135	6.00	5.00	3.00
136	5.00	2.00	9.00
137	5.00	5.00	9.00
138	6.00	4.00	5.00
139	2.00	1.00	1.00
140	5.00	1.00	6.00
141	7.00	2.00	2.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
142	1.00	1.00	9.00
143	5.00	2.00	6.00
144	6.00	2.00	10.00
145	6.00	1.00	9.00
146	6.00	1.00	9.00
147	9.00	1.00	18.00
148	5.00	2.00	15.00
149	3.00	2.00	8.00
150	6.00	2.00	1.00
151	4.00	5.00	3.00
152	6.00	4.00	3.00
153	6.00	3.00	3.00
154	6.00	6.00	5.00
155	3.00	1.00	3.00
156	9.00	3.00	3.00
157	2.00	3.00	4.00
158	5.00	1.00	1.00
159	1.00	1.00	1.00
160	1.00	1.00	1.00
161	9.00	3.00	3.00
162	3.00	4.00	3.00
163	2.00	3.00	7.00
164	2.00	2.00	2.00
165	2.00	3.00	7.00
166	2.00	3.00	9.00
167	2.00	3.00	3.00
168	2.00	3.00	4.00
169	2.00	4.00	10.00
201	6.00	2.00	9.00
202	5.00	2.00	1.00
203	4.00	1.00	2.00
204	6.00	3.00	4.00
209	6.00	3.00	3.00
211	5.00	2.00	3.00
212	5.00	2.00	5.00
213	5.00	3.00	5.00
216	3.00	2.00	5.00
218	2.00	2.00	2.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
223	6.00	4.00	5.00
224	7.00	2.00	5.00
225	1.00	1.00	10.00
226	2.00	1.00	8.00
227	2.00	1.00	2.00
228	7.00	2.00	7.00
229	4.00	2.00	15.00
230	2.00	5.00	10.00
231	1.00	1.00	6.00
232	5.00	4.00	5.00
233	8.00	3.00	8.00
234	3.00	2.00	8.00
235	5.00	2.00	15.00
236	5.00	1.00	12.00
237	9.00	2.00	5.00
238	6.00	3.00	2.00
239	6.00	4.00	2.00
240	4.00	4.00	4.00
241	6.00	4.00	3.00
242	6.00	3.00	5.00
243	2.00	3.00	4.00
244	9.00	3.00	6.00
245	7.00	4.00	2.00
246	8.00	3.00	6.00
247	9.00	3.00	7.00
248	6.00	1.00	1.00
249	8.00	2.00	4.00
250	7.00	3.00	8.00
251	7.00	3.00	18.00
252	6.00	4.00	12.00
253	7.00	3.00	11.00
254	6.00	2.00	2.00
255	5.00	3.00	1.00
256	6.00	2.00	9.00
257	6.00	1.00	5.00
258	9.00	1.00	8.00
259	3.00	1.00	2.00
260	6.00	2.00	9.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
261	6.00	6.00	10.00
262	3.00	3.00	2.00
263	3.00	2.00	11.00
264	8.00	2.00	16.00
265	4.00	3.00	13.00
266	4.00	2.00	16.00
267	2.00	1.00	2.00
268	5.00	1.00	17.00
269	6.00	1.00	2.00
270	6.00	2.00	10.00
271	3.00	3.00	5.00
272	2.00	2.00	11.00
273	4.00	5.00	10.00
274	2.00	5.00	10.00
275	6.00	1.00	10.00
276	2.00	1.00	9.00
300	2.00	3.00	1.00
301	4.00	2.00	4.00
302	9.00	3.00	1.00
303	6.00	3.00	4.00
304	6.00	2.00	10.00
305	5.00	3.00	4.00
307	6.00	2.00	4.00
308	5.00	2.00	4.00
309	4.00	1.00	1.00
310	4.00	1.00	3.00
311	2.00	3.00	5.00
313	2.00	2.00	5.00
314	4.00	2.00	5.00
315	4.00	2.00	2.00
316	5.00	2.00	4.00
317	2.00	3.00	1.00
318	2.00	3.00	4.00
319	2.00	3.00	6.00
511	4.00	2.00	3.00
512	4.00	1.00	1.00
513	2.00	1.00	5.00
514	2.00	3.00	1.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
515	3.00	2.00	2.00
516	2.00	2.00	3.00
517	2.00	2.00	5.00
518	2.00	1.00	3.00
519	6.00	1.00	3.00
520	3.00	4.00	7.00
521	6.00	1.00	3.00
522	4.00	2.00	8.00
523	4.00	4.00	6.00
524	7.00	1.00	2.00
525	5.00	3.00	17.00
526	4.00	2.00	18.00
527	4.00	1.00	16.00
528	4.00	3.00	13.00
529	6.00	2.00	14.00
530	5.00	4.00	15.00
531	7.00	3.00	13.00
536	6.00	5.00	8.00
537	6.00	2.00	8.00
538	7.00	3.00	2.00
539	5.00	1.00	5.00
540	7.00	3.00	3.00
541	3.00	3.00	2.00
542	5.00	2.00	3.00
544	2.00	5.00	5.00
545	2.00	1.00	1.00
546	2.00	1.00	1.00
547	3.00	3.00	5.00
548	9.00	3.00	2.00
550	2.00	3.00	5.00
551	4.00	2.00	2.00
553	3.00	3.00	4.00
554	6.00	1.00	2.00
555	6.00	2.00	3.00
556	2.00	2.00	6.00
557	6.00	3.00	2.00
559	4.00	2.00	3.00
560	2.00	2.00	7.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
562	8.00	4.00	12.00
565	6.00	2.00	3.00
566	2.00	3.00	10.00
567	3.00	3.00	5.00
568	2.00	3.00	2.00
569	2.00	3.00	2.00
570	2.00	4.00	6.00
571	4.00	3.00	1.00
572	2.00	4.00	7.00
573	2.00	5.00	4.00
574	3.00	4.00	7.00
575	3.00	2.00	5.00
576	2.00	3.00	3.00
577	4.00	1.00	3.00
578	6.00	2.00	3.00
579	5.00	3.00	5.00
580	6.00	3.00	5.00
581	4.00	3.00	8.00
582	6.00	1.00	3.00
583	8.00	1.00	14.00
584	6.00	1.00	7.00
585	6.00	4.00	11.00
586	2.00	1.00	4.00
587	4.00	1.00	1.00
588	9.00	2.00	3.00
589	2.00	2.00	4.00
590	4.00	2.00	4.00
592	2.00	4.00	14.00
1001	6.00	2.00	18.00
1003	5.00	4.00	8.00
1013	2.00	1.00	9.00
1014	3.00	2.00	14.00
1030	4.00	2.00	12.00
1034	3.00	2.00	5.00
1039	6.00	6.00	5.00
1041	2.00	1.00	10.00
1045	6.00	1.00	5.00
1046	5.00	3.00	11.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
1048	2.00	2.00	4.00
1049	6.00	2.00	2.00
1051	9.00	4.00	9.00
1052	7.00	3.00	3.00
1053	6.00	3.00	7.00
1056	6.00	5.00	12.00
1060	8.00	2.00	6.00
1067	6.00	1.00	10.00
1068	6.00	2.00	10.00
1510	5.00	2.00	5.00
1511	4.00	1.00	12.00
1512	3.00	3.00	12.00
1513	4.00	2.00	15.00
1514	9.00	1.00	3.00
1515	5.00	3.00	3.00
1517	6.00	3.00	9.00
1518	6.00	1.00	3.00
1566	8.00	2.00	6.00
1571	6.00	8.00	13.00
1573	5.00	3.00	13.00
1574	7.00	8.00	9.00
1575	6.00	8.00	4.00
1576	3.00	3.00	4.00
1577	4.00	1.00	6.00
1578	5.00	1.00	13.00
1579	6.00	2.00	7.00
1582	6.00	3.00	7.00
1597	5.00	3.00	6.00
1602	4.00	2.00	2.00
1609	7.00	2.00	3.00
1610	6.00	2.00	3.00
1619	5.00	4.00	9.00
1625	4.00	4.00	6.00
1626	6.00	2.00	3.00
1640	6.00	4.00	6.00
1641	4.00	3.00	3.00
1942	6.00	3.00	8.00
1943	8.00	4.00	13.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
1944	6.00	3.00	14.00
1945	6.00	4.00	9.00
1946	8.00	3.00	9.00
1947	4.00	3.00	9.00
1948	5.00	2.00	4.00
1949	3.00	2.00	10.00
1950	4.00	2.00	9.00
1951	8.00	4.00	10.00
1952	2.00	1.00	3.00
1953	4.00	1.00	8.00
1954	2.00	3.00	3.00
1955	4.00	3.00	9.00
1956	2.00	3.00	8.00
1957	7.00	5.00	11.00
1958	4.00	2.00	10.00
1959	7.00	3.00	10.00
1960	5.00	2.00	5.00
1962	4.00	2.00	11.00
1963	9.00	4.00	7.00
1964	6.00	4.00	15.00
1966	8.00	2.00	14.00
1967	6.00	2.00	5.00
1968	4.00	1.00	9.00
1969	6.00	2.00	10.00
1970	4.00	2.00	6.00
1971	6.00	4.00	15.00
1973	4.00	1.00	5.00
1974	5.00	2.00	7.00
1975	5.00	2.00	1.00
1978	8.00	1.00	15.00
1980	2.00	1.00	7.00
2004	4.00	2.00	2.00
2005	2.00	1.00	3.00
2006	6.00	2.00	4.00
2007	4.00	3.00	5.00
2008	5.00	2.00	6.00
2012	6.00	4.00	5.00
2013	6.00	2.00	2.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
2014	2.00	3.00	8.00
2016	5.00	2.00	7.00
2025	2.00	2.00	7.00
2085	5.00	3.00	10.00
2086	3.00	3.00	3.00
2089	2.00	6.00	3.00
2090	4.00	4.00	5.00
2091	5.00	1.00	13.00
2092	8.00	4.00	9.00
2093	4.00	2.00	5.00
2094	7.00	8.00	5.00
2095	8.00	1.00	10.00
2096	6.00	3.00	10.00
2097	5.00	8.00	15.00
2098	6.00	1.00	5.00
2099	8.00	4.00	8.00
2100	8.00	3.00	6.00
2102	6.00	1.00	5.00
2103	5.00	2.00	5.00
2104	6.00	3.00	3.00
2106	3.00	4.00	10.00
2107	6.00	5.00	10.00
2108	6.00	2.00	15.00
2109	6.00	3.00	3.00
2111	2.00	2.00	3.00
2112	4.00	5.00	11.00
2113	6.00	3.00	4.00
2114	7.00	3.00	14.00
2115	3.00	4.00	13.00
2116	2.00	5.00	5.00
2117	2.00	1.00	3.00
2118	6.00	5.00	9.00
2119	2.00	2.00	3.00
2120	4.00	2.00	4.00
2139	6.00	3.00	15.00
2140	2.00	5.00	16.00
2141	2.00	4.00	4.00
2142	3.00	3.00	10.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
2143	4.00	3.00	7.00
2144	8.00	3.00	8.00
2145	3.00	5.00	5.00
2146	2.00	1.00	7.00
2147	2.00	1.00	11.00
2148	2.00	3.00	14.00
2149	7.00	8.00	3.00
2150	4.00	1.00	7.00
2151	5.00	3.00	6.00
2152	6.00	1.00	12.00
2153	6.00	4.00	4.00
2154	7.00	3.00	6.00
2236	4.00	3.00	9.00
2237	7.00	6.00	5.00
2238	3.00	2.00	10.00
2239	6.00	3.00	10.00
2240	2.00	1.00	11.00
2241	4.00	3.00	5.00
2242	8.00	4.00	10.00
2243	4.00	3.00	5.00
2244	5.00	4.00	3.00
2245	6.00	3.00	11.00
2246	3.00	6.00	9.00
2247	2.00	5.00	8.00
2248	6.00	3.00	5.00
2516	5.00	2.00	4.00
2517	5.00	2.00	12.00
2518	5.00	1.00	1.00
2519	3.00	2.00	7.00
2520	6.00	6.00	4.00
2521	5.00	4.00	1.00
2523	3.00	3.00	9.00
2524	9.00	1.00	3.00
2525	3.00	6.00	5.00
2526	2.00	4.00	4.00
2527	3.00	5.00	10.00
2530	5.00	1.00	8.00
2531	2.00	2.00	13.00

CROSS-TABULATION DATA
VARIABLE CATEGORIES

ID	ASP	SLP	D TO WAT
2532	2.00	4.00	6.00
2533	4.00	2.00	9.00
2534	9.00	1.00	9.00
2535	2.00	1.00	2.00