ARCHEOLOGICAL INVESTIGATIONS
of the
DEER CREEK SITE 48BH18
Big Horn County, Wyoming

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FORWARD

This volume, entitled Archaeological Investigations of the Deer Creek Site, 48BH18, Wyoming, represents the final product of an impressive team effort. The team was composed of various specialists within the Bureau of Land Management (BLM), the archaeological contractor and private land owners. The principal purpose of the study was to stabilize and rescue the exposed archaeological materials before they were destroyed by flash floods and downcutting in the narrow channel of Deer Creek Canyon. Lying in close proximity to a popular recreation area, the exposed bone beds were an easy target for unthinking vandals and "pot hunters".

This monograph represents an important contribution to the study of late period bison kills in the Northwestern Plains. Test excavations at Bischoff Shelter have revealed that the canyon of Deer Creek was occupied from about 8,000 years ago and probably longer. The Deer Creek Site complex has been evaluated as being eligible for nomination to the National Register of Historic Places. The importance of this project lies not only in the archaeological research data and knowledge derived from the archaeological field work, but also in the fact that public funds were wisely and efficiently expended for the preservation and use of a valuable public resource.

Several key individuals deserve special mention for their role in making the project a success. George C. Frison, then Wyoming State Archaeologist and current head of the University of Wyoming's Anthropology Department in Laramie, visited the site with me in September, 1981, and has been a strong advocate and supporter. H. D. Bischoff of Lovell, Wyoming, generously provided access across his private lands, and also furnished lodging facilities for the excavators. Raymond C. Leicht, staff archaeologist at the Wyoming BLM State Office in Cheyenne, greatly assisted in the planning and budgeting phases of the project.

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ABSTRACT

Archaeological testing conducted at the Deer Creek site, 48BH18, investigated four areas of the canyon bottom. Based on the results from this testing, it is believed that the site contains at least two bison kills, an open habitation area and an occupied rock shelter. The rock shelter is known to contain deposits ranging in age from the Late Prehistoric period (ca. 1890 B.P.) to the late Paleoindian period (ca. 7730 B.P.). Although the exact age of the bison kills is unknown, they are believed to date from the Late Prehistoric period. The bone beds appear to have been influenced only slightly by stream action and carnivore activity but the bone in Area B of the site seems to be much more disturbed. The primary activities carried out in Area C and Area D appear to have been the trapping, killing and primary disarticulation of the bison. No large processing areas were found in excavation. The Deer Creek site is considered to be a significant archaeological property which is eligible for nomination to the National Register of Historic Places.
ACKNOWLEDGEMENTS

The authors would like to thank a number of people whose assistance made this project and the resultant report possible. Primary among these are the H.D. Bischoff family who actively encouraged this research project, permitted access to the site locality and provided housing for the field crew at the Winter Ranch. Without their help, it is doubted if this work would ever have taken place.

Besides the authors, other crew members involved in the Deer Creek project included Debra Angulski, Mona Charles, Carolyn Craig, Rhoda Lewis and Paula Tibesar. The archaeological experience and professionalism of this field crew made it possible to accomplish a great deal of research in the limited time that was available.

Stephen A. Chomko of Paleo-Environmental Consultants identified the non-bison bone recovered from the site. John Jameson, Jr., Worland District Archeologist, provided us with initial land survey data and photos of the site which made relocation and mapping much easier.
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CHAPTER ONE
INTRODUCTION

The following is a report on the archaeological testing and stabilization work carried out at the Deer Creek site, 48BH18. This work was done by Larson-Tibesar Associates under a cost sharing agreement (Contract #WY-019-4331-4571) between that company and U.S. Department of Interior, Bureau of Land Management.

The Deer Creek site is located in the northern Bighorn Mountains of Wyoming. Portions of the site are administered by the Worland District of the Bureau of Land Management and other portions are owned by H.D. Bischoff.

It is quite likely that the Deer Creek site has been recognized as a prehistoric site by local residents, hunters and avocational archaeologists for many years. It was first recorded by R.A. Flayharty of the Worland District in January of 1975 and was assigned the site number 48BH18. On the original site form Flayharty described the site as "exposed bison bone on the south side of Deer Creek Canyon." He went on to state that the site was "probably a bison jump kill site" that might be significant.

Since the time of the original recording several major floods and increasing use of the trail passing the site area have increased the chances of damage or complete destruction of
the cultural materials. The archaeological work conducted under this contract was therefore intended to assess the Deer Creek site's significance, to determine the amount of damage occurring to the deposits and to take measures to stabilize the contents of the site. These goals are consistent with the intent of the Federal Land Management Policy Act, the National Historic Preservation Act, Executive Order 11593 and the Historical and Archeological Data Preservation Act.

While these mandates provide the legal basis for the study, of equal importance is the archaeological information to be gained from such an undertaking. Although bison kills are one of the most studied archaeological manifestations on the High Plains much remains to be learned from these types of sites. The importance of *Bison bison* to the prehistoric inhabitants of the Plains cannot be overemphasized. Until the introduction of the horse, no other land mammal so influenced the economy, social structure, religion and overall survival of a very large proportion of Native Americans.

Site specific studies (e.g. Frison 1974; Kehoe 1973; Wheat 1972), regional syntheses (e.g. Frison 1978; Wilson 1974), ethnographic accounts (e.g. Ewers 1955; Medicine Crow 1962), ethnoarchaeological studies (e.g. Binford 1978, 1981) and a greater understanding of the mechanics of taphonomy (e.g. Voorhies 1969; Hill 1975, 1979) have all made important contributions to our understanding of the dynamics of bison procurement. These studies have in turn generated a renewed interest in bison kills and resulted in many older theories being questioned, refined and reformulated.
Because of its location, the Deer Creek site also offers a rare opportunity to study man-bison relationships in the foothills region of the Bighorn Mountains. Very little is known about bison procurement practices in the mid to high altitude mountainous regions of the Plains. The position of the Deer Creek site in such an area both increases the site's importance and serves to justify the attempts made to understand and protect it.

Due to the overall intent and limited nature of the testing program at the Deer Creek site the interpretations which can be offered at this point are somewhat limited. This should not in any way be interpreted as a lack of information content at the site. What follows is a testing report and this testing was intended to assess the site's importance, not necessarily gather an extensive site record.

As will be seen in the following chapters and appendices, the authors have made every attempt to describe the work carried out, present the data gathered and from this make interpretations. These data and the resultant interpretations should not, however, be construed as the end of studies at Deer Creek. Analysis is still continuing on other aspects of the site (e.g. absolute dating of the bone beds, bone cut mark studies and bison taxonomy investigations) and it is hoped that further excavations sometime in the future will yield additional information geared toward answering many of the questions posed here.
CHAPTER TWO
LOCAL ENVIRONMENTAL SETTING

Location

The Deer Creek site is located in northcentral Wyoming, 35 kilometers northeast of Lovell, Wyoming, on the northwestern shoulder of the Bighorn Mountains (Figure 2-1). This mountain range is a broad anticlinal fold which divides the Powder River Basin, to the east, from the Bighorn Basin to the west.

The Bighorns reach a maximum elevation of 4,015 meters (13,175 feet) above mean sea level (Porter 1962), or approximately 2,850 meters (9,350 feet) above the floor of the Bighorn Basin. These mountains, in conjunction with other ranges surrounding the basin, greatly influence the precipitation levels and temperatures of the region. The rapid changes in elevation and the differences in precipitation and soil type across the basin and mountain region have resulted in a wide range of floral communities and a great diversity of faunal assemblages.

The northwestern shoulder of the Bighorn Mountains is separated from the Pryor Mountains to the west by the Bighorn River. In the vicinity of the Montana-Wyoming border the river leaves the basin through Bighorn Canyon and enters the Yellowstone River valley. The Deer Creek site is located to the east of Bighorn Canyon in the foothills scrub vegetation.
zone (Porter 1962) at an elevation of approximately 1,530 meters (5,020 feet) above mean sea level.

Present and Past Climate

The western slopes of the Bighorn Mountains are semi-arid with hot summers and cold winters. Lovell, in the basin to the west of the Deer Creek site, has recorded extremes of -46.7 degrees C. (-52 degrees F.) and 44.4 degrees C. (+112 degrees F.; Becker and Alyea 1964a). The mountainous areas above the site to the east experience temperatures ranging from -54.4 degrees C. (-66 degrees F.) in February to 34.4 degrees C. (+94 degrees F.) in July (Martner 1981).

The amount of precipitation varies across the Bighorn Mountains with the western slope receiving less annual precipitation than the eastern slope. On the western slope, something less than one-third as much mean annual precipitation is received in the basin than in the higher elevations. Approximately 17.8 centimeters (7 inches) of annual moisture are received at Lovell (Husted 1969) while the annual precipitation at Burgess Junction, near the top of the range, is approximately 53.3 centimeters (21 inches; Becker and Alyea 1964b). Much of this difference in precipitation is due to snow accumulation at higher elevations during the fall, winter and spring. Snowpack depths of more than 1.8 meters (6 feet) are common by late winter and drifts well over 6.1 meters (20 feet) have been observed over the Medicine Wheel road east of the Deer Creek site.

Temperature inversions and air currents in the vicinity of
the Deer Creek site create an interesting and perhaps culturally significant phenomenon. Throughout many winters, these mid-elevation regions on the west slope are both warmer and dryer than areas in the basin below them. Local residents report that this area is often snow free and passable up to the timber line the year round.

Studies at Natural Trap Cave (Martin and Gilbert 1978), eight kilometers (five miles) west of the Deer Creek site and at approximately the same elevation, show that the region has undergone tremendous climatic changes in the past 20,000 years, and certainly these influenced the distribution of flora, fauna and man. Until about 14,000 years ago the Bighorns were glaciated within about 150 kilometers (90 miles) of Cloud Peak (Mathes 1900). All of the vegetation zones were depressed in elevation compared to their present locations (Martin and Gilbert 1978). For example, the subalpine grassy parks and interspersed pine groves presently typical of the 2743-2896 meter (9000-9500 foot) elevation, were depressed to an elevation of approximately 1524 meters (5000 feet). Approximately 10,000 years ago, a major climatic shift to a warmer and dryer climate occurred. Within 500 years the subalpine parks and pine forest plant communities moved upslope and sage and sparse grasslands moved into the 1524 meter (5000 foot) zone (Gilbert 1979).

Topography, Geology and Soils

Deer Creek is a second order tributary to the Bighorn River. The stream empties into Devil Canyon of Porcupine Creek
approximately 7.5 kilometers downstream from the area of the Deer Creek site. The site area itself is within and on either side of a steep-sided canyon cut into Mississippian age Madison limestone (Figure 2-2). In site area the canyon is 75 to 120 meters wide and approximately 37 meters deep. Talus slopes extend 15 to 20 meters from the canyon walls onto the canyon floor and act to confine the meandering actions of Deer Creek.

Downcutting of the canyon has exposed the upper Madison A and B lithologic units (Sutherland 1976). These two units are divided by an easily eroded brecciated sub-unit in which numerous caves and overhangs have developed.

The more resistant tan, finely crystalline, thinly bedded limestones of the upper A unit have acted to produce gently sloping and rolling topography behind the canyon rims. Numerous small intermittent drainages bisect this surface and empty over the canyon rim.

Evidence of repeated meandering by Deer Creek across the canyon floor is seen in the present-day channel, canyon sinuosity, numerous meander scars, gravel bars and the cumulative fluvial horizons exposed in the bank cuts and excavation test units. These cumulative fluvial events have helped produce a Ustic Torrifluvent soil (Soil Conservation Service 1975:189-190) in the canyon bottom.

East and upstream from the study area the canyon becomes more shallow and access to the stream bottom is much easier. At the Winter Ranch, approximately 6 kilometers upstream from
Figure 2-2. View of the Deer Creek site with Bighorn Mountains in the background.
the site, Deer Creek occupies a gently sloping, 700 meter wide valley free of confining canyon walls.

Vegetation

The Deer Creek site area is within the foothills region of the Bighorn Basin. Cary (1917) has described the Bighorn Basin as within the Great Basin Division of the Upper Sonoran Zone. This zone, however, contains species related to both the Great Basin and the Great Plains. Cary (1917:23) provides the following description of this region.

Over this region the Upper Sonoran Zone is variously characterized as to vegetation by a rank growth of broad-leaved cottonwood, willow, buffaloberry, skunk bush, and flowering currant along most of the streams; greasewood, rabbit brush, and Suoeda on adobe river flats; saltbushes, rabbit brush, spiny sagebrush, prickly-pear cactus, and such plants as Cleome lutea, Psoralea tenuiflora, and Plantago purshii on firm-soil benches, with Grayia spinosa, Polanisia trachysperma, Lupinus pusillus, yucca, sand dock, and a small yellow flowered Malacothrix added in sandy areas; and by a scattering growth of juniper and skunk bush on bad lands bluffs and on the rough southern and especially eastern margins of the basin.

The vegetation within the Deer Creek site area is similar to that described above. Two general communities are present which are related to their topographic situation. The vegetation within the Deer Creek canyon is typical of that described by Cary (1917) as occurring along streams with cottonwood, willow and currant being dominant species. Sagebrush and various grasses form the understory along wider portions of the canyon. Juniper is most plentiful on the canyon slopes. Areas with springs or other sources of water also tend to have dense concentrations of currant, skunkbrush and other bushes.
The primary goals of the testing program at the Deer Creek Site were the interpretation of site function and site integrity. Although it was believed that the site is a bison kill with an associated processing area, this was not taken as an absolute fact, but rather as an initial theory to be explored further. The following statements were formulated in order to delineate specific lines of investigation to be undertaken.

If Deer Creek is a bison kill it should exhibit similarities in bone distributions and artifactual material with other excavated kill sites in the High Plains. The proximity of the bone deposits to the present ground surface seems to indicate a probable Late Prehistoric Period component (or components). If this is the case comparisons can be made with the Piney Creek Sites (Frison 1967); Kobold (Frison 1970a); Glenrock (Frison 1970b); Wardell (Frison 1973); Vore (Reher and Frison 1980) and other Late Period kills.

The cliff faces at the Deer Creek site may have formed what Frison (1978:229) refers to as the "classic Late Prehistoric bison jump." If this is the case, we can expect to find 1) a large number of individual bison, 2) many with broken long bones from the fall, 3) drive lanes on the south canyon rim and 4) a paucity of projectile points in the kill areas.
If, on the other hand, the site is some type of impoundment, rather than a jump, fewer animals may have been involved, a greater use of projectiles would have been necessary to dispatch the animals and we might expect to find the remnants of some type of pound or corral structure.

In the case of either a jump or an impoundment, however, the data from other kill sites indicate that one can expect to find an area within the site containing bison in varying stages of disarticulation and bearing distinctive marks resulting from human butchering practices. Also associated with these bones one would expect to find the stone and bone tools used during these activities.

Ancillary to the actual kill location may be a processing area where the meat and other by-products were both consumed and rendered into less perishable and more transportable forms. Here, one would expect to find stone boiling pits for the production of bone grease and large amounts of highly fractured bone and fire altered rock from the same activity. Additionally, there may be long bones split open for the removal of marrow. It can also be expected that there would be a more diverse assemblage of artifacts at the processing location than at the kill area.

The above descriptions can be considered as a very brief synthesis of the characteristics of previously excavated Late Period bison kill sites in the Plains. Additional information on seasonality studies, butchering patterns, social patterns and technological aspects of the communal bison kill may be
found in the above cited references. While these patterns are highly consistent from site to site, the meaning of these patterns has been questioned. Recently, Binford (1981) has suggested, based on ethnoarchaeological and carnivore studies, that several of Frison's interpretations may be in error, particularly in relation to bone breakage patterns. "At Glenrock," Binford (1981:41) states, "canid-modified bones were misinterpreted by Frison as the product of human action...as deriving from a particular method of butchering (muscle stripping) postulated to account for many of the modifications, whereas others were viewed as intentional modification of bones for use as 'expediency tools' (Frison 1974)."

It was believed that the Deer Creek site might be an ideal location to explore further the questions raised by this debate. In order to gather information relevant to both the nature of the kill and to address the questions raised by Binford, individual bones, articulated units, breakage patterns, the position of cut marks and the overall distribution of elements found at the Deer Creek site were to be compared against the studies of Frison (1970b, 1973, 1974, 1978), Binford (1978, 1981), Hill (1975, 1979), Voorhies (1969), White (e.g. 1952) and others to see if the deposits most closely match the observed and/or projected characteristics of human disarticulation or if they more closely resemble nonhuman disarticulation and natural taphonomy. It was planned that these observations would then be combined with the data on human tools and features at the site to formulate a more objective interpretation of the site and the natural and
human agents which have affected its development.

As with most research designs, the materials encountered in excavations necessitated several alterations in both orientation and approach. In the areas examined, no evidence could be found of a processing area. Additionally, surface inventory of the Deer Creek canyon area resulted in the discovery of rock shelter. It was believed that the testing of this rock shelter would be an aid in determining the temporal extent of human occupation in the Deer Creek area. The possibility that the rock shelter would contain occupation levels associated with the kill areas also contributed to the decision to test it.

The analyses which follow are therefore a result of the original research strategy, but with alterations made necessary by nature of the materials encountered in the areas tested. It is believed the results presented as well as the unanswered questions posed serve to point out the significance of the Deer Creek site and its potential value to future research.
CHAPTER FOUR
METHODS AND TECHNIQUES

Site Areas

Figure 4-1 illustrates the various areas of the Deer Creek site complex and their relationship to one another. Test excavations were carried out in areas B, C and D and within Bischoff Shelter. Additional surface inventory and mapping was conducted at the possible occupation area on the north rim of the canyon and at the isolated stone circle on the south rim (see Figure 4-1). Of the areas shown in Figure 4-1, neither Area A nor the easternmost rockshelter at the site were tested. Surface evidence indicates that there are definitely in situ bone deposits on the east side of a small tributary canyon in Area A. The reported hearth features in the trail in Area A could not be substantiated. Actual human utilization of the easternmost rockshelter has not been absolutely determined.

The main point of reference for positioning all areas of the Deer Creek site in relation to one another was an "x" grooved into the rock on the north rim of the canyon by B.L.M. surveyors. This mark is on a boundary line between private and federal land and was designated by the B.L.M. surveyors as "P.O.L. 3A" on their original maps. A point on the floor of the canyon 36 meters due south of P.O.L. 3A served as the main site datum (i.e. 00 m North/00 m West). This datum is the triangle shown in Figure 4-1.
Figure 4-1. Topographic map showing the location of the various areas of the Deer Creek site, 48BH18.
Scale 1:12,000; 40 foot contour interval.
Map adapted from USGS Simmons Canyon Quadrangle, 7.5 minute series.
Due to the sinuosity of the canyon bottom and the large size of the site area, it was necessary to establish several subdatums from which to measure horizontal proveniences for the various areas of excavation. For Area B, Datum 2 was established 12 meters south and 72 meters west of the main site datum. Measuring from Datum 2, the four units excavated were: 0-2 m S, 0-2 m W; 5-6 m S, 0-1 m W; 10-11 m S, 0-1 m W; and 8-9 m S, 6-7 m W (Figure 4-2).

Datum 3 was established 88 meters north and 117 meters west of the main site datum for use in Area C. From Datum 3, the areas excavated are: 14-16 m N, 6-7 m W; 3-5 m S, 0-2 m W; 3-4 m S, 6-7 m W; 3-4 m S, 12-13 m W; and an area of excavation at an exposed bone bed on the left bank of Deer Creek (Figure 4-3). The northwest corner of the latter excavation is 39 meters north and 27 meters west of Datum 3.

Datum 4 was placed near the center of Bischoff shelter and was used for both the excavations within this area and those in Area D. The exact provenience of Datum 4 in relation to the main site datum was not determined due to interfering vegetation and topography. Area D and Bischoff Shelter are approximately .4 miles downstream from the main site datum. This datum was positioned on an east-west property line. Using the topographic map for the area, its position was determined with a potential error factor of ± 20 meters east or west.

The areas excavated in Area D consisted of a one by one meter test unit (65-66 m S, 79-80 m W) and an area of excavation over an exposed bone bed on the left bank of Deer Creek (Figure 4-4). The northwest corner of this bone bed
Figure 4-2. The Deer Creek site, 48BH18, Area B.
Figure 4-4. The Deer Creek site, 48BH18, Area D.
excavation measures 102 meters south and 35 meters west of Datum 4. Numerous test units within Bischoff Shelter were also measured in with relation to Datum 4. These will be discussed in a later chapter.

The two other site areas that were investigated are located on benches on either side of the canyon. Above the rim of the canyon on the south side is a single stone circle (Figure 4-5). This feature was mapped by using a compass and chain and measuring the dimensions of individual stones.

On the opposite side of the canyon there is an area of the site which consists of a large scatter of lithics artifacts and stones. The area appears to have been plowed in the past and the scatters of stones may be the remains of stone circles (see Figure 4-1). The surface investigation of this site area consisted of marking the concentrations of lithic materials and collecting materials within two high density loci. The surface collections consisted of two five by five meter units. The locations of the units were established with relation to P.O.L. 3A (see above).

Sequence of Investigations

In order to put this report in proper perspective, it is necessary to briefly describe the timing of the field investigations. An initial investigation of the Deer Creek site, which included a surface inventory, mapping, soil description, a coring program and the placement of bank erosion monitoring stakes, was conducted from October 7 to October 10, 1982. Field personnel for this segment of the project were
Figure 4-5. Drawing of the isolated stone circle on the south rim of the canyon, Deer Creek site, 48BH18.
Thomas K. Larson, Paul H. Sanders and Michael McFaul. Upon completion of this first stage of the field work, a laboratory soils analysis was conducted, site maps were constructed and the first preliminary report on the project was submitted to the Bureau of Land Management (McFaul and Sanders 1983).

The site was not visited again until the spring of 1983. From May 16 through May 23, 1983, an eight-person crew conducted the second stage of field work at Deer Creek. In addition to the three individuals mentioned above, this crew also included Debra Angulski, Mona Charles, Carolyn Craig, Rhoda Lewis and Paula Tibesar. While the primary activities carried out during the second stage of field investigation concerned subsurface testing, it was also during this phase of the work that the second rockshelter (Bischoff Shelter) was discovered, the isolated stone circle on the south rim of the canyon was reinvestigated and recorded, and a controlled surface collection was conducted at the probable occupation area on the north rim. The discovery of Bischoff Shelter and a reexamination of western bone bed (Area D) at the site caused the excavation strategy to be altered somewhat from what was originally proposed.

**Soil Testing and Analysis**

Field procedures for soils analysis included collection of soil-sediment samples, soil profile description and soil core programs. Soil-sediment samples were collected above, within, and below areas B and C for further laboratory analysis. A
control profile was also selected and sampled at 10 centimeter levels from an area immediately east (up stream) of Area B.

Two different core grid programs were developed to test the valley bottom associated with areas B and C (Figure 4-6). In Area C, starting at the talus slope, seven cores were drilled and collected at ten meter intervals along each of two parallel transects 10 meters apart (see Figure 4-3). The transects were oriented to include a core from the major bone concentration on the left creek bank and a core from the bone exposure at the northeastern end of the transect.

Drilling and collection at Area B was along three parallel transects extending from the stream bank bone exposure southward to the talus slopes (see Figure 4-2). Samples were collected at five meter intervals with each transect spaced five meters apart.

The goal of the field procedures at areas B and C was to determine the soil associated with the Deer Creek bone beds and the Deer Creek site area in general. The working classification of this soil and the review of its pedogenic history permitted initial inferences to be developed about the Deer Creek site. To determine the soilscape of the study area, the tests listed in Table 4-1 were conducted. These results were combined with the field geomorphic analysis to produce a working classification for the site and its associated bone beds. All the soil samples tested at the site are considered to be Ustic Torrifluvents (Soil Conservation Service 1975: 189-190). This classification was determined on the basis of:
Figure 4-6. Map showing the location of the soil cores in relation to areas B and C of the Deer Creek site; 48B:18.
<table>
<thead>
<tr>
<th>Sample</th>
<th>% T of PO₄</th>
<th>% O.M.</th>
<th>pH</th>
<th>Texture</th>
<th>Sorting</th>
<th>Sphericity</th>
<th>Sand Size</th>
<th>Color</th>
<th>Munsell</th>
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<td></td>
<td></td>
<td></td>
<td>Well</td>
<td></td>
<td>3-4</td>
<td>5 YR 5/4</td>
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</tr>
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<td>Core #4 7-22</td>
<td>76</td>
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<td></td>
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<td>5 YR 4/4</td>
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<td></td>
<td>Well</td>
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<td>5 YR 4/3</td>
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</tr>
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<td></td>
<td>Poor</td>
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<td>5 YR 5/3</td>
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<td>5 YR 5/4</td>
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<td>5 YR 5/4</td>
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<td>5 YR 6/4</td>
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</tr>
<tr>
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<td></td>
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<td>5 YR 6/4</td>
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<td></td>
<td>Well</td>
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<td>5 YR 5/4</td>
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<td></td>
<td>Well</td>
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<td>5 YR 5/4</td>
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<td></td>
<td>Well</td>
<td></td>
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<td></td>
<td>10 YR 8/1</td>
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<td>Silty clv</td>
<td>Well-mod.</td>
<td>Subround 3-4</td>
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<td>Red</td>
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<td>Sbrd-sbang</td>
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<td>Red</td>
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<td>Silt loam</td>
<td>Well</td>
<td>Sbrd-round</td>
<td>3-4</td>
<td>5 YR 4/4</td>
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<td>Subround</td>
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</tr>
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<td>Subangular</td>
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<td>Yellowish red</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>Silty clv</td>
<td>Moderate</td>
<td>Subangular</td>
<td>3-4</td>
<td>7.5 YR 3/2</td>
<td>Dark brown</td>
</tr>
<tr>
<td>RP 10-20</td>
<td>8.3</td>
<td></td>
<td></td>
<td>Silty clv</td>
<td>Poor</td>
<td>Sbang-sbrd</td>
<td>1-4</td>
<td>10 YR 4/4</td>
<td>Dk yellowish br</td>
</tr>
<tr>
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<td></td>
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<td>Poor</td>
<td>Sbrd-sbang</td>
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<td>7.5 YR 5/4</td>
<td>Brown</td>
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<td></td>
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<td>Poor-Mod.</td>
<td>Sbang-ang</td>
<td>3-4</td>
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<td>Brown</td>
</tr>
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<td></td>
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<td>3-4</td>
<td>7.6 YR 4/4</td>
<td>Dark brown</td>
<td></td>
</tr>
<tr>
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<td>2.63</td>
<td></td>
<td>Cly</td>
<td>Very well</td>
<td>Ang-sbang</td>
<td>2-4</td>
<td>7.5 YR 5/4</td>
<td>Brown</td>
</tr>
<tr>
<td>RP 60-70</td>
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<td></td>
<td></td>
<td>Cly</td>
<td>Poor</td>
<td>Subangular</td>
<td>2-4</td>
<td>5 YR 4/4</td>
<td>Reddish brown</td>
</tr>
<tr>
<td>RP 70-80</td>
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<td></td>
<td></td>
<td>Sndy clv</td>
<td>m Well</td>
<td>Subangular</td>
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<td>5 YR 4/4</td>
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</tr>
<tr>
<td>RP 80-90</td>
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<td>2.68</td>
<td></td>
<td>Sndy clv</td>
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<td>Sbang-sbrd</td>
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<td>5 YR 5/4</td>
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</tr>
<tr>
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<td>Silty clv</td>
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</tr>
<tr>
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<td>.63</td>
<td></td>
<td>Sndy clv</td>
<td>m Well</td>
<td>Subround 1.5-2.5</td>
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<tr>
<td>RP 110-120</td>
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<td>Sbang-ang</td>
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<td>5 YR 5/4</td>
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<tr>
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<td>Very well</td>
<td>Sbang-ang</td>
<td>3-4</td>
<td>5 YR 5/4</td>
<td>Reddish brown</td>
</tr>
</tbody>
</table>
1) little evidence of pedogenic horizon development
2) the flood plain location
3) brownish and reddish colors
4) the young age of the sediment deposits
5) stratification seen in the representative profile
6) high or calcareous pHs
7) a lack of cementation seen in the profiles
and 8) soil texture.

The implications for a site found in a Ustic Torrifluvent environment are very important to the Deer Creek site. These fluvial Entisols are subjected to repeated cumulative and erosional events. Profile stratification, sand fraction morphology, texture and the valley floor microtopography all show evidence of these events.

Careful consideration was given to site stratigraphy-bone exposure relationships. Bone exposure samples and comparable levels from the test cores were examined and described. The results of this examination show the bone exposures differ from each other in texture, pH, and sand fraction morphology but are similar in having a red-brown matrix. This similarity in color was chosen to be an indicator of levels possibly containing bison bone accumulations. Color strata columns were then drawn for the grid core samples noting the presence of the red-brown strata. Samples were taken from the red-brown core levels and tested selectively for organic matter where materials believed to be bone were seen and all red-brown samples were tested for the presence of inorganic phosphate. Inorganic phosphate has been shown to be an effective indicator of cultural midden deposits (e.g. Hassan 1981) and it was hoped that similar tests might differentiate areas lacking and containing bison bone at the Deer Creek site.
As a reference, organic and phosphate tests were also conducted on a piece of bison rib bone from Bone Bed C. A fresh break was made in the center of the rib and the newly exposed interior of the bone was sampled. A ground Madison limestone specimen from the canyon wall was also tested as a possible phosphate contamination source.

Testing procedures for the organic matter percentages were based upon a modified Walkly-Black method developed by the La Motte Chemical Company for their field organic matter testing bit. Phosphate transmittance followed a method described by Hassan (1981). This method was modified slightly in that the samples were not allowed to set for 15 minutes after the addition of the ascorbic acid solution. A Sargent-Welch Colorimeter was also used in place of the La Motte TRL apparatus used by Hassan. Both changes were discussed with Hassan (personal communication, December 14, 1982).

Excavation Procedures

Excavation procedures at the Deer Creek site were designed to explore both areas of known bone concentrations and areas where it was believed, but not verified, that cultural materials were present. For these reasons excavation procedures varied somewhat from place to place.

All small test excavation units in areas B, C, D and the western-most excavation area in Bischoff Shelter were excavated in ten centimeter arbitrary levels. The only exception to this was that upper levels were sometimes excavated somewhat deeper
than ten centimeters due to uneven ground surfaces and loose, disturbed top soil.

The two areas of major bone tested, one in Area C and one in Area D, were excavated in such a manner the the overburden was removed and screened as one level. This overburden varied from one to 15 centimeters in thickness. The bone level itself was then treated as the second level. This varied from ten to 25 centimeters in thickness. After removal of the bone deposits another five to ten centimeters were skimmed out and screened to ensure that all materials had been recovered.

Due to the extreme slope of the surface of the eastern excavation unit in Bischoff Shelter, the upper 30 centimeters of fill were removed as one level. In other words, the level was 30 centimeters thick along the northern wall, but practically nonexistent over the southern two-thirds of the unit. Portions of a discontinuous upper cultural component were encountered in this upper 30 centimeters. Because it seemed that the cultural levels in this portion of the site were not following smooth surface planes, excavation in the lower 30 centimeters was continuous; point plotting of cultural materials, drawings of the extent of encountered strata, and wall profiles replaced the information which would have normally been recorded level-by-level. This ultimately resulted in a much clearer interpretation of the deposits than would have been possible if flat, or even-sloped, arbitrary levels had been maintained.

In all areas excavated, matrix was screened through one-quarter inch hardware cloth. All identifiable bone elements
were photographically mapped in place. On selected bones in the two large bone deposits, notes were also taken on the distance below datum, angle of orientation and angle of strike from the horizontal plane.

Plaster jacketing was placed around the three bison skulls excavated as well as one of the articulated vertebral columns. This was done to protect these materials during transport out of the canyon.

All bone elements and articulated units were numbered and tentatively identified in the field. These identifications were subsequently rechecked after cleaning and stabilization of the bone in the laboratory.

Whenever possible, a band of sod was removed intact from the excavation units and stockpiled. Upon completion of the excavations screened matrix was backfilled into the areas and the sod was replaced.
CHAPTER FIVE
EXCAVATION RESULTS

Area B

During the fall of 1982, Area B was subjected to a soil coring program. This coring consisted of three parallel transects positioned at five meter intervals and extending southwestward from the cutbank of Deer Creek. Samples were collected at five meter intervals along each of these three transects.

As stated in McFaul and Sanders (1983:8) "Samples were taken from the red-brown core levels and tested selectively for organic matter where materials believed to be bone were seen and all red-brown samples were tested for the presence of phosphate." The general concept behind phosphate testing is that phosphate content reflects the amount of organic remains within a soil. Levels of phosphate higher than standard background rates may therefore indicate the location of archaeological materials such as bone (e.g. Hassan 1981). The results of phosphate tests performed on these soil samples indicate a variation in phosphate concentrations. Plotting of phosphate isopleths extrapolated from these tests are illustrated in Figure 5-1. Archaeological testing of Area B during the spring of 1983 was designed to test areas of high as well as low phosphate concentrations.
Figure 5-1. Phosphate isopleth map of Area B, 48BH18. Isopleths are expressed in PO₄ millogram/gram of soil.
A total of four units were excavated within Area B (see Figure 3-2). These include a two by two meter unit (coordinates 0-2mS, 0-2mW) and three one by one meter units (coordinates 5-6mS, 0-1mW; 10-11mS, 0-1mW; and 8-9mS, 6-7mW). Excavation unit 0-2mS, 0-2mW was positioned adjacent to the cutbank of Deer Creek within an area of the highest percentage of phosphates revealed in the coring program conducted at Area B. Unit 5-6mS, 0-1mW was positioned in an area of a low percentage of phosphate. Both units 10-11mS, 0-1mW and 8-9mS, 6-7mW were positioned in areas of high phosphate concentrations. Table 5-1 lists the weight of faunal material recovered from each of the four excavation units in Area B. In order to make the weight of bone recovered from the two by two meter excavation unit comparable with the other three units, only the faunal material recovered from the northwestern one by one meter square (coordinates 0-1mS, 0-1mW) is included in Table 5-1. A detailed description of all identified elements is presented in Appendix A.

Examination of Table 5-1 suggests several important considerations. The first of these deals with the accuracy of phosphate tests for determining the presence/absence of faunal material at Area B of the Deer Creek site. It appears from examination of Table 5-1 that there is little or no relationship between the results obtained from the phosphate tests and the amount of faunal material recovered through excavation. In comparing excavation units 10-11mS, 0-1mW with unit 8-9mS, 6-7mW little correlation between the amount of phosphate and weight of bone recovered is evident. Both of
Table 5-1. Comparison of phosphate levels and bone weights by excavation units in Area B of the Deer Creek site.

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<th>0-1S; 0-1W</th>
<th>5-6S; 0-1W</th>
<th>10-11S; 0-1W</th>
<th>8-9S; 6-7W</th>
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<td>--</td>
<td>120.5</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>20-30</td>
<td>--</td>
<td>35.0</td>
<td>12.0</td>
<td>77.5</td>
</tr>
<tr>
<td>30-40</td>
<td>445.5</td>
<td>0.5</td>
<td>0.5</td>
<td>2.5</td>
</tr>
<tr>
<td>40-50</td>
<td>--</td>
<td>9.0</td>
<td>2.0</td>
<td>--</td>
</tr>
<tr>
<td>50-60</td>
<td>--</td>
<td>797.0</td>
<td>189.0</td>
<td>86.5</td>
</tr>
<tr>
<td>60-70</td>
<td>--</td>
<td>128.0</td>
<td>756.0</td>
<td>86.0</td>
</tr>
<tr>
<td>70-80</td>
<td>1046.0</td>
<td></td>
<td></td>
<td>40.0</td>
</tr>
<tr>
<td>Total</td>
<td>1491.5</td>
<td>1090.0</td>
<td>960.0</td>
<td>292.5</td>
</tr>
</tbody>
</table>

* -- Isopleth reading extrapolated from location of excavation unit in relation to phosphate map (see Figure 5-1).

** -- Measurements given in centimeters below datum.
these units exhibit a comparable percentage of phosphates (isopleth reading of between 8 and 12); however, the weight of faunal material recovered from unit 10-11mS, 0-1mW is nearly three times as great as that recovered from unit 8-9mS, 6-7mW. On the other hand, unit 5-6mS, 0-1mW, which produced a comparable weight of faunal material as did unit 10-11mS, 0-1mW, has an isopleth reading of only one-third as high as unit 10-11mS, 0-1mW.

The only apparent agreement between percent of phosphate and excavation results is in unit 0-1mS, 0-1mW. This unit produced the highest weight of faunal material of the four units in Area B and is also located within the highest isopleth readings extrapolated from the coring program. This may be due to chance considering the lack of any additional correlations. Also, the weight of faunal material recovered from Unit 0-1mS, 0-1mW does not appear to be significantly greater than that recovered from unit 5-6mS, 0-1mW although the latter unit exhibits a phosphate reading of approximately one-quarter that of unit 0-1mS, 0-1mW.

Two major bone bearing levels were encountered in Area B. The first of these occurs at a depth of approximately 20 to 40 centimeters and the second is between 50 and 80 centimeters (see Table 5-1). Sediments associated with the upper bone bearing level are generally characterized by numerous sand and gravel lenses intermixed with silty clays, red to brown in color. The lower bone bearing level is also characterized by a variety of colors ranging from reddish brown to yellowish brown. Sediments associated with this lower level generally
have a clay texture. The sand and gravel lenses prevalent within the upper 40 centimeters of excavation were not encountered within the lower bone bearing level.

The majority of identifiable bone elements in both levels are *Bison bison*. All elements described in the following discussion without reference to species may be assumed to be bison. Area B did yield some elements other than bison. Portions of at least two positively identified and one tentatively identified bighorn sheep (*Ovis canadensis*) were found in the upper level and a rib fragment of an unspeciated, but non-bison, large mammal was found in the lower bone level.

The weight of faunal material recovered from the upper level is somewhat misleading. In unit 0-1mS, 0-1mW for instance, the majority of the 445.5 grams recovered is represented by two elements (a left mandible fragment weighing 73 grams and a complete cervical vertebra weighing 364 grams). In unit 5-6mS, 0-1mW three elements account for the majority of the weight shown in Table 5-1 (femur shaft fragment weighing 97 grams, a complete first phalange weighing 23.5 grams and a distal metapodial fragment weighing 21.5 grams). The same is also true for unit 8-9mS, 6-7mW where a rib fragment and a complete right calcaneus (*Ovis canadensis*) account for 59 of the 80 grams of faunal material recovered.

Much of the faunal material recovered at the 20 to 40 centimeter depth appears to have been redeposited in Area B from areas further upstream. This is suggested by the rounded and polished appearance of many of the smaller elements, lack
of articulated units, nearly vertical positioning of several of the elements, presence of sand and gravel lenses throughout the upper 40 centimeters of excavation and occasional occurrence of faunal material within these sand and gravel lenses.

The majority of faunal material in Area B was recovered at a depth of 50 to 80 centimeters (see Table 5-1). Although much of this material is fragmentary, complete vertebrae, carpals and phalanges were recovered as well as one articulated right front leg unit (distal radius, radial carpal, interior carpal, ulnar carpal and fused 2nd and 3rd carpal).

In terms of the horizontal distribution of faunal material within this lower bone level, it appears that the majority of faunal material is located adjacent to Deer Creek and perhaps extending back for a distance of between five and ten meters. This is indicated by the fact that approximately 1000 grams of faunal material was recovered from the lower levels in each of the three eastern-most excavation units while only 212.5 grams of faunal material was recovered from unit 8-9mS, 6-7mW, located approximately 10 meters west of Deer Creek.

Finally, the distribution of bone weights illustrated in Table 5-1 indicates that the lower level of faunal material is deepest in unit 0-1mS, 0-1mW. On the basis of results obtained through excavation, the distribution of faunal material associated with the 40-80 centimeter levels of excavation in Area B is more deeply buried and is more concentrated in areas adjacent to the cutbank of Deer Creek. Cultural materials associated with the 50-80 centimeter levels of excavation appear to represent in situ cultural deposits.
In addition to faunal material, six pieces of lithic debitage were recovered from Area B. All of these were recovered from the two by two meter excavation unit (0-2mS, 0-2mW) at a depth of 30-40 centimeters. The six flakes recovered include: two tertiary red chert flakes, one tertiary brown chert flake, one tertiary white chert flake, one tertiary brown quartzite flake and one primary brown chert flake. The tertiary brown chert flake also appears to have been water-rolled as evidenced by the smoothed lateral edges and striking platform as well as the overall polishing exhibited by this specimen. As previously indicated, cultural material associated with the upper 40 centimeters of soil does not appear to represent in situ cultural deposits. No chipped stone tools were recovered from excavation of Area B.

Area C:

Testing at Area C was conducted on either side of what is believed to be an old meander channel at Area C (McFaul and Sanders 1983). Four test units to the east and northeast of this channel (3-5mS, 0-2mW; 3-4mS, 6-7mW; 3-4mS, 12-13mW; 14-16mN, 6-7mW) revealed very little in the way of cultural material. Although there were lithics and bone on the surface at 14-16mN, 6-7mW, subsurface testing recovered only a few fragments of bone 2 to 5 centimeters below the present ground surface.

The stratigraphy in these small test units is composed of a series of narrow stream deposited sand and gravel lenses interspersed with even thinner levels of organic stain. A typical
profile from these units is shown in Figure 5-2. It seems likely that little, if any, cultural materials have been preserved in this part of the site except for small areas protected by the talus slopes.

Two additional test units were placed on the other side of the stream and to the west of the old meander (see Figure 4-3). These units were intentionally placed directly over a large amount of bison bone exposed in the cutbank of the stream. Articulated units and individual elements from at least three bison were recovered from this area. Figure 5-3 is a map of these materials. Table 5-2 lists the bone elements displayed in this figure. It should be noted that this illustration does not reflect the total amount of bone encountered. This is due to the fact that many bones were found underneath those illustrated. For a complete listing of all faunal material recovered in Area C, see Appendix A.

Although no cultural materials were found in association with this bone, examination of the bone itself has revealed distinct cut marks on the surface of many specimens. These marks are clearly the result of human activity. This bone deposit will be discussed in greater detail in the Analysis chapter of this report.

Area D:

This area was first discovered because of a bison horn core and other bone fragments exposed in the stream bank on the south side of Deer Creek. Additional inspection also revealed a level of charcoal and fragmentary burned bone downstream from
Figure 5-2. East wall profile of Unit 3-4mS, 12-13mW, Area C.
Figure 5-3. Map of excavated area of bone bed in Area C. See Figure 4-3 for orientation of units.
Table 5-2. Explanation of Map Numbers in Figure 5-3.

1  SKULL, NEARLY COMPLETE.
2  COMPLETE ATLAS
4  LEFT ILIUM, FRAGMENTARY
4  RIGHT ILIUM, FRAGMENTARY
4  SACRUM, COMPLETE.
5  DISTAL METATARSAL AND ARTICULATED 1ST PHALANGE. SPIRAL FRACTURE TO DIAPHYSIS
7  RIGHT RADIUS-ULNA, COMPLETE
8  LEFT HUMERUS, NEARLY COMPLETE. LATERAL AND MEDIAL TUBEROSITIES BROKEN OFF DUE TO WEATHERING
10 COMPLETE METACARPAL AND ARTICULATED 1ST PHALANGE
11 STERNUM FRAGMENT.
12  SKULL FRAGMENT, TEMPORAL BULLA.
13 ONE PIECE OF COSTAL CARTILAGE.
15 13TH AND 14TH THORACIC WITH CUT MARKS AT BASE OF DORSAL SPINE ON LEFT SIDE OF 14TH.
16 LARGE AND INTERMEDIATE HYOIDS, COMPLETE.
17 THREE ARTICULATED THORACICS AND THREE ASSOCIATED LEFT RIB HEADS. CUT MARKS AT BASE OF DORSAL SPINE.
18 DISTAL METATARSAL. SPIRAL FRACTURE OF DIAPHYSIS. CUT MARKS ENCIRCLING SHAFT 10 CM ABOVE DISTAL END
20 LEFT MANDIBLE, NEARLY COMPLETE. ASCENDING RAMUS BROKEN OFF. CUT MARKS ON INTERIOR SURFACE.
23 COMPLETE CERVICAL VERTEBRA
24 TWO THORACIC VERTEBRAE WITH ONE ASSOCIATED LEFT RIB HEAD.
25 RIGHT FUSED 2ND AND 3RD CARPAL, COMPLETE.
28 THORACIC BODY AND MOST OF SPINE.
29 COMPLETE LEFT SCAPULA. CUT MARKS ENCIRCLE THE SHAFT 5 CM BELOW THE GLENOID CAVITY.
30 COMPLETE ATLAS
31 RIGHT ACETABULUM WITH PORTIONS OF ILIUM AND ISCHIUM
32 DISTAL LEFT RADIUS-ULNA. SPIRAL FRACTURE OF DIAPHYSIS.
33 THORACIC BODY AND APPROX. 10 CM OF DORSAL SPINE. CUT MARKS AT BASE OF SPINE.
34 UNIT, ARTICULATED ASTRAGALUS, CALCANEUM AND FUSED CENTRAL AND 4TH TARSAL.
Table 5-2. Continued.

35  THIRD PHALANGE, COMPLETE
36  SECOND PHALANGE, COMPLETE
37  THORACIC VERTEBRA WITH CUT MARKS ON DORSAL SPINE.
38  COMPLETE ATLAS
39  LEFT METACARPAL, COMPLETE
40  RIGHT METACARPAL, COMPLETE, AND ARTICULATED FIRST PHALANGE.
41  IMMATURE RIGHT METACARPAL, COMPLETE EXCEPT FOR WEATHERING ON THE POSTERIOR-PROXIMAL SURFACE
42  STERNUM FRAGMENT.
43  THORACIC UNIT OF 6TH THRU 14TH WITH SOME ASSOCIATED RIB HEADS. CUT MARKS AT BASE OF SPINE
44  IMMATURE, SMALL AXIS, NEARLY COMPLETE
46  THIRD PHALANGE, COMPLETE
47  SKULL, NEARLY COMPLETE.
48  CERVICAL UNIT OF TWO VERTEBRAE
the exposed horn core. A one meter by four meter excavation unit was placed over the exposed bone and a one by one meter unit was excavated in the area of the charcoal stain (see Figure 4-4).

The one by four meter excavation unit revealed a concentrated level of bison bone approximately 20 centimeters below the present ground surface. A minimum of three bison are represented in this excavation as well as the fragmentary remains of a canid and a deer or sheep size animal. A map of this bone bed is shown in Figure 5-4 and the bone elements in this figure are described in Table 5-3. A more specific description of all faunal materials recovered from Area D is given in Appendix A.

As with Area C, no definite cultural material was recovered in this excavation. The bison bone recovered from this excavation does, however, exhibits many cut marks and bone breakage patterns indicative of human butchering activities.

In addition to the bison material, Area D also contained a small burned area (see Figure 5-4) containing a number of non-bison elements. Identifiable bone elements from this area indicate the presence of a wolf (*Canis lupus*) and a deer (*Odocoileus* sp.) in the deposits.

The one by one meter test unit into the charcoal and burned bone region of Area D exposed only a few identifiable bison bones and no cultural material. The unit did produce a charcoal sample in association with the bone which dated as "modern" (Beta-7149). Comparable soil strata in both excavation units would seem to indicate that the burned level
Figure 5-4. Map of excavated area of bone bed in Area D.
Table 5-3. Explanation of Map Numbers in Figure 5-4.

1
COMPLETE ATLAS
2
LEFT SCAPULA, COMPLETE EXCEPT FOR MISSING PORTIONS OF THE BORDER OF THE BLADE
3
THORACIC BODY AND APPROX. 15 CM OF SPINE. CUT MARKS AT BASE OF SPINE ON RIGHT SIDE.
4
SKULL, NEARLY COMPLETE.
5
THORACIC VERTEBRA, COMPLETE.
8
RIGHT SCAPULA, COMPLETE EXCEPT FOR UPPER END OF THE ACROMION AND BORDERS. CUT MARKS ENCIRCLE SHAFT 5 CM BELOW GLENIOD.
9
LEFT HALF OF PELVIS, NEARLY COMPLETE EXCEPT BORDERS OF ILIUM AND ISCHIUM. GNAWING AROUND ACETABULUM.
10
COMPLETE CERVICAL VERTEBRA
11
FIRST PHALANGE, COMPLETE
14
THIRD PHALANGE, COMPLETE
15
THORACIC VERTEBRA, BODY AND NEURAL ARCH.
16
THREE THORACIC VERTEBRAE WITH CUT MARKS AT BASE AND UP AND DOWN THE DORSAL SPINES.
18
RIGHT MANDIBLE, COMPLETE.
19
DISTAL RADIUS-ULNA, VERY LITTLE OF THE SHAFT. SPIRAL FRACTURES ON THE DIAPHYSIS WITH CUT MARKS AT THE BREAK
20
CERVICAL UNIT, AXIS THRU SIXTH CERVICAL
21
UNIT, DISTAL TIBIA, LATERTAL MALLEOLUS AND ASTRAGALUS. SPIRAL FRACTURE OF SHAFT AND POLISH. POSSIBLE TOOL.
23
FIRST PHALANGE, COMPLETE
24
LEFT METATARSAL, COMPLETE
25
LEFT METATARSAL, COMPLETE
26
DISTAL RADIUS-ULNA. SPIRAL FRACTURE OF THE DIAPHYSIS WITH CUT MARKS PARALLEL TO IT
27
UNIT, LEFT HUMERUS AND RADIUS-ULNA. COMPLETE EXCEPT THAT HEAD OF HUMERUS IS MISSING
28
SIX PIECES OF FEMUR SHAFT, POSSIBLY BROKEN FOR MARROW EXTRACTION.
29
LEFT METACARPAL, COMPLETE
30
LEFT SCAPULA, COMPLETE EXCEPT FOR MISSING PORTIONS OF THE BORDER OF THE BLADE
32
THORACIC BODY AND APPROX. 15 CM OF SPINE. CUT MARKS ON SPINE
34
LEFT FUSED 2ND AND 3RD CARPAL, COMPLETE.
35
LEFT ULNAR CARPAL, COMPLETE
Table 5-3. Continued.

36
FIRST PHALANGE, COMPLETE
37
2ND THRU 5TH LUMBAR AND SACRUM. MAP #S 37, 60, 109, 121.
38
LEFT INTERMEDIATE CARPAL, COMPLETE
40
SECOND PHALANGE, COMPLETE
41
COMPLETE CERVICAL VERTEBRA
42
COMPLETE CERVICAL VERTEBRA
43
THORACIC VERTEBRA, BODY AND NEURAL ARCH.
48
COSTAL CARTILAGE
49
RIGHT METACARPAL, COMPLETE. RODENT GNAWING ON THE LATERAL SURFACE OF THE DIAPHYSIS
53
COSTAL CARTILAGE
58
STERNUM
63
COMPLETE ATLAS
64
THORACIC VERTEBRA WITH CUT MARKS AT BASE OF SPINE ON RIGHT SIDE
65
COMPLETE THORACIC, RECONSTRUCTED AT OLD BREAKS.
69
COMPLETE CERVICAL VERTEBRA
70
RIGHT MANDIBLE, COMPLETE.
71
ODOCOILEUS SP., SECOND PHALANX, PATHOLOGICAL.
79
THORACIC VERTEBRA WITH CUT MARKS AT BASE OF SPINE ON RIGHT SIDE.
81
LEFT FEMUR, NEARLY COMPLETE. TROCHANTER MAJOR AND SMALL PORTION OF TROCHLEA CREWED OFF
121
THORACIC VERTEBRA, COMPLETE.
is contemporaneous with the bison bone excavated in the one by four meter unit of Area D.

Bischoff Shelter

The Bischoff Shelter (Figure 5-5) is a rockshelter containing diagnostic prehistoric cultural materials dating from the Late Prehistoric through the Paleoindian period (Figure 5-6). In the discussions which follow, measurements given for the projectile points follow the procedures utilized by Reher and Frison (1980).

The rockshelter is in the canyon wall north of Area D. It is approximately 75 meters above the valley floor at the head of a shallow draw. A small ephemeral drainage enters the canyon and produces a small waterfall in front of the shelter. In places, water also seeps through the porous breccia roof and walls of the rockshelter. This water is probably responsible for the presence of a relatively thick growth of vegetation in front of the rockshelter.

The rockshelter is composed of a large, ten by twenty meter room entirely exposed to the south and an adjoining room which extends eastward a minimum of seven meters from the east wall of the main chamber (Figure 5-7). This adjoining room is almost entirely filled with pack rat refuse so its exact size could not be determined.

Western Excavation Units:

Four excavation units were placed within the rockshelter to investigate for subsurface cultural deposits. Another purpose for placing test units in the shelter was to determine whether
Figure 5-5. Photo showing the entrance to Bischoff Shelter.

Figure 5-6. Projectile points recovered from Bischoff Shelter. All illustrations are actual size.
or not the cave deposits are associated with the bison bone beds along Deer Creek. For the purposes of this discussion the three units excavated in the western portion of the shelter (0.50-2.00mS, 2.00-3.00mW; 1.00mN-0.50mS, 2.00-3.50mW; 0.00-1.00mS, 1.00-2.00mW) will be discussed together. Figure 5-8 is a wall profile showing the natural and cultural stratigraphy of this area of the shelter.

This area of excavation contained the majority of chronological indicators. The top twenty centimeters were composed of a loose, unconsolidated fill which contained a small amount of cultural material. These materials probably date from the historic and/or Late Prehistoric period but no definitive level could be established. Two end scrapers and a possible bone awl recovered from this level are illustrated in Figure 5-9 a-c).

The first chronological indicators were recovered from in and around a large feature (Feature 1) extending from 20 centimeters below the ground surface to bedrock. A corner notched projectile point of red porcellanite (Figure 5-6a) was found in an ashy sediment associated with the top of this feature. The projectile point is broken at the notches and consists of the tip and midsection. It is 36 millimeters long, 18 millimeters wide, four millimeters thick and eight millimeters between the notches. This specimen has straight blade edges and is similar to a point collected from a level above Occupation V at Bottleneck Cave (Husted 1969: Plate 30u) which is believed to date at approximately A.D. 600.
Figure 5-8. East wall profile of the western area of excavation in Bischoff Shelter, 48BH18.
Figure 5-9. Stone, bone and wooden artifacts from Bischoff Shelter, 48BH18.
Bottleneck Cave is located near the Bighorn River approximately 16 kilometers (ten miles) southwest of the Deer Creek site.

Feature 1 was located in the northeast corner of the unit and consisted of a semi-circular arrangement of limestone rocks (Figure 5-10). This probable hearth feature was approximately 110 centimeters in diameter and 40 centimeters in depth. The charcoal and powdery hearth fill associated with this hearth radiocarbon dated to 1890 ± 70 years B.P. (Beta-7151).

Feature 2 was located approximately one meter southwest of Feature 1 and was composed of a three to five centimeter wide white ashy stain which forms a half circle (see Figure 5-10). Removal of the charcoal flecked fill revealed a shallow, basin shaped hearth feature. Two Middle Plains Archaic projectile point bases were recovered at the contact of the base of Feature 2 with the matrix below it. One of the projectile points appears to be a McKean lanceolate (Figure 5-6b) with a basal notch three millimeters deep. The broken specimen is 21 millimeters long, 20 millimeters wide and five millimeters thick. Slight grinding is present on the lower basal edges. The other projectile point base (Figure 5-6c) appears to be representative of the stemmed and indented base Hanna variety of the McKean point complex. This incomplete projectile point is 20 millimeters long, 18 millimeters wide and five millimeters thick. Depth of the basal notch is two millimeters.

At the surface of the loose limestone bedrock, a late Paleoindian level was encountered which contained two distinctive projectile points and associated fill from a hearth
Figure 5-10. Features 1 and 2 from Bischoff Shelter, 48BH18.
radiocarbon dated to 7730 ± 200 years B.P. (Beta-7150). The first projectile point (Figure 5-6e) is characterized by fine, regular parallel oblique flaking, slightly ground basal blade margins and a rounded base. It is nearly complete, missing only the tip. The specimen is 46 millimeters long, 14 millimeters wide and five millimeters thick. A bend break (see Frison and Bradley 1980:44) and the burination of one edge suggests probable breakage due to impact with another object.

The second projectile point (Figure 5-6f) is manufactured from medium-grained brown quartzite. It is 62 millimeters long, 23 millimeters wide and ten millimeters thick. Lateral edges are slightly convex and the extreme basal portion of the specimen is missing. The left lateral margins (basal portion down) are characterized by parallel oblique flaking. Flaking on the right lateral margins is random and is marked by several large step fractures. There is a very slight shoulder present approximately one-fifth up the length of the projectile point. In cross-section, the blade edges are bi-beveled from the shoulder to the tip. The basal portion is lenticular in cross-section.

The radiocarbon date of 7730 ± 200 years B.P. (Beta-7150) was recovered from the fill of an apparent hearth remnant situated on the surface of the loose limestone bedrock in Bischoff Shelter. Around this hearth stain, and in association with the two projectile points, were a number of unidentifiable large mammal long bone splinters.

The only other potentially diagnostic artifact within the western area is a biface midsection found within the upper
portion of loose bedrock 30 to 40 centimeters below the surface (Figure 5-6g). The artifact is 37 millimeters long, 23 millimeters wide and eight millimeters thick. It is manufactured from a medium-grained red quartzite with a fine, regular flaking pattern. The lower blade margins have been ground producing a pattern reminiscent of Paleoindian projectile points, especially the Hell Gap and Agate Basin varieties (e.g. Frison 1974; Frison and Stanford 1982). However the fragmentary nature of the artifact and its questionable provenience prevent an accurate typological assignment for this artifact.

Unit 2.00-3.50mS, 2.50-4.00mE:

This unit was located in the eastern portion of the rockshelter (see Figure 5-7). The ground surface in this area was uneven resulting in a 45 centimeter difference between the northeast and southwest corners of the unit.

Several cultural and sedimentary layers were present within this unit (Figure 5-11). The first recognizable cultural level is a brown ashy layer containing fragments of charcoal. Part of this layer was exposed at the surface but was overlain by a small amount of brown sandy loam in the northeast corner. Ten pieces of lithicdebitage and seven burned and unburned bone fragments were recovered from this brown ashy stratum. The level is quite disturbed and it was not possible to determine if the cultural materials are an intact level or the result of mixing.
Figure 5-11. Profiles of the eastern excavation unit in Bischoff Shelter, 48BH18.
Underlying this ash layer was a strong brown sandy loam which extended from approximately 20 to 45 centimeters below the present ground surface. Below this stratum, in the northern one-half of the unit, is a layer of limestone rock and light red loam. Cultural materials were not encountered in any of these deposits.

In the northwestern corner of the unit the layer of limestone rock and red loam was interrupted by a charcoal lens overlying a circular feature having a charcoal stained fill. The amount of charcoal recovered from this feature was insufficient for radiometric dating. Within and around this feature a large amount cultural material was recovered. This material includes numerous pieces of lithic debitage, small cores, a utilized flake, a shaved wooden stick (Figure 5-9d), an obsidian blade (Figure 5-9e) and fragments of burned and unburned bone from medium and large size mammals.

The limestone and light red loam was not continuous over the entire unit; rather, it pinched out in the southeastern corner. In this area, two pack rat middens, an intervening layer of yellowish red loam and a lower layer of strong brown sandy loam overlie the limestone and light red loam (see Figure 5-11).

The last layer containing cultural material was a red sandy loam which lies on top of the loose limestone bedrock. It was out of this layer that a McKean type projectile point base (Figure 5-6d) was recovered. The presence of an impact flute on one side and the burination of one of the edges indicates that the point probably broke as the result of impact. This
specimen measures 25 millimeters long, 19 millimeters wide, five millimeters thick and has a basal notch one and one-half millimeters deep. The point is stylistically similar to the Mummy Cave artifacts (McCracken et al. 1978: Plate 44 r). Several pieces of debitage, a chert end scraper (Figure 5-9f) and bone fragments of rabbit and other small mammals were also recovered from this level.

It seems likely that the McKean materials found in Bischoff Shelter are continuous from one side of the room to the other. The continuity and interrelationships of the other cultural materials encountered in the two areas of testing is difficult to discern at this time. Greater discussion of the cultural materials, fauna and added interpretations of Bischoff Shelter will be discussed in the Analysis chapter of this report.
Nonhuman Actions on the Bone Deposits

As already stated, one of the primary goals of this study was to determine the actual function of the Deer Creek site. The first step in this process is to determine the degree to which human action has influenced the deposits encountered in excavation.

In most prehistoric sites, the presence of stone tools within a level is perhaps the best indicator of the type and degree of human activity. However as has already been noted, such items were not encountered in good context within any areas of the site other than Bischoff Shelter. Human actions on the bones themselves therefore becomes the next best alternative. In most of the bone deposits at Deer Creek these types of indicators, primarily cut marks, are clearly present. The primary question therefore becomes not whether or not human activity was present at the Deer Creek site, but whether or not human activity was a primary causal factor in the resultant appearance of the bone deposits as they were encountered in excavation. This is perhaps the only means of assessing cultural "integrity."

Hill (1975, 1979) has studied the natural disarticulation of bovid remains on the African Topi to determine the sequence
in which the skeleton of a large mammal breaks apart. He then compared this sequence against the butchering patterns described by Wheat (1972) at the Olsen-Chubbuck bison kill (Hill 1979). The two sequences are very similar and the author attributes this to the fact "that the determining controls of the pattern are inherent in the anatomy of the dead animal itself and thus independent of the agents whereby it is realized" (Hill 1979:744).

Although the data gathered by Hill have some utility for the Deer Creek deposits, any conclusions based solely on his disarticulation sequence would be very speculative. There is evidence in the bone beds of Area C and Area D that natural disarticulation probably did affect the skeletal remains. However, in a testing program such as the one carried out at Deer Creek, detecting "patterns" is somewhat difficult. We can only describe the articulations and dispersal patterns of elements for portions of two or three animals in each area. A different approach to natural actions on the bone beds will therefore be presented here.

The deposits encountered seem to lend themselves to the study of two specific types of natural actions, stream flow and carnivore activity. By first explaining the patterns which these actions caused it is believed that a better picture can be presented of the patterns caused by human butchering.

Stream action:

If fluvial actions significantly influenced the patterning of bones in the excavated deposits it should be possible to
detect this in long bone orientation and selective transport or dispersal of certain elements (Voorhies 1969:66-69). Sufficient elements are present in the upper and lower levels of Area B and the bone beds in areas C and D to see if this is the case.

Through stream table experiments Voorhies has demonstrated that, given sufficient stream volume and depths, "bones which tend to move by rolling will become oriented transverse to the current; those with one end markedly heavier than the other will tend to move by sliding with their long axes parallel the current. Except in very shallow water in which the bones are emergent, orientation parallel to the current is characteristic...since in most bones the proximal and distal ends are of unequal size" (Voorhies 1969:11). These conclusions are consistent with the results of Reineck and Singh (1975:128) who state that "organic remains are oriented either parallel to the direction of flow or at right angles to it."

Figures 6-1 and 6-2 are stereographic projections for the bone beds in areas C and D. Following Voorhies (1969), the pole of the axis of each long bone is shown by a dot. Points around the outside of the circle represent bones which are nearly horizontal, while those approaching the center have increasingly steeper vertical angles. The Area C and Area D samples illustrated here represent approximately 50 percent of the long bones which would have been suitable for such measurements. Also shown in figures 6-1 and 6-2 is the
Figure 6-1. Orientation of the long axis of elongate bones, Area C, 48BH18.
Figure 6-2. Orientation of the long axis of elongate bones, Area D, 48BH18.
orientation of the present-day stream channel next to each bone bed.

Figures 6-3 and 6-4 are for the upper and lower bone levels encountered in Area B. While they are similar to the preceding figures, figures 6-3 and 6-4 do not illustrate the vertical angle of the bones. In the case of figures 6-3 and 6-4 the horizontal orientations were calculated on the basis of excavation maps rather than compass bearings. The dots indicate the angles in relation to the largest end of the element.

Although the number of elements from each area or level is quite small, the bones in figures 6-1, 6-2 and 6-4 seem to be unclustered and are not aligned either transversely or parallel to the present-day stream channel. Figure 6-3 on the other hand illustrates that over 66 percent of the long bone elements in the upper level of Area B are somewhat clustered in the northwest quadrant and oriented parallel to stream flow.

Selective bone dispersal is another possible indicator of stream action on the deposits. Voorhies (1969:69) presents a break down of those elements which are: 1) immediately removed; 2) removed gradually; and 3) those which generally remain in the lag deposits.

In comparing these data with the elements represented at the Deer Creek site (see Appendix A) it can easily be demonstrated that the major bone beds in areas C and D do not contain an assemblage of elements which would be expected if stream transport had caused significant dispersal. Both bone levels of Area B may have been subjected to stream actions.
Figure 6-3. Orientation of the long axis of elongate bone, Area B, upper bone level, 48BH18.
Figure 6-4. Orientation of the long axis of elongate bones, Area B, lower bone bed, 48BH18.
which altered their composition. However this possibility is based only on the lack of complete, or nearly complete, skulls and the presence of few (two) and only fragmented mandibles.

The overall picture presented by these data seems to be that the bone beds in areas C and D were not influenced significantly be stream action; that the lower level in Area B may have been altered somewhat by fluvial action but was not completely the result of it; and that the upper bone level in Area B may be the result of stream transport. These conclusions seem consistent with the other evidence concerning these deposits. The upper level of bone in Area B is contained in a coarse matrix of sand and gravel while the bone in areas C, D and the lower level in B are covered with a matrix containing more fines (silts and clays).

Carnivore Activity:

Only the bone beds in areas C and D seem to contain enough material to investigate carnivore actions. While the bone from the upper and lower bone beds in Area B may have been acted upon by carnivores, the assemblages are too small to detect this.

The presence of more than one mature bison in both the Area C and Area D bone beds makes it unlikely that carnivores such as wolves actually killed the animals. But after death by other actions there is a good possibility that carnivores scavenged on the remains.

Binford divides the feeding behavior of wolves into two phases:
Feeding on flesh prior to the basic disarticulation of the skeleton was the communal phase, where all wolves fed directly on the body. After this, there was a sleep or rest period. If the wolves returned, the kill was then gradually disarticulated and the parts dragged off to a perimeter around the kill where each wolf fed on the bones individually....This second phase of feeding was where most bone destruction and disarticulation occurred (1981:207).

The first phase of feeding on the flesh and whether or not it was communal is not detectable in the Deer Creek deposits; nor is it expected that it is detectable in most archaeological situations. Bone destruction and displacement of elements is observable in the deposits of Area D. Figure 5-4 illustrates bone distribution in Area D. Map number 27 in that figure is a front leg unit which appears to have been gnawed off from the scapula (map number 30) lying underneath it. Underneath these elements and not shown in Figure 5-4 are portions of three femora, all of which have gnawing marks on one or both articular ends (catalog numbers 1, 4 and 33 in Area D bone, Appendix A).

From this evidence and also the general patterning of bone in Area D, it seems likely that many of the bones in the western one-third (the left side of Figure 5-4) are the result of carnivore scavenging. Besides the gnawing mentioned above, there was a general tendency of finding the large cranial element in the east side of the unit, articulated vertebral segments in the central area and leg units, individual leg bones and rib fragments in the western one-third.

Neither the bone gnawing nor the bone dispersal patterns described for Area D were noted in Area C. This is not to say
that scavenging did not take place in Area C, it is simply not detectable there.

In either area it does not appear that significant amounts of bone were moved great distances. The most likely unit to be transported away from the kill area first would be the entire forelimb below the scapula (see, for example, Hill 1979: Figure 1; Binford 1981:207-242). Examination of the bone counts in Appendix A indicates that forelimb elements are present in both bone beds. Although the humerus appears to be under represented, the abundance of metacarpals, especially in Area C, seems to indicate that complete leg units were not being dragged away with any great regularity.

To summarize, the bone patterning and gnawing marks in Area D seem to indicate that carnivores did scavenge on the bones after the kill. There are no indicators of these activities in the bone deposits at Area C. In neither area does it appear likely that large units such as the forelimb were dragged away from the kill location.

**Human Activities Represented in Areas C and D**

Having explained two of the most likely natural actions which might have influenced the bone beds, stream action and carnivore activity, there would seem to be a greater degree of assurance that much of the patterning is due to human activity. For a number of reasons which will be presented below it is believed that the bone beds at areas C and D represent the actual kill locations of the bison. Besides the actual killing of the animals and primary disarticulation, it also appears
that some processing and/or consumption took place at these localities.

Although the patterns do vary to some degree, the evidence from other kill locations on the Plains (e.g. Wheat 1972; Kehoe 1973; Frison 1970, 1973, 1974) indicates that there is a strong tendency to remove high yield parts of the body and leave the less usable elements. This is consistent with ethnoarchaeological data gathered by Binford from Nunamiut caribou kills:

...with the possible exception of the data from summer dispersed kills... anatomical parts of high general utility are represented by low frequencies, whereas parts of low utility are represented by high frequencies (1978:77,81).

Figure 6-5 is a graph showing the comparative percentages for parts remaining at the bone beds in Area C and Area D. The "% MNI" on the Y-axis of this graph have been calculated using the procedure described by Binford (1978:69-72). This approach first calculates the number of individuals represented by each bone element and then scales all of these relative to the bone element which yields the greatest minimum number (i.e. 100% MNI).

If there is a correlation between high utility of the anatomical part and removal from the kill location then this should be statistically demonstratable. Figures 6-6 and 6-7 are the MNI percentages given in Figure 6-5 plotted against the corresponding modified general utility indices (MGUI) for the anatomical parts. Since these indices have not been calculated for bison, Binford's (1978:74) figures for caribou have been used. Although the two animals do vary in size and build, it
Figure 6-5. Comparative percentages of the bone elements present in the bone beds of Area C and Area D, 48BH18.
Figure 6-6. Relationship between the bone data from Area C and the modified general utility index.

Figure 6-7. Relationship between the bone data from Area D and the modified general utility index.
is believed that the percentage of contribution for each anatomical part should remain approximately the same for each species.

The correlation coefficients and the t-statistics printed with each of the scattergrams indicates that, in both cases, there is a good negative correlation between the two variables plotted. In other words the frequency of a bone generally increases as its utility decreases. However, in both scattergrams, these correlations do not appear to be linear. It seems more likely that a logarithmic or some other form of nonlinear relationship exists between the two variables.

The bone distributions in both bone beds correspond to what would be expected for a kill location. Additionally, the lack of fire hearths, boiling features and the paucity of fragmented long bones seems to argue against the areas having been used as major processing or habitation locations. While the killing and primary disarticulation may not have been the only activities carried out at the bone beds, they are believed to have been the predominant activities detectable in the archaeological record.

**Observed Butchering Marks**

In a testing program such as the one carried out at the Deer Creek site it is very difficult to discern a butchering sequence or butchering patterns due to small sample size. What follows is a description of the butchering marks which were clearly present on the bone assemblage recovered. The locations of these marks correspond favorably with those
observed in other bison kill sites (e.g. Frison et al. 1976).

With the exception of the cut marks noted on the metatarsal, which is probably the result of hide skinning, all of the marks described are believed to be the result of meat removal or bone disarticulation. It should be kept in mind that many elements were apparently removed in whole from the kill area (see above). Any butchering marks which may have been present on these are of course not represented in the observed sample.

Mandible:

Cut marks occur on the interior of the mandible, probably to remove the tongue. Proportion with cut marks: 100 percent in Area C (sample size = 2); marks absent in Area D (sample size = 2).

Cervical Vertebrae:

Cut marks are present on the base of the spinous process. Proportion with cut marks: Marks absent in Area C (sample size = 3); 16.7 percent in Area D (sample size = 6) [atlas and axis not included in counts].

Thoracic Vertebrae:

Cut marks are present on the spinous processes of many of the articulated and disarticulated thoracic vertebrae. The majority of the marks are near the base of the spine but cut marks may extend longitudinally up the length of the spine. Proportion with cut marks: 78.9 percent in Area C (sample size = 19); 75 percent in Area D (sample size = 12).
Ribs:

Cut marks occur on the exterior surface of some ribs. Proportion with cut marks: 16.7 percent in Area C (sample size = 6); 3.3 percent in Area D (sample size = 30). Similar marks were also observed on a few ribs on the interior surface. Proportion with cut marks: Marks absent in Area C (sample size = 6); 3.3 percent in Area D (sample size = 30). It appears that most ribs were removed from the kill area. Articulated vertebral units encountered indicate that rib slabs were chopped off, usually just below the rib head.

Scapula:

Cut marks occur on the scapula encircling the the glenoid cavity. This was probably done to separate the rest of the front leg from the scapula. Proportion with cut marks: 100 percent in Area C (sample size = 1); 33.3 percent in Area D (sample size = 3).

Femur:

Cut marks were observed which encircle the shaft of the femur. Proportion with cut marks: Marks absent in Area C (sample size = 1); 33.3 percent in Area D (sample size = 3).

Metatarsal:

Cut marks are present on the diaphysis, probably the result of skinning activities. Proportion with cut marks: 100 percent in Area C (sample size = 1); 25 percent in Area D (sample size = 4). In both areas these type of cut marks occur only on the distal end of broken specimens.
Characteristics of the Bison Population

If the bone assemblage encountered in testing is representative, both bone beds represent a herd composition which is quite unusual for a bison kill. All three of the complete or nearly complete crania from the excavations are mature bulls. There are also present, however, unfused long bone and dentition fragments which indicate the presence of juveniles and calves in both of the bone beds. This would seem to indicate herds composed of mature bulls, cows and calves. Unfortunately none of the immature dentition is complete enough to estimate the age the individuals or the season of death.

One technique which has been shown to be effective in determining the sex ratio of a given bison population involves the size of metapodials. Bedord explains the technique:

In the field many single cannon bones can be sexed by taking three measurements: transverse width of the distal end (No. 4), transverse width at the center of the shaft (No. 3) and length (No. 1). For sites within the past ten thousand years, if the bone measurements fall below the line defined for the Vore Site, the bone is probably female or if the bone measurements fall above the line defined for Casper, Olsen-Chubbuck and Finley, then the bone is probably male. Specifically for metacarpals, if measurement No. 4 is greater than (90-1/2[Ratio 6]), then the bone is probably female, and if No. 4 is less than (80-1/2[Ratio 6]), then the bone is probably female. For metatarsals, the corresponding divisions would be as follows: if Measurement No. 4 is less than (67.5-1/3[Ratio 6]), the bone is probably male and if measurement No. 4 is less than (67.5-1/3[Ratio 6]), the bone is probably female. For those falling between these two lines, the entire population should be plotted to determine where the break occurs between males and females (1974: 239).

These measurements and indices were computed for the measurable metapodials from the two bone beds (the procedures
used follow those described by Bedord 1974:200-203, 226). In Area C, three metacarpals were measurable. In Area D, two metacarpals and three metatarsals were usable. One bone in Area D is probably from a male and one is probably from a female. All other specimens fall into the "indeterminate" category. Sample size is not sufficient in either area to conduct the bivariate plotting recommended by Bedord to sort out these latter specimens.

The data available seem to indicate a very mixed herd composition with an unusual abundance of males. The male crania also indicate that these individuals were quite large for modern Plains bison (*Bison bison bison*). Wilson (1974, 1975) has noted the same large size in other samples from the Bighorn Mountains. Table 6-1 presents the craniometric figures (following Skinner and Kaisen 1947) for the three skulls from the Deer Creek site. As with Wilson's samples, the individuals appear to be quite large, but they cannot be conclusively assigned to either the Plains bison or the Wood bison (*Bison bison athabascae*) subspecies.

It is interesting to note that a similar herd composition was apparently found at the Woodruff Bison Kill in the Bear River Divide of northeastern Utah (Shields 1978). At that site the bison were identified as *Bison bison athabascae*. Unfortunately, no sex ratios or specific craniometric data have been published for the Woodruff site.

Such subspecific taxonomic questions may seem trivial, but if bison populations in the mountainous areas of the Plains
<table>
<thead>
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<th>C-1</th>
<th>C-47</th>
<th>D-4</th>
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<tr>
<td>Spread of horn cores, tip to tip.</td>
<td>644</td>
<td>670</td>
<td>590</td>
</tr>
<tr>
<td>Greatest spread of cores on outside curve.</td>
<td>650</td>
<td>680</td>
<td>614</td>
</tr>
<tr>
<td>Core length on upper curve, tip to burr.</td>
<td>191</td>
<td>195</td>
<td>185</td>
</tr>
<tr>
<td>Core length on lower curve, tip to burr.</td>
<td>238</td>
<td>235</td>
<td>246</td>
</tr>
<tr>
<td>Length, tip of core to upper base of burr.</td>
<td>177</td>
<td>189</td>
<td>171</td>
</tr>
<tr>
<td>Vertical diameter of horn-core at right angle to longitudinal axis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circumference of horn-core at right angle to longitudinal axis.</td>
<td>272</td>
<td>275</td>
<td>274</td>
</tr>
<tr>
<td>Greatest width at auditory openings.</td>
<td>283</td>
<td>272</td>
<td>274</td>
</tr>
<tr>
<td>Width of condyles.</td>
<td>144</td>
<td>127</td>
<td>137</td>
</tr>
<tr>
<td>Depth, occipital crest to top of foramen magnum.</td>
<td>107</td>
<td>85</td>
<td>93</td>
</tr>
<tr>
<td>Depth, occipital crest to lower border of foramen magnum.</td>
<td>131</td>
<td>115</td>
<td>135</td>
</tr>
<tr>
<td>Transverse diameter of core at right angle to longitudinal axis.</td>
<td>89</td>
<td>88</td>
<td>92</td>
</tr>
<tr>
<td>Width between bases of horn-cores</td>
<td>242</td>
<td>272</td>
<td>220</td>
</tr>
<tr>
<td>Width of cranium between horn-cores and orbits.</td>
<td>266</td>
<td>282</td>
<td>-</td>
</tr>
<tr>
<td>Greatest postorbital width.</td>
<td>332</td>
<td>320</td>
<td>-</td>
</tr>
<tr>
<td>Anterior orbital width at notch.</td>
<td>242</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Width of skull at masseteric process above M1.</td>
<td>182</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rostral width at maxillary-premaxillary suture.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>P2-M3 alveolar length</td>
<td>154</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M1-M3 alveolar length</td>
<td>97</td>
<td>92</td>
<td>-</td>
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<td>Index 1</td>
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<td>92</td>
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<tr>
<td>Index 3</td>
<td>70</td>
<td>-</td>
<td>68</td>
</tr>
<tr>
<td>Index 4</td>
<td>72</td>
<td>69</td>
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Table 6-1. Measurements of bison skulls from the Deer Creek Site, 48BH18.
were isolated enough to cause differences in cranial characteristics they may also have had slightly different behavior patterns. These differences may, in turn, have influenced the procurement patterns of the humans hunting them. With increasing sample size from the Bighorn Mountains and other high altitude regions of the Plains, more definitive statements concerning these populations may someday be possible.

Mode of Procurement

No features such as drive lines or post molds were found at the Deer Creek site which could be used to conclusively establish the specific method of bison procurement utilized. Several lines of indirect inference lead to the conclusion that the bone beds are probably the result of impoundments rather than jumps, however.

Frison (1978:243-244) has stated that a critical number of bison are necessary before jumping becomes feasible. Besides the size of the herd, its composition, which varies seasonally, is also a factor influencing the effectiveness of a jumping strategy (Frison 1978:243). An ideal situation would seem to be a large cow-calf herd encountered in the late summer or early fall of the year.

It is simply not known at this time whether or not the western foothills region of the Bighorn Mountains could have sustained large enough bison populations to make bison jumping productive. As Frison (1978:347) has noted, communal bison kills in the Bighorn Basin are a rarity. However the foothills
in which the Deer Creek site is located are essentially in between the Bighorn Basin to the southwest and the grasslands of the Yellowstone River to the north. In contrast to the Bighorn Basin, these grasslands are known to have been prime communal bison hunting habitat (e.g. Medicine Crow 1962). It is probably not accurate to equate the foothills regions such as Deer Creek solely with either of these areas, but rather view them as somewhat of a transitional zone between the two.

Although large numbers of bison may therefore have been present in the region, it seems clear that large numbers were not killed simultaneously at the areas of Deer Creek investigated. Based on available surface area at the kill locations investigated, small consolidated kills of perhaps ten to 20 animals each seem to have been the pattern. This is considerably less than the size requirements believed necessary for a successful bison jump (Frison 1974:14-18). Although it could be argued that the kill areas were once much larger and have simply eroded away to their present size, such massive erosion would tend to leave large lag deposits of certain bone elements in the stream beds and this is not the case at Deer Creek.

The herd composition already mentioned would also argue against the use of jumping. It is therefore believed that the bison killed at the Deer Creek site were probably driven into small traps or impoundments rather than being driven over the canyon edge. Quite probably these animals were already in the canyon or entering in from the upper end when the hunters started to move them. A typical encounter may have been
similar in appearance to an account related described to Colonel Richard Irving Dodge in 1847, probably in the Laramie Range in southeastern Wyoming:

From the tops of the mountains which rim the parks the rains of ages have cut deep gorges, which plunge with brusque abruptness, but nevertheless with great regularity, hundreds and even thousands of feet to the valleys below. Down the bottom of each such gorge is a clear cold stream of purest water, fertilizing a narrow belt of a few feet of alluvial, and giving birth and growth to a dense jungle of spruce, quaking asp, and other mountain trees. One side of the gorge is generally a thick forest of pine, while the other side is a meadow-like park, covered with splendid grass. Such gorges are the favourite haunt of the mountain buffalo. Early in the morning he enjoys a bountiful breakfast of the rich nutritious grasses, quenches his thirst with the finest water, and, retiring just within the line of jungle, where, himself unseen, he can scan the open, he crouches himself in the long grass and reposes in comfort and security until appetite calls him to his dinner late in the evening. Unlike his plains relative, there is no stupid staring at the intruder. At the first symptom of danger, they disappear like magic in the thicket, and never stop until far removed from even the apprehension of pursuit (taken from Roe 1951:36)

Unlike this account, however, the hunters who came upon the bison in the Deer Creek canyon probably did not come upon them simply by chance, but rather they did it as part of a well laid plan in which some form of trap had first been constructed either upstream or downstream from the bison.

Bone Tools from the Kill Areas

In the bone beds of both Area C and Area D distal tibiae were found which exhibit rounding and polish on the diaphysial break characteristic of chopping tools. Only one of these tools was found in each bone bed.
The breakage patterns, edge rounding and polish on both artifacts are very similar to the tibia choppers described by Frison (1974:51-57) at the Casper site. Judging from the small amount of shaft left on each, both may have been totally expended as usable tools. It seems likely that these types of choppers may have been used to separate the rib slabs from the vertebral columns as has been described above with the butchering marks.

The Bischoff Shelter Materials

As has been already stated, one of the primary goals in testing Bischoff Shelter was to discovery occupation levels within the shelter which might be linked to the bison procurement activities in the canyon bottom. This was not possible and there seems to be every indication the occupants of the shelter had nothing to do with the bone beds. The primary reason for this assumption is the almost total lack of bison bone in the shelter deposits.

The upper Late Prehistoric deposits are quite disturbed and it cannot be determined at this time if they represent one or more cultural occupations. Similarly, the activities being performed in the shelter during the Late Prehistoric are difficult to determine due to the paucity artifactual material.

The Middle Archaic deposits in Bischoff Shelter are perhaps the least disturbed of any found. There appears to have been an occupation of the shelter during this time period which covered much of the available floor area. In addition to the broken projectile points found in this level, it also
contained a large amount of tertiary flakes, end scrapers, utilized flakes, worked wood and a fairly diverse faunal assemblage (see Appendix A). These materials may indicate that the occupation was a small hunting camp at which game animals were consumed and weaponry was repaired and manufactured.

Very little can be said about the Paleoindian level at this time. Less than one-half square meter of intact Paleoindian materials were encountered although it is believed much more is present. The older deposits seem to lie on the contact with the bedrock floor of the shelter. Because of this it is very likely that the appearance of the shelter was much different during Paleoindian times. It therefore seems quite likely that the small side room in the shelter contains one or more Paleoindian levels.
CHAPTER SEVEN
SUMMARY AND RECOMMENDATIONS

The preceding chapters have explained the studies conducted at the Deer Creek site and attempted to present the results of these studies. One of the key objects of this study was to gather a body of information which could be used to both interpret the materials contained at the site and assess their importance. This chapter will attempt to briefly summarize the findings and explain the significance of the Deer Creek site.

The major bone beds investigated appear to be small individual bison kills probably dating from the Late Prehistoric or Protohistoric period. The "modern" radiocarbon date from Area D must be considered somewhat suspect. Such a date would indicate that the bone was deposited sometime after A.D. 1830 (Dr. Murray Tamers, Beta Analytic, personal communication). Although this seems unlikely, the close vertical proximity of this charcoal sample to the bone bed would seem to indicate that the bone is not a great deal older.

At both areas C and D the primary activities appear to have been the killing and initial disarticulation of the bison. Additional processing and consumption of the animals probably took place in another area of the site.

The upper bone in Area B appears to be secondarily deposited, most likely due to stream action. The lower bone
level in this area appears to be somewhat more intact but its exact function is unknown. The presence of non-bison fauna in both the upper and lower levels of Area B suggests that a more diverse set of activities than was taking place at the two kill areas.

Testing outside of the bone bed in Area C indicates that much of this area is disturbed by stream action. Although this flat open area may have been occupied, there is little remaining of these occupations in this particular area of the site.

Carnivore activity seems to have influenced the bone patterning in the deposits excavated in Area D. This disturbance is minor, however, and should in no way be considered a negative aspect of the assemblage. If such carnivore activity can be detected and studied it can lend valuable insight concerning the factors which ultimately result in the appearance of a bison kill site.

It is likely that the scatter of lithics and cobbles on the north rim of the canyon is a camp site associated with one of the bison kills. Much more surface collection and analysis as well as a testing program would be necessary to conclusively demonstrate this.

The isolated stone circle found on the south rim of the canyon is much more problematical. Although stone circle sites range from a few to many hundreds of rings, the occurrence of single rings is rare. It seems possible that the feature represents a shaman's circle associated with the bison procurement activities. Similar features have been encountered
at other kill sites (Frison 1971) and are believed to have served a magico-religious function. If this is the case with the stone circle at the Deer Creek site, it may have implications concerning both the complexity and the amount of communal effort and organization involved in one or more of the kills.

While the cultural deposits in Bischoff Shelter do not appear to be directly related to the bison kills they are equally significant. The Middle Archaic and Paleoindian levels appear to be in good condition and it is believed that upwards of another 30 cubic meters of deposits remains in the shelter. Although portions of the shelter are damp, the presence of at least one piece of worked wood indicates that more perishables may be present.

After completion of excavations at the Deer Creek site, attempts were made to stabilize the deposits. This primarily involved backfilling and replacing sod over the excavation units as well as removing all exposed bone from the cutbanks and streambeds. While these measures will serve to temporarily protect the site, it is recommended that further mitigation be undertaken in the near future. Of first concern should be further excavation of the bone bed in Area D. Stream actions seem to be exposing these deposits at a fairly rapid rate and a major flood could destroy the entire area.

Although mitigation work at other areas of the site would be helpful, these are probably not immediately necessary. Unless traffic on the trail passing through the site increases
significantly, destruction from factors other than flooding will probably be quite slow.

The data gathered from test excavations at the Deer Creek site demonstrate that more archaeological information could easily be gathered from further work. For this reason the site is believed eligible for Nomination to the National Register of Historic Places. More specifically, the site offers the opportunity to further study Late Prehistoric bison procurement activities in the foothills-mountain region of the Bighorn Basin, Middle Archaic and Paleoindian subsistence in the Deer Creek area and the overall utilization of canyon area for at least the last 7700 years.
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Wheat, Joe Ben

White, T.E.

Wilson, Michael

APPENDIX A
FAUNAL IDENTIFICATION LISTS

The following lists of identified bone elements from the Deer Creek site, 48BH18, are designed to provide a more detailed accounting of faunal assemblage recovered. Since bison bone was by far the most common species identified, the elements from this species are provided separately in the first listing. Identified non-bison vertebrates are presented in a second listing. In both cases the provenience of the bone is listed along with its identification.

Because of the volume of bison bone involved as well for greater utility, much of the information has been codified. The legend which follows on the next page explains the coding for the variables which have been printed in these tables. A verbal description follows the coded information for each identified element.
"CAT": CATALOG NUMBER
"MAP": MAPPING NUMBER
"AREA":
B1L = Area B, 1-2S, 0-1W, Lower Level
B1U = Area B, 0-2S, 0-2W, Upper Level
B2L = Area B, 5-6S, 0-1W, Lower Level
B2U = Area B, 5-6S, 0-1W, Upper Level
B3L = Area B, 10-11S, 0-1W, Lower Level
B3U = Area B, 10-11S, 0-1W, Upper Level
B4L = Area B, 8-9S, 0-1W, Lower Level
B4U = Area B, 8-9S, 0-1W, Upper Level
C = Area C, Bone Bed
C2 = Area C, 14-15N, 7-7.5W
C3 = Area C, 14-15N, 6-7W
C4 = Area C, Feature in 14-15N, 6-7W
D = Area D, Bone Bed
D2 = Area D, 65-66S, 79-80W
"SIDE"
L = Left
R = Right
Ax = Axial
U = Un-sided
"CUT": Cut Marks (Present or Absent)
<table>
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181. Bil 212 FM FR U ABSENT
   Femoral shaft fragment

178. Bil MLT FU L R ABSENT
   Articulated unit, distal radius and fused 2nd and 3rd, radial, ulnar and intermediate carpals. Map #’s 1,2,3,4 and 6

182. Bil MLT RB U ABSENT
   Two small rib fragments. Map #’s B and 13

180. Bil 210 RB FR U ABSENT
   Fragments of a midsection of a rib

177. Bil 207 RU Q R ABSENT
   Distal radius-ulna

179. Bil 205 TA D U ABSENT
   Tibia diaphysis fragment

183. Bil 302 TH C AX ABSENT
   Thoracic body and approximately 20 centimeters of dorsal spine

175. Biu MLT AP U ABSENT
   Miscellaneous long bone fragments. Map #17

174. Biu MLT AX AX ABSENT
   Miscellaneous vertebrae fragments. Map #’s 15 and 16

172. Biu 118 CA FR AX ABSENT
   First? caudal vertebra

162. Biu 104 CE C AX ABSENT
   Cervical vertebra, complete, cut marks present along dorsal spine

161. Biu 111 CE FR AX ABSENT
   Cervical fragment, left half of body.

167. Biu 110 FM D R ABSENT
   Femur, upper diaphysis fragment

168. Biu 105 FM D U ABSENT
   Femur, unsided diaphysis fragment

176. Biu S FR U ABSENT
   Bone from screening of upper bone level, 10-40 centimeters BD, 147.5 grams

164. Biu 108 LU C AX ABSENT
   Lumbar vertebra, missing only left transverse process

192. Biu S MP Q U ABSENT
   Distal fragment of a metapodial from screening of 20-30 centimeters BD

165. Biu 103 MR FR L ABSENT
   Left mandible fragment

171. Biu 114 PH 2 U ABSENT
   Complete 2nd phalanx

166. Biu 112 PL C R ABSENT
   Complete right patella

173. Biu MLT RB U ABSENT
   Miscellaneous rib fragments. Map #’s 1,19,21

169. Biu 120 SC Q R ABSENT
   Scapula, distal portion of right scapula

170. Biu 102 SK FR U ABSENT
   Small skull fragment

163. Biu 122 TH C AX ABSENT
   Thoracic vertebra, body and proximal portion of dorsal spine

188. B2L 305 CE FR AX ABSENT
   Cervical vertebra transverse process and body fragment
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<th>Area</th>
<th>Map</th>
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<td>211</td>
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<td>Bone</td>
<td>Approximately five centimeter long fragment of an ulna shaft</td>
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<td>212</td>
<td>B4L 504</td>
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<td>213</td>
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<td>RL</td>
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<td>Proximal portion of a left rib</td>
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<td>Approximately 10 centimeters of the proximal portion of the spinus process</td>
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<td>Miscellaneous small bone fragments from screening of upper level, 20-40 centimeters 80, 21 grams</td>
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<td>23</td>
<td>C 27B</td>
<td>C</td>
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<td>Absent left astragalus, complete except for weathering around edges</td>
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<td>29</td>
<td>C 27B</td>
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<td>Absent left astragalus, complete except for weathering around edges</td>
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<td>C 25</td>
<td>CR</td>
<td>Bone</td>
<td>Right fused 2nd and 3rd carpal, complete.</td>
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<td>Absent cervical unit of two vertebrae</td>
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<td>C 50</td>
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<td>Fragmentary proximal femur</td>
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<td>219</td>
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<td>Miscellaneous small bone fragments from screening of bone bed in area C, 335 grams</td>
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<td>Complete metacarpal and articulated 1st phalange</td>
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<td>Right metacarpal, complete, and articulated first phalange.</td>
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<td>M</td>
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<td>Left metacarpal, complete</td>
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<td>C 41</td>
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<td>Immature right metacarpal, complete except for weathering on the posterior-proximal surface</td>
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230. C 20 MR C L PRESENT
  LEFT MANDIBLE, NEARLY COMPLETE, ASCENDING RAMUS BROKEN OFF. CUT MARKS ON INTERIOR SURFACE.
25. C 18 MT 3 U PRESENT
  DISTAL METATARSAL, SPIRAL FRACTURE OF DIAPHYSIS. CUT MARKS ENCIRCLING SHAFT 10 CM ABOVE DISTAL END
58. C PH 1 U ABSENT
  IMMATURE FIRST PHALANGE. BURNED AND FRAGMENTARY.
48. C 36 PH 2 U ABSENT
  SECOND PHALANGE, COMPLETE
51. C 46 PH 3 U ABSENT
  THIRD PHALANGE, COMPLETE
52. C 35 PH 3 U ABSENT
  THIRD PHALANGE, COMPLETE
55. C 31 PV AC R ABSENT
  RIGHT ACETABULUM WITH PORTIONS OF ILIUM AND ISCHIUM
54. C 4 PV IL R ABSENT
  RIGHT ILIUM, FRAGMENTARY
56. C 4 PV IL L ABSENT
  LEFT ILIUM, FRAGMENTARY
79. C 27 RB AR L ABSENT
  RIB HEAD, BROKEN 5 CM BELOW ARTICULAR END.
62. C 26 RB AR L ABSENT
  RIB HEAD AND PORTION OF SHAFT.
65. C 22 RB AR R ABSENT
  RIB HEAD, BROKEN 10 CM BELOW ARTICULAR END
74. C 45 RB AR R ABSENT
  RIB HEAD, BROKEN 10 CM BELOW ARTICULAR END
70. C 45 RB AR R ABSENT
  RIB HEAD, BROKEN 5 CM BELOW ARTICULAR END.
61. C 43 RB AR U PRESENT
  RIB FRAGMENT, CUT MARKS ON EXTERIOR SURFACE NEAR STERNAL END.
60. C MLT RB FR U ABSENT
  RIB FRAGMENTS FROM AREA C WITHOUT CUT MARKS; NOS 3, 9, 19, 21, 34B
63. C 14 RB FR U PRESENT
  RIB FRAGMENT WITH CUT MARKS
20. C 7 RU C R ABSENT
  RIGHT RADIUS-ULNA, COMPLETE
29. C 32 RU Q L ABSENT
  DISTAL LEFT RADIUS-ULNA. SPIRAL FRACTURE OF DIAPHYSIS.
146. C 4 SA C AX ABSENT
  SACRUM, COMPLETE.
16. C 29 SC C L PRESENT
  COMPLETE LEFT SCAPULA. CUT MARKS ENCIRCLE THE SHAFT 5 CM BELOW THE GLENOID CAVITY.
158. C 47 SK C AX ABSENT
  SKULL, NEARLY COMPLETE.
159. C 1 SK C AX ABSENT
  SKULL, NEARLY COMPLETE.
157. C 12 SK FR *U ABSENT
  SKULL FRAGMENT, TEMPORAL BULLA.
101. C MLT SN AX ABSENT
  TWO PIECES OF STERNUM. NOS 11, 42
232. C 42 SN FR AX ABSENT
Sternum fragment.

231. C 11 SN FR AX ABSENT
Sternum fragment.

19. C 50 TA Q L ABSENT
Distal left tibia. Spiral fracture with blunted point and polish. Possible tool.

130. C 28 TH C AX ABSENT
Thoracic body and most of spine.

129. C 37 TH C AX PRESENT
Thoracic vertebra with cut marks on dorsal spine.

128. C 33 TH C AX PRESENT
Thoracic body and approx. 10 cm of dorsal spine. Cut marks at base of spine.

124. C 24 TU AX ABSENT
Two thoracic vertebrae with one associated left rib head.

122. C 43 TU AX PRESENT
Three articulated thoracics and three associated left rib heads. Cut marks at base of dorsal spine.

123. C 43 TU AX PRESENT
Thoracic unit of 6th thru 14th with some associated rib heads. Cut marks at base of spine.

126. C 15 TU AX PRESENT
13th and 14 thoracic with cut marks at base of dorsal spine on left side of 14th.

222. C 2 S FR U ABSENT
Bone fragments from screening. 0-30 cm bs. 179 grams.

229. C 2 RU N R ABSENT
Proximal end of a right radius, very weathered.

221. C 3 S FR U ABSENT
Bone fragments from screening, 10-30 cm bs. 222 grams.

220. C 4 S FR U ABSENT
Bone fragments from screening, surface to 10 cm bs. 98 grams.

108. D 63 AT C AX ABSENT
Complete atlas.

107. D 1 AT C AX ABSENT
Complete atlas.

109. D 89 AT FR AX ABSENT
Ventral half of atlas.

147. D 107 CA C AX ABSENT
First (?) caudal vertebra, complete.

112. D 41 CE C AX ABSENT
Complete cervical vertebra.

113. D 69 CE C AX ABSENT
Complete cervical vertebra.

114. D 42 CE C AX ABSENT
Complete cervical vertebra.

110. D 84 CE C AX ABSENT
Complete cervical vertebra.

120. D 10 CE C AX ABSENT
Complete cervical vertebra.

116. D 85 CE C AX PRESENT
Cervical vertebra with cut marks at the base of the dorsal spine on the left side.

21. D 99 CM CL ABSENT
Left calcaneum, complete.
103. D MLT CO AX ABSENT
THREE PIECES OF COSTAL CARTILAGE. NOS 48, 53, 55.
35. D 39 CP 1 R ABSENT
RIGHT RADIAL CARPAL, COMPLETE.
40. D 35 CP 3 L ABSENT
LEFT ULNAR CARPAL, COMPLETE
36. D 34 CP 4 L ABSENT
LEFT FUSED 2ND AND 3RD CARPAL, COMPLETE.
34. D 38 CP 5 L ABSENT
LEFT INTERMEDIATE CARPAL, COMPLETE
37. D 102 CP 6 RT ABSENT
RIGHT ACCESSORY CARPAL, COMPLETE.
111. D 113 CU AX ABSENT
ARTICULATED AXIS AND THIRD CERVICAL, COMPLETE
115. D 20 CU AX ABSENT
CERVICAL UNIT, AXIS THRU SIXTH CERVICAL
1. D 81 FM C L ABSENT
LEFT FEMUR, NEARLY COMPLETE. TROCHANTER MAJOR AND SMALL PORTION OF TROCHLEA CREWED OFF
4. D 119 FM D L ABSENT
IMMATURE LEFT FEMUR, DIAPHYSIS ONLY. HEAVY GNAWING ON THE PROXIMAL END
33. D 118 FM D R ABSENT
SHAFT OF RIGHT FEMUR. CUT EN CirCLING CENTER OF SHAFT. PROXIMAL END APPEARS GNAWED OFF.
217. D 5 FR U ABSENT
MISCELLANEOUS SMALL BONE FRAGMENTS FROM BONE BED IN AREA D, 2205 GRAMS
2. D 27 FU U L ABSENT
UNIT, LEFT HUMERUS AND RADIUS-UlNA. COMPLETE EXCEPT THAT HEAD OF HUMERUS IS MISSING
20. D 21 HU U L ABSENT
UNIT, DISTAL TIBIA, LATERAL MALLEOLUS AND ASTRAGALUS. SPIRAL FRACTURE OF SHAFT AND POLISH. POSSIBLE TOOL.
153. D 98 HY C L ABSENT
LARGE HYOID, COMPLETE
154. D 18 HY C U ABSENT
INTERMEDIATE HYOID, COMPLETE
155. D 87 HY C R ABSENT
LARGE HYOID, COMPLETE.
145. D MLT LM AX ABSENT
2ND THRU 5TH LUMBAR AND SACRUM. MAP #’S 37, 60, 109, 121.
148. D 93 LU DS AX ABSENT
DORSAL SPINE OF LUMBAR VERTEBRA.
149. D 80 LU TP AX ABSENT
TRANSVERSE PROCESS OF LUMBAR VERTEBRA.
7. D 49 MC C R ABSENT
RIGHT METACARPAL. COMPLETE. RODENT GNAWING ON THE LATERAL SURFACE OF THE DIAPHYSIS
5. D 29 MC C L ABSENT
LEFT METACARPAL, COMPLETE
24. D 62 MC N L ABSENT
PROXIMAL LEFT METACARPAL. SPIRAL FRACTURE OF DIAPHYSIS
151. D 70 MR C R ABSENT
RIGHT MANDIBLE, COMPLETE.
152. D 18 MR C R ABSENT
RIGHT MANDIBLE, COMPLETE.
<table>
<thead>
<tr>
<th>Bone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. D 102 MT C L</td>
<td>Absent left metatarsal, complete</td>
</tr>
<tr>
<td>9. D 25 MT C L</td>
<td>Absent left metatarsal, complete</td>
</tr>
<tr>
<td>10. D 24 MT C L</td>
<td>Absent left metatarsal, complete</td>
</tr>
<tr>
<td>12. D 106 MT Q</td>
<td>Present distal metacarpal, spiral fracture of diaphysis. Many cut marks in area of break</td>
</tr>
<tr>
<td>46. D 11 PH 1 U</td>
<td>Absent first phalanx, complete</td>
</tr>
<tr>
<td>45. D 33 PH 1 U</td>
<td>Absent first phalanx, complete</td>
</tr>
<tr>
<td>44. D 23 PH 1 U</td>
<td>Absent first phalanx, complete</td>
</tr>
<tr>
<td>42. D 36 PH 1 U</td>
<td>Absent first phalanx, complete</td>
</tr>
<tr>
<td>43. D 36 PH 1 U</td>
<td>Absent first phalanx, complete</td>
</tr>
<tr>
<td>47. D 40 PH 2 U</td>
<td>Absent second phalanx, complete</td>
</tr>
<tr>
<td>49. D 105 PH 2 U</td>
<td>Absent second phalanx, complete</td>
</tr>
<tr>
<td>12. D 14 PH 3 U</td>
<td>Absent third phalanx, complete</td>
</tr>
<tr>
<td>50. D 3 PH 3 U</td>
<td>Absent third phalanx, complete</td>
</tr>
<tr>
<td>53. D 3 PH 3 U</td>
<td>Absent third phalanx, complete</td>
</tr>
<tr>
<td>57. D 9 PV C L</td>
<td>Absent left half of pelvis, nearly complete except borders of ilium and ischium. Gnawing around acetabulum.</td>
</tr>
<tr>
<td>85. D 17 RB AR L</td>
<td>Absent rib head, broken 3 cm below articular end.</td>
</tr>
<tr>
<td>86. D 101 RB AR L</td>
<td>Absent rib head, broken 5 cm below articular end.</td>
</tr>
<tr>
<td>87. D 96 RB AR L</td>
<td>Absent portion of rib head and 20 cm of shaft.</td>
</tr>
<tr>
<td>88. D 111 RB AR L</td>
<td>Absent rib head, broken 15 cm below articular end.</td>
</tr>
<tr>
<td>83. D 22 RB AR L</td>
<td>Absent rib head, broken 5 cm below articular surface</td>
</tr>
<tr>
<td>76. D 111 RB AR R</td>
<td>Absent portion of rib head and 10 cm of shaft.</td>
</tr>
<tr>
<td>80. D 111 RB AR L</td>
<td>Absent portion of rib head and 25 cm of shaft.</td>
</tr>
<tr>
<td>81. D 111 RB AR L</td>
<td>Absent rib head, broken 5 cm below the articular end</td>
</tr>
<tr>
<td>89. D 106 RB AR L</td>
<td>Absent rib head, broken 15 cm below articular end.</td>
</tr>
<tr>
<td>90. D 77 RB AR L</td>
<td>Absent rib head, broken 15 cm below articular end.</td>
</tr>
</tbody>
</table>
BISON BONE

<table>
<thead>
<tr>
<th>Cat</th>
<th>Area Map Bone</th>
<th>Side Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>96</td>
<td>D 88 RB AR L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib Head, Broken 20 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>D 56 RB AR L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Nearly complete rib, Broken 40 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>D 120 RB AR L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib Head, Broken 15 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>D 111 RB AR L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib Head, Broken 15 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>93</td>
<td>D 65 RB AR L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head and 20 cm of shaft.</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>D 54 RB AR L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 5 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>D 67 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 2 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>D 16 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 5 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>D 66 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 8 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>D 69 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 15 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>D 106 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, recent break 15 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>D 61 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head and 40 cm of shaft.</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>D 111 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 10 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>D 111 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Portion of rib head.</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>D 109 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 10 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>D 120 RB AR R</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 20 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>D 94 RB AR R</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Rib head and 35 cm of shaft. Cut marks on interior at the head and at the area of the break.</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>D 120 RB AR L</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Rib head, Broken 5 cm below articular end. Deep cut marks on anterior ridge just above break.</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>D  RB  C L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Complete left rib.</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>D 75 RB C L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Nearly complete rib, Broken 60 cm below articular end.</td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>D MLT RB FR U</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Rib fragments without cut marks. Nos 3, 6, 7, 12, 13, 31, 44-47, 51-52, 61, 74, 76, 78, 82, 83, 94, 97, 98, 111, 114, 120</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>D MLT RB FR U</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Rib fragments with cut marks. Nos 97, 98, 120.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>D 19 RU N L</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Distal radius-ulna. Very little of the shaft. Spiral fractures on the diaphysis with cut marks at the break.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>D 26 RU Q L</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Distal radius-ulna. Spiral fracture of the diaphysis with cut marks parallel to it.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>D 2 SC C L</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>Left scapula, complete except for missing portions of the border of the blade.</td>
<td></td>
</tr>
</tbody>
</table>
18. D 30 SC C L ABSENT
   LEFT SCAPULA, COMPLETE EXCEPT FOR MISSING PORTIONS OF THE BORDER OF THE BLADE
15. D 8 SC C R PRESENT
   RIGHT SCAPULA, COMPLETE EXCEPT FOR UPPER END OF THE ACROMION AND BLADE BORDERS. CUT MARKS ENCIRCLE SHAFT 5 CM BELOW GLENOID.
38. D 102 SE O U ABSENT
   DISTAL SESAMOID, COMPLETE
160. D 4 SK C AX ABSENT
    SKULL, NEARLY COMPLETE.
100. D MLT SN AX ABSENT
    SIX PIECES OF STERNUM. NGS 58, 92, 100, 110, 111.
137. D 90 TH B AX ABSENT
    THORACIC VERTEBRA, BODY ONLY.
139. D 15 TH B AX ABSENT
    THORACIC VERTEBRA, BODY AND NEURAL ARCH.
141. D 117 TH B AX ABSENT
    THORACIC VERTEBRA, BODY AND NEURAL ARCH.
140. D 43 TH B AX ABSENT
    THORACIC VERTEBRA, BODY AND NEURAL ARCH.
138. D 98 TH B AX PRESENT
    THORACIC VERTEBRA, BODY AND NEURAL ARCH WITH CUT MARKS AT BASE OF SPINE ON RIGHT SIDE.
136. D 5 TH C AX ABSENT
    THORACIC VERTEBRA, COMPLETE.
133. D 65 TH C AX ABSENT
    COMPLETE THORACIC, RECONSTRUCTED AT OLD BREAKS.
143. D 57 TH C AX ABSENT
    THORACIC VERTEBRA, COMPLETE.
134. D 32 TH C AX PRESENT
    THORACIC BODY AND APPROX. 15 CM OF SPINE. CUT MARKS ON SPINE
132. D 115 TH C AX PRESENT
    THORACIC BODY AND APPROX. 15 CM OF SPINE. CUT MARKS AT BASE OF SPINE ON RIGHT SIDE.
135. D 79 TH C AX PRESENT
    THORACIC VERTEBRA WITH CUT MARKS AT BASE OF SPINE ON RIGHT SIDE.
142. D MLT TH C AX PRESENT
    THORACIC BODY AND APPROX. 25 CM OF SPINE. CUT MARKS AT BASE OF SPINE ON RIGHT SIDE. RECONSTRUCTED AT OLD BREAKS. MN'S 109, 111
131. D 3 TH C AX PRESENT
    THORACIC BODY AND APPROX. 15 CM OF SPINE. CUT MARKS AT BASE OF SPINE ON RIGHT SIDE.
127. D 64 TH C AX PRESENT
    THORACIC VERTEBRA WITH CUT MARKS AT BASE OF SPINE ON RIGHT SIDE
144. D 109 TH BS AX ABSENT
    DORSAL SPINE OF THORACIC AND PORTION OF NEURAL ARCH.
150. D MLT FR AX ABSENT
    MISC. FRAGMENTS OF THORACIC VERTEBRAE. MAP #'S 98, 115, 116.
41. D 24 TR 1 L ABSENT
    LEFT FUSED 2ND AND 3RD TARSAL, COMPLETE.
22. D 104 TR 2 L ABSENT
    FUSED CENTRAL AND 4TH TARSAL, COMPLETE.
59. D 26 TR 3 L ABSENT
    LEFT FIRST TARSAL, COMPLETE.
125. D 16 TU AX PRESENT
    THREE THORACIC VERTEBRAE WITH CUT MARKS AT BASE AND UP AND DOWN THE DORSAL SPINES.
228. D2  AS  FR  AX  ABSENT
   FRAGMENT OF THE BODY OF A SMALL AXIS, BURNED.
218. D2  S  FR  U  ABSENT
   MISCELLANEOUS SMALL BONE FRAGMENTS FROM BURNED BONE TEST OF AREA D, 1474 GRAMS.
225. D2  M  FR  U  ABSENT
   FRAGMENT OF MANDIBULAR M3, APPEARS TO JUST BE STARTING TO WEAR.
224. D2  MR  C  R  ABSENT
   NEARLY COMPLETE RIGHT MANDIBLE, M3 NOT FULLY Erupted.
226. D2  MR  FR  L  ABSENT
   FRAGMENT OF LEFT ASCENDING RAMUS, BURNED.
227. D2  SK  MI  R  ABSENT
   FRAGMENTARY RIGHT MAXILLA OF CALF CONTAINING DP3, DP4 AND FRAGMENTARY M1, ALL IN WEAR.
223. D2  TH  C  AX  ABSENT
   THORACIC BODY AND APPROXIMATELY 20 CM OF SHAFT.
Non-bison material

The following identifications of non-bison elements recovered at the Deer Creek site were made by Stephen A. Chomko of Paleo-Environmental Consultants. For small mammals, the following should probably be considered a poor sample due to the recovery methods utilized in the field (i.e. one-quarter inch screening).

Area B, 0-2 S, 0-2 W, upper level, map #6 & 7:
Unidentifiable large mammal long bone fragment. Sheep-deer-elk size.

Area B, 0-2 S, 0-2 W, upper level, map #9:
Ovis canadensis, complete right calcaneous. Fused, from a very robust individual.

Area B, 0-2 S, 0-2 W, upper level, map #13:
Unidentifiable large mammal, right (?) calcaneus. Tuber calcis unfused. Sheep-deer-antelope size.

Area B, 1-2 S, 0-1 W, lower level, map #23:
cf. Odocoileus sp., right tibia. Proximal-posterior portion of the diaphysis. Possible wear on distal end.

Area B, 5-6 S, 0-1 W, lower level, map #9:
Unidentified large mammal, medial rib fragment.

Area B, 8-9 S, 6-7 W, lower level, map #7:
cf. Ovis canadensis, right calcaneus. Proximal end and tuber calcis.

Area D, main bone bed, map #71:
Odocoileus sp., left second phalange. Pathological, probably osteoporosis.

Area D, main bone bed, map #72:
 cf. Canis lupis, left fourth metacarpal.

Area D, main bone bed, map #72:
 cf. Canis lupis, right proximal scapula.

Area D, main bone bed, map #91:
Unidentifiable long bone fragment from large (antelope-deer-sheep size) mammal.

Bischoff Shelter, 0-1 S, 1-2 W, +11 to -10 cm:
Neotoma cinerea, complete right mandible with M1 and M2.

Bischoff Shelter, 1 N-.5 S, 2-3.5 W, 20-30 cm:
Odocoileus sp., second or third lower incisor, complete, adult dentition.
Bischoff Shelter, 1 N-.5 S, 2-3.5 W, 20-30 cm:
Syvilagus sp., proximal right femur, unfused.
Bischoff Shelter, 1 N-.5 S, 2-3.5 W, 20-30 cm:
cf. Canis lupus, complete first phalange, fused.
Bischoff Shelter, 2-3.5 S, 2.5-4 E, 0-45 cm:
distal radius or tibia from marmot size animal.
Bischoff Shelter, 2-3.5 S, 2.5-4 E, 45-70 cm:
Marmota flaviventris, left radius, complete except for
distal end, unfused.
Bischoff Shelter, 2-3.5 S, 2.5-4 E, 70-80 cm:
Syvilagus sp., portion of right maxilla from P2-M2. P3,
M1 and M3 intact.