

**OCCURRENCE OF CULTURALLY MODIFIED BISON BONE ELEMENTS
IN NORTHWEST AND WEST-CENTRAL COLORADO:
AN ARCHAEOLOGICAL ASSESSMENT FOR
THE WESTERN COLORADO BISON PROJECT**

**FUNDED BY THE HISTORY COLORADO
STATE HISTORICAL FUND**



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Dominquez Archaeological Research Group

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Frontispiece Photograph by Curtis Martin
Bison Skull recovered from 5GF2416.1
(Craniectomy likely for removal of brain
matter for use in hide tanning.)

**Occurrence of Culturally Modified Bison Bone Elements
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Prepared by

**Holly Shelton, Project Archaeologist
Michael Berry, Ph.D., Database Architect
Carl E. Conner, Principal Investigator**

**Dominquez Archaeological Research Group, Inc.
P.O. Box 3543
Grand Junction, Colorado 815025**

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**History Colorado
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1200 Broadway
Denver, Colorado 80203**

ABSTRACT

This is a History Colorado State Historical Fund grant (2016-AS-008) related project undertaken by Dominquez Archaeological Research Group for the purpose of conducting an assessment of curated culturally modified bison faunal elements specific to northwest and west-central Colorado. Resultant data was assimilated into comprehensive and professionally accessible databases. Radiocarbon dates obtained from culturally modified specimens have been incorporated into the Dominquez Archaeological Research Group's Colorado Radiocarbon Database Project as a separate interactive map and query tool. The fundamental purpose of this report is to develop a more accurate understanding of the interrelationship of bison and the native occupants of the region and to share this knowledge with the scientific and academic community, the interested public, and with present day Ute, Shoshone, and other tribes whose ancestral home and hunting territory included western Colorado. A total of 250 bison faunal elements identified within the study area were analyzed and evaluated for cultural modification and other indicators by visual examination or via review of formal archaeological reports and photographs in order to collect specific data that was ultimately incorporated into interactive databases and query maps.

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1.0 INTRODUCTION

Dominquez Archaeological Research Group, Inc. (DARG), in compliance with an award from the History Colorado State Historical Fund (2016-AS-008), conducted an archaeological assessment project to locate, identify, and document bison faunal elements specific to northwest and west-central Colorado for evidence of cultural modification. This project was conducted under the direction of Carl Conner, Principal Investigator. Michael Berry created a database for the DARG website for use by researchers. No field work was involved, as the project's focus was the examination of bison faunal elements held in private collections and curated in museums in northwest and west-central Colorado. Existing archaeological reports were searched to identify any faunal elements possibly available for examination for cultural modification. In all, bones held by six county and four private museums, and in two private collections, were examined and documented. The collections were examined between 20 September and 22 November 2016.

The assessment involved visual, microscopic, and non-destructive ultra-violet analysis of available bison faunal specimens. Photographic documentation of each specimen was completed. A variety of comprehensive and comparative spreadsheets was developed to assimilate information gleaned from the specimens, which were later incorporated into the database. Bone collagen samples of selected faunal elements were collected and those originating from culturally modified specimens were submitted for radiocarbon dating with results being entered into the Colorado Radiocarbon Database Project's newly created Western Colorado Bison Study website (dargnet.org/net/bison/bison.html). Bone stabilization and preservation technique information was provided to the curation facilities desiring such. In order to provide educational opportunities an aspect of the bison radiocarbon database – not including location information – is available to the interested public. In addition, a series of Power Point presentations and accompanying lectures are available to organizations, museums and schools. The DARG website (dargnet.org) also offers high resolution photographs, 3-D images of faunal elements, and slide shows related to the research.

2.0 LOCATION OF THE PROJECT AREA

The focus area of this project is located in seven counties (Delta, Eagle, Garfield, Mesa, Moffat, Montrose, and Rio Blanco) west of the Continental Divide in the northwest and part of the west-central region of Colorado (Figure 1). Four physiographic provinces are represented. Central and eastern Moffat County and the north-eastern aspect of Rio Blanco county are located in the Wyoming Basin Province with the westernmost aspect of Moffat County located in the Middle Rocky Mountains Province. Delta, western Garfield, Mesa, Montrose, and western Rio Blanco counties rest within the Colorado Plateau Province, and Eagle, eastern Garfield and the south-eastern aspect of Rio Blanco counties are situated in the Southern Rocky Mountains Province.

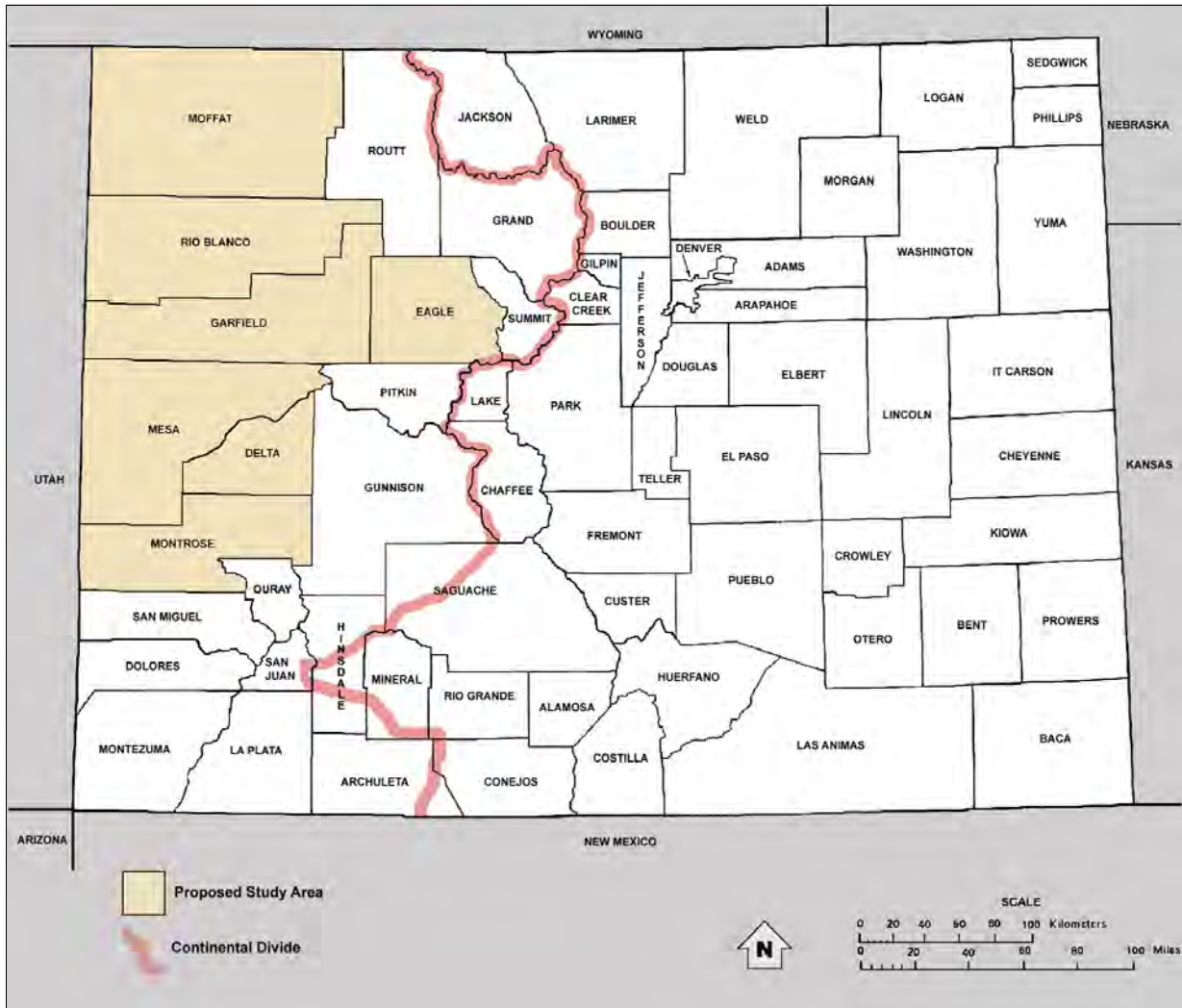


Figure 1. Project location map showing the northwest and west-central counties of western Colorado investigated during the assessment.

The majority of the bison faunal elements examined were curated at the following participating museums:

- Delta County Museum, 251 Meeker St., Delta
- Frontier Historical Museum, 1001 Colorado Ave., Glenwood Springs
- Montrose County Historical Museum, 21 N Rio Grande Ave., Montrose
- Museum of the Mountain West, Inc. 68169 Miami Rd., Montrose
- Museum of Northwest Colorado, 590 Yampa Ave., Craig
- Museum of the West, 462 Ute Ave., Grand Junction
- Rangely Outdoor Museum 150 Kennedy Dr., Rangely
- Rifle Creek Center for Historical Preservation, P.O. Box 1882 Rifle
- Rio Blanco County Historical Society and White River Museum, 565 Park Ave, Meeker

- Ute Indian Museum, 17253 Chipeta Rd., Montrose
- Wyman Museum (Private) 94350 US-40, Craig

The majority of specimens were curated in the above listed museums. Two specimens discovered during a Bureau of Land Management, Grand Junction Field Office excavation were located in Mesa, County. Privately owned specimens consisting of single elements on loan and on display at several of the above listed museums originated in Garfield, Mesa, Moffat, and Rio Blanco counties. These were examined with permission of the donor, if still living. A single specimen (RDR001) was located at a private business in Eagle County approximately 10 miles from where originally found on private ranch land.

3.0 ENVIRONMENT

In general, the region is characterized as having a steppe-type climate. It is semi-arid with temperatures ranging from -15 degrees F during the winters to 100 degrees F in the summers. Frosts occur frequently between mid-September and early June, resulting in a growing season of roughly 70-100 days (U.S.D.A. SCS 1982). Average annual rainfall ranges between 12 and 16 inches. Agriculture is limited by the low rainfall, short period of frost-free days, and low winter temperatures (ibid.). The optimum growing season for native plants is May-June, during which time temperatures average around 55-60 F. The surrounding higher elevations are characterized as cooler and moister. Annually, the high mountain temperatures average 5 degrees cooler with precipitation as much as 10 inches greater than the surrounding low elevations (U.S.D.A. SCS 1975:244). Temperatures have varied between -20 degrees F. in winter and 90 degrees F. in summer with a frost free seasonal range of 70 to 100 days. Agriculture is limited by the low rainfall, a short period of frost-free days, and low winter temperatures.

Elevational life zones throughout the project area consisted of approximately 5% Desert Canyonlands and Sage (5,000 to 7,000 ft.); 80% Foothills Pinyon/Juniper woodlands and Montane shrubs; (6,000 to 8,000 ft.), 10% Montane (8,000 to 10,000 ft.), 5% Subalpine (10,000 to 11,500 ft.) and a minuscule fraction of Alpine (11,000 ft. and higher). The life zone boundaries of western Colorado are undefined with vegetation intermingling at elevational boundaries (Gregersen 2010). Paleoclimate during the Holocene Period would have repeatedly expanded and retracted these life zone boundaries dependent upon associated cool-wet and warm-dry episodes, with all life zones extending to lower altitudes in cool wet periods and retreating to higher, more moist altitudes during warm-dry occurrences (Miller 2012).

Flora of the various Provinces consists of vegetation appropriate to each of the aforementioned life zones and includes a remarkable diversity of species. Alpine plants include many flowers and dwarf species such as Rocky Mountain columbine, dwarf astor, golden draba, and bareground willow. Subalpine trees and herbage include wild strawberry, larkspur, candytuft, columbine, iris, skunk cabbage, wild raspberry, willow, Bristlecone pine, Engelmann spruce, and fir. Montane forest life boasts aspen and pine forests with a variety of native and

introduced grasses, ferns and red willow while the Woodlands and Foothills consist primarily of pinyon and juniper forests with stunted aspen, gambel oak, and various drought tolerant flowers, forbs and grasses including Indian ricegrass, astors, penstemons and cacti. Finally the lower altitude deserts and canyonlands produce rugged grasses and invasive weeds, assorted cacti, sego lily, globemallow, rabbitbrush, yucca, common sagebrush, and occasional pinyon pine and juniper trees (Gregersen 2010).

Fauna throughout the project area is abundant. Large mammals include carnivores such as mountain lion and bear while herbivores include mountain goat, Rocky Mountain bighorn sheep, elk, mule deer, and pronghorn. The more common medium size mammals include coyote, red fox, bobcat, with many species of smaller mammals including badger, raccoon, skunk, white tailed jack rabbit, chipmunk and various voles and mice. Raptors and other avian life range from the bald and golden eagle, Cooper's hawk, merlin, and assorted owls to Miriam's turkey, blue grouse, American dipper, western tanager, and the broad tailed hummingbird. Reptiles and amphibians include several indicator species such as the leopard frog. Insect species are varied and diverse.

Although the geology within the study area includes small parts three physiographic provinces; the Middle Rocky Mountains, the Wyoming Basin, and the Southern Rocky Mountains, the majority of the study area lies within the Colorado Plateau. This region consists primarily of relatively horizontal sedimentary rock layers altered by eons of uplift and erosion into basins separated by up-warps and plateaus. This province, drained by the Colorado River, has been eroded and shaped into a multitude of canyons, mesas, and cuervas resulting in a complicated landscape; much of which is remote, isolated, and difficult to access. Outside of the Colorado Plateau the High Plains and Upper Sonoran deserts are bisected by major drainages such as the Colorado, Gunnison, Little Snake, and Yampa rivers.

A broad spectrum of geologic formations and land forms occurs throughout the four physiographic provinces including high altitude mountains consisting of Precambrian Proterozoic granite intrusions and metamorphic rock such as gneiss, schist, amphibolite, and quartzite. Other high altitude formations include batholiths, calderas and landscapes such as the Grand Mesa, a remnant flat topped shield volcano capped by volcanic basalt atop Wasatch (Paleocene) and Green River (Eocene) Formation sandstones. The Piceance Basin, which includes Uintah and Wasatch formations (Cenozoic), terminates peripherally to the west, south, and east in characteristic cliff-slope-cliff topography. Quaternary terraces and pediments, some composed of Mancos (Cretaceous) shale, enclose broad river valleys that intermittently narrow into deep canyons cutting through various formations ranging from Precambrian rock to Mesa Verde Group (Cretaceous) formations.

4.0 ALLUVIAL DEPOSITION PROCESSES (abbreviated from Berry et al. 2012)

Alluvial deposition processes in northwest and west-central Colorado significantly impact the burial, preservation and ultimate exposure of bison faunal remains. An

understanding of these processes aides in predicting where bison remains may be interred and in anticipating likely areas in drainages and cut banks where they are most likely to be exposed. The majority of bison faunal remains are recovered from Holocene soils. In the middle Holocene, from 6500 to 4500 RCYBP (radiocarbon years before present), cool/moist climates caused incision, though erosion in this interval was not sufficient to remove the Pleistocene gravel. Once these gravels were exposed drainages started a cycle of valley widening, usually undercutting the braided alluvium and forming vertical walls. In the late middle Holocene, from 4500 to 2500 RCYBP, drier conditions prevailed and resulted in deposition of the second major alluvial unit. Variable climatic conditions in the late Holocene, after 2500 RCYBP, caused alternate periods of incision and deposition.

Unlike the period of early Holocene alluviation, the volume of sediment available during the second period was much less, so the bulk of the middle Holocene deposits remained in the upper reaches of main drainages and in their tributaries. These deposits display a fan-like geometry overlying the early Holocene alluvium and can deeply bury faunal remains.

Another period of incision occurred in the late Holocene and in many perennial streams, the incision took place sometime after 2800 but before 1100 RCYBP. In many ephemeral streams where the second deposit is preserved, the second and third periods of alluviation are almost continuous. The evidence of incision in this period is fleeting since the incision followed the path of least resistance and re-excavated the arroyos formed in the middle Holocene.

Deposition of the third alluvial deposit started as early as 2000 RCYBP, was interrupted and partly incised during the Little Ice Age (ca. 600 to 150 years ago), and resumed deposition afterwards. Today drainages are still adjusting to the sediment release, and down-cutting since the turn of the 19th and 20th centuries is more properly considered avulsion; the normal reworking of sediment in a drainage on the scale of hundreds of years, as opposed to incision in the middle and early part of the late Holocene, and dissection in the Late Pleistocene. Incision occurs on the scale of thousands of years, and dissection, on the scale of tens of thousands of years. It should be stated clearly that the volume of sediment released from chemical weathering in the highlands is directly proportional to the duration of the preceding cool/moist climates.

The occurrence of cultural horizons, including culturally modified bison bone, in alluvial sequences is predictable over a large region of northwest and west-central Colorado. Sites are commonly present at the base and near the top of Kaycee-equivalent deposits, and in most deposits overlying Kaycee-equivalent deposits.

5.0 OBJECTIVES

In general, the purposes of this continuing study are to collect, analyze, and process data regarding culturally modified bison faunal elements and any associated or retrievable

radiocarbon dates. In particular, faunal material was researched for this project in seven counties in western Colorado. In order to better access the study's information, a database was created and integrated into an interactive website with search and query capability. The public version of the database limits access to location information. Those bison faunal elements not exhibiting cultural modification were also incorporated into the database to provide a baseline for population concentrations, migration patterns, and species differentiation.

6.0 METHODS

Project work included: records searches; coordination with regional museums and individuals; examination of available curated bison faunal element collections; examination and documentation of said elements and associated information; radiocarbon dating of those elements with cultural modification; development of documentation categories; and, assimilation of all data into an electronic database. Ultimately, the data was integrated into the newly created Western Colorado Bison Study website (dargnet.org/net/bison/bison.html), a subsection of the Dominquez Archaeological Research Group's Colorado Radiocarbon Database Project. The database has a search option with site data accessible by a site number or name and photographs of the documented specimens. It also has a query option with selections including attributes, maps, and radiocarbon dates. The Western Colorado Bison Study website is interactive and dynamic in that data can be added by professionals with password access.

The methodology included:

- Establishment of a project boundary, including Delta, Eagle, Garfield, Mesa, Moffat, Montrose, and Rio Blanco counties;
- Review of selected archaeological reports, museum collections and records, and anecdotal information referencing bison faunal elements within the study area;
- Assessments of data collected from bison faunal elements curated in regional museums including Delta County Museum, Eagle County Historical Society Local History Museum, Montrose County Museum, Museum of the West, Rifle Heritage Center, Ute Indian Museum, and Museum of Northwest Colorado;
- Inquiries into the presence of and access to private collections and, with permission, examination of faunal elements collected from private land.

Faunal elements were visually examined to determine the presence or absence of cultural modification with the majority of such being subjected to microscopic analysis using an American Optical FORTY binocular microscope. Weathering stages were determined using the parameters established by Behrensmeyer (1978). Excepting those bison bones that were inaccessible due to curation restrictions, unknown curation location, or other complications, the specimens were scanned using non-destructive ultra-violet fluorescence analysis in order to identify the presence of remnant organic pigments.

Photographic documentation of each specimen was completed. Measurements of each available faunal element were recorded and faunal element identification was accomplished following techniques set forth by Brown and Gustafson (1979). With permission of the legal owner, bone collagen samples were taken from those faunal specimens exhibiting evidence of cultural modification. Selected samples of particular interest, such as an occurrence at high altitude, were submitted for radiocarbon analysis and dating. When possible, the original location of all bison faunal elements was noted and the locations translated to the closest UTM and plotted using standardized GIS procedures on the study area map. All collected data was recorded electronically on a standardized assessment tool created by DARG associates and developed from an Excel spreadsheet in order that a variety of comparative analysis options could be explored. As the majority of faunal elements found in the region were impregnated with compact calcite soils (known to be extremely destructive when bone is exposed to atmospheric humidity) participating museums were provided printed information relating to bone element conservation and stabilization techniques based upon correct cleaning and safe storage procedures.

7.0 FINDINGS

This section of the report, organized by county, describes selected faunal elements and their attributes. Only those faunal elements presenting with cultural modification and those of particular interest or importance will be addressed in this section. Complete details of each specimen encountered and examined during this project, including the specific faunal element, the presence or absence of cultural or natural modification, the weathering stage, comments, and radiometric data are located in Appendices A through E.

As a number of the faunal elements are associated with a general area and not a particular site, and in order to preserve sequencing and minimize confusion, the description content is structured using the assigned DARG number; the site number if applicable; any accession or temporary number(s) of the element or element group; the faunal element; and, a detailed description that includes the curation facility or specimen location. Although no sites were re-visited as an aspect of this project, previously recorded sites in western Colorado known to have produced bison bone include, but may not be limited to: 5EA2742, 5EA2872, 5EA2944, 5GF90, 5GF2416, 5GF4046, 5GF4294, 5ME901, 5ME5997, 5ME6144, 5ME15338, 5MF625, 5MF969, 5MF4313, 5MF4314, 5RB6795, 5RB6796, 5RB6797, 5RB6798, 5RB6799, 5RB6800, 5RB6801, 5RB6802, 5RB6803, 5RB6804, 5RB6805, 5RB6807, 5RB6809, RB8600, and RB31575. Specimens with known UTM's are listed in Appendix E, (OAHF copy only).

7.1 Delta County

DARG 1 is a significantly deteriorated partial bison crania fragment (accession number 90.67.1) with highly deteriorated horn cores. It is notable that the specimen was collected at an altitude of approximately 10,000 feet from the Grand Mesa southeast of state Highway 65 and Forest Service road 100 near Flowing Park Reservoir in the 1960s. There is no visible cultural

modification. As high altitude bison are a rare occurrence in western Colorado, a radiocarbon date was obtained from the specimen indicating a calibrated age of AD1400 to 1500. The specimen is curated at the Delta County Museum.

DARG 2 is a deteriorated cranial fragment (temporary number D001) collected in the 1920s by Bill and Velma Shreeves from the upper Escalante Creek area (per her son). The specimen was located on the Shreeves ranch which encompassed the confluence of Escalante Creek and the Gunnison River; Escalante Creek to the Lower Huffington ranch; the XVX ranch on and above the North Fork of the Escalante, and three quarter-sections on the Uncompahgre Plateau (Public Lands Partnership 2014). There is no visible cultural modification of the specimen. This specimen is remarkable in that, to date, only two bison bone specimens are known to this researcher to have originated from the Uncompahgre Plateau. It should be mentioned that protein residue analysis testing of rocks from the bottom of Structure 4-A, a storage pit located at 5MN3462, the Jeff Lick Site, produced a result of “probable positive” indicating meat storage from protein sources that included members of Bovidae and Antilocapridae such as bison, bighorn sheep, or pronghorn antelope (Cummings and Milligan 2014:16). The specimen is curated at the Delta County Museum.

7.2 Eagle County

DARG 3, is from site 5EA2742, with 5EA2742.1 being the partial skull from a four year old winter kill female bison informally referred to as the Bocco Bison I. It consists of the crania minus the sphenoid and the frontal minus the vomer. Cultural modification includes a cranial left side foreskull impact indentation from a stone maul (Plate 1) and placement of the skull on several upright sandstone slabs arranged to orient to 150 deg SSE (winter sunrise), suggesting ceremonial intent. The specimen was repatriated, in accordance with NAGPRA regulations, to an undisclosed location in July or August of 2016 by the Northern Ute Tribe.

Plate 1. DARG 3, 5EA2742.1, female bison skull. Note stone maul indentation on upper left foreskull.



DARG 4 through DARG 28, from site 5EA2742, (specimens 5EA2742.2 through 5EA2742.28) is a group of 25 bison faunal elements from a four year old winter kill female bison informally referred to as the Bocco Bison I. 5EA2742.2, the left and right mandible with molars present, has metal knife cuts and gouge marks on the medial surfaces of both sides of the mandible indicating the tongue was harvested. 5EA2742.3 is an atlas (C1 vertebra) missing the process due to breakage by a bone chopper used during disarticulation of the skull. Additional vertebrae, **DARG 6 through DARG 15**, and **DARG 16**, the sacrum, also show evidence of butchering including metal knife cuts and stone tool chopped processes (Plate 2). Various ribs evidence stone tool chopping at 5EA2742. A right metatarsal fragment measuring 8.2×4.6×2.0cm, exhibits green bone fractures and a polished distal surface. It should be noted that the astragalus-calcaneus-metatarsal together were often used as an expedient chopper (Frison 1978). Previously curated at the Museum of the West, the specimens have been repatriated to an undisclosed location by the Northern Ute Tribe.



Plate 2. DARG 6 to DARG 15, 5EA2742, Articulated spinal column showing stone tool chopped processes.

DARG 29 through DARG 36, are from 5EA2872, informally referred to as the Bocco Bison II, and consist of a group of four non-cultural bison bones from a single animal, including the skull, the atlas, and the C3 and C4 vertebrae. There is no evidence of human predation or cultural modification. All were collected from soils indicative of the period of the Little Ice Age, which occurred during the Late Prehistoric era. It is notable in being situated near two other bison finds (5EA2742 and 5EA2944) in the Bocco Mountain area. These

specimens are curated at the Museum of the West in Grand Junction.

DARG 33 through DARG 36, from 5EA2944, informally referred to as the Bocco Bison III, includes a partial cranium with a damaged horn core. The absence of a mandible precludes gender identification, however the sutures are closed indicating a mature animal. Additional bones found in the Little Ice Age, Late Prehistoric era soils included a partial sacrum, a right humerus, and an undetermined left rib. It is notable in being situated near two other bison finds (5EA2742 and 5EA2872) in the Bocco Mountain area. The specimens are curated at the Museum of the West in Grand Junction.

DARG 37, is a non-cultural bison skull (temporary number RDR001) sans mandible. It was collected between 1950-1960 by Buck and Wanda Wilcox, since deceased, who discovered it eroding out of a drainage on their ranch near Burns. It exhibits no evidence of human predation or cultural modification, however it is reported to have been found in association with multiple lithic artifacts including bifaces, projectile points, and a mano which were not collected. The specimen is presently on display in the Rio del Rancho campground office near State Bridge.

7.3 Garfield County

DARG 38, from 5GF2416, is a bison skull (5GF2416.1) recovered from Trapper Creek in 1996 by Alpine Archaeological Consultants (Tickner 1996). The partial skull, missing the mandible and nasal, has a 12x14.2cm craniectomy (Plate 3) in the center of the foreskull with peripheral bone compression, impact scalloping, and crushing secondary to the use of a stone maul or chopper. Cut marks are present on the left orbit between two small fossa. Sandstone



clasts are densely impregnated in the turbinates indicating long term burial and recent exposure. Nearby site 5GF90 produced a bison atlas. In accordance with NAGPRA regulations the specimen was repatriated in 2016 to an undisclosed location by the Northern Ute Tribe.

Plate 3. DARG 38, 5GF2416.1, bison skull with craniectomy likely for removal of brain matter for use in hide tanning.

DARG 39, from 5GF90, is a bison atlas located approximately 110m upstream from 5GF2416. There is unconfirmed information of a possible bison rib and rib fragment also found at the site. There is no evidence of cultural modification. It is curated at the Museum of the West.

DARG 40, is a partially deteriorated skull with mandible missing and breakage below the orbits. The upper teeth are present, as are both horn cores. The turbinates and interior orifices of the specimen are densely packed with alluvial clayey, silty, sediment with multiple small, flat shale clasts. The specimen was collected by an unknown individual approximately four miles north of Rifle, from the creek bed of Government Creek in the early 1920s. There is a known Ute trail in this drainage. There is no cultural modification. It is curated at the Rifle Creek Center for Historical Preservation in Rifle.

DARG 41 is a partial skull (temporary number 5GFA1) missing the mandible, and bilateral lacrimal, nasal, incise, and maxilla. The specimen was donated to the museum in 1973 by Oren and Marie Harmon, many years after it was collected from the Government Creek creekbed near Government road, north of Rifle, Colorado in the 1930s. There is no cultural modification. The specimen is curated at the Rifle Creek Center for Historical Preservation, in Rifle.

DARG 42 is a partial skull missing the mandible (temporary number 5GFA2). The right horn core is fractured at the base and the left is complete but weathered. The entire surface of the specimen is encrusted with dry calcite soil obscuring visual inspection for cultural modification. It was collected by Neva Wilcox on her family's sheep ranch on Government Creek and donated to the museum May 4, 1967. The specimen is curated at the Rifle Creek Center for Historical Preservation, in Rifle.

DARG 43 is a partial skull (temporary numbers 5GFPW001/GFA3) consisting of both horn cores, with the frontal and upper half of both orbits intact. Cranial sutures are fully closed indicating a mature adult. The mandible, maxilla, lacrimals, nasals, and incise are missing. Multidirectional abrasion striations and small stone tool cut marks are present on the frontal. The specimen was located in the Stump Gulch area at an unknown time in the past. Two additional bones were observed eroding out of a cut-bank. This specimen is not presently curated.

DARG 44 is a left metacarpal (temporary numbers GFPW002/GFA5) with 90% of the bone surface covered with heavy impact indentations. The surface shows extensive use wear polish and oblique and multidirectional striations. The specimen was located in the Stump Gulch area at an unknown time in the past. This specimen is not presently curated.

DARG 45 is a bison tibia (temporary numbers 5GFPW003/GFA4) with V shaped, steeply faceted stone tool cut marks and multidirectional striations along the diaphysis. The specimen was located in the Stump Gulch area at an unknown time in the past. The specimen is not presently curated.

DARG 46, from 5GF4046, the Clear Creek Bison Kill site, is a partial crania (5GF4046.1, temporary number FS1). The nasals, mandible and the maxilla are missing. Both horn cores, foramen magnum, and orbits are intact. There is a faint circular concave, possible cultural impact indentation of the right frontal. The skull is robust, with large horn cores and majority of the cranial frontal suture closed indicating a 3-to-5 year old bull. This and the following seven un-curated specimens, **DARG 47** through **DARG 53** are from the same location.

DARG 47, from 5GF4046, is a partial skull (5GF4046.2, temporary number FS2) with a right horn core deformity secondary to pre-mortem injury as exhibited by indication of bone healing. The right orbit is missing as are the nasals and all structure below the left orbit. The skull is robust and although the frontal suture has widened due to weathering the suture was approaching full closure indicating a three to five year old male. Although there is no cultural modification the specimen is included as it is associated with the kill site.

DARG 48, from 5GF4046, is a partial crania (5GF4046.3, temporary number FS3) missing the mandible and all structure below the upper half of the orbits. The cranial suture is closed and the horn cores are relatively small likely indicating a mature female. Abbreviated stone tool butchering cut marks are present on the central aspect of the frontal bone.

DARG 49, from 5GF4046, is a partial crania (5GF4046.4, temporary number FS4) with horn cores, occiput, and foramen magnum intact. All frontal structure below the upper half of the orbits is missing. Due to the moderate sized skull and the near closure of the cranial frontal suture it is likely an adolescent or young adult bison.

DARG 50, from 5GF4046, is a thoracic vertebrae (5GF4046.5, temporary number FS5) with stone tool butchering cut marks, multiple multidirectional striations and extensive surface polish all located on and around the spinous process. The distal end of spinous process is missing but does not appear to have been chopped. The specimen shows evidence of bilateral polishing on the spinous process and bone surface likely secondary from the application of an unidentified expedient bone tool used to aggressively remove meat from between the articular and spinous processes.

DARG 54, from 5GF4294, is the distal portion of a left tibia located in Willow Creek near the Clear Creek Bison Kill site (5GF4046) northwest of De Beque. The specimen exhibits green bone fracturing likely performed to remove bone marrow. In addition there is evidence of intentional flaking along the distal edge forming an expedient fleshing tool. The specimen was not subjected to radiocarbon dating at the time of analysis. Although curated at the Museum of the West in Grand Junction, the museum staff are unable to locate the specimen at this time.

DARG 55 is a partial skull (temporary number RES2001) missing the mandible and lower maxilla frag and encrusted with live moss and lichen that obscures 80% of bone surface visibility. The specimen was located on Forest Service property approx 60 feet south of FDR

801 and 30 feet inside Cutting Unit #16 of the Reservoir Park Timber Sale by Todd Burton in July of 2001. It was recovered by Philip Steers August 9, 2001 and subsequently delivered to Alice Gustafson at the Forest Service Office in Glenwood Springs. Extensive weathering and organic encrustation obscure the surface of the specimen and no cultural modification is evident. Of significant interest regarding the specimen is the altitude, 10,200 feet, at which the specimen was located and recovered. The specimen was donated to Grand River Institute on February 17, 2016.

7.4 Mesa County

DARG 56 is a left scapula (FS#20) recovered from 5ME5997, the Glade Park Site, an Archaic or Late Prehistoric open camp. Stone tool cut marks are described in the report as being located near the “vertebral border on both sides of the blade” and indicating the presence of cut marks located on the cranial border extending to each side of the blade. There is also evidence of use wear on the caudal border. An irregular shaped hole perforating the infraspinous fossa is likely due to natural bone deterioration although it has been suggested that the thin, but strong structure from this area may have been used for the construction of awls and perforators as it is the only part of the skeletal anatomy from which a tool having a smooth, strong laminar surface on both sides, could easily be constructed (Collins 2017, personal communication). The specimen is curated at the Museum of the West in Grand Junction.

DARG 57 is a bison bone fragment (FS3) recovered from the feature fill of excavation test pit TP#1 at 5ME6144, a Late Prehistoric sheltered camp. In addition, two unidentified bison bones, undetermined possible tarsals or carpals, specimens **DARG 58** and **DARG 59**, were also found on the surface of a slope, in a packrat midden immediately east of the test units in the rockshelter, which is located in the Glade Park area. The specimen is curated at the Museum of the West in Grand Junction.

DARG 60, from 5ME15338, is an adolescent femur and separated head of the femur; fractured during excavation. The specimen was found at the mouth of Big Dominquez Canyon by Grand Junction Field Office BLM staff during posthole construction for a fence. Multiple stone tool butchering marks and multidirectional striations are present on the bone surface. Modern parallel striations, likely from handling and transport post excavation, are also visible. Radiocarbon testing has been done and results are pending. A pelvis fragment, **DARG 61** is associated. The pelvis fragment, was also fractured post excavation, and shows no cultural modification. Pending further evaluation the specimens are currently in storage at the Grand Junction BLM Field Office.

DARG 62, from 5ME901, is a bison bone fragment (found in association with a bison mandible fragment, teeth intact) excavated from a hearth feature #1 from the Bella Site in Knowles Canyon. Identified by Carl Conner, this is one of the first documented bison bones on the western slope to be associated with a hearth feature. It is curated at the Museum of the West in Grand Junction.

7.5 Moffat County

DARG 63 and DARG 64 (1964.001.1, temporary number MFA1 and 1964.001.108, temporary number MFA2, respectively) are both skull fragments. **DARG 63** is missing the mandible, right sinus, and part of the right horn core and was once fully buried as indicated by impregnated alluvial clasts and soils. **DARG 64** consists of the upper orbits and both horn cores with the tip of the left horn core missing. Lichen is present on the frontal prominences and a thin calcite patina covers 80% of the bone surface. Neither has evidence of human predation. Notable as high altitude bison; each was found at approximately 8400 feet in 1948. They were located approximately 2.5 miles west of the Pyramid Guard Station in the timber and atop the soil at the site of a historic wallow known to still be in use by game animals in 1965. It was not possible to remove either specimen from the wall for thorough inspection, and although documented as fossilized, they are not. Both skulls were donated by the Craig Women's Club in 1964 and are curated at the Museum of the Northwest in Craig.

DARG 65, is a robust bison metacarpal (2004.34) originally found on Baker's Peak, north of Craig, Colorado on the Alberta and Chuck Mack ranch property. Multiple stone tool cut marks, abrasions, and chop marks are visible on the bone surface, however; a thorough examination was not possible as the specimen cannot be safely removed from the display case. An information card states the specimen was dated between 4,000 and 6,500 years before present. Documentation of actual radiocarbon testing was not found in the facility records. The specimen is curated at the Museum of Northwest Colorado in Craig.

DARG 66 is a *Bison priscus* crania (temporary number WYM001) consisting of partial frontal, the upper half of both orbits, the occiput, and foramen magnum, a left horn core and right partial horn core (Plate 4). There is no discernable cultural modification. The specimen was located and recovered by Rick Ellifritz in 1998 from Pleistocene age gravels in the Yampa River approximately 2 miles southwest of Craig and assigned site number 5MF4314. The skull was taken to the Sundance Research Institute and Museum where it was examined by Gary Collins, Jan Roth and Brian Naze. Bureau of Land Management authorities were informed of



Plate 4. DARG 66, 5MF4314, *Bison priscus* (steppe bison), partial crania.

the find. Subsequent visits to the location of origin in 1999 produced a bison mandible eroding out of Pleistocene gravels approximately one foot away from the cavity left by the skull. Metric analysis indicates the skull is comparable to *Bison priscus* (McDonald 1981). The skull sample is of significant interest as it is one of a very few documented *Bison priscus* specimens to be recovered from Western Colorado. It is curated at the Wyman Museum in Craig.

DARG 67 is a bison skull fragment (temporary number WY002) consisting of the frontal from the upper orbits to and including the foramen magnum and both horn cores. The nasals are missing. A faint semi-circular band of a red stain is visible on the frontal between the orbits and above the sinus. Ultraviolet light and D-Stretch enhancement provide some improvement in definition of the stain, suggesting the possibility of intentionally applied pigment. Further testing, beyond the scope of this project, would be required in order to confirm this. The specimen is displayed at the Wyman Museum in Craig.

DARG 73 is a suspected adolescent bison tibia (temporary number WYM008) with extensive stone tool cut marks and multiple fine, multidirectional abrasion striation marks, use wear polish, and impact crushing at the proximal end. The Archaic projectile point base inserted into the mid-section of the bone and secured with an Elmer's Glue type fixative was done by the collector in the late 1990s. Testing by AMS of a bone collagen sample provided a calibrated date of AD 1990 - 1995. This date is unlikely considering the presence of cultural modification in the form of stone tool cut marks, parallel and multidirectional striations and use wear polish. The cause of the aberration is unknown. The resultant radiocarbon date has been noted but disregarded. The specimen is on display at the Wyman Museum in Craig.

DARG 74 through DARG 77, from 5MF969, is a collection of four bison faunal elements (ASS1, ASS2, ASS3, and ASS5) from the Somemore Site originally excavated in 1980. The specimens are notable in that the site and associated specimens are possibly of Paleoindian affiliation as the length of ASS1, a femur, is more indicative of an extinct cow bison than of a modern bison and Paleoindian occupation was documented at nearby site 5MF968 which produced a Hell Gap or Agate Basin isolated find (Lowe et al. 2006). Specimen ASS1, a left femur of an adult cow, bison shows an abnormality of the shaft and the head of the femur that is indicative of a pre-mortem injury. Possible butchering marks consisting of shallow parallel striae may be stone tool cut marks although this is not confirmed. Specimen ASS2 is a left humerus with definite stone tool cut marks as evidenced by oblique striations with angled faceting, a spiral fracture in the mid-section of the bone versus the distal ends, and impact indentations. Specimens ASS3 and ASS5, are, respectively, a bison thoracic vertebra and an unidentified bison tooth fragment each with no cultural modification. All are curated at the Museum of the West in Grand Junction.

DARG 79, from 5MF625, is a scapula (5MF625.18) with the central area possibly chopped out and multiple multidirectional stone tool cut marks on the blade, periphery, and edges. This specimen was found in one of two eroded sinkholes in blocky, eroding Holocene soils of a small isolated butte or hill. Both sinkholes contained layers of bison bone elements, crania, bone fragments, charcoal, and unburned wood. Also collected at the base of these

sinkholes were at least 14 Lusk and Humbolt type Paleoindian and Early Archaic lanceolate atlatl dart points. The specimen is curated at the Museum of the West in Grand Junction.

DARG 80, from 5MF4313, is a large and robust partial crania of an undetermined species of bison collected from the Vermillion Bluffs Bison Trap in the 1980s by a private citizen. It is missing the right horn core. The tip of left horn core is broken but retained with the specimen. The maxilla is intact though the mandible and nasals are missing. All teeth, having light to moderate wear, are present excepting a right molar removed for testing in 1980 when the specimen was housed at the Sundance Research Institute Museum (SRIM). Testing results are unknown at this time. There is a possible 1.2cm diameter stone tool impact indentation to the left frontal; however, this could be secondary to pre or post mortem goring from another bison. Possible cut marks exist on the right frontal but these are obscured by heavy application of acetone thinned Ambriolide fixative thereby inhibiting examination. A total of 47 additional bison bones were excavated from the Vermillion Bluffs Bison Trap site from two “sinkholes” or pockets of blocky, eroding Holocene soils and a multitude of bison bones are evident throughout the site. These specimens were initially curated at SRIM in Craig. At this time it is suspected that the professionally excavated field specimens are curated at the Museum of the West as a single, unlabeled box of bison faunal elements housed at the facility appear to match some of those described in the initial report. The location of additional, uncurated specimens, collected in the 1980s, possibly without authorization, have not yet been located. However, it is anecdotally reported that the private citizen, now deceased, who initially collected them, may have disposed of a number of the ribs and other bones in a local landfill. Previously on display during the 1980s at the Sundance Research Institute Museum, the specimen was later donated to the Museum of Northwest Colorado where it is now on display.

DARG 83, from 5MF4313, is an expedient bone butchering tool made from an unidentified right rib. The distal end is intentionally shaped and rounded and use wear polish evident. It should be noted that a fragment of tooth enamel (**DARG 82**) is identified in the original report with the same accession number (5MF4313-ASS1). Curation location is unknown.

DARG 81 and 84 through DARG 128, the remainder of the Vermillion Bluffs Bison Trap (5MF4313) faunal collection, consists of a variety of determined and undetermined vertebra, ribs, long bones, and other elements which, though apparently having no cultural modification, were recovered in association with the culturally modified specimens and were likely manipulated by humans during the harvesting episode(s) and butchering processes. Curation location is unknown.

7.6 Montrose County

DARG 129 through DARG 131, is a group of three bison faunal elements; a deteriorated cranium, a partial cranium with both horn cores, and a left scapula, none of which present with cultural modification. Although the scapula displays lengthwise cracks that could be attributed to wear from use as a scraper or scoop, no other cultural modification, such as use

wear polish or impact crushing of the edges, is present to support this. Each specimen has the same accession number, #175, indicating they were received from the 175th person to make a donation to the museum. All are curated at the Montrose County Historical Museum in Montrose.

DARG 231, from 5MN7595 is a well preserved, complete, mineral stained left metatarsal with parallel striations and stone tool cut marks on the diaphysis. Originally collected from near the Iron Mike Spring in downtown Montrose, the specimen is now curated in the City Safe at the Montrose City Hall in Montrose.

DARG 233, from 5MN7595, is a well preserved, complete left metacarpal with overall mineral staining secondary to exposure to iron oxide leaching into surrounding soils from Iron Mike Spring. Although having no cultural modification, the specimen was found in immediate association with **DARG 231**, a culturally modified left metatarsal. It is curated in the City Safe at the Montrose City Hall in Montrose.

DARG 232 and DARG 234 through DARG 248, from 5MN7595, includes the remaining collection of 15 bison faunal elements from the site. As the location of these specimens is unknown, a thorough inspection of each element is not possible and, therefore, it cannot be determined if cultural modification exists on any of these specimens. A bone sample or samples from an unidentified number of sesamoids and phalanges from the collection were submitted to Beta Analytic, Inc. for radiocarbon dating in 1995. As a result, a conventional age of 1843±123 AD (Rood 1995) was obtained. At this time the existence of a complete report has not been confirmed.

7.7 Rio Blanco County

DARG 132, is a bison bone fragment recovered from the Kuck Rock Shelter (5RB3157) a mid-elevation site near East Douglass Creek between East Dry Lake Canyon and Bowman Canyon. Radiocarbon testing from the site produced a date of 1020 +/- 50 BP. Although the specimen is curated at the Museum of the West in Grand Junction, it could not be located at this time.

DARG 134 is a bison partial skull (temporary number RBA002) with both horn cores, foramen magnum, frontal, orbits, part of maxilla and missing the nasals and mandible. There is possible chopping of the occipital condyles. Found at the mouth of Miller Creek near Meeker after a high water episode, it is curated at the White River Museum in Meeker.

DARG 135 is a partial skull (temporary number RBA003) with a 9.7cm x 10.5cm circular craniectomy resultant from intentional stone tool impact and crushing to open the cranium for removal of brain matter. There are possible multiple cut marks on the foreskull. Both horn cores, frontal, orbits, and partial upper part of maxilla are intact. The nasals and mandible are missing. Teeth present include the upper two molars on the right and three on the left. The specimen was located on Flag Creek in the 1970s by a local family and donated to the

White River Museum in Meeker.

DARG 139 is an exceptionally large, robust, partial bison skull (temporary number RBA007), likely a *Bison priscus*. The right horn core is intact though the left horn core tip is fractured. This specimen has been painted with a heavy, silver metallic based industrial paint on the frontal surface. At some point after collection, as indicated by oxidized paint, the entire specimen was exposed to high heat (a fire). An attached tag indicates: "Brought in by Cuppy Sanderson." Per museum staff, local resident Cuthbert Sanderson donated the specimen in approximately 1956. An anonymous local rancher who knew Mr. Sanderson states it was found at confluence of Four Mile Gulch and Sulphur Creek, northeast of Meeker. Permission for sampling was denied at the time of inspection and, due to the degree of oxidation and the extensive application of industrial paint, it is unlikely a reliable sample could be obtained. The specimen is curated at the White River Museum in Meeker.

DARG 140 is a large, 45.4cm long, right humerus (temporary number RB008) with stone tool cut marks, multidirectional striations, and use wear polish. It was donated in approximately 1956 by Cuthbert Sanderson who collected it from the mouth of Four Mile Gulch and Sulphur Creek, northeast of Meeker. Permission for sampling is denied at this time. The specimen is curated at the White River Museum in Meeker.

DARG 143, from 5RB8600, is a bison partial crania with cut marks and a large circular impact craniectomy on the frontal. It is likely the craniectomy was intended for the practical purpose of brain tissue extraction. Brain tissue from a butchered mammal is commonly used in tanning the animals pelt. It was collected from an undisclosed location near the Brushy Creek area of the Piceance Basin by a contracted biologist and delivered to Michael Selle and Sara McDonald, White River BLM Field Office archaeologists in Meeker, for examination. It is presently held at the Little Snake BLM Field Office in Meeker, pending Tribal consultation to determine disposition in accordance with NAGPRA regulations.

DARG 144 through **DARG 152**, from site 5RB6795 includes a bison skull and eight bison bones (5RB6795.1 through 5RB6795.9) that present with evidence of postmortem cultural modification. The skull consists of the majority of the left frontal, part of the right frontal and all of the occipital bone. The interfrontal suture measures 11.7 centimeters in length and is closed indicting an adult specimen. The left horn core diameter measures 7.63 centimeter and has a circumference of 24.7 centimeters again indicating an adult animal. The right maxilla retains the partial right nasal and turbinates and palate with three molars and two pre-molars partially preserved. There is a faint indentation possibly indicating evidence of a stone maul blow on the left frontal aspect of the skull. There is fresh breakage along the right posterior maxillar palate, the internal nasals, and right lacrimal nasal suture. The proximal end of a left humerus, the right ischium, the right partial femur, the thoracic vertebrae and the ribs and rib fragments all show evidence of cultural modification.

Five of the nine specimens from this site exhibit spiral, green bone fracturing indicative

of marrow extraction (e.g., Frison 1978). Additionally, stone tool cut marks occur on one bone and burning on three. The artifact exhibiting cut marks provides evidence of butchering, while green bone spiral-fracturing is indicative of marrow extraction. The burn marks are likely from roasting. Due to the initial disturbance by construction activity, the possibility of evaluation and assessment of *in situ* placement and original depth was not possible. Due to the close proximity of the specimens in the trench fill, and the identified cultural modifications on the bones, 5RB6795 was determined to be a bison processing site. The specimens are curated at the Museum of the West in Grand Junction.

DARG 157 through DARG 185, from site 5RB6798 is a prehistoric bison kill and processing site situated at the point of inflection of an alluvial fan in the mouth of a short southeast facing tertiary drainage that opens into the valley floor of East Stewart Gulch in the Piceance Basin. The collection consists of a concentration of 29 bison bones comprising the faunal remains of one adult and one adolescent (*Bison bison*). Of the 24 bones collected 22 of these presented with evidence of post mortem cultural modification including stone tool cut marks, butchering chop marks, oxidation due to burning, spiral fracturing and bone tool manufacturing including the proximal end of a right bison rib modified into a flesher (5RB6798.6). The bones were initially oriented in close proximity to one another indicating minimal environmental disturbance before burial. In addition, four lenses of charcoal, two bison caudal vertebrae, a retouched McKean Lanceolate projectile point, and burnt rock were uncovered within these units. The McKean Lanceolate projectile point was modified into a small knife and found in close association with the bison bones. It was most likely used in the processing of the kill. The specimens are curated at the Museum of the West in Grand Junction.

DARG 187, isolate 5RB.6807, a single right bison tibia (5RB6807.1) broken in two pieces by construction activity, was located in a spoils pile on a pipeline right-of-way in a northeast to southwest trending drainage known as East Stewart Gulch. Post mortem cultural modification is evident as a large butchering chop mark on the tibial tuberosity (Plate 5) and part of the tibial crest, and as an impact indentation midway on the medial aspect of the shaft. No other remains were found in association with the specimen. It is curated at the Museum of the West in Grand Junction.

DARG 191 through DARG 197, isolate 5RB6800 consists of six adult bison bones; one T14 thoracic vertebrae, two fragments of a single scapula, one sacrum, one frontal, upper fragment of a right orbital, one L6 lumbar vertebrae and one rib fragment all situated in the mouth of a steep tertiary drainage of East Stewart Gulch in the Piceance Basin. Three of the bones have evidence of post mortem cultural modification. The thoracic vertebrae (5RB6800.3) has butchering chop marks on the neural spine. The scapula fragments (5RB6800.1) have evidence of burning as well as carnivore and rodent gnaw marks. The sacrum, (5RB6800.5) has distinct butchering chop marks located on the posterior and dorsal aspects, and on the spinous processes (Plate 6).



Plate 5. DARG 187, 5RB6807.1, a right bison tibia with butchering chop marks on the tibial tuberosity, tibial crest, and impact indentation midway on the medial aspect of the shaft.



Plate 6. DARG 193, 5RB6800.5 the anterior aspect of a bison sacrum. Arrows indicate stone tool cut marks.

Evidence of burning is present on the posterior surface of the transverse processes and in the osseous tissue. Mineral staining and rodent gnawing are also observed on the sacrum. The structure of the single right orbital is indicative of a species predating *Bison bison* and is possibly that of *Bison antiquus* and will require further analysis. The specimen is curated at the Museum of the West in Grand Junction.

DARG 198 through DARG 205 consists of eight bison bones; three rib fragments, four thoracic vertebrae and one neural spine (possibly thoracic) (5RB6799.1 through 5RB6799.8) all situated at the base of the mouth of a tertiary drainage of East Stewart Gulch in the Piceance Basin. Based on the degree of fusion of the centrum faces the bison bones are likely an immature specimen. One of the thoracic vertebrae has evidence of post mortem cultural modification with possible butchering chop marks on the transverse processes. One of the rib fragments has carnivore gnaw marks. All other bones at the site lack evidence of cultural modification aside from fresh breakage incurred during trench construction. All are curated at the Museum of the West in Grand Junction.

DARG 206, isolate 5RB6801 consists of one right acetabulum of an adult bison pelvis (5RB6801.1) situated at the mouth of a tertiary drainage in East Stewart Gulch in the Piceance Basin. Evidence of post mortem cultural modification in the form of stone tool cutting is present on the medial aspect of the acetabulum. Non-cultural modification consists of carnivore gnaw marks. The specimen is curated at the Museum of the West in Grand Junction.

DARG 207, isolate 5RB.6809, a left metacarpal, was located in a spoils pile on a pipeline right-of-way in a tertiary drainage in East Stewart Gulch in the Piceance Basin. Post mortem cultural modification consists of a deep V-shaped chop mark to the anterior, medial condyle on the distal end (Plate 7). It is curated at the Museum of the West in Grand Junction.



Plate 7. DARG 207, 5RB.6809.1, a left bison metacarpal with a V-shaped chop mark to the anterior, medial condyle on the distal end and an impact indentation just above the chop.

DARG 208, isolate 5RB6802, a single bison skull, was located in an excavated pipeline spoils pile in East Stewart Gulch, Piceance Basin. The skull was initially found by a trench construction employee, who carefully transported the specimen an unknown distance and placed it in a safe location on a spoils pile. It was later recovered by the landowner's hired hand who was concerned it would be damaged or taken by unauthorized persons. Upon learning of the scientific and educational potential of the specimen he relinquished it to Grand River Institute archaeologists for study. The prehistoric component consists of a single bison skull consisting of the proximal half of the anterior aspect extending to the orbital (Plate 8). The right horn core is intact and the left horn core partially intact. The right horn core measures 28.7cm in circumference and 9.3cm in diameter, indicating an adult specimen. The length is 21.2cm. The tip of the right horn core to the inner frontal suture is 36.4cm. The intrafrontal suture is partially closed six centimeters from the apex of the skull and the occipital suture is completely closed, also indicating an adult. There is faint indentation on the right frontal, behind the eye orbit evidencing a possible maul blow. After study the specimen was returned to the landowner.

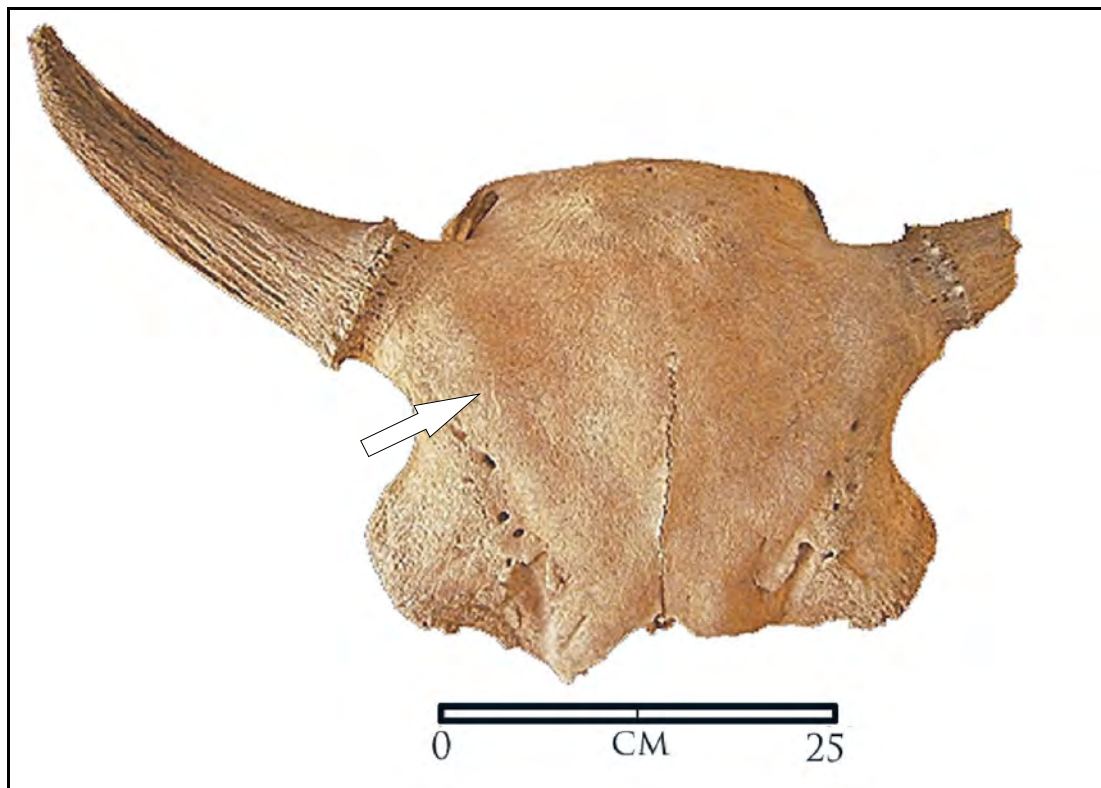


Plate 8. DARG 208, 5RB6802.1, adult bison skull with possible stone maul blow indentation to the right frontal.

DARG 209, isolate 5RB6803 consists of a right adult bison humerus (5RB6803.1) situated near the mouth of a southwest draining tertiary drainage in East Stewart Gulch in the Piceance Basin. There is evidence of post mortem cultural modification on the proximal end in the form of scalloping of the edge (Plate 9). The intentional breakage may indicate the bone's use as a fleshing tool. Butchering of bone in this manner is indicative of marrow extraction. The specimen is curated at the Museum of the West in Grand Junction.



Plate 9. DARG 209, 5RB6803.1, the distal end of a right bison humerus with possible modification into a flesher and scalloping on broken shaft.

DARG 210 through DARG 211, isolate 5RB6804 consists of two adult bison bones; one right humerus and one right tibia (5RB6804.1 and 5RB6804.2) each situated at the mouth of a northeast trending, tertiary drainage in East Stewart Gulch in the Piceance Basin. Both show evidence of post mortem cultural modification. Butchering marks are present on the proximal lateral muscle attachments as well as on the proximal condyle of the right humerus (5RB6804.1). Mineral staining and carnivore gnawing were also noted on the humerus with canine puncture marks (Plate 10) visible at the terminal end. Interestingly, the two largest puncture marks aligned perfectly with the canine teeth tips of a mature coyote skull. Butchering marks are present on the anterior aspect of the proximal end of the right tibia (5RB6804.2).

Mineral staining, likely an iron oxide, is also present on the tibia. Each of these specimens are curated at the Museum of the West in Grand Junction.

Plate 10. DARG 210, 5RB6804.1, carnivore gnaw marks on right bison humerus.



DARG 212 through DARG 214, isolate 5RB.6805 consists of three adult bison bones; one anterior, ventral fragment of an axis, one right metacarpal and one rib fragment (5RB6805.1 through 5RB6805.3), all situated to the south of a southwest trending large tertiary drainage in East Stewart Gulch in the Piceance Basin. Post mortem cultural modification is evident on the axis fragment in the form of butchering chop marks on the posterior aspect. One additional medium sized unknown mammal rib was found at the site but lacked any evidence of cultural modification. All are curated at the Museum of the West in Grand Junction.

DARG 215 through DARG 217, isolate 5RB6797 consists of three bison bones; an adolescent lumbar vertebrae, an adolescent radius and ulna and an adolescent pelvis (5RB6797.1 through 5RB6797.3). They were located in a spoils pile on a pipeline right-of-way to the north of the mouth of a steep tertiary drainage in East Stewart Gulch in the Piceance Basin. Two of the bison bones show evidence of post mortem cultural modification. The radius and ulna have evidence of butchering chop marks on the olecranon tuber. The pelvis has evidence of butchering chop marks on the right sacral and coxal tubers and stone tool cut marks on the dorsal and ventral aspects of the right ilium. It also has carnivore and rodent gnaw marks. The specimens are curated at the Museum of the West in Grand Junction.

DARG 219 through DARG 224, isolate 5RB6796 includes six adult bison bones; a cervical vertebrae, a left radius and ulna, a left humerus, a left metacarpal, and the left aspect of a pelvis with the acetabulum intact (5RB6796.1 through 5RB6796.7). Three of these, the radius and ulna, the left humerus, and the pelvis exhibit evidence of cultural modification. The radius and ulna have evidence of butchering chop marks on the olecranon tuberosity. The left humerus exhibits green bone fracture just superior to the distal aspect which is indicative of butchering and the breaking of fresh bone for marrow extraction. There are also stone tool cut marks on the medial aspect of the shaft near the green bone fracture. The pelvis has evidence of chopping on the ilium, ischium and pubis and stone tool cut marks on the dorsal aspect of the pubis (Plate 11). All of the bones have evidence of rodent gnawing and the radius and ulna also have mammal scratch marks. The specimens are curated at the Museum of the West in Grand Junction.

Plate 11. DARG 221, 5RB6796.2, the dorsal aspect of the pubis. Arrows indicate stone tool cut marks.



DARG 249 is a partial bison cranium with a partial frontal and the upper one-half of both orbits. Both horn cores are intact. Several short V shaped stone tool incised and steeply faceted grooves or nick marks (Plate 12) are present on the upper aspect and near the tips of each. It is suspected these occurred during removal of the horn caps and are the result of the stone tool cutting through the dense connective tissue and nicking the bone of the horn core. The specimen was located and collected on the surface of the East Douglas Creek drainage after a series of severe thunderstorms in 1983 or 1984. It is curated at the Rangely Outdoor Museum in Rangely.



Plate 12. DARG 249, stone tool nick marks on horn core.

8.0 DISCUSSION

A total of 250 bison faunal elements (representing 75 individuals) identified within the study area were analyzed and evaluated for cultural modification and other indicators by direct examination or via review of formal archaeological reports and photographs in order to collect specific data that was ultimately incorporated into the newly created interactive database and query map of the Western Colorado Bison Study (dargnet.org/net/bison/bison.html). These tools are available and accessible to professionals, students, and the interested public. The data base and query maps are designed to allow professional archaeologists and researchers to enter newly acquired data in order to contribute to the development of an ever evolving and timely data base.

All museums within the study area actively participated in the project by generously permitting access to bison faunal elements in their collections for examination, data collection, photography and collection of bone samples. In addition, each facility made available their curation files and any available records. Additional contributors included private land owners who had inherited specimens found on their farm and ranch properties and who had often donated these specimens to local museums. These individuals graciously provided, to the best of their knowledge, general location information, dates of collection, photographs and other pertinent information during one-on-one visits or telephone interviews.

Bison bone artifacts and non-modified faunal elements were verified in the collections of every museum in every county visited during the study. All museums, excepting the Museum of Northwest Colorado, permitted the investigator to obtain bone collagen samples for radiometric dating. Excepting a single culturally modified bison metatarsal curated at the Museum of Northwest Colorado that was situated in a showcase which proved too difficult and fragile to access, all available bison bone specimens were directly examined for cultural modification and other data. Bone collagen samples were obtained from all available faunal elements, including non-culturally modified bone, excepting two specimens located at the White River Museum.

8.1 The Occurrence and Fluctuation of Bison in the Desert West

(by James C. Miller and Holly Shelton; abbreviated from Berry et al. 2012)

The occurrence of bison on the Great Plains has received substantial documentation. Several scholars and writers suggest that bison roamed in abundance west of the Great Plains. Research conducted by Butler (1978), as well as, Meaney and Van Vuren (1993) promotes a basic knowledge of the occurrence of bison west of the Great Plains.

Butler (1978) focuses on documenting a regional occurrence of bison west of the Great Plains. A consensus exists between many scholars and writers that bison were abundant from the Green River in southwestern Wyoming westward through the northeastern corner of Utah and the Snake River Plain in eastern Idaho (Butler 1978). "According to early travelers (Kingston 1932), there were thousands upon thousands of bison to be seen in the Upper Snake

country, but only occasional skulls, 'strays,' and small 'bands' farther west (Butler 1978).” This historical account led Butler to postulate the westward boundary for bison. Other reports by early travelers recount bison in the northern portion of Nevada, eastern Oregon and eastern Washington.

Meaney and Van Vuren (1993) undertook an extensive records search to document the former distribution of bison in western Colorado excluding the eastern Colorado plains due to previous substantial documentation of bison in that area. Their search of records from local museums and private collections yielded 102 specimens from 86 localities in 20 counties. Review of literature yielded an additional 47 localities in 18 counties. Meaney and Van Vuren conclude that bison were abundant in northwestern Colorado. The Front Range, South, Middle and North Parks of Colorado provided good forage and cover for bison. Conversely, bison are relatively rare in the southwest portion of the state, particularly the San Juan Mountains and the Uncompahgre Plateau. The rugged terrain of the San Juan Mountains is perhaps one reason for the lack of bison in this area. On the other hand, the Uncompahgre Plateau would have been prime habitat for bison and it is surprising that there are so few reports of bison remains there.

It has been a long held belief that the presence of bison in the Desert West was a phenomenon of the early Historic Period. This belief has been challenged by the inundation of data concerning the presence and absence of bison remains in archaeological contexts. It is now known that the presence of bison in the Desert West fluctuated throughout Prehistoric and Historic periods. Archaeological research conducted by Butler (1978), and Lubinski (1995), as well as, Thompson and Pastor (1995) stated that bison populations were highest during the Late Prehistoric period in the Desert West. The Medithermal climate from 500 BP to 1500 BP fluctuated somewhat but overall consisted of relatively stable cool and wet periods which likely contributed to the high bison populations of that time. Excavation due to construction also results in exposure of bison remains and, when the construction is monitored, they can be recovered previous to deterioration.

According to Robert Butler, discernable patterns for the occurrence of bison through time are only evident in the sagebrush grass regions of the Desert West. It appears that “bison were continually present in the Upper Snake country from before man first entered the region until well into the Historic period, but were apparently more abundant in the Late Prehistoric period” (Butler 1978). Butler’s premise is based on data recovered from stratified rockshelters in the Birch Creek Valley of eastern Idaho. A distinctively different distribution is present in the Columbia Basin (Butler 1978). Data from 32 archaeological sites suggests that bison roamed the area up until 6,300 years ago and then populations significantly declined. This is in-part evidenced by the “3,000-year gap between the bison remains reported by Schroedl (1985:83) and those recovered from Layer 5e at the Weis Rockshelter at the extreme eastern margin of the Basin that dates from 6,300 years ago” (Butler 1978). Bison appeared to be most abundant from 3000-1500 years ago.

Archaeological investigations by Lubinski (1995) also reveal evidence for a fluctuating bison population. Lubinski dated 93 faunal assemblages from sites in southwest Wyoming

ranging from Paleoindian to Protohistoric. Analysis of the faunal assemblages revealed that bison were present in 50% of the assemblages. Bison remains were most prevalent from the Middle Archaic through the Late Prehistoric. From about 5,000 to 8,000 years BP, bison remains essentially disappeared, constituting less than 1% of 955 identifiable species. Bison remains reappear in the archaeological record between 9,000-10,000 BP after a 1000 year hiatus.

Thompson and Pastor (1995) conducted a study similar to Lubinski's. Archaeological data was compiled through an intensive cultural resource management study of southwest Wyoming. Analysis of the data suggests that bison occurred sporadically during the Archaic and increased in frequency during the Late Prehistoric. Frequency was measured through the tabulation of identifiable bison remains in dated components, organized into 400-year increments, spanning the complete cultural chronology from Paleoindian to Late Prehistoric (Thompson and Pastor 1995:79, Table 8). Total frequency of bison remains recorded for sites in southwest Wyoming equals 19, which comprises 11.66% of the combined faunal assemblages. There are no identifiable bison remains in the study area dating to the Paleoindian period. The sporadic occurrence of bison in the Archaic is clearly illustrated by the distribution of only three bison throughout the Early Archaic, one bison in the Middle Archaic and three bison in the Late Archaic. In the Late Prehistoric, there is a marked increase in the frequency of bison. A total of 12 bison were identified at Late Prehistoric sites.

Butler, Lubinski, and Thompson and Pastor acknowledge that there are inherent problems with their data. Assuming that bison remains in archaeological sites correlates directly with bison population deserves careful consideration. It is possible that bison remains in archaeological sites may reflect encounter hunting instead of bison populations. Limited sample size, primarily due to the extremely fragmented nature of faunal assemblages in archaeological sites, plays a significant role in biasing data. Displacement of elements by carnivores and rodents and the inability to discern certain cultural specimens from non-cultural specimens, also causes complications with data interpretation.

Native American reliance on bison in the Desert West exhibits a sporadic quality when examined through time. On the other hand, the minimum number of bison manifest in the archaeological record remains relatively constant through time. A series of sites, with the exception of a few anomalies, in southwest Wyoming and Colorado are noted to reveal this evident pattern.

The Barnes site (48LN350) and the Wardell site (48SU301) warrant valid classification as an aberration in the archaeological record when compared to the plethora of sites containing the remains of only a few bison. The main difference for their anomalistic quality is rooted in site function. The Barnes site and the Wardell site are bison procurement sites; whereas, the majority of sites in southwest Wyoming and Colorado are short-term encampments. The Barnes site is a Late Prehistoric bison jump located along the Fontenelle Creek in southwest Wyoming (McKern 1995). Investigations in 1987, revealed eighteen individual bison. However, during the first investigation conducted in 1978, Professor Charles Love noted that

bone, possibly representing four or five different bison, was collected by his informants. Unfortunately, the bone was not included in the analysis of the 1987 investigation. The Wardell site is a Late Prehistoric bison pound, butchering and processing area, and campsite located in the Green River Basin near Big Piney, Wyoming (Frison 1991). Bison were herded into a corral at the base of a steep scarp and slaughtered. There are nearly 5 five feet of stratified bone levels spanning a total of 500 years. Hundreds of bison are interred at the site. Excavations involving less than a quarter of the site revealed at least 150 bison. According to Frison (1991:225), “there is no way of knowing whether the corral was partly cleaned at various times or how much of the bone material was taken to the processing area, so the total count of animals killed [is] a guess.”

The majority of the archeological sites in southwestern Colorado that contain bison remains are typically short-term encampments. Archaeological investigations by Carl E. Conner at sites 5ME5997 and 5ME6144 revealed a small sample of bison bone. A utilized bison scapula was found at site 5ME5997, which is a Late Prehistoric open camp that lies along the rim of Clark Wash in Glade Park, in Mesa County. According to Conner (1998), the carbon date for the hearth feature associated with the bison scapula served as the first substantial date for the presence of bison on the Uncompahgre Plateau. Site 5ME6144, also on the rim of Clark Wash in Glade Park, is a Late Prehistoric rockshelter. Four identifiable fragments of bison bone were recovered from the site and additional bison bones were found in a packrat midden outside the rockshelter.

Buckles recovered bone in buried context during his work on the Uncompahgre uplift; however, the material was lost before analysis was complete, so it is uncertain if bison remains were included in the assemblage (1971:575-576). Archaeological investigations at the Taylor site (5LP696), located at the south end of Red Mesa near the Colorado-New Mexico state line, revealed a large artiodactyl rib and vertebra fragments that may represent bison (Fior 2001). Bison bone was also discovered on the Roan Plateau at site 5GF2416 (Conner 2008, personal communication). Grand River Institute of Grand Junction, recorded bison bone (distal portion of a left tibia) in the upper reaches of Willow Creek in Garfield County. The tibia has been culturally modified. It exhibits green bone fractures, which indicate marrow extraction. The bone was then modified through flaking to produce a fleshing tool (Smith et al. 2008).

Reliable historical documentation of living bison in western Colorado is rare and often anecdotal. Several individuals did document the presence of bison the area including Simmons (2000) who notes that by 1850 bison were no longer found in lower elevations but that the Heap-Beale expedition of 1853 observed Utes hunting bison at Cochetopa Pass and that Mexicans still came to trade with the Utes for “buffalo” hides. In December of 1854 the Utes and Shoshones hunted bison together on the White River (Simmons 2000). Documentation of the last known living bison in western Colorado includes Felger’s (1909) inclusion of Mr. R. S. Ball’s, owner of the Meeker Hotel, observation that the last known bison in the area was killed in 1884 by the Ute Indians at Cedar Springs six miles west of Craig. Dr. W. H. Bergtold, of Denver, stated that in 1894 he found “abundant” bison bones in the area between Rifle Creek and the Bears Ears mountains near Craig.

8.2 Identification of Bison Remains

The postcranial elements of bison (*Bison* spp.) and cattle (*Bos* spp.) are similar. Brown and Gustafson (1979) identify 11 elements that present with singular distinctions diagnostic of *Bison* spp. These include the axis, the 5th cervical vertebrae, the 3rd and 6th lumbar vertebrae, the proximal end of the humerus, the anterior view and proximal end of the ulna, the proximal end of the radius, the tuber coxae at the dorsal of the ilium, the distal end of the tibia and the posterior view of the metatarsal. The presence of these traits in their corresponding elements aided in distinguishing and definitively identifying the specimens evaluated during the project.

8.3 Cultural Modification

Of the 250 faunal elements included in the study, 171 specimens were available for direct visual inspection. These were evaluated for cultural modification attributes defined by this project as: possible butchering, butchering chop marks, spiral fracture, stone tool cutting, use wear polish, impact indentation, craniectomy, abrasion striations, and metal tool cutting. In addition, evidence of human manipulation absent of surface modification, such as the intentional rearrangement of faunal elements due to butchering activity or for ceremonial purposes, was noted. Burning was noted as cultural modification when it was deemed secondary to human activity such as cooking. Non-cultural modification including carnivore and rodent gnaw marks, mammal claw scratches, root etching, burning, oxidation, and mineral staining were noted when evident. Evaluation of the available bison bone was performed at the various participating museums, and at the Dominquez Archaeological Research Group facility in Grand Junction. Data collected from the 79 remaining specimens not available for direct visual inspection was accessed from photographs, report content and occasionally supplemented with input from the archaeologists who had recovered the bones.

Of the 250 bison bones evaluated, a total of 96, an astounding 38.4%, exhibited evidence of some form of cultural modification or human manipulation as detailed in Appendix A. Human manipulation of bone with no additional cultural modification totaled 11% of all culturally modified bone. Binford (1981:179) defines the act butchering an animal carcass as requiring the use of tools to dismember and fillet meat without the need of weakening articulated joints akin to the destructive activity of a carnivore. Human induced butchering is a refined, purposeful, and selectively progressive endeavor requiring specialized knowledge and skill related to appropriate tool use and the process itself.

Binford (1981) explains processing techniques as being either primary or secondary butchering processes. Primary processes occur at the kill site, and are commonly associated with dismemberment and disarticulation for ease of transport back to camp. Secondary processes occur at the site of consumption and this “filleting” involves more precise removal of meat from bone. Each of these processes has different characteristic traits that may be recognized on bone. Cut marks on points of articulation are likely associated with the primary processes of disarticulation and dismemberment. Primary and secondary processes may be observed together as was evident on several elements in the EPCO bison bone collection (Berry

et al. 2012).

Of the identified cultural modification 34%, resulted from stone tool use. This was most often exhibited as cut marks made by stone tools most often presenting as fine linear, parallel striations and deeper V-shaped grooves with steeply faceted sides. Finer cut marks, likely due to filleting of meat from the bone, were also noted. These are either long, longitudinally oriented cuts or a concentrated series of short, parallel, oblique cuts that result from butchering to free the meat from the bone for immediate consumption or for distribution. The percentage of modification secondary to metal tool use was minimal, at 2%. This result is not unexpected as the period of use of metal tools and projectile points is relatively brief being primarily confined to the Protohistoric and Historic periods (Martin 2016) with the most concentrated use of metal trade goods occurring during the Fur Trade era between the early 1820s to the late 1870s. Hafén and Hafén (1993) report documentation recorded in the Spanish Archives of New Mexico (Twitchell 1914) regarding legal action taken against a number of Abiquiú residents in 1783 for engaging in unauthorized trade with the Ute people indicating that trade with the Utes preceded this date.

Bone breakage and subsequent spiral bone fracturing has commonly been considered indicative of human processing for the extraction of nutritious bone marrow; a common practice among humans. A total of 13% of the total culturally modified bone specimens exhibited spiral fracturing. However, it should be noted that this type of fracture should not be referenced exclusively to human processing activity as it may also result from the bone crushing by carnivores (Binford 1981:58). The marrow extraction process was documented by Binford (1981) while observing Anaktuvuk women actively extracting bone marrow.

Chop marks were the most frequently employed butchering technique noted in this study at 46.8% of the total of culturally modified specimens. Chopping tends to result in a flattening or planing of the bone, an identifiable modification (Frison 1978: 306) caused by the use of larger stone and bone tools used to disarticulate skeletal segments. Often these are expedient tools manufactured from a large bone, such as a humerus or tibia, obtained directly from the carcass undergoing processing (Frison 1978). These marks are most often located at the transverse process of vertebrae, the proximal end of ribs and the proximal and distal ends of long bones.

Impact processing, as distinguished from chop marks by a tendency to concavity, was most often observed during this study on the surface of long bones and foreshulls including a ceremonial stone maul impact on the left foreshull of a female bison (5EA2742). Impact processing accounts for 8% of the total of culturally modified bone while craniectomy, a type of impact processing for the purpose of brain matter extraction, was noted on a mere 3% of bison skulls. Craniectomy is distinguished from maul impact by a somewhat irregular circular orifice, usually located on the central foreshull, with conchoidal scalloping at the interior periphery. The craniectomy perforates the foreshull leaving a gaping hole of adequate dimensions for accessing brain matter. Associated bone flakes may or may not be present within the skull cavity.

8.4 Radiometric Data

Bone collagen samples submitted for or having had previous radiometric testing totaled 35 with resultant dates ranging from 11,700±90 BP to AD 1830±40. Appendix D contains detailed results of all radiometric testing.

Two bison skull specimens, one from Moffat County, DARG 66, and one from Rio Blanco County, **DARG 139**, were tentatively identified as *Bison priscus*, or Steppe Bison. **DARG 139** was heavily contaminated with industrial grade paint and had been oxidized at high heat in the recent past. Therefore; it was excluded from testing. Neither of the specimens exhibited evidence of cultural modification. However, due to the rarity of bison faunal elements dating from the Late Pleistocene in this region it was deemed important to take advantage of the opportunity to test a specimen. **DARG 66** from 5MF4314 proved acceptable as a bone collagen donor. A bone collagen sample (WYM001) was submitted to International Chemical Analysis, Inc. (ICA-16B/1141) for accelerator mass spectrometry (AMS) testing. As a result, a conventional age of 11700±90 BP and a calibrated date of 11,790 to 11,410 BC was obtained, indicating existence of the animal within the most recently reported parameters for occurrence of the species (Serduk et al. 2014). The date places the specimen late in the Pleistocene but within parameters of the occurrence of Steppe bison in prehistoric time. It is to be noted that the frozen mummy of a well preserved and complete Steppe Bison (*Bison priscus*), referred to as the Yukagir Bison, was recovered in 2011 from the Chukchalakh Lake shore of the northern Yana-Indigirka Lowland, of Eastern Siberia. An extensive necropsy, performed by scientists of the Yakutian Academy of Sciences in Siberia, revealed the bison to be a male about four to four and a half years of age that had likely died of starvation. An accelerator mass spectrometry (AMS) radiocarbon date of approximately 9300 BP was obtained. The specimen represents the most complete mummy among known records of this extinct species (Serduk et al. 2014). Previously curated in the Sundance Research Institute Museum, the specimen is presently displayed at the Wyman Museum in Craig.

It was reported that shortly after recovery **DARG 66** was stabilized with Ambroid cement thinned with acetone (Collins 2017, personal communication). The bone collagen sample obtained from the specimen was collected from the interior of the cranial structure in an area least likely to have been contaminated. However, today, standard pretreatment of bone collagen samples eliminates any contamination that would result in an inaccurate date (Diaz 2017, personal communication).

No culturally modified specimens produced dates between 0 AD and 700 AD. Eight specimens produced dates between AD 775 and 1400 with an increase noted between AD 1000 and 1400 consisting of six specimens. Beginning in AD 1400 through late AD 1800 there is a significant increase in the occurrence of culturally modified bone, 25 specimen dates and a noticeable spike of 20 of these dates falling between approximately AD 1450 and the early 1800s.

The resultant bison collagen dates reveal four distinctive episodes of activity beginning

in the Formative Era and moving forward into the Historic period. Formative Era peoples, limited to hunting on foot, would likely have taken bison on an intermittent or occasional basis thereby possibly accounting for the low incidence of culturally modified bone during this period. Intermittent drought episodes may also have contributed to extreme fluctuations in regional bison populations. Significant numbers of bison may have succumbed to starvation or migrated northward and northeast away from the western slope to higher altitudes and more productive drainages systems such as the Yellowstone, Missouri, Platte and Kansas rivers. Excluding the date of 11,790 BC to 11,410 BC produced by **DARG 66**, the *Bison priscus*, and concentrating on the higher calibration percentages, the most frequent occurrence of bison within the present study area spans a time period between the middle to late 1400s and into the early 1800s. These dates fall within the later Medithermal climatic period and include the Little Ice Age, occurring between AD 1300 and 1870. This time of a predominant cool/wet climate with interspersed warmer episodes resulted in an environment capable of sustaining a substantial western slope bison population. A measurable concentration of dates beginning AD 1600 and forward is likely indicative of the presence of the horse mounted Ute and possibly speaks to hunting by occasional intrusive tribes that would likely have included the Shoshone.

It is admitted that the sampling is limited and that future and more extensive testing would certainly produce a more complete and reliable interpretation of the data. The indicated increase in preservation of more recent bison remains may be secondary to the opportunity presented for increased visibility due to natural erosive processes exposing those faunal elements stratigraphically situated nearer the soil surface. Older, deeply buried specimens, rarely exposed except by construction excavation or significant and violent erosional episodes, are less likely to be observed, identified, and collected by the casual or professional individual before they weather and deteriorate into obscurity.

8.5 Selected County Specific Observations

8.5.1 Delta County

Two bison skull fragments were identified as having originated in Delta County. Neither of these are associated with a formal site number and are isolated finds located and recovered by local ranchers between 1920 and 1960. Although neither specimen presented with cultural modification each was notable due to its original location. **DARG 1** was recovered from a high altitude park of the southwestern aspect of the Grand Mesa. **DARG 2** was recovered from Escalante Creek, approaching the interior of the Uncompahgre Plateau, which, although an ideal habitat for bison, has yet to produce bison kill sites or paleontological faunal elements. Only one recent discovery by the Grand Junction Field Office of the BLM at the mouth of Dominquez Creek on the extreme eastern perimeter of the Plateau has been reported.

8.5.2 Eagle County

As a result of work performed in the Bocco Mountain Special Recreation Management Area by Dominquez Archaeological Research Group, a total of three sites consisting of concentrations of bison bone were excavated. These included 5EA2742 consisting of 26 bones

of a butchered bison with the skull situated on a ceremonial altar (Miller et al. 2009), and 5EA2872 (Miller et al. 2011), and 5EA2944 (Conner et al. 2013), with three and four bones, respectively, both having died of natural causes. An additional non-cultural skull, DARG 37, from the Yarmony Mountain area in Eagle County was also evaluated and included in the project.

Specimens, **DARG 3** through **DARG 28**, were excavated from Little Ice Age soils, Late Prehistoric era in the Bocco Mountain area near Wolcott. The collection, previously residing at the Colorado River Valley BLM office and later at the Museum of the West in Grand Junction, was repatriated by the Northern Ute Tribe under NAGPRA regulations, in July or August of 2016 at an unknown and protected location.

8.5.3 Garfield County

Although curated by the Museum of the West in Grand Junction, the specimen, 5GF2416.1 (**DARG 38**), was, for many years, loaned and on display with a reconstructed Ute wickiup at the Ute Indian Museum in Montrose. During the 2016 preparations for the museum remodeling and the reorganizing of the collections, Tribal members were consulted and the display was reevaluated. At that time it was determined that continued display of the specimen was inappropriate as some Tribal members felt that due to the presence of the craniectomy, the skull had spiritual significance. The display was disassembled and the skull was returned to the Museum of the West. The specimen was repatriated to an unknown location by members of the Northern Ute Tribe in July or August of 2016 in accordance with NAGPRA regulations.

8.5.4 Mesa County

There is a paucity of bison bone located in and recovered from Mesa County. This assessment revealed only four incidences of the occurrence of bison faunal elements with all having been excavated from the extreme western aspect of the county. The specimens from 5ME901, 5ME5997, and 5ME6114 are disarticulated elements and fragments likely having been subjected to processing secondary to butchering, storage and possibly cooking. These elements offer no information regarding the location of initial procurement. However, the specimens recovered from 5ME15338, being long bones with evidence of stone tool butchering marks and located near the confluence of Big Dominguez Creek and the Gunnison River, likely indicate procurement from the immediate area. Stone structure game drive features are known to exist approximately 5 miles to the east and on the north side of the river (Decker personal communication 2016). It has not been determined if these structures were used for a multiple or single species procurement or if this included bison.

8.5.5 Moffat County

A total of 66 bison faunal elements were identified from various collections in Moffat County. The high occurrence of bison in the region is likely due to the presence of several expansive drainages that provide easily accessible migration routes to the mountains and high

plains of Wyoming. These continued to be populated with bison as late as the 1870s. By the early 1800s the increased density of fur trappers employed by British, French and American fur trapping companies such as the Hudson Bay Company and the American Fur Company, exponentially increased hunting pressure through the 1870s (Dary 1974).

Osborne Russell, a Free Trapper who hunted and trapped extensively in the Rocky Mountains of Wyoming and into Colorado, speaks in his journal of 1840 of the scarcity of the bison in these regions (Haines 1955) The impact of the fur industry combined with the now armed and mounted native peoples and the ultimate influx of emigrants to California and the Oregon territory, resulted in unprecedented over-hunting of many species and the near extermination of both the Plains and Mountain bison. During this period it is likely these relentless stressors pressured some few remaining bison, generationally familiar with the northwest and west-central Colorado territory, to move south and south westward through the southern most aspect of the Wyoming Basin along the broad drainages of the Little Snake, Vermillion Creek, and Shell Creek drainages and into the more secluded, rugged, and isolated terrain of the Yampa drainage.

8.5.6 Montrose County

Although the prehistoric and early historic landscape, climate, and environment of Montrose County was amenable to bison, there is a paucity of bison bone in the area. Unfortunately, the three specimens curated at the Montrose County Historical Museum, **DARG 129** through **DARG 131**, were donated by a private individual who had recovered them in 1962 from an eight foot deep road cut on Colorado State Highway 13 approximately five miles south of Meeker.

Interestingly, in the Spring of 1995, during construction excavation at the southeast corner of the Montrose City Hall building for installation of a pneumatic tube system between the City Hall and the Police Department, 17 bison bones (5MN7595, **DARG 231** through **DARG 248**) were exposed in the disturbed soils. Construction was stopped and Ronald J. Rood of the Division of State History, Antiquities Section was contacted to perform an evaluation. The bones were recovered and taken to Western State College, identified as bison, examined, photographed, and a five page brief was ultimately completed by Rood in 2010. Based on mediopodial counts, portions of two individuals were recovered. A bone sample was submitted to Beta Analytic, Inc. for radiocarbon dating; as a result, a conventional age of AD 1843±123 was obtained (Rood 2010). Notably, the cultural modification of **DARG 231**, consisting of stone tool cut marks and parallel striations, was not included in the brief.

As the specimens were located at the site of Iron Mike Spring, historically and prehistorically an attractant to wildlife and Native Americans alike, it is probable that additional bison bones are present at the location. Although, over several months during this project, much anecdotal information related to the existence of the “Iron Mike buffalo bones” was volunteered by local informants, identification of the excavation site and the curation location of the collected elements proved extremely difficult. Fortunately, archaeologist Rand

Grubel of Alpine Archaeology generously and in a most timely manner, provided the aforementioned brief by Rood. Subsequently, a series of inquiries produced two credible informants, Mr. Tom Chinn, the Montrose City Police Chief, and Mr. Virgil Turner, the Montrose City Director of Innovation and Citizen Engagement, both of whom were present during the excavation of the bones. Mr. Turner indicated two of the bones, **DARG 231** and **DARG 233**, were secured in the City Hall safe and produced them for examination. These two specimens were designated as 5MN7595, an isolated find, in 2005. The location of the remaining 15 bones is unknown.

As the bison bones from 5MN7595 were located in the immediate downtown area of Montrose, Colorado, a historic location first settled by EuroAmericans in the 1870s, it is of interest to note that modern bison carcass processing for provision of meat to working class miners of the region was known to occur from the late 1870s and possibly into the early 1880s. Butchered bison bone artifacts recovered from the railhead mining camp of Dallas City in Ouray County, 23 miles south of Montrose, were butchered using consistent, modern techniques; namely sawing (Baker 2013). However, the cut marks and striations observed on **DARG 231** are not consistent with this identified EuroAmerican butchering practice. Accordingly, considering the radiocarbon testing results combined with the evidence of stone tool processing, it is likely that the cultural modification is associated with very Late Protohistoric or Historic Ute bison procurement.

8.5.7 Rio Blanco County

In 2011, a monitor of trenching operations, spanning more than 20 miles, for the Meeker to Greasewood Pipeline in Hatch Gulch and East Stewart Gulch, in the Piceance Basin, produced unanticipated archaeological finds consisting of 15 faunal localities with culturally modified bison bones (Berry et al. 2012). On 16 August 2011, Courtney Groff, geoarchaeologist of Grand River Institute, identified a bison skull in spoil fill from the Meeker to Greasewood Pipeline in Hatch Gulch (5RB6795) that had previously been disregarded as a bovine specimen. James C. Miller and Groff subsequently recorded and recovered the majority of a mature *Bison* spp. skull and eleven additional bison bones from the same location. This find initiated archaeological monitoring of the remainder of the pipeline construction project.

Monitoring resulted in the identification of 15 faunal localities that exhibited bones with cultural modifications: two were designated sites (5RB6795, 5RB6798), and 12 were recorded as isolated finds (5RB6796, 5RB6797, 5RB6799, 5RB6800 to 5RB6805, 5RB6807, 5RB6808, and 5RB6809).

Subsequent report preparation for the project revealed a paucity of information specific to the immediate region on the subject of prehistoric, protohistoric, and historic bison occurrence and procurement. The available evidence was confined to the identification and/or recovery of an occasional skull, several faunal elements, or unidentifiable bone fragments. This difficulty inspired the concept of the need for research and data collection related to the occurrence of bison and the frequency of culturally modified bison faunal elements specific to

the western slope of Colorado.

8.6 A Probable Modified Hunting Technique

A number of the specimens evaluated during this assessment are likely representative of Mountain bison (*B.b.b. spp.*) a subspecies of Plains bison (*B.b. spp.*) Congregating in herds of no more than 5 to 30 individuals and tending to be slightly smaller and likely more agile than Plains bison, this subspecies would have been well adapted to negotiate the difficult and varied terrain of northwest and west-central Colorado. Although Paleoindian through Late Prehistoric bison hunting methods are well documented (Kornfeld et al 2010:213-286) and include a variety of techniques, it is suspected that these adaptations would have required the native hunters, whether mounted or not, to frequently engage in a modified hunting technique suited to the environment and the species. Hunting bison in the intricate and multitudinous canyons and drainages of northwest and west-central Colorado, as opposed to the open plains of the east, would have required a singular approach. As many of the culturally modified specimens originated at, in or near the mouths of secondary and tertiary drainages, it is suggested that the following specific hunting technique was employed. Small groups of bison, or one or two animals could have been gently pressured, either by hunters on foot or horseback, to move up a drainage, preferably toward the mouth of a short, steep, tertiary drainage. Individuals strategically situated to the side and up drainage of the bison could then alarm the animals causing them to turn and move up into the selected tertiary drainage, as, from the perspective of the bison, it would appear to be a viable escape route. At this point the bison, restricted and slowed by the narrowness and severe steepness of the drainage and having no option but to return, would then be susceptible to ambush at the mouth of the drainage by the now congregated hunters. After a successful kill, primary and possibly secondary processing could then be undertaken. After abandonment of the processing site, alluvial deposition would have quickly buried and preserved the remains.

9.0 CONCLUSIONS

Curated within the antique display cases, dusty back rooms, and dark basements of western Colorado's small regional and private museums rest a multitude of scientifically neglected cultural resources. Among these are a surprising number of bison bones and skulls recovered by local residents, ranchers, and hunters, who have donated their "finds" with the sincere hope and trust that these rare specimens would add some small contribution to history and maybe even to science. More often than not, and primarily due to their large size and awkward shapes, these remnant faunal elements are relegated to a high shelf or displayed in a showcase behind a plethora of "Indian" artifacts, fossils and other miscellany. As discovered during this project, many of these bison faunal elements present with evidence of cultural modification; the butchering cut marks, impact indentations, spiral fracturing, faint pigments, and other evidence of processing and ceremonial modification left by prehistoric and protohistoric Native American hunters. These previously untapped archaeological resources have the potential to provide an abundance of scientific data that will contribute to and magnify

the present understanding of the interrelationship of bison and the Native peoples of northwest and west-central Colorado.

Investigations into the occurrence of bison and culturally modified bison faunal elements in northwest and west-central Colorado have produced exciting results. Bison bone artifacts were verified in the collections of every museum in every county visited during the initial phase of the study and data regarding additional specimens was gleaned from formal reports. Because of this cooperative effort, a total of 250 bison faunal elements from 7 western slope counties were identified and analyzed for cultural and non-cultural modification. Considering that the initial estimate of unknown faunal elements was anticipated to be approximately 10 to 15 specimens; this is a remarkable sampling for a limited assessment.

Butler (1978), and Meaney and Van Vuren (1993) unquestionably confirmed the occurrence of bison west of the Great Plains. Although Meaney and Van Vuren's record searches of bison distribution in the west provided adequate information to conclude that bison were likely abundant in extreme northwestern Colorado, this assurance was less apparent in the general northwest and west-central regions. As a result of this assessment it has now become clear that a significantly larger population of bison existed and were being exploited by native hunters, primarily by early Prehistoric through Historic Ute, than previously indicated.

The encouraging results of the assessment and the unexpected high number of bison faunal elements exhibiting cultural modification discovered during this brief assessment support the initial theory that bison were not only present in western Colorado, but that they were present in sustainable populations adequate to support regular harvesting by native peoples over an extended period of time. Resultant radiometric data supports evidence of ongoing, sustainable bison procurement and the viability of a relationship between carrying capacity of prehistoric bison populations and aboriginal bison procurement in the study area from late AD 700 through the early 1800s.

In order to develop an accurate scientific perspective of the interrelationship of bison and the native occupants of western Colorado it is crucial that further investigation of bison faunal elements located in the museums and private collections of the remaining western slope counties be undertaken. Data collection tools and techniques developed by DARG specifically for this project have now been made available for professional and layman use via the Western Colorado Bison Project Database (dargnet.org/net/bison/bison.html). This interactive program will allow researchers to enter newly acquired data regarding known and recently discovered bison faunal elements and their associated attributes, photos, location information and any radiometric dating information. Data submitted by participating researchers will continue to clarify and define bison population concentrations, their movement on the landscape, and procurement patterns and processing techniques specific to the native people of the region. The addition of newly acquired bison faunal element data will contribute to the evolution of a viable and credible research tool; accessible not only to professional archaeological and historic communities, but to all researchers with an interest in the subject of bison in western Colorado.

Information acquired from the ever-expanding Western Colorado Bison Project Database will be incorporated into the on-going public and professional outreach program that Carl Conner, Michael Berry, and Holly Shelton have produced and delivered at numerous professional presentations, public lectures, and interactive public school programs. In addition bison related content directed toward the lay public has been made available on the newly enhanced DARG website (dargnet.org).

Traditional Ute oral history refers frequently to bison, bison hunts, and the bison's relationship with man, other animals and supernatural beings (Smith 1974). Although there is a respectable amount of information related to Ute hunting practices in western Colorado, very little is documented regarding actual episodes of Ute bison hunting in the northwest and west-central region. Clifford Duncan, Elder of the Northern Ute Tribe, shared many stories of bison and prior to his passing, asked this writer to "learn all possible about the buffalo" and then "come and teach it to the kids; tell them how it was so they'll know. Too much is forgotten and there aren't too many of us left." (personal communication, Clifford Duncan, 2012). It is the sincere hope of the Dominguez Archaeological Research Group that the efforts and results of the Western Colorado Bison Project will, in some small way, begin to respectfully honor his request.

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APPENDIX A: Cultural Modification

Western Colorado Bison Project. Appendix A: CULTURAL MODIFICATION

DARG #	Element*	Cultural Mod**
DARG 3	Skull (R)	6
DARG 4	Mandible; left & right. (R)	9
DARG 5	atlas; C1 vertebra. (R)	2
DARG 6	vertebra, T10 (R)	9
DARG 7	vertebra, T11 (R)	0
DARG 8	vertebra, T12 (R)	0
DARG 9	vertebra, T13 (R)	0
DARG 10	vertebra, T14 (R)	0
DARG 11	vertebra, L1 (R)	2
DARG 12	vertebra, L2 (R)	2
DARG 13	vertebra, L3 (R)	2
DARG 14	vertebra, L4 (R)	2
DARG 15	vertebra, L5 (R)	2
DARG 16	partial sacrum (R)	2
DARG 17	R 1st rib, complete (R)	2
DARG 18	R 12th rib, partial (R)	0
DARG 19	R 14th rib, partial (R)	0
DARG 20	undetermined L rib, partial (R)	2
DARG 21	undetermined L rib, partial (R)	2
DARG 22	R ilium (R)	1
DARG 23	R. astralagus (R)	0
DARG 24	R. calcaneus (R)	0
DARG 25	R. naviculo-cuboid (R)	0
DARG 26	R. ectocuneiform (R)	0
DARG 27	R. metatarsal fragment (R)	5
DARG 28	Bone frags (R)	0
DARG 38	Skull (R)	4, 7
DARG 40	Skull	4, 7
DARG 43	Skull	4, 8
DARG 44	Metacarpal	5, 6
DARG 45	Tibia	4, 8
DARG 46	Skull A	6
DARG 48	Skull C	4
DARG 50	T8 Vert	4, 5, 8
DARG 54	Left Tibia	3
DARG 56	Scapula tool	2, 4, 5
DARG 60	Femur	4, 5
DARG 62	Bone fragment	1
DARG 65	Metacarpal	2, 4, 8
DARG 67	Bison skull frag	Poss pigment
DARG 73	Tibia	2, 3, 4, 5, 6, 8
DARG 74	Left Femur	1
DARG 75	Left Humerus	3, 4, 6
DARG 79	Scapula	1,2, 4, 6
DARG 80	Skull	1
DARG 83	Rib fragment tool	5
DARG 231	Left metatarsal	4, 8
DARG 132	Bone fragment	14
DARG 134	Skull	1
DARG 135	Skull	4, 7
DARG 140	Humerus	4, 5, 8
DARG 143	Skull	4, 6
DARG 249	Skull	4

Western Colorado Bison Project. Appendix A: CULTURAL MODIFICATION

DARG #	Element*	Cultural Mod**
DARG 144	Femur	2, 3
DARG 145	Humerus	2, 3
DARG 148	Rib	2, 3
DARG 149	Rib	2, 3
DARG 150	Rib fragments	2, 3
DARG 152	Thoracic vertebrae	4
DARG 157	Calcaneus	1
DARG 160	Cervical vertebrae	2
DARG 161	Cervical vertebrae	4
DARG 162	Femur	2
DARG 163	Femur	2
DARG 164	Humerus	2
DARG 165	Humerus	3
DARG 167	Lumbar vertebrae	2
DARG 168	Lumbar vertebrae	2, 4
DARG 173	Rib fleshing tool	2, 4, 5
DARG 175	Rib	1, 4
DARG 176	Rib	5
DARG 177	Rib	1, 3
DARG 179	Thoracic vertebrae	2
DARG 180	Thoracic vertebrae	2, 4
DARG 181	Thoracic vertebrae	2
DARG 182	Thoracic vertebrae	2
DARG 183	Tibia	2, 3
DARG 184	Tibia	2
DARG 187	Tibia	2
DARG 191	Lumbar vertebrae	2
DARG 193	Sacrum	2, 4
DARG 194	Scapula	4
DARG 195	Thoracic vertebrae	2
DARG 197	Pelvis fragments	2
DARG 202	Thoracic vertebrae	1
DARG 206	Pelvis	4
DARG 207	Metacarpal	2
DARG 208	Skull	6
DARG 209	Humerus	1, 3
DARG 210	Humerus	2
DARG 211	Tibia	2
DARG 212	Axis	2
DARG 216	Pelvis	2, 4
DARG 217	Radius and ulna	2
DARG 219	Humerus	2, 3, 4
DARG 221	Pelvis	2, 4

*(R)-Repatriated

**Cultural Modification

0-Has evidence of human manipulation, no surface modification

1-Possible butchering

2-Butchering chop mark

3-Spiral fracture

4-Stone tool cutting

5-Use wear polish

6-Impact indentation

7-Craniectomy

8-Abraision striations

9-Metal tool cutting

APPENDIX B: Non-Cultural Modification

Western Colorado Bison Project. Appendix B: NON-CULTURAL MODIFICATION		
DARG #	Element	Other Mod**
DARG 1	Skull	12, 16
DARG 2	Skull	16
DARG 21	undetermined L rib, partial	16
DARG 33	Partial Cranium	16
DARG 36	Undetermined left rib	12, 16
DARG 37	Skull	16
DARG 38	Skull	16
DARG 39	Atlas	16
DARG 43	Skull	16
DARG 45	Tibia	16
DARG 46	Skull A	16
DARG 47	Skull B	11, 12, 16
DARG 48	Skull C	10, 13
DARG 49	Skull D	16
DARG 50	T8 Vert	16
DARG 51	Atlas	16
DARG 52	Tibia, Left	16
DARG 55	Skull frag	12, 16
DARG 56	Scapula tool	16
DARG 57	Bone frag	16
DARG 58	Tarsal or carpal	16
DARG 59	Tarsal or carpal	16
DARG 60	Femur	16
DARG 61	Pelvis frag	16
DARG 62	Bone fragment	14
DARG 63	Skull	16
DARG 64	Skull	16
DARG 66	Bison priscus Skull frag	16
DARG 67	Bison skull frag	16
DARG 73	Tibia	16
DARG 74	Left Femur	16
DARG 75	Left Humerus	16
DARG 76	Thoracic vertebrae	16
DARG 79	Scapula	16
DARG 80	Skull	16
DARG 81	Skull frag	16
DARG 82	Tooth enamel and	16
DARG 83	Rib fragment tool	16
DARG 84	Cervical vertebrae	16
DARG 85	vertebra	16
DARG 86	Thoracic vertebrae	16
DARG 87	Rib	16
DARG 88	Left rib	16
DARG 89	Left rib	16
DARG 90	Left rib	16
DARG 91	Left rib	16
DARG 92	Left rib	16

Western Colorado Bison Project. Appendix B: NON-CULTURAL MODIFICATION		
DARG #	Element	Other Mod**
DARG 93	Left rib	16
DARG 94	Left rib	16
DARG 95	Left rib	16
DARG 96	Left rib	16
DARG 97	Left rib	16
DARG 98	Right rib	16
DARG 99	Right rib	16
DARG 100	Right rib	16
DARG 101	Right rib	16
DARG 102	Right rib	16
DARG 103	Right rib	16
DARG 104	Right rib	16
DARG 105	Right rib fragment	16
DARG 106	Right rib fragment	16
DARG 107	Rib fragment	16
DARG 108	Rib fragment	16
DARG 109	Manubrium	16
DARG 110	Xiphoid process	16
DARG 111	Lumbar vertebrae	16
DARG 112	Lumbar vertebrae	16
DARG 113	Lumbar vertebrae	16
DARG 114	Lumbar vertebrae	16
DARG 115	Sacrum	16
DARG 116	Caudal vertebrae	16
DARG 117	Right ulna fragment	16
DARG 118	Right tibia	16
DARG 119	Left ulna	16
DARG 120	Radius	16
DARG 121	Radius	16
DARG 122	Radius	16
DARG 123	Metacarpal	16
DARG 124	Innominate	16
DARG 125	Innominate	16
DARG 126	Tibia	16
DARG 127	Calcaneus	16
DARG 128	Metatarsal	16
DARG 129	Skull	16
DARG 130	Skull	16
DARG 133	Skull	16
DARG 134	Skull	16
DARG 135	Skull	16
DARG 136	Skull	16
DARG 137	Skull	16
DARG 138	Skull	16
DARG 139	Skull	15, 16
DARG 140	Humerus	16
DARG 143	Skull	16

Western Colorado Bison Project. Appendix B: NON-CULTURAL MODIFICATION		
DARG #	Element	Other Mod**
DARG 144	Femur	11, 16
DARG 145	Humerus	11, 15
DARG 146	Ischium	14, 15, 16
DARG 147	Maxilla	10
DARG 148	Rib	11
DARG 149	Rib	NA
DARG 150	Rib fragments	14
DARG 151	Skull	14
DARG 152	Thoracic vertebrae	16
DARG 155	Metatarsal	10
DARG 156	Metatarsal	11
DARG 157	Calcaneus	16
DARG 160	Cervical vertebrae	14, 15
DARG 161	Cervical vertebrae	14
DARG 162	Femur	16
DARG 163	Femur	14, 15, 16
DARG 164	Humerus	10, 11, 14
DARG 165	Humerus	11, 14
DARG 166	Ischium	15
DARG 167	Lumbar vertebrae	14, 16
DARG 168	Lumbar vertebrae	14, 16
DARG 169	Metacarpal	11, 14, 15, 16
DARG 170	Metatarsal	11, 14
DARG 171	Patella	10
DARG 173	Rib fleshing tool	14, 16
DARG 174	Rib	11, 14
DARG 175	Rib	14, 16
DARG 176	Rib	10, 11
DARG 177	Rib	10, 14
DARG 178	Scapula	11, 14
DARG 179	Thoracic vertebrae	14
DARG 180	Thoracic vertebrae	11, 14
DARG 181	Thoracic vertebrae	14
DARG 182	Thoracic vertebrae	11, 14
DARG 183	Tibia	10, 14, 16
DARG 184	Tibia	11, 14
DARG 185	True rib	11, 14
DARG 187	Tibia	11
DARG 191	Lumbar vertebrae	11, 12, 16
DARG 193	Sacrum	11, 14, 16
DARG 194	Scapula	10, 11, 14
DARG 195	Thoracic vertebrae	11
DARG 196	Rib	11

Western Colorado Bison Project. Appendix B: NON-CULTURAL MODIFICATION		
DARG #	Element	Other Mod**
DARG 197	Pelvis fragments	10
DARG 199	Rib	10
DARG 200	Rib	11
DARG 201	Rib	11
DARG 206	Pelvis	10
DARG 210	Humerus	10, 16
DARG 211	Tibia	11, 16
DARG 214	Rib	11
DARG 216	Pelvis	10, 11
DARG 217	Radius and ulna	11
DARG 218	Cervical vertebrae	11
DARG 219	Humerus	11
DARG 220	Metacarpal	11
DARG 221	Pelvis	11
DARG 222	Lumbar vertebrae	11
DARG 223	Radius and ulna	11, 13
DARG 226	Metacarpal	11
DARG 227	Long bone	11
DARG 228	Radius	16
DARG 229	Metatarsal	11
DARG 230	Metatarsal	11

****OTHER MODIFICATION**

- 10-Carnivore gnaw marks
- 11-Rodent gnaw marks
- 12-Root etching
- 13-Mammal scratch marks
- 14-Burning
- 15-Oxidation due to burning
- 16-Mineral staining

APPENDIX C: Comments

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Delta	Delta County Museum	DARG 1	NA	(90.67.1) D002(T)	Skull	3	Bison crania fragment with partial crania and deteriorated horn cores. Collected from the Grand Mesa at approximately 10,000' southeast of state Hwy 65 and FS 100 Rd. No visible cultural modification.
Delta	Delta County Museum	DARG 2	NA	D001(T)	Skull	2	Crania fragment collected in the 1920s by Bill and Velma Shreeves in the upper Escalante (per her son) from the Shreeves ranch that encompassed the confluence of Escalante Creek and the Gunnison River; Escalante Creek to the Lower Huffinton ranch; the XVX ranch on and above the North Fork of the Escalante, and three quarter sections on the Uncompahgre Plateau. No visible cultural modification. Donated by Velma Shreeves.
Eagle (Bocco I)	Museum of the West Grand Jct. (MOWGJ), (Bocco I)	DARG 3	5EA2742	5EA2742.1	Skull	1 to 4	A winter kill 4 yo female bison (small horn cores). Crania minus sphenoid, face minus vomer. Cranial left side foreskull impact indentation. Intentional placement of skull on upright sandstone slabs oriented 50 deg SSE (winter Sunrise), suggestive of ceremonial use. Excavated from Little Ice Age soils, Late Prehistoric era. Previously stored at the Colorado River Valley BLM office, this specimen and DARG 4 through DARG 28 were all repatriated to an undisclosed location by the Northern Ute Tribe in accordance with NAGPRA regulations in July or August of 2016.
Eagle	MOWGJ	DARG 4	5EA2742	5EA2742.2	Mandible (L&R)	1	Molars present indicating 4 yo female, winter kill. Metal knife cut and gouge marks are apparent on the medial surfaces of both sides of the mandible indicating the tongue was harvested.
Eagle	MOWGJ	DARG 5	5EA2742	5EA2742.3	atlas (C1 vertebra)	1	The processes of the atlas are missing; broken by a bone chopper during disarticulation of the skull.
Eagle	MOWGJ	DARG 6	5EA2742	5EA2742.4	vertebra, T10	1	A cut mark made by a metal knife, identified by the smooth, V-shaped impression, is obvious on the left side of the dorsal spine about 3cm above the top of the centrum or body of the vertebra.
Eagle	MOWGJ	DARG 7	5EA2742	5EA2742.5	vertebra, T11	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 8	5EA2742	5EA2742.6	vertebra, T12	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 9	5EA2742	5EA2742.7	vertebra, T13	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 10	5EA2742	5EA2742.8	vertebra, T14	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 11	5EA2742	5EA2742.9	vertebra, L1	1	Lateral processes on both sides are vertebrae are chopped off
Eagle	MOWGJ	DARG 12	5EA2742	5EA2742.10	vertebra, L2	1	Lateral processes on both sides are vertebrae are chopped off

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Eagle	MOWGJ	DARG 13	5EA2742	5EA2742.11	vertebra, L3	1	Lateral processes on both sides are vertebrae are chopped off
Eagle	MOWGJ	DARG 14	5EA2742	5EA2742.12	vertebra, L4	1	Lateral processes on both sides are vertebrae are chopped off
Eagle	MOWGJ	DARG 15	5EA2742	5EA2742.13	vertebra, L5	1	Lateral processes on both sides are vertebrae are chopped off
Eagle	MOWGJ	DARG 16	5EA2742	5EA2742.14	partial sacrum	1	Sacrum was chopped off posterior to the posterior edge of the right ilium.
Eagle	MOWGJ	DARG 17	5EA2742	5EA2742.15	R 1st rib, complete	1	Damage to the distal end, likely caused by a bone chopper
Eagle	MOWGJ	DARG 18	5EA2742	5EA2742.16	R 12th rib, partial	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 19	5EA2742	5EA2742.17	R 14th rib, partial	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 20	5EA2742	5EA2742.18	Undeter-mined L rib, partial	1	Butchering chop breakage at both ends along the spine and near the distal margins where they articulate with the costal cartilage. Chop marks made by a stone chopper on the medial surface near the distal end.
Eagle	MOWGJ	DARG 21	5EA2742	5EA2742.19	Undeter-mined L rib, partial	1	Butchering chop breakage at both ends along the spine and nearer the distal margins where they articulated with the costal cartilage. Red hematite mineral stain, possibility of red ochre.
Eagle	MOWGJ	DARG 22	5EA2742	5EA2742.20	R ilium	1	Green bone fracture at the posterior edge and tuber coxae on the anterior of the right ilium is broken likely by a bone chopper.
Eagle	MOWGJ	DARG 23	5EA2742	5EA2742.21	R. astralagus	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 24	5EA2742	5EA2742.22	R. calcaneus	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 25	5EA2742	5EA2742.23	R. naviculo- cuboid	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 26	5EA2742	5EA2742.24	R. ecto- cuneiform	1	Manipulated during butchering process.
Eagle	MOWGJ	DARG 27	5EA2742	5EA2742.25	R. metatarsal fragment	1	Fragment of the metatarsal on the right side, measuring 8.2x4.6x2.0cm, exhibits green bone fractures and a polished distal surface. The astragalus-calcaneus-metatarsal together were often used as an expedient chopper.
Eagle	MOWGJ	DARG 28	5EA2742	5EA2742.26	Bone frags	2 to 4	Miscellaneous bone fragments; mostly cranial or pelvic. No evidence of human predation/cultural modification but were manipulated during butchering process.
Eagle (Bocco II)	MOWGJ (Bocco II)	DARG 29	5EA2872	NA	Skull	3	Non-cultural. Soils indicate Little Ice Age, Late Prehistoric era.
Eagle	MOWGJ	DARG 30	5EA2872	NA	Atlas	2	No evidence of human predation/cultural modification.
Eagle	MOWGJ	DARG 31	5EA2872	NA	C-3	3	No evidence of human predation/cultural modification.

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Eagle	MOWGJ	DARG 32	5EA2872	NA	C-4	3	No evidence of human predation/cultural modification.
Eagle (Bocco III)	MOWGJ (Bocco III)	DARG 33	5EA2944	5EA2944.s1	Partial Cranium	2	Damaged horn core and lack of mandible preclude gender ID. Sutures closed indicating mature animal. Soils indicate Little Ice Age, Late Prehistoric era.
Eagle	MOWGJ	DARG 34	5EA2944	5EA2944.s2	Partial sacrum	2	No evidence of human predation/cultural modification.
Eagle	MOWGJ	DARG 35	5EA2944	5EA2944.s3	Right humerus	2	Right humerus sans trochanter major. No evidence of human predation/cultural modification.
Eagle	MOWGJ	DARG 36	5EA2944	5EA2944.s4	Undeter-mined left rib	3	No evidence of human predation/cultural modification.
Eagle	Rancho del Rio, Private	DARG 37	NA	RDR001	Skull	2	Bison skull, majority of upper aspect sans mandible. Collected approx. 1950-1960 by Buck and Wanda Wilcox eroding out of a drainage on their ranch near Burns, CO. Presently on display in the Rio del Rancho campground office near State Bridge, CO. No evidence of human predation/cultural modification, however it is reported to have been found in association with multiple lithic artifacts including bifaces, projectile points, and a mano.
Garfield	Unkown	DARG 38	5GF2416	5GF2416.1	Skull	2	Skull recovered from Trapper Creek, Garfield City has 12x14.2cm roughly circular hole in center of foreskull with obvious bone compression at periphery aeb impact scalloping, and crushing. Cut marks on left orbit near a hole b/t two fossa. Sandstone clasts impregnated in turbinata. Mandible and nasal missing. Nearby site 5GF90 produced a bison atlas. This specimen was on Display in the Ute Museum, Montrose for many years. Repatriated in July or August of 2016 to an undisclosed location by the Northern Ute Tribe in accordance with NAGPRA regulations.
Garfield	MOWGJ	DARG 39	5GF90	NA	Atlas	Unk	Bison atlas located approximately 110m upstream from 5GF2416. Also, unconfirmed possible bison rib and rib fragment. Curated at MOW, but not viewed. Photo in site form.
Garfield	Rifle Creek Museum, Rifle	DARG 40	5GF2416	5GF2416.1	Skull	2	Mandible missing, upper teeth present. Large circular chopped hole located in the center of foreskull. Collected from Government Creek creekbed.
	Rifle Creek Museum, Rifle	DARG 41	NA	5GF A1 (T)	Skull	2	Mandible, and bilat lacrimal, nasal, incisor, and maxilla missing., Donated to the museum in 1973 by Orem and Marie Harmon, collected from Government Creek creekbed near Government road, Rifle, CO.

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	Rifle Creek Museum, Rifle	DARG 42	NA	5GF A2 (T)	Skull	2	Mandible missing, right horn core fractured. Entire specimen encrusted with dry calcite soil obscuring visual inspection for cultural modification. Collected by Neva Wilcoxon on her sheep ranch on Government Creek.
	Rifle, CO Private	DARG 43	NA	5GF PW001 (was GF A3) (T)	Skull	3	Both horn cores, frontal above nasal, and upper 1/2 of both orbits are intact. Suture fully closed indicating an adult. Mandible, maxilla, bilat lacrimal, nasal, and incisive missing. Multidirectional abrasion striations and small stone tool cut marks on frontal.
	Rifle, CO Private	DARG 44	NA	GFP W002 (was GF A5) (T)	Metacarpal	2	90% of bone surface covered with heavy impact indentations. Surface shows extensive use wear polish.
	Rifle, CO Private	DARG 45	NA	GFP W003 (was GF A4) (T)	Tibia	2	Stone tool cut marks and abraision striations on diaphysis.
Garfield	Clear Creek Private	DARG 46	5GF4046	5GF4046.1 (was FS1 (T)	Skull A	2 to 3	Bison skull crania missing nasals, mandible and all of maxilla. Both horn cores, foramen magnum, and orbits intact. Circular concave, cultural impact indentation of the right frontal. Skull is robust, with large horn cores and majority of suture closed indicating a 3 to 5 year old bull.
	Clear Creek Private	DARG 47	5GF4046	5GF4046.2 (was FS2(T)	Skull B	2	Bison skull fragment with right horn core deformity secondary to pre-mortem injury aeb bone healing. Right orbit missing as is are nasals and all below the left orbit. Skull is robust with suture not fully closed (presently open due to decay) indicating a bull approximately 3 to 5 years old.
	Clear Creek Private	DARG 48	5GF4046	5GF4046.3 (was FS3 (T)	Skull C	2	Bison crania missing the mandible and all below the upper 1/2 of the orbits. Suture closed, horn ores are relatively small likely indicating a mature female. Stone tool butchering cut marks present on the central aspect of the frontal bone.
	Clear Creek Private	DARG 49	5GF4046	5GF4046.4 (was FS4 (T)	Skull D	1	Bison crania with horn cores and foramen magnum intact. All below the upper 1/2 of the orbits is missing. The suture is near closure, the horn cores of moderate size, and the skull less than robust likely indicating a mature female.
	Clear Creek Private	DARG 50	5GF4046	5GF4046.5 (was FS5 (T)	T8 Vert	2	Stone tool butchering cut marks, multiple multidirectional striations and significant use wear polish all located on and around the spinous process. Distal end of spinous process missing.

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County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
	Clear Creek Private	DARG 51	5GF4046	5GF4046.6 (was FS6 (T))	Atlas	2	No evidence of cultural modification.
	Clear Creek Private	DARG 52	5GF4046	5GF4046.7 (was FS7 (T))	Tibia, Left	2	Complete left tibia with no evidence of cultural modification.
	Clear Creek Private	DARG 53	5GF4046	5GF4046.8 (was FS8 (T))	Horn Core Tip Frag	3	No evidence of cultural modification.
Garfield	Willow Creek	DARG 54	5GF4294	5GF4294	Left Tibia	Unk	Left Tibia distal portion. Isolated Find located in Willow Creek near Clear Creek. Green bone fracturing to remove marrow and flaking to produce a fleshing tool. Not dated. MOW unable to locate specimen at this time.
Garfield	From Reservoir Park area. Donated to DARG by USFS	DARG 55	NA	RES2001 (T)	Skull frag	3	A bison skull missing the mandible and lower maxilla frag and encrusted with live moss and lichen that obscures surface visibility. Specimen located on Forest Service property approx. 60 feet south of FDR 801 30 feet inside cutting unit 16 of the Reservoir Park Timber Sale by Todd Burton in July of 2001. It was recovered by Philip Steers August 9, 2001 and subsequently delivered to Alice Gustafson at the FSO in GWS. Andrea Brogan donated the specimen to Grand River Institute in 2/17/2016. Due to the extent of weathering and organic encrustation, no cultural modification is visible. Of interest is the altitude, 10,200 ft., at which the specimen was located.
Mesa	MOWGJ	DARG 56	5ME5997	FS#20	Scapula tool	2	Left scapula tool with stone tool cut marks near the vertebral border on both sides of the blade, use wear on the caudal border, . An irregular shaped hole in the infraspinous fossa is likely due to natural bone deterioration.
Mesa	MOWGJ	DARG 57	5ME6144	FS3b	Bone frag	2	Bison bone fragment from the feature fill of TP#1. Two unidentified bison foot bones were also found on the surface of a slope, in a packrat midden immediately east of the test units in the rockshelter.
Mesa	MOWGJ	DARG 58	5ME6144	NA	Tarsal or carpal	2	One of two: an unidentified bison foot bone (tarsal or carpal) found on the surface of a slope, in a packrat midden immediately east of the test units in the rockshelter.
Mesa	Museum of Western Colorado	DARG 59	5ME6144	NA	Tarsal or carpal	2	One of two: an unidentified bison foot bone (tarsal or carpal) found on the surface of a slope, in a packrat midden immediately east of the test units in the rockshelter.

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Mesa	GJFO BLM	DARG 60	5ME15338	NA	Femur	2	Adolescent femur and head of femur; fractured during excavation. Specimen found at the mouth of Big Dominquez Canyon by GJFO BLM staff during posthole construction for a fence. A pelvis fragment is associated. Presence of multiple stone tool butchering marks and some multidirectional striations. Also, modern parallel striations likely from handling and transport post excavation. Radiocarbon date pending.
Mesa	GJFO BLM	DARG 61	5ME15338	NA	Pelvis frag	2	Adolescent pelvic fragment; fractured during excavation. Specimen found at the mouth of Big Dominquez Canyon by GJFO BLM staff during posthole construction for a fence. A femur is associated. Radiocarbon date pending.
Mesa	Museum of Western Colorado	DARG 62	5ME901	Unknown	Bone fragment	2	Bison bone fragment (found in association with a bison mandible fragment, teeth intact) excavated from a hearth feature #1 from the Bella Site in Knowles Canyon.
Moffat	Museum of NW CO, Craig	DARG 63	NA	1964.001.108 MF A1 (T)	Skull	3	Skull fragment missing mandible, right sinus, and part of right horn core. Documented as fossilized however; is not. No evidence of human predation. Unable to remove from wall for thorough inspection. Donor: the Craig Women's Club 2.5 miles west of the Pyramid Guard Station in 1948, atop the soil in the timber at the site of an active wallow that was known to still be in use by animals in 1965. The specimen was fully buried at one time aeb impregnated alluvial clasts and soils. Unable to remove from wall for thorough inspection.
Moffat	Museum of NW CO, Craig	DARG 64	NA	1964.001.108 MF A2 (T)	Skull	2	Skull fragment consisting of upper orbits, cap and horn cores with tip of left horn core missing. Lichen on frontal prominences, calcite patina. No evidence of human predation. Unable to remove from wall for thorough inspection. Donor: the Craig Women's Club 2.5 miles west of the Pyramid Guard Station in 1948.
Moffat	Museum of NW CO, Craig	DARG 65	NA	2004.34 MF A3 (T)	Metacarpal	3	Found on Baker's Peak, north of Craig, CO on the Alberta and Chuck Mack ranch property. Stone tool cut mark, abrasions, and chop mark. Unable to examine thoroughly as curator unable to remove from case. Specimen card states between 4,000 and 6,500 years old however; the validity and source of testing is unknown.

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Moffat	Wyman Museum	DARG 66	5MF4314	5MF4314.1 was WYM001(T)	Bison priscus Skull frag	4	Bison priscus crania consisting of partial frontal, top 1/2 of orbits, occiput, and foramen magnum, left horn core and right partial core. No visible cultural modification. Specimen located on a gravel bar in the Yampa river. Specimen was stabilized with Ambroide thinned with acetone. Unsure regarding effect on radiocarbon dating.
Moffat	Wyman Museum	DARG 67	NA	WYM002(T)	Bison skull frag	3	Bison skull fragment consisting of the cap from the upper orbits to and including the foramen magnum. Faint circular red ring stain on the frontal between the orbits and above the sinus enhanced with ultraviolet light, suggestive of intentionally applied pigment.
Moffat	Wyman Museum	DARG 68	NA	WYM003(T)	Horn cap	3	Deteriorated bison horn cap
Moffat	Wyman Museum	DARG 69	NA	WYM004(T)	Horn cap	3	Deteriorated bison horn cap
Moffat	Wyman Museum	DARG 70	NA	WYM005(T)	Horn cap	3	Deteriorated bison horn cap
Moffat	Wyman Museum	DARG 71	NA	WYM006(T)	Horn cap	3	Deteriorated bison horn cap
Moffat	Wyman Museum	DARG 72	NA	WYM007(T)	Horn cap	3	Deteriorated bison horn cap
Moffat	Wyman Museum	DARG 73	NA	WYM008(T)	Tibia	1	Bison tibia with extensive stone tool cut marks and multiple fine, multidirectional abrasion striation marks, use wear polish, and impact crushing at the proximal end. The Archaic projectile point base inserted into the midsection of the bone and secured with a fixative was done by the collector in the late 1990s. It is likely the bone collagen sample was inadvertently contaminated by the fixative as the resultant date of Cal 1990 - 1995 AD conflicts with the evidence of prehistoric cultural modification. Due to this unfortunate incident the radiocarbon date is discarded.
Moffat	MOWGJ	DARG 74	5MF969	ASS1	Left Femur	2 to 3	A left femur of an adult, likely cow, bison with abnormality of the head of the femur and shaft indicative of a pre-mortem injury. Possible butchering marks are obscured by weathering and the abnormality.

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Moffat	MOWGJ	DARG 75	5MF969	ASS2	Left Humerus	2	A left humerus with stone tool cut marks as exhibited by oblique striations with angled faceting, a spiral fracture in the mid-section of the bone vs the distal ends, and impact indentations.
Moffat	MOWGJ	DARG 76	5MF969	ASS3	Thoracic vertebrae	2 to 3	A thoracic vertebrae missing the upper aspect of the spinous process. No evidence of cultural modification however the specimen was located in close proximity to the other bison bone on the site.
Moffat	MOWGJ	DARG 77	5MF969	ASS5	Bison tooth	3	A single unidentified bison tooth located in the same bag containing the ASS3 spinous process bone fragments collected in 1981 by Joe Ben Wheat. No cultural modification.
Moffat	Unknown	DARG 78	5MF4314	5MF4314.2	Mandible	Unk	Bison mandible fragment with some teeth (not presently available for assessment) recovered one year later from the same location as 5MF4314.1.
Moffat	Museum of the West (MOWGJ), Grand Jct.	DARG 79	5MF625	5MF625.18	Scapula	2	Scapula with the central area possibly chopped out and multiple multidirectional stone tool cut marks on the blade, periphery, and edges. This specimen was found in one of two eroded sinkholes in blocky, eroding Holocene soils of a small isolated butte or hill. Both sinkholes contained layers of bison bone elements, crania, and bone fragments, charcoal, and unburned wood. Also collected at the base of these sinkholes were at least 14 Lusk and Humbolt type Paleoindian and Early Archaic lanceolate atlatl dart points.

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Moffat	Vermillion Bluffs Bison Trap (VBBT) Previously at Sundance Research Institute Museum	DARG 80	5MF4313	Unk	Skull	2	This specimen was collected by a citizen and on display in the 1980s at the Sundance Research Institute Museum. It was donated to the Museum of NW Colo. in late 2016. Specimen has been stabilized with Ambroide thinned with acetone. It is a bison crania with a broken right horn core, and tip of left horn core broken but with specimen. Maxilla intact, missing: mandible, and nasals. All teeth present excepting right molar removed for testing. Light to moderate wear on teeth. Possible 1.2cm diameter impact indentation to left frontal. Possible cut marks on right frontal but obscured by Ambriolide fixative. A total of 47 bison bones were excavated from the Vermillion Bluffs Bison Trap site from two sinkholes or pockets of blocky, eroding Holocene soils. Bison bones are evident throughout the site. The specimens were initially curated at the Sundance Institute Museum in Craig, CO. At this time it is suspected that the bones are curated at the Museum of the West as a single unlabeled box of bison faunal elements housed at the facility may match some of the following specimens. The remaining curated specimens have not yet been located and a number of the ribs and other bones may have been disposed of.
Moffat	VBBT	DARG 81	5MF4313	5MF4313-ASS1	Skull frag	Unk	Possible skull fragment
Moffat	VBBT	DARG 82	5MF4313	NA	Tooth enamel and	Unk	A small fragment of tooth enamel with no cultural modification. A culturally modified rib fragment tool has the same accession number (5MF4313-ASS1).
Moffat	VBBT	DARG 83	5MF4313	5MF4313-ASS2	Rib fragment tool	Unk	Expedient bone butchering tool made from right rib, distal end shaped, end rounded and use wear polish evident. A fragment of tooth enamel has the same accession number (5MF4313-ASS1).
Moffat	VBBT	DARG 84	5MF4313	5MF4313-ASS3	Cervical vertebrae	Unk	Undetermined cervical vertebra
Moffat	VBBT	DARG 85	5MF4313	5MF4313-ASS4	vertebra	Unk	Undetermined vertebra
Moffat	VBBT	DARG 86	5MF4313	5MF4313-ASS5	Thoracic vertebrae	Unk	Undetermined thoracic vertebra
Moffat	VBBT	DARG 87	5MF4313	5MF4313-ASS6	Rib	Unk	Undetermined rib.

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Moffat	VBBT	DARG 88	5MF4313	5MF4313-ASS7	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 89	5MF4313	5MF4313-ASS8	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 90	5MF4313	5MF4313-ASS9	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 91	5MF4313	5MF4313- ASS10	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 92	5MF4313	5MF4313- ASS11	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 93	5MF4313	5MF4313- ASS12	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 94	5MF4313	5MF4313- ASS13	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 95	5MF4313	5MF4313- ASS14	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 96	5MF4313	5MF4313- ASS15	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 97	5MF4313	5MF4313- ASS16	Left rib	Unk	Left rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 98	5MF4313	5MF4313- ASS17	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 99	5MF4313	5MF4313- ASS18	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 100	5MF4313	5MF4313- ASS19	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 101	5MF4313	5MF4313- ASS20	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 102	5MF4313	5MF4313- ASS21	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 103	5MF4313	5MF4313- ASS22	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 104	5MF4313	5MF4313- ASS23	Right rib	Unk	Right rib collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 105	5MF4313	5MF4313- ASS24	Right rib fragment	Unk	Right rib fragment collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 106	5MF4313	5MF4313- ASS25	Right rib fragment	Unk	Right rib fragment collected from the southwest sinkhole at the kill site.

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Moffat	VBBT	DARG 107	5MF4313	5MF4313- ASS26	Rib fragment	Unk	Undetermined rib fragment collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 108	5MF4313	5MF4313- ASS27	Rib fragment	Unk	Undetermined rib fragment collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 109	5MF4313	5MF4313- ASS28	Manubrium	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 110	5MF4313	5MF4313- ASS29	Xiphoid process	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 111	5MF4313	5MF4313- ASS30	Lumbar vertebrae	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 112	5MF4313	5MF4313- ASS31	Lumbar vertebrae	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 113	5MF4313	5MF4313- ASS32	Lumbar vertebrae	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 114	5MF4313	5MF4313- ASS33	Lumbar vertebrae	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 115	5MF4313	5MF4313- ASS34	Sacrum	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 116	5MF4313	5MF4313- ASS35	Caudal vertebrae	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 117	5MF4313	5MF4313- ASS36	Right ulna fragment	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 118	5MF4313	5MF4313- ASS37	Right tibia	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 119	5MF4313	5MF4313- ASS38	Left ulna	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 120	5MF4313	5MF4313- ASS39	Radius	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 121	5MF4313	5MF4313- ASS40	Radius	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 123	5MF4313	5MF4313- ASS42	Metacarpal	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 124	5MF4313	5MF4313- ASS43	Innominate	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 125	5MF4313	5MF4313- ASS44	Innominate	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 126	5MF4313	5MF4313- ASS45	Tibia	Unk	Undetermined tibia

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Moffat	VBBT	DARG 127	5MF4313	5MF4313-ASS46	Calcaneus	Unk	Collected from the southwest sinkhole at the kill site.
Moffat	VBBT	DARG 128	5MF4313	5MF4313-ASS47	Metatarsal	Unk	Collected from the southwest sinkhole at the kill site.
Montrose	Montrose County Historical Museum	DARG 129	NA	5M001 Museum #:175	Skull	3	Deteriorated partial cranium missing horn cores, majority of frontal, and all of mandible, maxilla. Foramen magnum intact. Orifices are impacted with clayey silt, sulfites, and grey Mancos shale. No cultural modification visible. This and the next two specimens all have the same museum curation number, #175, indicating the 175th person to make a donation. Originally collected from a roadcut 8ft deep, in 1962 by a DOT employee approx. 5 miles south of Meeker, CO. on Hwy
Montrose	Montrose County Historical Museum	DARG 130	NA	5M002 Museum #175	Skull	2	Partial cranium with both horn cores and foramen magnum and upper aspect of frontal and orbits intact. No nasal, maxilla, mandible, or teeth. No cultural modification visible. Originally collected from a roadcut 8ft deep, in 1962 by a DOT employee approx. 5 miles south of Meeker, CO.
Montrose	Montrose County Historical Museum	DARG 131	NA	5M003 Museum #175	Left scapula	2	Lengthwise cracks possibly secondary to use as a scraper or scoop but no other cultural modification, such as use wear polish, is present to support this. Originally collected from a roadcut 8ft deep, in 1962 by a DOT employee approx. 5 miles south of Meeker, CO.
Montrose	Montrose City Hall	DARG 231	5MN7595	None	Metatarsal	1	Well preserved complete left metatarsal with mineral stains, parallel striations and stone tool cut marks on the diaphysis. Originally recovered from the Iron Mike Artesian Spring in downtown Montrose, Colorado during construction in 1995, the specimens were examined by R. Rood. The present curation location of DARG 231 and DARG 234 through DARG 248 is unknown.
Montrose	Unk	DARG 232	5MN7595	None	Metatarsal	Unk	Not available for analysis
Montrose	Montrose City Hall	DARG233	5MN7595	None	Metacarpal	1	A well preserved, complete left metacarpal with overall mineral staining secondary to exposure to iron oxide leaching into surrounding soils from Iron Mike Spring. Although having no cultural modification, the specimen was found in association with DARG 231 .
Montrose	Unk	DARG 234	5MN7595	None	Metacarpal	Unk	Not available for analysis
Montrose	Unk	DARG 235	5MN7595	None	1st Phalange	Unk	Not available for analysis
Montrose	Unk	DARG 236	5MN7595	None	1st Phalange	Unk	Not available for analysis
Montrose	Unk	DARG 237	5MN7595	None	1st Phalange	Unk	Not available for analysis

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Montrose	Unk	DARG 238	5MN7595	None	2nd Phalange	Unk	Not available for analysis
Montrose	Unk	DARG 239	5MN7595	None	3rd Phalange	Unk	Not available for analysis
Montrose	Unk	DARG 240	5MN7595	None	3rd Phalange	Unk	Not available for analysis
Montrose	Unk	DARG 241	5MN7595	None	3rd Phalange	Unk	Not available for analysis
Montrose	Unk	DARG 242	5MN7595	None	Sesamoid	Unk	Not available for analysis
Montrose	Unk	DARG 243	5MN7595	None	Sesamoid	Unk	Not available for analysis
Montrose	Unk	DARG 244	5MN7595	None	Sesamoid	Unk	Not available for analysis
Montrose	Unk	DARG245	5MN7595	None	Sesamoid	Unk	Not available for analysis
Montrose	Unk	DARG246	5MN7595	None	Sesamoid	Unk	Not available for analysis
Montrose	Unk	DARG247	5MN7595	None	Sesamoid	Unk	Not available for analysis
Montrose	Unk	DARG 248	5MN7595	None	Sesamoid	Unk	Not available for analysis
Rio Blanco	Museum of the West, Grand Jct.	DARG 132	5RB3157	Unk	Bone fragment	2	Bison bone recovered from the Kuck Shelter near East Douglass Creek between East Dry Lake Canyon and Bowman Canyon. Radiocarbon date obtained.
Rio Blanco	White River Museum, Meeker	DARG 133	NA	1958.008.001 RB A001 (T)	Skull	2	Skull fragment with no cultural modification. Missing all below orbits, no teeth. Attached tag states: Summer of 1958 by James Swarts 1958 from East Miller Creek between the Miller Creek. Cow Camp and the narrow part of the drainage to the SE. No cultural modification.
Rio Blanco	White River Museum, Meeker	DARG 134	NA	RB A002 (T)	Skull	2	Crania with both horn cores, foramen magnum, frontal, orbits, part of maxilla. Missing nasals and mandible. Found by Ralph Rector at the mouth of Miller Creek near Meeker, CO after high water. Possible chopping of the occipital processes.
Rio Blanco	White River Museum, Meeker	DARG 135	NA	RB A003 (T)	Skull	2	Skull fragment with a 9.7cm x 10.5cm circular craniotomy resultant from intentional impact and crushing to open the cranium to remove brain matter. Possible multiple cut marks on foreskull. Both horn cores, frontal, orbits, and partial upper part of maxilla intact. Teeth present include upper 2 molars on right and 3 on the left. Nasals and mandible missing. Skull located on Flag Creek by a local family and donated to the Meeker museum.
Rio Blanco	White River Museum, Meeker	DARG 136	NA	RB A004 (T)	Skull	2	Crania with right horn core intact, tip of left missing, orbits intact as is frontal. Nasals, maxilla and mandible missing. Moss present on right frontal above orbit. No cultural modification.

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Rio Blanco	White River Museum, Meeker	DARG 137	NA	RB A005 (T)	Skull	2	Crania with horn cores intact, all missing below top of orbits excepting some of upper turbinate. Multiple 2 to 3cm diameter holes on frontal likely secondary to abrasive erosion of bone. No cultural modification.
Rio Blanco	White River Museum, Meeker	DARG 138	NA	RB A006 (T)	Skull	2	Crania with horn cores intact, right horn core tip missing. All below top 1/2 of orbits is missing.
Rio Blanco	White River Museum, Meeker	DARG 139	NA	RB A007 (T)	Skull	2	Bison Priscus partial cranium with horn cores, the left horn core tip being fx. This specimen has been painted with a heavy, silver metallic based industrial paint on the frontal surface. At some point after collection the entire specimen was exposed to high heat (burnt), including the paint. An attached tag states: "Brought in by Cuppy Sanderson". Per museum staff this was local resident Cuthbert Sanderson and the specimen was likely donated approx. 1956. Anon LDS local rancher, who knew Cuppy, states it was found at mouth of Four Mile Gulch and Sulphur Creek, NE of Meeker, CO. Permission for sampling denied at this time.
Rio Blanco	White River Museum, Meeker	DARG 140	NA	RBA008	Humerus	2	Large, 45.4cm long, right humerus with stone tool cut marks, multidirectional striations, and use wear polish. Donated approx. 1956 by Cuppy Sanderson who collected from mouth of Four Mile Gulch and Sulphur Creek, NE of Meeker, CO. Permission for sampling denied at this time.
Rio Blanco	White River Museum, Meeker	DARG 141	NA	RBA009	horn cap frag	2	Highly weathered bison horn cap fragment. Unable to determine side.
Rio Blanco	White River Museum, Meeker	DARG 142	NA	RBA010	patella?	2	Patella or cuboid frag. Donated approx. 1956 by Cuppy Sanderson who collected from mouth of Four Mile Gulch and Sulphur Creek, NE of Meeker, CO. Permission for sampling denied at this time. No visible modification, unable to extract from showcase.

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Rio Blanco	Little Snake BLM Field Office	DARG 143	5RB8600	5RB8600	Skull	2	Bison skull fragment with cut marks and circular incision on forehead (for brain extraction), collected from Brushy Creek in the Piceance Basin by a contracted biologist and delivered to Sara McDonald, an archaeologist at the White River BLM Field Office in Meeker.
Rio Blanco	Museum of the West (MOWGJ), Grand Jct.	DARG 144	5RB6795	5RB6795.5	Femur	2	Right, distal aspect w/ partial shaft
Rio Blanco	MOWGJ	DARG 145	5RB6795	5RB6795.3	Humerus	2	Left, proximal end
Rio Blanco	MOWGJ	DARG 146	5RB6795	5RB6795.4	Ischium	2	Right, partial
Rio Blanco	MOWGJ	DARG 147	5RB6795	5RB6795.2	Maxilla	2	Right w/ partial right nasal and palate, 3 molars, 2 pre-molars
Rio Blanco	MOWGJ	DARG 148	5RB6795	5RB6795.7	Rib	2	Right fragment
Rio Blanco	MOWGJ	DARG 149	5RB6795	5RB6795.8	Rib	2	Right fragment
Rio Blanco	MOWGJ	DARG 150	5RB6795	5RB6795.9	Rib fragments	2	4 undetermined rib fragments
Rio Blanco	MOWGJ	DARG 151	5RB6795	5RB6795.1	Skull	2	Upper portion
Rio Blanco	MOWGJ	DARG 152	5RB6795	5RB6795.6	Thoracic vertebrae	2	T2-T13 has congenital defect of neural arch
Rio Blanco	MOWGJ	DARG 153	None	NA	2 Cervical Vertebrae	0	C3-C6
Rio Blanco	MOWGJ	DARG 154	None	NA	Radial carpal	1 to 2	Right
Rio Blanco	MOWGJ	DARG 155	None	NA	Metatarsal	2	Right proximal fragment
Rio Blanco	MOWGJ	DARG 156	None	NA	Metatarsal	2	Right
Rio Blanco	MOWGJ	DARG 157	5RB6798	5RB6798.23	Calcaneus	1 to 2	Left
Rio Blanco	MOWGJ	DARG 158	5RB6798	5RB6798.17	Caudal vertebrae	0 to 2	Congenital defect in bone aeb incomplete neural arch.
Rio Blanco	MOWGJ	DARG 159	5RB6798	5RB6798.18	Caudal vertebrae	0 to 2	Unknown caudal
Rio Blanco	MOWGJ	DARG 160	5RB6798	5RB6798.2	Cervical vertebrae	2	C5
Rio Blanco	MOWGJ	DARG 161	5RB6798	5RB6798.3	Cervical vertebrae	2	C7
Rio Blanco	MOWGJ	DARG 162	5RB6798	5RB6798.21	Femur	0 to 2	Left
Rio Blanco	MOWGJ	DARG 163	5RB6798	5RB6798.16	Femur	2	Right proximal end
Rio Blanco	MOWGJ	DARG 164	5RB6798	5RB6798.13	Humerus	2	Left distal end and partial shaft

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Rio Blanco	MOWGJ	DARG 165	5RB6798	5RB6798.12	Humerus	2 to 3	Right distal end and partial shaft, conchoidal fracture
Rio Blanco	MOWGJ	DARG 166	5RB6798	5RB6798.11	Ischium	4	Left and fragments
Rio Blanco	MOWGJ	DARG 167	5RB6798	5RB6798.27	Lumbar vertebrae	2	Adolescent, central
Rio Blanco	MOWGJ	DARG 168	5RB6798	5RB6798.4	Lumbar vertebrae	2	L2-L4
Rio Blanco	MOWGJ	DARG 169	5RB6798	5RB6798.15	Metacarpal	2	Left distal end
Rio Blanco	MOWGJ	DARG 170	5RB6798	5RB6798.24	Metatarsal	2	Left
Rio Blanco	MOWGJ	DARG 171	5RB6798	5RB6798.20	Patella	0	Right
Rio Blanco	MOWGJ	DARG 172	5RB6798	5RB6798.1	Pre-molar and 2 lower roots	2 to 3	Significant wear
Rio Blanco	MOWGJ	DARG 173	5RB6798	5RB6798.6	Rib fleshing tool	1	Right proximal, modified and shaped as an expedient fleshing tool. Use wear polish, rounding of the tip, and oblique and multidirectional striations are visible.
Rio Blanco	MOWGJ	DARG 174	5RB6798	5RB6798.9	Rib	0 to 3	Left fragment with partial shaft
Rio Blanco	MOWGJ	DARG 175	5RB6798	5RB6798.5	Rib	0 to 2	Right, frontal missing distal end
Rio Blanco	MOWGJ	DARG 176	5RB6798	5RB6798.7	Rib	2	Right, proximal frontal fragment modified as an expedient fleshing tool
Rio Blanco	MOWGJ	DARG 177	5RB6798	5RB6798.8	Rib	2	Shaft fragment
Rio Blanco	MOWGJ	DARG 178	5RB6798	5RB6798.14	Scapula	0 to 2	Right
Rio Blanco	MOWGJ	DARG 179	5RB6798	5RB6798.28	Thoracic vertebrae	0 to 2	Adolescent, central
Rio Blanco	MOWGJ	DARG 180	5RB6798	5RB6798.25	Thoracic vertebrae	1 to 4	Adolescent, anterior
Rio Blanco	MOWGJ	DARG 181	5RB6798	5RB6798.26	Thoracic vertebrae	0 to 2	Adolescent, anterior
Rio Blanco	MOWGJ	DARG 182	5RB6798	5RB6798.29	Thoracic vertebrae	2	Adolescent, posterior
Rio Blanco	MOWGJ	DARG 183	5RB6798	5RB6798.22	Tibia	1 to 3	Left proximal half
Rio Blanco	MOWGJ	DARG 184	5RB6798	5RB6798.19	Tibia	0 to 3	Right
Rio Blanco	MOWGJ	DARG 185	5RB6798	5RB6798.10	True rib	2	Left, proximal
Rio Blanco	MOWGJ	DARG 186	None	None	Tibia	2	Left, distal fragment
Rio Blanco	MOWGJ	DARG 187	5RB6807	5RB6807.1	Tibia	2	Right, proximal end w/ shaft. Broken during pipeline construction by backhoe.
Rio Blanco	MOWGJ	DARG 188	None	NA	Vertebrae	2 to 3	Neural spine fragment

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Rio Blanco	MOWGJ	DARG 189	None	NA	Tibia	2 to 4	Right, proximal fragment
Rio Blanco	MOWGJ	DARG 190	None	NA	Scapula	0 to 1	Adolescent, proximal blade fragment
Rio Blanco	MOWGJ	DARG 191	5RB6800	5RB6800.4	Lumbar vertebrae	2	L6
Rio Blanco	MOWGJ	DARG 192	5RB6800	5RB6800.2	Orbital	1	Right, partial, frontal, upper fragment
Rio Blanco	MOWGJ	DARG 193	5RB6800	5RB6800.5	Sacrum	1	Found articulated with 5RB6800.4
Rio Blanco	MOWGJ	DARG 194	5RB6800	5RB6800.1	Scapula	2	Right, proximal glenoid fragment and separated lateral dorsal fragment
Rio Blanco	MOWGJ	DARG 195	5RB6800	5RB6800.3	Thoracic vertebrae	2	T14
Rio Blanco	MOWGJ	DARG 196	5RB6800	5RB6800	Rib	3	Fragment
Rio Blanco	MOWGJ	DARG 197	5RB6800	5RB6800	Pelvis fragments	1 to 2	3 fragments
Rio Blanco	MOWGJ	DARG 198	5RB6799	5RB6799.4	Neural spine	2	Possibly thoracic
Rio Blanco	MOWGJ	DARG 199	5RB6799	5RB6799.1	Rib	2	Right, proximal fragment
Rio Blanco	MOWGJ	DARG 200	5RB6799	5RB6799.2	Rib	2	Right, proximal fragment
Rio Blanco	MOWGJ	DARG 201	5RB6799	5RB6799.3	Rib	2	Shaft fragment
Rio Blanco	MOWGJ	DARG 202	5RB6799	5RB6799.5	Thoracic vertebrae	2	Unknown thoracic
Rio Blanco	MOWGJ	DARG 203	5RB6799	5RB6799.6	Thoracic vertebrae	2	Unknown thoracic
Rio Blanco	MOWGJ	DARG 204	5RB6799	5RB6799.7	Thoracic vertebrae	2	Unknown thoracic
Rio Blanco	MOWGJ	DARG 205	5RB6799	5RB6799.8	Thoracic vertebrae	2	Unknown thoracic
Rio Blanco	MOWGJ	DARG 206	5RB6801	5RB6801.1	Pelvis	2	Right acetabulum
Rio Blanco	MOWGJ	DARG 207	5RB6809	5RB6809.1	Metacarpal	2	Left metacarpal with butchering chop mark.
Rio Blanco	MOWGJ	DARG 208	5RB6802	5RB6802.1	Skull	1 to 2	Possible maul blow indentation to frontal
Rio Blanco	MOWGJ	DARG 209	5RB6803	5RB6803.1	Humerus	1	Right, modified as a flesher
Rio Blanco	MOWGJ	DARG 210	5RB6804	5RB6804.1	Humerus	1	Right
Rio Blanco	MOWGJ	DARG 211	5RB6804	5RB6804.2	Tibia	1	Right
Rio Blanco	MOWGJ	DARG 212	5RB6805	5RB6805.3	Axis	1 to 3	Anterior ventral fragment
Rio Blanco	MOWGJ	DARG 213	5RB6805	5RB6805.1	Metacarpal	1 to 3	Right
Rio Blanco	MOWGJ	DARG 214	5RB6805	5RB6805.2	Rib	1 to 3	Fragment
Rio Blanco	MOWGJ	DARG 215	5RB6797	5RB6797.1	Lumbar vertebrae	2	Adolescent

Western Colorado Bison Project. Appendix C: COMMENTS AND WEATHERING STAGES							
County	Curated	DARG #	Site #	Accession # (T=Temporary)	Element	Weathering stage*	Comments
Rio Blanco	MOWGJ	DARG 216	5RB6797	5RB6797.2	Pelvis	2	Adolescent
Rio Blanco	MOWGJ	DARG 217	5RB6797	5RB6797.3	Radius and ulna	2	Adolescent
Rio Blanco	MOWGJ	DARG 218	None	NA	Cervical vertebrae	2	No cultural modification
Rio Blanco	MOWGJ	DARG 219	5RB6796	5RB6796.7	Humerus	1 to 2	Left distal aspect and partial shaft
Rio Blanco	MOWGJ	DARG 220	5RB6796	5RB6796.1	Metacarpal	2	Left
Rio Blanco	MOWGJ	DARG 221	5RB6796	5RB6796.2	Pelvis	2	Left, fragment w/ acetabulum
Rio Blanco	MOWGJ	DARG 222	5RB6796	5RB6796.3	Lumbar vertebrae	1 to 2	Old and fresh breakage
Rio Blanco	MOWGJ	DARG 223	5RB6796	5RB6796.5	Radius and ulna	1 to 2	Left
Rio Blanco	MOWGJ	DARG 224	5RB6796	5RB6796.4	Thoracic vertebrae	1 to 3	No modification
Rio Blanco	MOWGJ	DARG 225	None	NA	Rib fragments-4	2	Four undetermined non-culturally modified rib fragments
Rio Blanco	MOWGJ	DARG 226	None	NA	Metacarpal	2 to 3	Left
Rio Blanco	MOWGJ	DARG 227	None	NA	Long bone	1 to 2	Shaft fragment (may be a piece of 865.1)
Rio Blanco	MOWGJ	DARG 228	None	NA	Radius	1 to 2	Fragment, calcified
Rio Blanco	MOWGJ	DARG 229	None	NA	Metatarsal	2	Right
Rio Blanco	MOWGJ	DARG 230	None	NA	Metatarsal	2	Right

***Weathering stages as categorized by Behrensmeyer, A. K. 1978, Taphonomic and Ecologic Information from Bone Weathering**

0-No cracking or flaking on bone surface

1-Longitudinal and/or mosaic cracking present on bone surface

2-Longitudinal cracks, exfoliation of bone surface

3-Fibrous texture, extensive exfoliation, weathering penetrates 1-1.5 mm into bone

4-Coarsely fibrous texture, splinters of bone loose on the surface, open cracks

5-Bone crumbling in situ, large splinters of bone

APPENDIX D: Radiometric Data

Western Colorado Bison Project. Appendix D: RADIOMETRIC DATA						
County	DARG #	Site #	FS # or Accession # (T)=Temporary	Element	Conventional Age	Calibrated Age
Delta	DARG 1	NA	90.67.1 or D002(T)	Crania fragment	460±40 BP	Cal 1400 - 1500 AD (93.4%) Cal 1600 - 1620 AD (2.0%)
Eagle (Bocco I)	DARG 3	5EA2742	5EA2742.1	Crania frag	1830±40	Cal 1700 - 1720 AD Cal 1820 - 1920 AD
Eagle (Bocco III)	DARG 33	5EA2944	5EA2944.s1	Skull	350±30	Cal 1458 - 1635 AD
Garfield	DARG 38	5GF2416	5GF2416.1	Skull	400±30	Cal 1440 - 1520 AD (76.4%) Cal 1570 - 1620 AD (19.0%)
Garfield	DARG 43	N/A	5GF PW001 (T) (was GF A3)	Skull	80±20 BP	Cal 1690 - 1730 AD (24.8%) Cal 1810 - 1920 AD (70.6%)
Garfield	DARG 44	N/A	GFP W002 (T) (was GF A5)	Metacarpal	140±30 BP	Cal 1670 - 1780 AD (43.1%) Cal 1800 - 1890 AD (36.8%) Cal 1910 - 1945 AD (15.5%)
Garfield	DARG 45	N/A	GFP W003 (T) (was GF A4)	Tibia	130±30 BP	Cal 1670 - 1780 AD (38.1%) Cal 1800 - 1890 AD (42.4%) Cal 1900 - 1940 AD (14.9%)
Garfield	DARG 46	5GF4046	5GF4046.1 (was FS1)	Skull A	260±40 BP	Cal 1510 - 1800 AD
Garfield	DARG 47	5GF4046	5GF4046.2 (was FS2)	Skull B	260±40 BP	Cal 1510 - 1800 AD
Garfield	DARG 48	5GF4046	5GF4046.3 (was FS3)	Skull C	290±40 BP	Cal 1490 - 1660 AD
Garfield	DARG 49	5GF4046	5GF4046.4 (was FS4)	Skull D	300±40 BP	Cal 1480 - 1660 AD
Garfield	DARG 50	5GF4046	5GF4046.5 (was FS5)	T8 Vert	300±40 BP	Cal 1480 - 1660 AD
Garfield	DARG 55	N/A	RES2001 (T)	Skull frag	390±40 BP	Cal 1440 - 1530AD (60.8%) Cal 1540 - 1630AD (34.6%)
Mesa	DARG 56	5ME5997	FS12	Charcoal associated with FS20: bison scapula	510±70 (charcoal from TP 5; Feature 2)	Cal 1410 AD
Mesa	DARG 62	5ME901	Unknown	Bone fragment	980±40	Cal 1069 AD
Moffat	DARG 66	5MF4314	WYM001(T)	Bison Priscus Skull frag	11700±90	11790-11410 BC
Moffat	DARG 73	NA	WYM008(T)	Tibia	1.1360±0.0060 F14C Date discarded due to modern unknown fixative contamination	Cal 1990 - 1995 AD Date discarded due to modern unknown fixative contamination
Moffat	DARG 94	5MF4313	5MF4313-ASS13	Left Rib	Not indicated	Cal 1020 -1295 AD

Western Colorado Bison Project. Appendix D: RADIOMETRIC DATA						
County	DARG #	Site #	FS # or Accession # (T)=Temporary	Element	Conventional Age	Calibrated Age
Moffat	DARG 118	5MF4313	5MF4313-ASS37	Right Tibia	800±80 AD	Cal 775 -1015 AD
Montrose	DARG 235	5MN7595	NA	unidentified phalange	1823±123	Cal 1720-1966 AD
Rio Blanco	DARG 132	5RB3157	NA	Bison bone fragment	1020±50	Cal 856-983 AD
Rio Blanco	DARG 249	N/A	ARB0011.1 (T)	Skull	740 ±40 BP	Cal 1220 - 1300 AD
Rio Blanco	DARG 135	NA	RB A003 (T)	Skull	210±30 BP	Cal 1640 - 1680 AD (29.6%) Cal 1730 - 1800 AD (48.5%) Cal 1930.....(17.3%)
Rio Blanco	DARG 143	5RB8600	5RB8600	Skull	640±30 BP	Cal 1280 - 1330 AD (41.0%) Cal 1340 - 1400 AD (54.4%)
Rio Blanco EPCO Project, Piceance Basin	DARG 145	5RB6795	5RB6795.3	L. Humerus	240±30 BP	Cal AD 1640 to 1670 Cal AD 1780 to 1800 Cal AD 1950 to post-1950
Rio Blanco EPCO Project, Piceance Basin	DARG 162	5RB6798	5RB6798.21	L. Femur	850±30 BP	Cal AD 1160 to 1220
Rio Blanco EPCO Project, Piceance Basin	DARG 193	5RB6800	5RB6800.5	Sacrum	910±30 BP	Cal AD 1030 to 1210
Rio Blanco EPCO Project, Piceance Basin	DARG 202	5RB6799	5RB6799.5	Thoracic vertebrae	120±30 BP	Cal AD 1670 to 1780 Cal AD 1800 to 1940 Cal AD post-1950
Rio Blanco EPCO Project, Piceance Basin	DARG 206	5RB6801	5RB6801.1	Pelvis	400±30 BP	Cal AD 1440 to 1520 Cal AD 1590 to 1620
Rio Blanco EPCO Project, Piceance Basin	DARG 208	5RB6802	5RB6802.1	Skull	130±30 BP	Cal AD 1670 to 1780 Cal AD 1800 to 1900 Cal AD 1900 to 1940 Cal AD 1950 to post-1950

Western Colorado Bison Project. Appendix D: RADIOMETRIC DATA						
County	DARG #	Site #	FS # or Accession # (T)=Temporary	Element	Conventional Age	Calibrated Age
Rio Blanco EPCO Project, Piceance Basin	DARG 209	5RB6803	5RB6803.1	Humerus	270±30 BP	Cal AD 1520 to 1570 Cal AD 1590 to 1590 Cal AD 1630 to 1670 Cal AD 1780 to 1800 Cal AD 1950 to 1950
Rio Blanco EPCO Project, Piceance Basin	DARG 211	5RB6804	5RB6804.2	Tibia	380±30 BP	Cal AD 1440 to 1520 Cal AD 1560 to 1630
Rio Blanco EPCO Project, Piceance Basin	DARG 212	5RB6805	5RB6805.3	Axis	180±30 BP	Cal AD 1440 to 1520 Cal AD 1560 to 1630
Rio Blanco EPCO Project, Piceance Basin	DARG 216	5RB6797	5RB6797.2	Pelvis	350±30 BP	Cal AD 1450 to 1640
Rio Blanco EPCO Project, Piceance Basin	DARG 219	5RB6796	5RB6796.7	Humerus	320±30 BP	Cal AD 1470 to 1650

APPENDIX E: Specimens With Known UTM's
(Privileged Data - Available OAHP copy only)

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 1	NA	(90.67.1) D002(T)	Skull	0.5K radius of:	12	753091	4323606
DARG 2	NA	D001(T)	Skull	Within a 5K radius of:	12	727022	4279229
DARG 3	5EA2742	5EA2742.1	Skull	NA	13	354241	4399850
DARG 4	5EA2742	5EA2742.2	Mandible (L&R)	NA	13	354241	4399850
DARG 5	5EA2742	5EA2742.3	atlas (C1 vertebra)	NA	13	354241	4399850
DARG 6	5EA2742	5EA2742.4	vertebra, T10	NA	13	354241	4399850
DARG 7	5EA2742	5EA2742.5	vertebra, T11	NA	13	354241	4399850
DARG 8	5EA2742	5EA2742.6	vertebra, T12	NA	13	354241	4399850
DARG 9	5EA2742	5EA2742.7	vertebra, T13	NA	13	354241	4399850
DARG 10	5EA2742	5EA2742.8	vertebra, T14	NA	13	354241	4399850
DARG 11	5EA2742	5EA2742.9	vertebra, L1	NA	13	354241	4399850
DARG 12	5EA2742	5EA2742.10	vertebra, L2	NA	13	354241	4399850
DARG 13	5EA2742	5EA2742.11	vertebra, L3	NA	13	354241	4399850
DARG 14	5EA2742	5EA2742.12	vertebra, L4	NA	13	354241	4399850
DARG 15	5EA2742	5EA2742.13	vertebra, L5	NA	13	354241	4399850
DARG 16	5EA2742	5EA2742.14	partial sacrum	NA	13	354241	4399850
DARG 17	5EA2742	5EA2742.15	R 1st rib, complete	NA	13	354241	4399850
DARG 18	5EA2742	5EA2742.16	R 12th rib, partial	NA	13	354241	4399850
DARG 19	5EA2742	5EA2742.17	R 14th rib, partial	NA	13	354241	4399850
DARG 20	5EA2742	5EA2742.18	undetermined L rib, partial	NA	13	354241	4399850
DARG 21	5EA2742	5EA2742.19	undetermined L rib, partial	NA	13	354241	4399850
DARG 22	5EA2742	5EA2742.20	R ilium	NA	13	354241	4399850
DARG 23	5EA2742	5EA2742.21	R. astralagus	NA	13	354241	4399850
DARG 24	5EA2742	5EA2742.22	R. calcaneus	NA	13	354241	4399850
DARG 25	5EA2742	5EA2742.23	R. naviculo- cuboid	NA	13	354241	4399850
DARG 28	5EA2742	5EA2742.26	Bone frags	NA	13	354241	4399850

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 29	5EA2872		Skull	NA	13	354596	4399425
DARG 30	5EA2872		Atlas	NA	13	354596	4399425
DARG 31	5EA2872		C-3	NA	13	354596	4399425
DARG 32	5EA2872		C-4	NA	13	354596	4399425
DARG 33	5EA2944	5EA2944.s1	Partial Cranium	NA	13	354278	4399051
DARG 34	5EA2944	5EA2944.s2	Partial sacrum	NA	13	354278	4399051
DARG 35	5EA2944	5EA2944.s3	Right humerus	NA	13	354278	4399051
DARG 36	5EA2944	5EA2944.s4	Undetermined left rib	NA	13	354278	4399051
DARG 37	NA	RDR001	Skull	5km radius of:	13	362558	4417291
DARG 38	5GF2416	5GF2416.1	Skull	NA	13	246490	4392120
DARG 39	5GF90		Atlas	NA	13	246670	4392180
DARG 40	5GF2416	5GF2416.1	Skull	Between Rifle,CO and 15 miles north along Government Creek.	13	unknown	unknown
DARG 41	NA	5GF A1 (T)	Skull	Between Rifle,CO and 15 miles north along Government Creek.	13	unknown	unknown
DARG 42	NA	5GF A2 (T)	Skull	Between Rifle,CO and 15 miles north along Government Creek.	13	unknown	unknown
DARG 43	NA	5GF PW001 (was GF A3) (T)	Skull	Within 100m radius of:	13	268897	4405816
DARG 44	NA	GFP W002 (was GF A5) (T)	Metacarpal	Within 100m radius of 13;	13	268897	4405816
DARG 45	NA	GFP W003 (was GF A4) (T)	Tibia	Within 100m radius of:	13	268897	4405816
DARG 46	5GF4046	5GF4046.1 (was FS1 (T)	Skull A	NA	12	716732	4389938
DARG 47	5GF4046	5GF4046.2 (was FS2(T)	Skull B	NA	12	716732	4389938
DARG 48	5GF4046	5GF4046.3 (was FS3 (T)	Skull C	NA	12	716732	4389938
DARG 49	5GF4046	5GF4046.4 (was FS4 (T)	Skull D	NA	12	716732	4389938
DARG 50	5GF4046	5GF4046.5 (was FS5 (T)	T8 Vert	NA	12	716732	4389938
DARG 51	5GF4046	5GF4046.6 (was FS6 (T)	Atlas	NA	12	716732	4389938
DARG 52	5GF4046	5GF4046.7 (was FS7 (T)	Tibia, Left	NA	12	716732	4389938
DARG 53	5GF4046	5GF4046.8 (was FS8 (T)	Horn Core Tip Frag	NA	12	716732	4389938

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 54	5GF4294	5GF4294	Left Tibia	NA	12	721254	4390122
DARG 55	NA	RES2001 (T)	Skull frag	NA	13	283909	4356385
DARG 56	5ME5997	FS#20	Scapula tool	NA	12	693815	4310267
DARG 57	5ME6144	FS3b	Bone frag	NA	12	693764	4310230
DARG 58	5ME6144		Tarsal or carpal	NA	12	693764	4310230
DARG 59	5ME6144		Tarsal or carpal	NA	12	693764	4310230
DARG 60	5ME15338		Femur	NA	12	727497	4301082
DARG 61	5ME15338		Pelvis frag	NA	12	727497	4301082
DARG 62	5ME901	Unknown	Bone fragment	NA	12	679980	4327355
DARG 63	NA	1964.001.108 MF A1 (T)	Skull	Within a 1KM radius of:	13	310536	4447101
DARG 64	NA	1964.001.108 MF A2 (T)	Skull	Within a 1KM radius of:	13	310536	4447101
DARG 65	NA	2004.34 MF A3 (T)	Metacarpal	Within a 1KM radius of:	13	293143	4532549
DARG 66	5MF4314	5MF4314.1 was WYM001(T)	Bison priscus Skull frag	NA	13	280578	4486239
DARG 67	NA	WYM002(T)	Bison skull frag	Within a 10KM radius of Craig CO	13	unknown	unknown
DARG 68	NA	WYM003(T)	Horn cap	NA	13	unknown	unknown
DARG 69	NA	WYM004(T)	Horn cap	NA	13	unknown	unknown
DARG 70	NA	WYM005(T)	Horn cap	NA	13	unknown	unknown
DARG 71	NA	WYM006(T)	Horn cap	NA	13	unknown	unknown
DARG 72	NA	WYM007(T)	Horn cap	NA	13	unknown	unknown
DARG 73	NA	WYM008(T)	Tibia	Within a 5KM radius of Craig CO	13	unknown	unknown
DARG 74	5MF969	ASS1	Left Femur	NA	13	255213	4463689
DARG 75	5MF969	ASS2	Left Humerus	NA	13	255213	4463689
DARG 76	5MF969	ASS3	Thoracic vertebrae	NA	13	255213	4463689
DARG 77	5MF969	ASS5	Bison tooth	NA	13	255213	4463689
DARG 78	5MF4314	5MF4314.2	Mandible	NA	13	280578	4486239
DARG 79	5MF625	5MF625.18	Scapula	NA	12	709335	4524928
DARG 80	5MF4313	unknown	Skull	NA	12	710440	4525712
DARG 81	5MF4313	5MF4313-ASS1	Skull frag	NA	12	710440	4525712
DARG 82	5MF4313		Tooth enamel and	NA	12	710440	4525712

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 83	5MF4313	5MF4313-ASS2	Rib fragment tool	NA	12	710440	4525712
DARG 84	5MF4313	5MF4313-ASS3	Cervical vertebrae	NA	12	710440	4525712
DARG 85	5MF4313	5MF4313-ASS4	vertebra	NA	12	710440	4525712
DARG 86	5MF4313	5MF4313-ASS5	Thoracic vertebrae	NA	12	710440	4525712
DARG 87	5MF4313	5MF4313-ASS6	Rib	NA	12	710440	4525712
DARG 88	5MF4313	5MF4313-ASS7	Left rib	NA	12	710440	4525712
DARG 89	5MF4313	5MF4313-ASS8	Left rib	NA	12	710440	4525712
DARG 90	5MF4313	5MF4313-ASS9	Left rib	NA	12	710440	4525712
DARG 91	5MF4313	5MF4313-ASS10	Left rib	NA	12	710440	4525712
DARG 92	5MF4313	5MF4313-ASS11	Left rib	NA	12	710440	4525712
DARG 93	5MF4313	5MF4313-ASS12	Left rib	NA	12	710440	4525712
DARG 94	5MF4313	5MF4313-ASS13	Left rib	NA	12	710440	4525712
DARG 95	5MF4313	5MF4313-ASS14	Left rib	NA	12	710440	4525712
DARG 96	5MF4313	5MF4313-ASS15	Left rib	NA	12	710440	4525712
DARG 97	5MF4313	5MF4313-ASS16	Left rib	NA	12	710440	4525712
DARG 98	5MF4313	5MF4313-ASS17	Right rib	NA	12	710440	4525712
DARG 99	5MF4313	5MF4313-ASS18	Right rib	NA	12	710440	4525712
DARG 100	5MF4313	5MF4313-ASS19	Right rib	NA	12	710440	4525712
DARG 101	5MF4313	5MF4313-ASS20	Right rib	NA	12	710440	4525712
DARG 102	5MF4313	5MF4313-ASS21	Right rib	NA	12	710440	4525712
DARG 103	5MF4313	5MF4313-ASS22	Right rib	NA	12	710440	4525712
DARG 104	5MF4313	5MF4313-ASS23	Right rib	NA	12	710440	4525712
DARG 105	5MF4313	5MF4313-ASS24	Right rib fragment	NA	12	710440	4525712
DARG 106	5MF4313	5MF4313-ASS25	Right rib fragment	NA	12	710440	4525712
DARG 107	5MF4313	5MF4313-ASS26	Rib fragment	NA	12	710440	4525712
DARG 108	5MF4313	5MF4313-ASS27	Rib fragment	NA	12	710440	4525712

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 109	5MF4313	5MF4313-ASS28	Manubrium	NA	12	710440	4525712
DARG 110	5MF4313	5MF4313-ASS29	Xiphoid process	NA	12	710440	4525712
DARG 111	5MF4313	5MF4313-ASS30	Lumbar vertebrae	NA	12	710440	4525712
DARG 112	5MF4313	5MF4313-ASS31	Lumbar vertebrae	NA	12	710440	4525712
DARG 113	5MF4313	5MF4313-ASS32	Lumbar vertebrae	NA	12	710440	4525712
DARG 114	5MF4313	5MF4313-ASS33	Lumbar vertebrae	NA	12	710440	4525712
DARG 115	5MF4313	5MF4313-ASS34	Sacrum	NA	12	710440	4525712
DARG 116	5MF4313	5MF4313-ASS35	Caudal vertebrae	NA	12	710440	4525712
DARG 117	5MF4313	5MF4313-ASS36	Right ulna fragment	NA	12	710440	4525712
DARG 118	5MF4313	5MF4313-ASS37	Right tibia	NA	12	710440	4525712
DARG 119	5MF4313	5MF4313-ASS38	Left ulna	NA	12	710440	4525712
DARG 120	5MF4313	5MF4313-ASS39	Radius	NA	12	710440	4525712
DARG 121	5MF4313	5MF4313-ASS40	Radius	NA	12	710440	4525712
DARG 122	5MF4313	5MF4313-ASS41	Radius	NA	12	710440	4525712
DARG 123	5MF4313	5MF4313-ASS42	Metacarpal	NA	12	710440	4525712
DARG 124	5MF4313	5MF4313-ASS43	Innominate	NA	12	710440	4525712
DARG 125	5MF4313	5MF4313-ASS44	Innominate	NA	12	710440	4525712
DARG 126	5MF4313	5MF4313-ASS45	Tibia	NA	12	710440	4525712
DARG 127	5MF4313	5MF4313-ASS46	Calcaneus	NA	12	710440	4525712
DARG 128	5MF4313	5MF4313-ASS47	Metatarsal	NA	12	710440	4525712
DARG 129	NA	5M001 Museum #:175	Skull	Within 500m radius of:	13	246742	4431172
DARG 130	NA	5M002 Museum #175	Skull	Within 500m radius of:	13	246742	4431172
DARG 131	NA	5M003 Museum #175	Left scapula	Within 500m radius of:	13	246742	4431172
DARG 231	5MN7595	NA	Left Metatarsal	NA	13	249232	4262904
DARG 232	5MN7595	NA	Left Metatarsal	NA	13	249232	4262904
DARG 233	5MN7595	NA	Left Metacarpal	NA	13	249232	4262904

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DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 234	5MN7595	NA	Left Metacarpal	NA	13	249232	4262904
DARG 235	5MN7595	NA	1st Phalange	NA	13	249232	4262904
DARG 236	5MN7595	NA	1st Phalange	NA	13	249232	4262904
DARG 237	5MN7595	NA	1st Phalange	NA	13	249232	4262904
DARG 238	5MN7595	NA	2nd Phalange	NA	13	249232	4262904
DARG 239	5MN7595	NA	3rd Phalange	NA	13	249232	4262904
DARG 240	5MN7595	NA	3rd Phalange	NA	13	249232	4262904
DARG 241	5MN7595	NA	3rd Phalange	NA	13	249232	4262904
DARG 242	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 243	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 244	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 245	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 246	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 247	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 248	5MN7595	NA	Sesamoid	NA	13	249232	4262904
DARG 132	5RB3157	unknown	Bone fragment	NA	12	700938	4411698
DARG 133	NA	1958.008.001 RB A001 (T)	Skull	E. Miller Creek, within a 200m radius of:	13	264145	4417052
DARG 134	NA	RB A002 (T)	Skull	Within a radius of 600m of:	13	263455	4424477
DARG 135	NA	RB A003 (T)	Skull	Within 200m radius of:	13	250207	4430023
DARG 136	NA	RB A004 (T)	Skull	E. Miller Creek, within a 200m radius of:	13	264145	4417052
DARG 137	NA	RB A005 (T)	Skull	Within a 2KM radius of:	13	263455	4424477
DARG 138	NA	RB A006 (T)	Skull	E. Miller Creek, within a 200m radius of:	13	264145	4417052
DARG 139	NA	RB A007 (T)	Skull	Within a 3000m radius of:	13	25242	443797
DARG 140	NA	RBA008	Humerus	Within a 3000m radius of:	13	25242	443797
DARG 141	NA	RBA009	horn cap frag	Possibly in Sanderson Creek	13	unknown	unknown
DARG 142	NA	RBA010	patella?	Within a 3000m radius of:	13	25242	443797

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 143	5RB8600	5RB8600	Skull	Pending info from LSFO	13	unknown	unknown
DARG 249	NA	NA	Skull	unknown	12	698628	4398953
DARG 250	NA	NA	Two Horn Cap Fragments	unknown	NA	unknown	unknown
DARG 144	5RB6795	5RB6795.5	Femur	NA	12	734591	4422428
DARG 145	5RB6795	5RB6795.3	Humerus	NA	12	734591	4422428
DARG 146	5RB6795	5RB6795.4	Ischium	NA	12	734591	4422428
DARG 147	5RB6795	5RB6795.2	Maxilla	NA	12	734591	4422428
DARG 148	5RB6795	5RB6795.7	Rib	NA	12	734591	4422428
DARG 149	5RB6795	5RB6795.8	Rib	NA	12	734591	4422428
DARG 150	5RB6795	5RB6795.9	Rib fragments	NA	12	734591	4422428
DARG 151	5RB6795	5RB6795.1	Skull	NA	12	734591	4422428
DARG 152	5RB6795	5RB6795.6	Thoracic vertebrae	NA	12	734591	4422428
DARG 153	None assigned	NA	2 Cervical Vertebrae	NA	12	742941	4413238
DARG 154	None assigned	NA	Radial carpal	NA	12	742054	4409546
DARG 155	None assigned	NA	Metatarsal	NA	12	742317	4409361
DARG 156	None assigned	NA	Metatarsal	NA	12	742317	4409361
DARG 157	5RB6798	5RB6798.23	Calcaneus	NA	12	742776	4409001
DARG 158	5RB6798	5RB6798.17	Caudal vertebrae	NA	12	742776	4409001
DARG 159	5RB6798	5RB6798.18	Caudal vertebrae	NA	12	742776	4409001
DARG 160	5RB6798	5RB6798.2	Cervical vertebrae	NA	12	742776	4409001
DARG 161	5RB6798	5RB6798.3	Cervical vertebrae	NA	12	742776	4409001
DARG 162	5RB6798	5RB6798.21	Femur	NA	12	742776	4409001
DARG 163	5RB6798	5RB6798.16	Femur	NA	12	742776	4409001
DARG 164	5RB6798	5RB6798.13	Humerus	NA	12	742776	4409001
DARG 165	5RB6798	5RB6798.12	Humerus	NA	12	742776	4409001
DARG 166	5RB6798	5RB6798.11	Ischium	NA	12	742776	4409001

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 167	5RB6798	5RB6798.27	Lumbar vertebrae	NA	12	742776	4409001
DARG 168	5RB6798	5RB6798.4	Lumbar vertebrae	NA	12	742776	4409001
DARG 169	5RB6798	5RB6798.15	Metacarpal	NA	12	742776	4409001
DARG 170	5RB6798	5RB6798.24	Metatarsal	NA	12	742776	4409001
DARG 171	5RB6798	5RB6798.20	Patella	NA	12	742776	4409001
DARG 172	5RB6798	5RB6798.1	Pre-molar and 2 lower roots	NA	12	742776	4409001
DARG 173	5RB6798	5RB6798.6	Rib fleshing tool	NA	12	742776	4409001
DARG 174	5RB6798	5RB6798.9	Rib	NA	12	742776	4409001
DARG 175	5RB6798	5RB6798.5	Rib	NA	12	742776	4409001
DARG 176	5RB6798	5RB6798.7	Rib	NA	12	742776	4409001
DARG 177	5RB6798	5RB6798.8	Rib	NA	12	742776	4409001
DARG 178	5RB6798	5RB6798.14	Scapula	NA	12	742776	4409001
DARG 179	5RB6798	5RB6798.28	Thoracic vertebrae	NA	12	742776	4409001
DARG 180	5RB6798	5RB6798.25	Thoracic vertebrae	NA	12	742776	4409001
DARG 181	5RB6798	5RB6798.26	Thoracic vertebrae	NA	12	742776	4409001
DARG 182	5RB6798	5RB6798.29	Thoracic vertebrae	NA	12	742776	4409001
DARG 183	5RB6798	5RB6798.22	Tibia	NA	12	742776	4409001
DARG 184	5RB6798	5RB6798.19	Tibia	NA	12	742776	4409001
DARG 185	5RB6798	5RB6798.10	True rib	NA	12	742776	4409001
DARG 186	None assigned	None	Tibia	NA	12	743091	4408762
DARG 187	5RB6807	5RB6807.1	Tibia	NA	12	743091	4408762
DARG 188	None assigned	NA	Vertebrae	NA	12	743114	4408945
DARG 189	None assigned	NA	Tibia	NA	12	744140	4407239
DARG 190	None assigned	NA	Scapula	NA	12	744207	4407123
DARG 191	5RB6800	5RB6800.4	Lumbar vertebrae	NA	12	744690	4405740
DARG 192	5RB6800	5RB6800.2	Orbital	NA	12	744690	4405740

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 193	5RB6800	5RB6800.5	Sacrum	NA	12	744690	4405740
DARG 194	5RB6800	5RB6800.1	Scapula	NA	12	744690	4405740
DARG 195	5RB6800	5RB6800.3	Thoracic vertebrae	NA	12	744690	4405740
DARG 196	5RB6800	5RB6800	Rib	NA	12	744690	4405740
DARG 197	5RB6800	5RB6800	Pelvis fragments	NA	12	744690	4405740
DARG 198	5RB6799	5RB6799.4	Neural spine	NA	12	744799	4405358
DARG 201	5RB6799	5RB6799.3	Rib	NA	12	744799	4405358
DARG 202	5RB6799	5RB6799.5	Thoracic vertebrae	NA	12	744799	4405358
DARG 203	5RB6799	5RB6799.6	Thoracic vertebrae	NA	12	744799	4405358
DARG 204	5RB6799	5RB6799.7	Thoracic vertebrae	NA	12	744799	4405358
DARG 205	5RB6799	5RB6799.8	Thoracic vertebrae	NA	12	744799	4405358
DARG 206	5RB6801	5RB6801.1	Pelvis	NA	12	744988	4404473
DARG 207	5RB6809	5RB6809.1	Metacarpal	NA	12	745053	4403373
DARG 208	5RB6802	5RB6802.1	Skull	NA	12	744735	4401303
DARG 209	5RB6803	5RB6803.1	Humerus	NA	12	744735	4401458
DARG 210	5RB6804	5RB6804.1	Humerus	NA	12	744726	4400887
DARG 211	5RB6804	5RB6804.2	Tibia	NA	12	744726	4400887
DARG 212	5RB6805	5RB6805.3	Axis	NA	12	744822	4400535
DARG 213	5RB6805	5RB6805.1	Metacarpal	NA	12	744822	4400535
DARG 214	5RB6805	5RB6805.2	Rib	NA	12	744822	4400535
DARG 215	5RB6797	5RB6797.1	Lumbar vertebrae	NA	12	744832	4400423
DARG 216	5RB6797	5RB6797.2	Pelvis	NA	12	744832	4400423
DARG 217	5RB6797	5RB6797.3	Radius and ulna	NA	12	744832	4400423
DARG 218	None assigned	NA	Cervical vertebrae	NA	12	744849	4400372
DARG 219	5RB6796	5RB6796.7	Humerus	NA	12	744849	4400372
DARG 220	5RB6796	5RB6796.1	Metacarpal	NA	12	744849	4400372

Western Colorado Bison Project. Appendix E: Specimens with known UTM's							
DARG #	Site #	Accession # T=Temporary	Element	General area or Radius, if applicable	Zone	Easting	Northing
DARG 221	5RB6796	5RB6796.2	Pelvis	NA	12	744849	4400372
DARG 222	5RB6796	5RB6796.3	Lumbar vertebrae	NA	12	744849	4400372
DARG 223	5RB6796	5RB6796.5	Radius and ulna	NA	12	744849	4400372
DARG 224	5RB6796	5RB6796.4	Thoracic vertebrae	NA	12	744849	4400372
DARG 225	None assigned	NA	Rib fragments-4	NA	12	744828	4400460
DARG 226	None assigned	NA	Metacarpal	NA	12	744855	4400087
DARG 227	None assigned	NA	Long bone	NA	12	744645	4399558
DARG 228	None assigned	NA	Radius	NA	12	744645	4399558
DARG 229	None assigned	NA	Metatarsal	NA	12	unknown	unknown
DARG 230	None assigned	NA	Metatarsal	NA	12	744726	4400887

APPENDIX F: General Distribution Map;
Shapefiles for the specified locations are included on the data disc; also,
Maps with specific locations and optional satellite backgrounds are included
as part of a database on:
dargnet.org/net/bison/bison.html