



*Miles City Field Office
Resource Management Plan (RMP)
and
Environmental Impact Statement (EIS)*

**CLASS I OVERVIEW OF
PALEONTOLOGICAL & CULTURAL
RESOURCES IN EASTERN MONTANA**

VOLUME I

Prepared for:
**U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MILES CITY FIELD OFFICE
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*Shared Lands ~
Shared Plan*

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ABSTRACT

Aaberg Cultural Resource Consulting Service (ACRCS) entered into a subconsultant agreement with ALL Consulting of Tulsa, Oklahoma to provide an updated or new Class I Overview of paleontological and cultural resources for the planning unit of the Miles City Bureau of Land Management (BLM) Field Office. The Class I Overview was a required element included in the Statement of Work for a contract that specified preparation of a new Resource Management Plan (RMP) for the Miles City Field Office. The contract was awarded to ALL Consulting by the BLM.

Paleontological surveys and considerations are often part of cultural resource Class I, II, and III surveys, and therefore the paleontological component was integrated into the same Class I document with cultural resources. The subject lands for this Class I include all lands (federal, state, private, and American Indian) within the Miles City Field Office planning unit. This unit includes all of Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, and Wibaux counties and portions of Big Horn and Valley counties.

A paleontological overview for eastern Montana had never been undertaken and because paleontological sites/properties are not routinely assigned site numbers, except when on federal lands, preparation of the paleontological component involved access of a variety of documents from a number of agencies. Far more documented paleontological sites (n=1929) were found to exist in the project area than are presently listed on the State Antiquities Data Base.

The cultural component of the Class I was to include both prehistoric and historic properties. A comprehensive and detailed context for historic sites in the project area has never been completed and therefore only a general chronology and thematic trends for historic sites are presented in the Class I. A general statistical review for historic properties is also presented.

ACRCS primarily focused on the post-1988 (the completion date of the last Class I for southeastern Montana) record for cultural resources. Over 7000 documents and reports related to Cultural Resource Management in the project area have been prepared since the early 1970s. Therefore review of "hard copy" documents was restricted for the most part to those generated through projects sponsored by the BLM or those projects that included substantial BLM lands. Attempts were made to review most "hard copy" reports that detailed the results of archaeological excavation and mitigation. The State Antiquities Data base was used extensively in preparation of statistics and attempts were made to cross-check data base statistics to a sample of site forms that formed the statistical population for a particular query. However, considering the number of sites that have been recorded in the project area, 7065 prehistoric properties and 2869 historic properties, it was not possible to check every individual site form.

As was the case upon completion of the 1988 Class I, surficial survey data continues to form the overwhelming majority of the written record of archaeological and

historical sites in the project area. Outside of the lands currently being developed by coal strip-mining interests in the southwestern part of the project area, very little site excavation has occurred since 1988. The north half of the Miles City BLM planning unit has not experienced anywhere near the amount of Class I survey, let alone excavation, as the south half. Paleoenvironmental data remains elusive for much of the project area and inconsistencies in the application of environmental terms and classifications (e.g. ecological section, landform type, vegetation community) continue. Considering these factors, it would be a spurious exercise to define or suggest an overall prehistoric settlement system model for the project area. Cultural resource management studies continue to dominate the project area and those studies are still most frequent in the south half of the project area.

The section of this report that covers environment and setting for the project area presents recent standardized descriptions of ecological sections and sub-sections, vegetation communities, and land cover types. It is hoped that these descriptions will help to standardize observations made by investigators working in the project area.

Federal and state agencies have made advances in recording and evaluation standards for some site types since 1988. However, lithic scatters remain the dominant site type in the project area, as they were in 1988, and surficial recording standards for such sites are not in place. Many of these lithic scatters are in surficial and shallowly buried settings and many are often recommended as non-significant or not eligible for listing in the National Register of Historic Places. Attempts should be made to maximize data recovery, through standardized observations of lithic artifacts, at the time these lithic scatters are recorded. Although information values of lithic scatters are limited, those values are important in developing settlement and subsistence models for the project area and those information values should not be compromised by inconsistent recording.

ACKNOWLEDGEMENTS

The data base for the project area is astoundingly large and generating any useful statements or statistics would not have been possible without the cooperation and assistance of the Montana State Historic Preservation Office (SHPO). In particular, Cultural Records Manager Damon Murdo was steadfast in his speedy and thorough responses to innumerable requests for data and information. Damon provided ACRCs with electronic text files of many elements of the State Antiquities Data Base. His support allowed us to create our own internal data base from which we were able to generate a number of queries and statistics. The SHPO also opened their documents and reports files to us and further allowed compilation of statistics. The SHPO, the University of Montana – Department of Anthropology, and the State Office of the Bureau of Land Management jointly allowed us access to site forms through the internet for the term of this project and that assistance was absolutely essential to completion of this report.

A number of agencies and institutions also advised us on limitations of data and site records that could be used in this report. Those agencies and institutions include the Museum of the Rockies, the University of Montana, Montana State University, the CMR Wildlife Refuge, and the Bureau of Indian Affairs. Gary Smith, State BLM Archaeologist, and David Wade, director of the BLM Curation Center, allowed access to their cultural resource and paleontological files. Doug Melton and Will Hubbell of the Miles City BLM Field Office also provided access to their cultural and paleontological files and also provided invaluable consultation and advice that assisted in completing this Class I. Doug Melton opened his personal and substantial library of cultural and paleontological materials to us and were it not for Doug we would not have known of the existence of some valuable theses, reports, and articles.

EXECUTIVE SUMMARY

This Class I overview of cultural and paleontological resources in the BLM Miles City, Montana Field Office planning unit covers all of Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, and Wibaux counties and portions of Big Horn and Valley counties. Cultural and paleontological resources on federal, state, private, city, county, and American Indian reservation were considered and investigated. The project area encompasses about 45,420 square miles or 29.1 million acres. Field reconnaissance was not a part of this project. Sources used during compilation of the Class I included published literature, cultural and paleontological resource management reports, site forms, the internet, the State of Montana Antiquities Data Base, and interviews with professionals. Various state, federal, and private institutions and agencies were consulted. Over 7000 cultural/paleontological resource management reports have been listed in the state data base. Literature research carried out during the Class I project focused on post-1988 material with an emphasis on reports associated with BLM sponsored projects or projects that encompassed BLM lands. Mitigation and excavation reports were also emphasized. Historic and prehistoric cultural resource investigations in the project area are dominated by cultural resource management (CRM) reports associated with the Section 106/compliance process. On the other hand, the majority of paleontological surveys have been academic in nature, and only two reports were encountered that describe the results of surveys initiated by NEPA or FLPMA. Because of confidentiality concerns and restrictions sites on the Northern Cheyenne and Fort Peck American Indian Reservations were not discussed or reported in detail. Paleontological sites (n=294) on the Charles M. Russell Wildlife Refuge were excluded from discussions as requested by the refuge managers.

Environmental discussions presented in this Class I include latest ecological section and sub-section classifications based on U.S. Forest Service descriptions that follow American classificatory standards. Latest plant community descriptions and land cover types are also included in this report. Paleoenvironmental data that has accumulated since 1988 was reviewed and presented. That data suggests that traditional paleoclimatic schemes used in the past by area archaeologists need to be refined and should not be used uncritically in project area modeling. The need for standardizing environmental observations in archaeological site recording and modeling was emphasized in the 1988 Class I for the project area but inconsistencies have remained. Environmental classificatory tools are presented in this report with the hope that they will serve to assist researchers in standardizing observations and will allow for the development of cultural subsistence and settlement models that can be compared and contrasted throughout the project area.

As of May 1, 2005 the project area was found to contain 7065 prehistoric sites, 2869 historic sites, and 1929 paleontological locations (only 54 paleontological sites have been assigned site numbers although about 800 locations are listed in the state data base). Historic and prehistoric sites occur in all counties within the project area and known paleontological resources occur in all counties except for Roosevelt.

Paleontological resources are strongly associated with the Hell Creek Formation where 80% of known sites occur. The Fort Union Formation (dominantly the Tullock Member) contains 14% of known paleontological sites and all other geological formations in eastern Montana contain less than 2% each of documented fossil localities. Of the 1929 paleontological sites, 1440 (75%) occur on BLM land, 278 (14.4%) on private land, 153 (7.9%) on state land, 7 (<1%) on USDA Forest Service land, 1 (<1%) on US Army Corps of Engineers land, 1 (<1%) on other federal land, and 1 (<1%) on lands owned by the state and the BLM. Landowner information for 48 of the paleontological sites (2.5%) could not be determined because of ambiguity of legal descriptions. Approximately 95% of the 1929 paleontological sites in the Miles City Field Office unit occur in Garfield, Carter, Dawson, McCone, Powder River, and Treasure counties, where the dominant geological formations are the Hell Creek and Fort Union. Of the 1929 documented sites, 1805 are vertebrate fossil localities and 124 are non-vertebrate sites. The non-vertebrate sites include 68 plant, 51 invertebrate, 1 plant and invertebrate, and 4 trace fossil.

A sensitivity rating was developed to address the paleontological potential of project area geological formations. Seven stratigraphic units in the study area have high paleontological resource sensitivity ratings, and these include: Bearpaw Shale (Upper Cretaceous); Brule Formation of the White River Group (Tertiary, Oligocene); Carlile Shale (Upper Cretaceous); Hell Creek Formation (Upper Cretaceous); Judith River Formation (Upper Cretaceous); Pierre Shale (Upper Cretaceous); and Tullock Member/Formation of the Fort Union Formation/Group (Tertiary, Paleocene). Moderate sensitivity ratings are given to the following units: Arikaree Formation (Tertiary, Miocene); Belle Fourche Shale (Upper Cretaceous); Chadron Formation of the White River Group (Tertiary, Oligocene); Claggett Shale (Upper Cretaceous); Flaxville Formation, north of the Missouri River (Tertiary, Miocene-Pliocene); Fort Union Formation/Group excluding the Tullock Member/Formation (Tertiary, Paleocene); Greenhorn Formation (Upper Cretaceous); Mowry Shale (Lower-Upper Cretaceous); Niobrara Formation (Upper Cretaceous); Pleistocene deposits; Quaternary deposits; Telegraph Creek Formation (Upper Cretaceous); and Wasatch Formation (Tertiary, Eocene). Geologic units with low sensitivity ratings include: Cartwright gravel (Quaternary, Pleistocene); Crane Creek gravel (Quaternary, Pleistocene); Eagle Sandstone (Upper Cretaceous); Flaxville Formation, south of the Missouri River (Tertiary, Miocene-Pliocene); Fox Hills Formation (Upper Cretaceous); Newcastle Sandstone (Lower Cretaceous); and Rimroad gravel (Tertiary, Oligocene-Miocene). The paleontological resource sensitivity rating is only an estimate, and although it is useful as a predictive planning tool, its application is not intended to preclude field inventories. Significant paleontological resources can still be encountered in units that have been assigned a low sensitivity rating. Publication of new data or discovery of new specimens could necessitate the revision of a previously assigned sensitivity rating.

The overall distribution of the 7065 prehistoric sites in the project area by county is as follows: Bighorn=957 (13.5%), Custer=596 (8.4%), Carter=493 (7.0%), Daniels=42 (0.6%), Dawson=253 (3.6%), Fallon=333 (4.7%), Garfield=156 (2.2%), McCone=163 (2.3%), Prairie=189 (2.7%), Powder River=1641 (23.2%), Rosebud=1301 (18.4%),

Richland=138 (2.0%), Roosevelt=263 (3.7%), Sheridan=318 (4.5%), Treasure=65 (0.9%), Valley=80 (1.1%), and Wibaux=77 (1.1%). The north zone (Daniels, Roosevelt, Sheridan, and Valley Counties) contains 703 sites (10.0%). The central zone (Dawson, Garfield, McCone, Prairie, Richland and Wibaux Counties) contains 976 sites (13.8%). The south zone (Bighorn, Carter, Custer, Fallon, Powder River, Rosebud, and Treasure Counties) contains 5386 sites (76.2%).

Historic sites recorded within the project area number 2,869. Distribution by county and percentage of total is: Bighorn=124 (4.3%), Custer=195 (6.8%), Carter=429 (15%), Daniels=49 (1.7%), Dawson=119 (4.1%), Fallon County=106 (3.7%), Garfield=146 (5.1%), McCone=122 (4.3%), Prairie County=150 (5.2%), Powder River=233 (8.1%), Rosebud=321 (11.2%), Richland=176 (6.1%), Roosevelt=178 (6.2%), Sheridan=398 (13.9%), Treasure=38 (1.3%), Valley=32 (1.1%), and Wibaux=53 (1.8%).

The amount (area) of cultural resource survey that has taken place in the project area over the past 35 years amounts to about 923,849 acres. Of that total, about 45.2% occurred on BLM land, 12.6% on Forest Service land, 10.4% on American Indian reservation land, 4.4% on Montana Department of Transportation land or project area, and 3.6% on Montana Department of Natural Resources and Conservation land. Private lands and a combination of other federal, state, and other agency lands account for about 23.8% of the total area surveyed. Nearly 40% of all surveyed land occurs in the four southern counties (Big Horn, Rosebud, Powder River, and Carter) of the project area. These counties have seen intense CRM investigation as a result of energy development and because substantial Custer Forest lands occur within them. This high coverage figure contrasts with the northernmost four project area counties (Valley, Roosevelt, Daniels, and Sheridan) where acres surveyed accounts for just 4.7% of the total.

Of the total cultural properties in the project area, 2,135 (28.5%) occur either entirely or partially on BLM land. The BLM site total includes 1,839 (86.1%) prehistoric sites and 296 (13.9%) historic sites. Thus 26% of all project area prehistoric sites, and 10.3% of all project area historic sites, are either entirely or partially owned/administered by the BLM.

Total cultural properties in the project area occurring either entirely or partially on USFS land is 1,487 (15%). The USFS site total includes 1,289 (86.7%) prehistoric sites and 198 (13.3%) historic sites. Thus 18.2% of all project area prehistoric sites, and 6.9% of all project area historic sites, are either entirely or partially owned/administered by the USFS.

Of the total cultural properties in the project area, 809 (8.1%) occur either entirely or partially on BIA land. The BIA site total includes 738 (91.2%) prehistoric sites and 71 (8.8%) historic sites. Thus 10.4% of all project area prehistoric sites, and 2.5% of all project area historic sites, are either entirely or partially owned/administered by the BIA.

Of the total cultural properties in the project area, 643 (6.5%) occur either entirely or partially on DNRC land. The DNRC site total includes 480 (74.7%) prehistoric sites

and 163 (25.3%) historic sites. Thus 6.8% of all project area prehistoric sites, and 5.7% of all project area historic sites, are either entirely or partially owned/administered by the BIA.

Of the total cultural properties in the project area 113 (1.1%) occur either entirely or partially on MDOT land. The MDOT site total includes 25 (22.1%) prehistoric sites and 88 (77.9%) historic sites. Thus 0.4% of all project area prehistoric sites, and 3.1% of all project area historic sites, are either entirely or partially owned/administered by the MDOT (far more sites have been located during MDOT projects but at the time recordation most sites occurred on private or other lands not yet acquired as right-of-way by the MDOT).

Sites owned by a combination of private, federal, state, or unknown amounts to 4,835 (48.7% of all project area sites) cultural properties. These sites include 2756 (57%) prehistoric sites and 2079 (43%) historic sites. Thus 39% of all project area prehistoric sites, and 72.5% of all project area historic sites, are entirely or partially owned by these other agencies or private parties. A substantial number of historic sites are privately owned.

Overall site density (historic and prehistoric) in the project area is 1 site per 93 acres (10.75 sites/1000 acres) or 6.9 sites/square mile for all surveyed acres. The 7,065 prehistoric sites recorded within the project area are distributed at 1 site per 130.8 acres (7.65 sites/1000 acres) or 4.9 sites/per square mile. The 2,869 historic sites recorded within the project area are distributed at 1 site per 322 acres (3.1 sites/1000 acres) or 2 sites per square mile for all surveyed acres within the project area.

Distribution of the 2,135 prehistoric and historic sites fully or partially located on land under the administration of the BLM is 1 site per 195.4 acres (5.1 sites/1000 acres) or 3.3 sites per square mile for the 417,356 BLM acres surveyed within the project area. These sites include 1,839 prehistoric properties at 1 site per 226.9 acres (4.4 sites/1000 acres) or 2.8 sites per square mile. Also included are 296 historic sites at 1 site per 1410 acres (0.7 sites/1000 acres) or 0.5 sites per square mile.

Distribution of the 1,487 prehistoric and historic sites fully or partially located on land under the administration of the USFS is 1 site per 78.6 acres (12.7 sites/1000 acres) or 8.1 sites per square mile for the 116,858 acres of USFS land surveyed within the project area. These sites include 1,289 prehistoric properties with a density of 1 site per 90.7 acres (11 sites/1000 acres) or 7.1 sites per square mile. Also included are 198 historic sites distributed at 1 site per 590.2 acres (1.7 sites/1000 acres) or 1.1 sites per square mile.

Distribution of the 809 prehistoric and historic sites fully or partially located on land under the administration of the BIA is 1 site per 118.5 acres (8.4 sites/1000 acres) or 5.4 sites per square mile for the 95,834 acres of BIA administered land surveyed within the project area. These sites include 738 prehistoric properties at 1 site per 129.9 acres (7.7 sites/1000 acres) or 4.9 sites per square mile. Also included are 71 historic sites at 1

site per 1349.8 acres (0.74 sites/1000 acres) or 0.5 sites per square mile. These site frequencies may not be representative of the number of sites that actually occur on lands within the two reservations present within project area boundaries. Some American Indian allottee lands and sites that occur on them are sometimes listed under private ownership, as are non-Indian lands and sites within reservation boundaries.

Distribution of the 643 prehistoric and historic sites fully or partially located on land under the administration of the DNRC is 1 site per 51.1 acres (19.5 sites/1000 acres) or 12.5 sites per square mile for the 32,874 acres of DNRC administered land surveyed within the project area. These sites include 480 prehistoric properties at 1 site per 68.5 acres (14.6 sites/1000 acres) or 9.3 sites per square mile. Also included are 163 historic sites at 1 site per 201.7 acres (4.96 sites/1000 acres) or 3.2 sites per square mile.

Distribution of the 4,835 prehistoric and historic sites fully or partially located on lands of mixed ownership and administration is 1 site per 45.5 acres (22 sites/1000 acres) or 14.1 sites per square mile for the 220,187 acres of survey in this category. These sites include 2,756 prehistoric sites at 1 site per 79.9 acres (12.5 sites/1000 acres) or 8 sites per square mile. Also included are 2,079 historic properties at 1 site per 105.9 acres (9.4 sites/1000 acres) or 6 sites per square mile.

Prehistoric sites documented in the project area include buffalo jumps, pounds, traps and kills sites. They also include lithic quarries where stone used for tool-making was obtained. Sites also include lithic workshops where stone was reduced or manufactured into tools. Stone alignments such as game drive lines and other linear arrangements are also present as are isolated and/or clustered cairns and rock piles. Tipi rings, vision quest structures, fortification structures, medicine wheels, possible eagle trapping pits and structures, and other rock structures have also been documented. Tipi rings are most numerous in the north part of the project area but are relatively common in the south part. Petroglyphs and pictographs have been documented and petroglyphs are particularly common in the southern half of the project area. Rockshelters and caves are present and are also most common in the south part of the project area where the geology is more suited to formation of such features. Buried and/or stratified sites occur throughout the project area but the best documented and most numerous of such sites are in the south part of the project area. Aboriginal and historic human burials have also been documented in the project area.

Within or immediately adjacent to the project area, 353 radiocarbon dates from 114 sites or localities were reviewed for this report. Twenty-three (n=23/6.5%) of the dates fall within the Early Precontact Period or Paleoindian Period.

Only 4 (1.1%) dates fall within the range of the early Middle Precontact or Early Plains Archaic Period. One of those dates was the first date obtained from the Powers-Yonkee site and it is now believed to be a “bad” date. The other 3 dates were obtained from paleosols where cultural materials were found nearby but not in direct association with the paleosols. Presently there are no cultural dates with good context from this period, which occurs within the arid Altithermal.

Twelve (n=12/3.4%) of radiocarbon dates associate with the middle Middle Precontact or Middle Plains Archaic Period and most of these dates appear to associate with McKean Complex components.

The late Middle Precontact or Late Plains Archaic Period is well represented in dated components with 121 dates (34.3%). These components include the Yonkee Phase, Pelican Lake Phase, and Besant Phase.

The Late Precontact or Late Prehistoric Period is the best represented period in the assembled radiocarbon list with 191 (54.1%) dates. Represented components include Besant, Avonlea, LPI, LPII, Old Women's, Saddle Butte, Mortlach, and possible ancestral Crow (at the Hagen Site).

The Early Precontact Period (or Paleoindian Period) is represented by about 9% of all reported project area projectile points. Folsom, Agate Basin, and Hell Gap are nearly equally represented with each represented by about 2% of the point total. Cody Complex points are most frequent of reported Paleoindian points consisting of about 3% of all points. Clovis, Goshen, Alberta, and Frederick Complex points are less commonly reported.

The Middle Precontact Period is best represented in reported projectile point occurrences, with such points accounting for about 63% of the total. Within the Middle Precontact Period the late portion (or Late Plains Archaic) accounts for about 72% of Middle Precontact points, the middle portion (or Middle Plains Archaic) accounts for about 26% of Middle Precontact points, and early portion (or Early Plains Archaic) accounts for just 2% of Middle Precontact points.

The Late Precontact Period (or Late Prehistoric Period) is represented by about 28% of all reported points in the project area. Of these Late Precontact points, about 13% associate with Avonlea and about 87% associate with later phases or complexes (e.g. Old Women's, Saddle Butte, Late Prehistoric I, Late Prehistoric II).

Historic sites in the project area are dominated by sites that post-date 1890. The most frequently recorded site types are homesteads/farmsteads and residences. These sites include many with standing architecture but a high percentage of homesteads/farmstead sites in rural settings include foundations and depressions or are entirely in ruins (no standing architecture). BLM and LU lands in particular often contain farmsteads/homesteads that are entirely in ruins. Many community surveys have been undertaken in most counties of the project area and these surveys have resulted in the recording of historic commercial buildings, civic buildings, art buildings, schools, and churches, as well as private historic residences. Historic districts or commercial blocks have been defined in several project area communities.

Road, highway, and bridge sites follow in numeric frequency with those that occur on state primary and secondary road systems forming the majority of recorded sites. Irrigation systems and associated features are also frequent in site records with a

high percentage occurring in the south part of the project area within the drainage system of the Yellowstone River.

Sites pre-dating 1880 are infrequent in the project area and, with the exception of Fort Keogh and several U.S. military and American Indian battle sites, these sites are often poorly documented. Some historic fur posts and some military-Indian skirmish sites are documented only by location as determined from archival map and descriptive references. Some of these trading posts, such as a series of posts established at or near the mouth of the Big Horn River, represent the earliest Euro-American settlements in eastern Montana. Fort Manuel Lisa, established in 1807 at the mouth of the Big Horn, could in fact represent the earliest white settlement in Montana.

Within the project area, of the 11,763 cultural and paleontological sites, only 66 have been formally nominated to the National Register of Historic Places. Those sites listed on the National Register are almost exclusively historic with only 2 prehistoric sites nominated. No paleontological sites from the project area have yet been listed.

Although state data base and agency records are sometimes conflicting, it appears that about 4.8% of historic sites have been recommended (consensus varies) as eligible for listing in the National Register and about 11.5% have been recommended and accepted as ineligible. Significance or National Register status for about 81.4% of historic sites is either unresolved or is not presented (blank) on the state data base. About 4% of prehistoric sites have been recommended as eligible (consensus varies) for listing in the National Register while 6.2% have been recommended and accepted as ineligible. Significance or National Register status of about 90% of prehistoric sites has either not been resolved or is not presented (blank) on the state data base.

Paleontological sites are generally not considered eligible as fossil localities. However, they may be eligible under National Register criteria A,B, and D for other reasons (e.g. the development of paleontology in Montana; association with important events such as exploration surveys; association with significant paleontologists; for their contribution to understanding of the “prehistory” of an area). In the project area, there are several National Natural Landmarks (NNLs) and Areas of Critical Environmental Concern that recognize significant paleontological areas. NNLs include Hell Creek, Bug Creek, and Capitol Rock and ACECs include Hell Creek, Bug Creek, Sand Arroyo, Sand Creek, and Ash Creek Divide.

In recognition of significance, some cultural resources in the project area have been designated as ACECs by the BLM. Prehistoric archaeological ACECS include the Seline Site in Dawson County, the Jordan Bison Kill in Garfield County, and Big Sheep Mountain and the Hoe Site in Prairie County. Historic era ACECs include federally-owned portions of the Powder River Depot in Prairie County, Battle Butte in Rosebud County, and Reynold’s Battlefield in Powder River County.

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INTRODUCTION

Background

The Miles City Field Office of the Montana Bureau of Land Management (BLM) is, through contract, producing a new Resource Management Plan (RMP) that revises, updates and combines earlier RMPs that were produced for the Powder River and Big Dry Resource areas. Administrative restructuring of the Montana BLM occurred in the late 1990s when 7 field offices (Billings, Butte, Dillon, Lewistown, Malta, Miles City, and Missoula) were created from what were 3 district offices centered in Butte, Lewistown and Miles City. The Miles City District once included BLM lands in North and South Dakota and up to the late 1990s the South Dakota Field Office was also included in the Miles City unit.

The Montana portion of the old Miles City District encompassed 12 complete Montana counties (Carter, Custer, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Rosebud, Treasure, and Wibaux) and the extreme southeast corner of Big Horn County. The old boundaries stretched southward from the south edge of the Missouri River and Fort Peck Reservoir to the Wyoming border; and westward from the North Dakota and South Dakota border to the Musselshell River (northwest area) and to the Yellowstone and Big Horn County lines (southeast area). Although administrative history is somewhat complex, it appears that restructuring occurred in the Miles City District in the 1980s before it became a Field Office. In Montana, that restructuring, resulted in all of Daniels, Roosevelt, and Sheridan Counties and the east-central portion of Valley County (areas that formerly were part of the Lewistown District) becoming part of the Miles City District. All lands and counties that were part of the old Miles City District were also included in the new Miles City Field Office.

The combination of administrative restructuring of the Montana BLM, changing resource conditions, changes in the use of public land, and the need for timely upgrading and revision of older dated management plans led the Miles City Field Office to issue a Request for Quotations (RFQ) from firms interested in completing the RMP revision and associated Environmental Impact Statement. The project planning area, as defined by the BLM in the RFQ, includes all of the BLM-administered surface and mineral estate managed by the Miles City Field Office in Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, and Wibaux counties and portions of Big Horn and Valley counties (Figure 1).

ALL Consulting (ALL), of Tulsa, Oklahoma was subsequently awarded the federal contract to complete the Miles City Field Office RMP. ALL entered into a sub-contracting agreement with Aaberg Cultural Resource Consulting Service (ACRCS) of Billings, Montana to complete the cultural resource and paleontological components of the RMP.

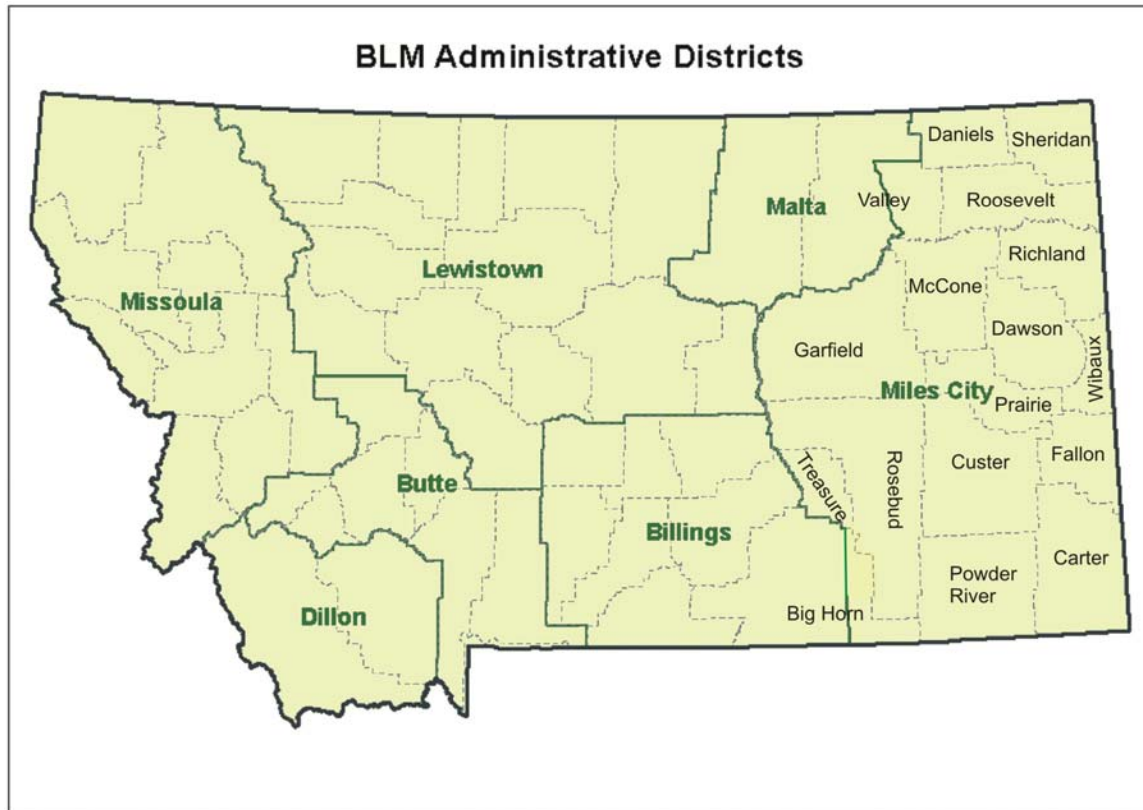


Figure 1: Montana BLM Administrative Units showing the Class I project area with labeled counties in the Miles City Field Office (map adapted from the Montana NRIS website).

Three previous Class I studies encompass portions of the Miles City Field Office RMP project area. They include the first Class I for the old Miles City BLM District (Clark 1979). A Class I for the Lewistown BLM District was published in 1983 (Ruebelmann 1983). At that time the Lewistown District included all of Daniels, Roosevelt, Sheridan, and Valley counties. The former three counties and a portion of Valley Count now form the northeast corner of the Miles City Field Office RMP project area. The 1979 (Clark) Class I for the Miles City District was revised and updated in 1988 (Deaver and Deaver 1988). The 1988 Class I did not include any of Daniels, Roosevelt, Sheridan, or Valley counties and focused on Montana lands south of the Missouri River where the bulk of BLM ownership occurs.

The 1988 Class I by Deaver and Deaver (1988) is a very well-written and theory-based document as well as a statistical source for prehistoric archaeological sites in southeastern Montana. This Class I was however restricted to archaeological sites, for the most part prehistoric properties, and did not include historic sites or paleontological sites. The Class I presented herein is intended as an update and addendum to the seminal report by Deaver and Deaver (1988). Because of the obvious significance of geology to paleontological resources, the geology section in this report is more detailed than that presented in the 1988 Class I. Some environmental background sections in the updated

Class I herein contain either more detail or changes from those in the 1988 Class I. Since the 1988 Class I was prepared, the “environmental matrix” in which archaeological sites occur, in local to regional contexts, has played an increasing role in interpreting past lifeways of Pre-contact peoples of North America. Thus the environmental setting (physical and biotic) for the Miles City Field Office planning unit was “fleshed out” some in this new Class I update. Rather than restate some of the more static elements of local and regional archaeology, readers of this update will be occasionally referred to the Deaver and Deaver (1988) volume.

Legislation History and Management Considerations

Cultural Resources Legislation

The term “cultural resources” is a broad term created by agency archaeologists in the 1970s to equate their work with natural resource management (King 1998). Since then, the term “cultural resources” has become ensconced in publications, environmental documents, and agency guidelines (although not in federal law). “Cultural resource” has come to mean a number of different things, but is essentially a very inclusive term referring to objects, sites, places, institutions, values, beliefs, customs, traditions, symbols, and social structures. Cultural resources can be defined as those parts of the natural and built physical environment that have cultural value of some kind to some sociocultural group (King 1998; Lynch 1972; Rapoport 1983). The group can be a community, a neighborhood, tribe, etc. Cultural resources also include the non-physical environment of social institutions, beliefs, and practices.

Several federal laws, implementing regulations, Executive Orders, policies, and guidelines that deal with cultural resources have been enacted through the years beginning with the Antiquities Act of 1906. This law gave the federal government and federal officials the responsibility of protecting archaeological sites as public resources. Subsequent federal acts were passed in part because of the failure of the Antiquities Act to adequately protect archaeological and historic sites.

The Historic Sites Act (HSA) of 1935 established a national policy for preserving historic resources for public use. This act gave the Secretary of the Interior “the power to make historic surveys, and to document, evaluate, acquire and preserve archaeological and historic sites across the country” (Montana SHPO-MHS 2001:1). The HSA is generally superseded by later law, but is politically important because it established the National Park Service as the government’s primary historic preservation advocate (King 1998). The National Park Service publishes the guidelines (issued as Bulletins) for identifying and evaluating historic properties, including archaeological sites and traditional cultural properties (TCP). Traditional cultural properties are districts, sites, buildings, structures, or objects that are valued by a human community for the role the property plays in sustaining the community’s cultural integrity. Traditional cultural properties often have a long history of use, and are associated with beliefs, customs, and practices of modern communities. Oral histories documenting the roles of these properties or resources in traditional cultural values have often been passed down through

generations. Generally, a TCP is a place that figures in important community traditions or in culturally important activities, and may be eligible for inclusion in the National Register.

In 1947, the National Council for Historic Sites and Buildings was organized to include members of the American public as well as representatives of the National Park Service and others interested in historic preservation (Montana SHPO-MHS 2001). Organization of the council was followed in 1949 by the establishment of the National Trust for Historic Preservation, which “was charged with facilitating public participation in historic preservation and was empowered to receive donations of sites, buildings and objects significant in American history as well as to administer gifts of money, securities and other property for carrying out a preservation program” (Montana SHPO-MHS 2001).

The 1966 National Historic Preservation Act (NHPA) established the Advisory Council on Historic Preservation (ACHP) as an independent federal agency to advise the President and Congress on matters involving historic preservation. The ACHP was authorized to review and comment on all actions, permitted by, licensed by, directed by, or undertaken by the federal government that will have effect on cultural resources. Subsequent amendments to the NHPA and the issuance of statutes and directives continued through the 1990s. Eventually a system of State Historic Preservation Offices (SHPOs), headed by a State Historic Preservation Officer, was established with federal assistance to aid in administering the many aspects of the NHPA on a local and state level. The law and subsequent amendments also provided for American Indian Tribes to set up their own Tribal Historic Preservation Offices (THPOs).

The National Historic Preservation Act (NHPA) requires agencies to consider the effects of their actions on historic properties, including archaeological resources. This law created the National Register of Historic Places, which is a listing of sites considered important to our past. Significance of a cultural resource is equated to a site/resource being eligible for listing in the National Register. Historic properties are defined in NHPA as “any prehistoric or historic district, building, structure or object included in, or eligible for inclusion on the National Register (of Historic Places), including artifacts, records, and material remains related to such a property...” (NHPA Sec. 301[5]). As mentioned above, this law requires federal agencies and recipients of federal assistance and permits to identify and manage historic properties through a process detailed in Section 106 of NHPA. The law also defines the roles of the ACHP, the SHPO, and the THPO.

The National Environmental Policy Act (NEPA) of 1969 requires agencies to consider project impacts on all kinds of cultural, as well as natural, resources. Impacts associated with various alternatives are addressed and various factors (economic, environmental, and cultural) are balanced in determining the preferred alternative. Generally, NEPA documents (Environmental Assessments and Impact Statements) address potential effects to cultural resources by stipulating compliance with Section 106 of the NHPA (and as amended).

Details for implementing previous cultural resource laws and directives more focused on federal lands were provided by Executive Order 11593 of 1971 and by the Federal Land Policy and Management Act of 1976.

The 1979 Archaeological Resources Protection Act (ARPA) established major criminal and civil penalties (including fines, confiscation of property, and prison terms) for violators of the 1906 Antiquities Act. The act prohibits unauthorized excavation, removal, or damage to archaeological resources including sites, ruins, artifacts, bones, etc., that are at least 100 years old. This law established a permitting procedure wherein archaeologists or historians document their academic credentials and explain their reason for investigating cultural resources. Amendments made to ARPA in 1988 simplified prosecutions and required federal agencies to undertake archaeological surveys and to develop and expand public education programs related to archaeological resources.

The American Indian Religious Freedom Act (AIRFA) requires the federal government to consider impacts to Indian tribes' free exercise of traditional religion. This law deals with the practices of a religion as well as the places and objects used in those practices. While the National Historic Preservation Act generally does not apply to cultural resources that are less than 50 years old, AIRFA does address impacts to recent and contemporary practices and places. A Sun Dance lodge or vision quest site built or used just a few years (or days) ago, for example, are cultural resources that could be AIRFA issues.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 requires federal agencies and museums to inventory human skeletal remains in their collections, and offer to repatriate Indian ancestral human remains and cultural items to tribes that can show cultural affiliation to them. This law also protects marked and unmarked Indian graves on public lands. This protection extends to associated and unassociated grave goods of cultural importance. The act also regulates excavation of such remains on federal and Indian land.

Executive Order 13007 was enacted by President Clinton in 1996 and deals with Indian sacred sites on federal and Indian land. The EO encourages agencies to avoid damage to sacred sites and to avoid limiting access to them by tribal traditional practitioners. This EO does not require a "sacred site" to be an historic property in order to merit consideration.

Cultural Resources Management and Evaluation Issues

The cultural resource laws and legislative mandates discussed above have been essentially incorporated into the BLM 8100 Series manuals and Handbook H-8110-1, and other internal agency directives, for Montana, North Dakota, and South Dakota. BLM cultural resources management and considerations follow the NHPA (and implementing regulations associated with this act) found at 36 CFR Part 800. Part 800 of these regulations discusses Title 1-Section 106 of the NHPA. Compliance with Federal cultural resource laws has come to be known as "the 106 process" or "Section 106 process". Under the National Programmatic Agreement in Montana, a state specific

protocol has been established to further guide compliance with the NHPA. This agreement establishes the requirements and defines the working relationship between the Montana BLM and the Montana SHPO (Montana BLM Handbook H-8110-1).

The foundation for cultural resource management is identifying the resource and determining its significance (i.e. National Register of Historic Places eligibility). All potential historic properties, including traditional cultural properties, are evaluated by a set of criteria established by the National Park Service. Historic properties are determined to be significant and eligible for inclusion in the National Register if they meet one or more of the following criteria (USDI-NPS Bulletin 15):

- a. they are associated with events that have made a significant contribution to broad patterns of our history; and/or
- b. they are associated with the lives of persons significant in our past;
- c. they embody distinctive characteristics of a type, period, or method of construction that represents the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;
- d. they have yielded, or may likely yield, information important to prehistory or history

Guidelines for applying criteria of significance are provided by both the National Park Service (Bulletin 15) and by the Montana BLM.

If sites do not meet the criteria of eligibility for the National Register of Historic Places after consultation with the appropriate parties, Section 106 of NHPA stipulates no further consideration of cultural resources is necessary and the undertaking may proceed. If a site meets any of these criteria, a permitting or managing agency is required by Section 106 to determine the effect of the proposed action on the site.

The BLM has developed another cultural resource management procedure that involves allocating use categories to a historic property. Determining the appropriate use involves a level of site evaluation. The BLM considers significance evaluation and use evaluation as complementary and suggests they should be part of a single, integrated evaluation process (Handbook H-8110-1).

A finding of non-significance does not exclude a BLM cultural property from being assigned a use category and does not preclude long-term management of the property. BLM Handbook H-8110 states “the characteristics and values which make a property eligible or not eligible for the National Register should serve as a basis for assigning the property to use categories and determining how the property should be managed in accordance with its potential uses”. Handbook H-8110 presently lists 6 use allocations: 1) scientific study, 2) conservation for future use, 3) traditional use, 4) public

use, 5) experimental use, and 6) discharged from management. Guidelines are also presented in the handbook.

As an agency that is responsible for an integrated multiple-use approach to land management, the BLM has included cultural and paleontological resources in developing overall resource management plans (RMPs). A variety of natural resources and related factors, including air quality, hazardous materials, lands and realty management, fluid mineral resources (oil and gas), coal resources, other mineral resources, recreation, social and economic factors, soil and water resources, vegetation, fish and wildlife, and visual resources, are considered in RMPs. Obviously these resources and issues are part of a system where management, development and use of any single resource may affect the quality and values of another resource (or resources). Class I cultural resource inventories are considered to be important tools in developing comprehensive RMPs. Class I overviews are also important tools for BLM cultural resource specialists who develop guidelines and regulations for management of, and protection of, cultural resources. Paraphrasing Deaver and Deaver (1988: 1), Class I inventories can “provide a framework for determining site significance”, can “serve as a basis for designing sample survey strategies”, can “assist in the preparation and evaluation of mitigation plans for significant sites”, can provide background data for planning purposes and environmental assessment documents”, and can “contribute to a management framework for determining most appropriate use for cultural resources”. Class I inventories can also be valuable to private and academic sector archaeologists and historians who carry out cultural resource compliance projects on public lands or who have research interests on public lands.

Paleontological Resources Legislation

Paleontological resources are the fossilized remains, traces, or imprints of organisms that have been preserved in a geologic context. Bureau of Land Management Manual Section 8270 and Handbook Section H-8270-1 provide uniform policy and direction for the agency’s Paleontological Resources Management Program (Bureau of Land Management 1998a, 1998b). Federal legislation that offers some protection to fossils includes: Antiquities Act (1906), National Environmental Policy Act (1969), Federal Land Policy and Management Act (1976), Archaeological Resources Protection Act (1979), and Federal Cave Resources Protection Act (1988). The latter two target illegal destruction or collection of fossils, but are limited in scope. The Archaeological Resources Protection Act only applies to fossils found in an archaeological context, and the Federal Caves Resources Protection Act protects paleontological resources from significant caves. Part 43 CFR8365: Rules of Conduct on Public Land of the NHPA also discusses regulations for collection of fossil plants and invertebrates on public lands.

Beginning in the 1980s, several bills relevant to paleontological resources on federal lands were introduced in the U. S. Congress. Senate Bill (SB) 1569 (1983) proposed opening federal lands to commercial collection of fossils (although fossils collected on public land would remain public property). SB 3107 (1992) proposed protection of fossils on federal lands in a manner similar to the treatment and

consideration of archaeological remains on federal land. In 1996, SB 2943 proposed opening federal lands to commercial collection of fossils.

In 1998, the U. S. Senate requested that the Secretary of the Interior prepare a study that would provide advice on management of fossils on federal lands. Preparation of this report involved all relevant U. S. Department of the Interior agencies (i.e., Bureau of Land Management, Bureau of Indian Affairs, Bureau of Reclamation, U. S. Fish and Wildlife Service, National Park Service, U. S. Geological Survey), the USDA Forest Service, and the Smithsonian Institution (U. S. Department of the Interior 2000). This study also provided opportunity for public comment. Recommendations from this report were incorporated into the Paleontological Resources Preservation Act, the purpose of which was to establish a comprehensive national policy for preserving and managing paleontological resources on Federal lands. In 2003, this proposed legislation was introduced as parallel bills in the Senate and the House of Representatives (SB 546; HB 2416). The Paleontological Resources Preservation Act was passed unanimously by the Senate, but was not acted upon by the House of Representatives. This bill was reintroduced in the 109th Congress as SB 263 and is scheduled for debate on the Senate's calendar of business (as of March 11, 2005).

Paleontological Resources Management and Evaluation Issues

The Bureau of Land Management (BLM) identifies the following use or value categories for paleontological sites: scientific, educational, and recreational (Bureau of Land Management 1998a, 1998b). BLM permit requirements emphasize the scientific value of vertebrate remains. In conjunction with their scientific use, some educational uses of vertebrate fossils are appropriate. For example, many BLM Paleontological Resources Use Permit holders involve students during data collection, specimen recovery, and preparation. Federally owned fossils can also be used in exhibits or as teaching aids. Given that vertebrate fossils are federal property whether in situ or in a museum collection, recreational collection of vertebrate fossils is never appropriate. Fossils on BLM land that are available for recreational collecting by the general public include invertebrates and plants: "The great majority of the fossil record — invertebrates, plants and petrified wood — is available for the enjoyment of hobbyists, school groups and the general public" (U. S. Department of the Interior 2000:39). Some fossilized invertebrates and plants are rare or exceptionally preserved, and in these cases it would be preferable to somehow restrict recreational collecting. However, under the current permitting scheme it may not be possible to limit recreational use to sites where common species of invertebrate and plant remains are abundantly preserved. However, the BLM can, through its land use planning (RMP) process, designate areas of rare or unique fossils as an Area of Critical Environmental Concern (ACEC). For invertebrates and plants, 'reasonable amounts' may be collected from BLM land 'for personal use' (see Part 43 CFR8365). For petrified wood, which is categorized by the BLM as mineral material, the recreational use restrictions are as follows: up to 25 pounds per day per person plus one piece, not to exceed 250 pounds per year, for noncommercial use (U. S. Department of the Interior 2000). The recreational and educational values of selected collecting areas can be enhanced by development of interpretive trails and guides (Bureau

of Land Management 1998a). However, it is important that statements regarding the illegality of collecting vertebrate remains without a permit be included.

One existing paleontological overview is available for parts of Garfield and McCone counties, and was compiled by William A. Clemens for the Bureau of Land Management in 1980 (Clemens 1980a, 1980b). This overview includes the following information: geologic history; vertebrate paleontology of the formations in the study area; a description of the field of vertebrate paleontology; definition of fossils, their significance, and their vulnerability; history of exploration; management recommendations; testing and evaluation of paleontological survey methods; and locality data and maps for University of California Museum of Paleontology (Berkeley) sites on federal land. In addition, a few project-specific inventories have been conducted by consulting paleontologists. These include paleontological inventories of a pipeline corridor through Powder River, Carter, and Fallon counties (Hager and Hooker 1985), and a land exchange in northeastern Garfield County (Harksen 1981). Additionally, there have been paleontological inventories for more recent pipeline projects (e.g. Grasslands in Carter, Powder River, Fallo, and Wibuax Counties). These projects also include a monitoring report. Some coals mining companies have also had paleontological reports prepared from some of their mines in Montana. The objectives for the present Class I Overview of Paleontological Resources are to provide the following: 1) a summary of the different types of fossils and fossil-bearing units that occur in the project area; 2) information on how fossils are distributed by county and by geologic formation; 3) a framework for determining use or value categories for paleontological resources; 4) guidelines for determining site significance; 5) information regarding development of paleontological sensitivity ratings for formations; and 6) background information for BLM decision-making, environmental assessments, and mitigation plans.

Presently there are no significance criteria or definitions that are widely accepted or used by both the scientific community and agencies. However, various definitions and methodologies have been proposed and utilized through the years. First of all, several different sources state that all vertebrate remains are significant (Hanson 1979, citing memorandum dated November 29, 1978, from Acting Associate Director of the Bureau of Land Management, Grissold E. Petty; Society of Vertebrate Paleontology n.d.; USDA Forest Service 2001). By this definition, even an isolated, unidentifiable bone fragment would be considered significant. Although this approach circumvents the whole issue of how to define a site, it seems unnecessarily broad in scope.

Several researchers have utilized the concepts of significance and sensitivity in their analyses, although the assessments have been determined in different ways. After field testing of methods that are statistical and intended to be “objective,” Clemens (1980a) concludes “...that the quest for an absolutely objective measure of paleontological resources is not a reasonable goal” (1980a:43). The difficulty in creating an objective method arises from the numerous variables involved. Hanson (1979) even supplies a mathematical equation for determining significance based on uniqueness, diversity of information, and quantity of information. Although this approach is cumbersome and highly time-consuming, some of its founding ideas should be retained,

and these are discussed below. After discarding the statistical, objective methods, Clemens (1980a) goes on to recommend the following procedures for evaluating the paleontological resources in a given project area: (1) project direction and final report writing should be done by a qualified vertebrate paleontologist, but field crews can include students of paleontology; (2) geologic and topographic overviews for the inventory area should be prepared before the field work occurs; (3) prospecting and collection of a sample of fossil material should be similar to the manner employed by university and museum field parties; (4) collected material should be identified and faunal lists compiled; and (5) significance of a locality or group of localities should be ascertained by ranking uniqueness, diversity, and quantity. For clarity, Clemens' original significance category descriptions are included here.

Uniqueness is judged in relation to what we already know or can reasonably expect to determine elsewhere. Some kinds of fossils have 'built-in' uniqueness either because the organisms they represent were rare, or their life environments or physical makeup did not favor their preservation as fossils. Geological formations representing unfavorable preservational environments will contain relatively few fossils, but those that are found will be particularly important. Because of this reciprocity between uniqueness and quantity, the paleontological significance of an area cannot be predicted solely on the basis of known productiveness of the area's geologic formations.

Greater diversity in the number of kinds of information available in a given area increases its paleontological value.

As the quantity of fossils of a given species increases, we are able to improve knowledge of the variability of the organism. If several species are present, greater numbers of specimens improve the statistical base for studies relating to the ecology of ancient communities. Unlike increasing diversity, successive increases in the quantity of fossils of a given kind contribute proportionately smaller amounts of new information. (Clemens 1980a:8).

Hanson (1979) evaluates fossil potential and locality significance in order to determine paleontological sensitivity. In ideology, this approach parallels that devised independently by the author (e.g., Hanna 2004), although Hanson (1979) employs a mathematical equation for determining significance. In addition, Hanson (1979) provides a graph for determining sensitivity based on fossil potential and significance. Generally speaking, his sensitivity ratings are comparable to the scheme created by the author, which is described below in the Paleontological Resource Sensitivity Rating section and presented in Table 1.

The USDA Forest Service, which considers all vertebrate remains to be significant, formed a Paleontological Advisory Group (Forest Service, University of Wyoming, Bureau of Land Management, and others) that devised and tested the application of probability classes to formations and sensitivity rankings to localities (USDA Forest Service 2001). The "Locality Sensitivity Ranking" is based on the

arithmetic mean of the following four factors that are rated from 1 (lowest) to 5 (highest): scientific significance of specimens and their context at the site; “Fossil Yield Potential Classification” of the geologic unit; value for educational, interpretive, and/or recreational opportunities; and risk of resource degradation. Fossil Yield Potential Classifications correspond to geologic formations and can be illustrated on maps, which are useful for planning purposes and decision-making by non-specialists in the agency and consulting paleontologists (USDA Forest Service 2001). This approach has been applied in Alberta, Canada, which produced a map that shows paleontological resource sensitivity zones, whereby “[z]onation depicts degrees of potential palaeontological sensitivity to land surface disturbances” (Alberta Culture 1984:map legend).

A classification scheme presented by the Bureau of Land Management in Manual H-8270-1 (1998b) also recommends classifying public lands on the basis of their potential to contain fossils. The three categories are labeled and defined as follows: Condition 1 applies to “[a]reas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils;” Condition 2 is for “[a]reas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils;” and Condition 3 refers to “[a]reas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils...” (1998b:II-3). Although these designations are useful for general planning purposes, they fail to address the issue of significance.

Finally, the Society of Vertebrate Paleontology (SVP) has put together guidelines for assessment and mitigation of adverse impacts to nonrenewable paleontological resources, and by their definition, all vertebrate fossils are significant. The SVP guidelines use the terms “Paleontological Potential” and “Paleontologic Sensitivity,” but unfortunately the descriptions are ambiguous and it remains unclear if these are actually intended to be two separate aspects. Another shortfall is that criteria for determining site significance are not included. The SVP guidelines state that Paleontological Potential is rated as high, low, or undetermined, and defined as “...the potential for the presence of significant nonrenewable paleontological resources” (Society of Vertebrate Paleontology n.d.:5) at a site or in a rock unit, that is “...founded on a review of pertinent geological and paleontological literature and on locality records of specimens deposited in institutions” (Society of Vertebrate Paleontology n.d.:2). On the other hand, Paleontologic Sensitivity is only determined after a field survey, and is based on “...(a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data” (Society of Vertebrate Paleontology 2004:2). By this definition, application of a paleontological sensitivity designation necessitates a field survey, which is an unfeasible requirement for preliminary project planning. Even so, the guidelines do recommend development of maps, “...which suggest sensitive areas and units that are likely to contain paleontological resources...and form the bases for preliminary planning decisions” (Society of Vertebrate Paleontology n.d.:2).

Over the past 15 years or so, the values of paleontological resources have moved well beyond what had been seen as chiefly scientific and academic. Sale of several “high-profile” dinosaur specimens brought notoriety to the potential economic value of paleontological specimens. Many believe that the impetus behind the sky-rocketing cash value of rare and relatively complete specimens, is the public’s “obsession” with dinosaurs and the world they lived in. The mass media, including the film industry, have fueled the public’s interest in paleontology with television specials, Hollywood movies, and major magazine articles. Whatever the driving force behind public interest in paleontology, the end result is that a significant part of the population is willing to support institutions involved in fossil recovery and research. The development of “eco-tourism” and “sci-tourism” demonstrates that many adults and their children are willing to pay for the opportunity of participating in fossil recovery and research. In Montana local communities have capitalized on this interest and have developed their own museums and programs that provide for volunteer and purchased opportunities and experiences. Such opportunities are of obvious economic benefit to communities, particularly small towns.

Considering the potential economic value of paleontological specimens to a variety of sectors, it is no surprise that competing interests have developed. More than at any time in history, the protection and management of paleontological resources is necessary. There is no existing Class I paleontological inventory for the Miles City Field Office. The objective for developing a Class I overview is to provide a baseline management tool and to establish standards for recording and evaluating paleontological resources.

Paleontological Resource Sensitivity Rating

Given that the previous examples contain varying and sometimes ambiguous methods and terms, the following paleontological resource sensitivity approach is employed. Although this method has been utilized during several projects (e.g., Brumley et al. 2001; Hanna 2004), it is still under revision. Necessary modifications and minor adjustments are revealed by its continued application. New data and publications may also necessitate changes to previously assigned ratings.

A paleontological resource sensitivity rating can be assigned to each mappable geologic unit and is based on the intersection of two attributes: the potential of the unit to contain fossils (i.e., fossil potential), and the probability that those fossils would be considered significant (i.e., significance probability) (Table 1). These fossil predictions are based on a synthesis of information derived from literature review, file searches with land managers, and institution locality and collection records (when available). Depending on the stage of the project, a field inventory may also contribute data to these determinations. Recommended mitigation measures can be defined on the basis of paleontological resource sensitivity ratings and known locality distribution.

The potential of each geologic unit or formation to contain paleontological remains should be based on fauna and flora reported to occur within and/or proximal to the project area. Note that it is possible for a particular geologic unit to have different sensitivity ratings in different geographic locations. Although almost all sedimentary units have at least some potential for preservation of paleontological resources (Lyman 1994), the fossils may or may not be rare and critical to scientific research (i.e., significant). Thus, a separate determination of significance probability is necessary. For example, many geologic units have a low potential for presence of fossils, but a high probability that those remains, if discovered, would be significant. In consultation with SHPO, a set of guidelines for evaluation of significance and integrity of paleontological resources in Montana has been compiled, but is preliminary and should be subjected to more rigorous testing and peer review (see below). The fossil potential and significance probability are each ranked as low, moderate, or high, and the intersection of these two attributes is used to assign the paleontological resource sensitivity rating using the relationships defined in Table 1.

It is important to emphasize that the paleontological resource sensitivity rating is only an estimate, and although it is useful as a predictive planning tool, it should not preclude field inventories. In addition, assignment of a low or moderate sensitivity rating to a formation does not mean that significant paleontological resources will not be encountered. Finally, a previously designated sensitivity rating could be altered by the discovery of new fossil material or publication of new data.

Table 1. Paleontological Resource Sensitivity matrix showing the relationship between the potential for a particular geologic unit to contain fossil material (Fossil Potential) and the probability that the fossil material would be considered significant (Significance Probability).

		SIGNIFICANCE PROBABILITY		
		LOW	MODERATE	HIGH
FOSSIL POTENTIAL	LOW	<i>Low</i>	<i>Moderate</i>	<i>Moderate</i>
	MODERATE	<i>Low</i>	<i>Moderate</i>	<i>High</i>
	HIGH	<i>Moderate</i>	<i>Moderate</i>	<i>High</i>

Guidelines For Determining Significance And Integrity Of Paleontological Resources

Paleontological remains are defined by the Montana Antiquities Act, as amended (1995), as “...fossilized plants and animals of a geological nature found upon or beneath the earth or under water which are rare and critical to scientific research.” Significance is defined as the estimation of scientific or educational importance of paleontological materials under the National Environmental Policy Act (1969) and the Federal Land Policy and Management Act (1976). The following guidelines also address paleontological resource management information presented in several federal documents (Bureau of Land Management 1998a, 1998b; U.S. Department of the Interior 2000; Kuntz et al. 1989). Fossil resources that meet significance Criteria i and ii may also be considered significant under the National Historic Preservation Act (NHPA) as amended (2001) (i.e., see significance Criterion iii). Once significance is established, integrity (i.e., the ability of the site to convey scientific, educational, or historical values) is evaluated.

SIGNIFICANCE

I. Materials Inventoried

A) Vertebrate material

- i. cranial material (i.e., partial or complete skull and/or jaw)
- ii. articulated or complete (>25%) skeleton
- iii. concentration of vertebrate material
- iv. unique or rare occurrence, including vertebrate trace fossils
- v. intimate association with paleoenvironment
- vi. coprolite(s)
- vii. egg(s)

B) Invertebrate material

- i. good-excellent preservation of shell material
- ii. concentrations of diverse material
- iii. unique or rare occurrence, including certain trace fossils
- iv. intimate association with paleoenvironment
- v. important stratigraphic marker

C) Plant material

- i. well preserved plant material
- ii. petrified wood
- iii. fossil stump(s)
- iv. intimate association with paleoenvironment
- v. important association of fossil plant and animal materials
- vi. coprolite(s)

II. Research or Education Potential

- A) material contributes to faunal or floral lists
- B) material significantly contributes to the systematics of group(s) collected
- C) material contributes to knowledge of the functional anatomy of the organism
- D) material contributes to knowledge of biostratigraphy, biogeography, paleoecology, paleoenvironment, and/or phylogeny
- E) material contributes to taphonomic analysis
- F) material contributes to a potential museum exhibit or educational activity

III. Eligible for the National Register of Historic Places under Criteria A or B

- A) Association with an event that has made a significant contribution to the broad patterns of our history. Refer to Section 106 regulations, 36 CFR Part 800, of the NHPA, as amended (2001).
- B) Association with the lives of persons significant in our past. Refer to Section 106 regulations, 36 CFR Part 800, of the NHPA, as amended (2001).

INTEGRITY

I. Site retains the ability to convey values that make it significant (e.g., site continues to produce important fossil material)

II. If the site is important for its association with an event, historical pattern, or person(s), and is potentially eligible for the National Register of Historic Places, it should retain some combination of the aspects of integrity (i.e., location, design, setting, materials, workmanship, feeling, association). Refer to Section 106 regulations, 36 CFR Part 800, of the NHPA, as amended (2001).

Project Areal and Temporal Limits

The study area is defined by contract and includes all lands, federal, state, and private, within the boundaries of the Miles City Field Office administrative unit (Figure 1). This includes all of Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, Valley, and

Wibaux counties, and parts of Big Horn and Valley counties. The project area encompasses about 45,420 square miles or 29.1 million acres.

Legal description for the portion of Big Horn County included in this overview is as follows:

T1N, R38E, Sections 1-4, 9-16, 21-28, 33-36;
T1N, R39E, Sections 19-21, 28-33;
T1S, R38E, Sections 1-2, 11-14, 23-26, 35-36;
T1S, R39E, Sections 4-9, 16-21, 28-33;
T2S, R38E, Sections 1-2, 11-14, 23-26, 35-36;
T2S, R39E, Sections 4-36;
T2S, R40E, Sections 7-36;
T3S, R38E, Sections 1-2, 11-14, 23-26, 35-36;
T3S, R39E, Sections 1-36;
T3S, R40E, Sections 1-36;
T4S, R38E, Sections 1-2, 11-14, 23-26, 35-36;
T4S, R39E, Sections 1-36;
T4S, R40E, Sections 1-36;
T5S, R38E, Sections 1-2, 11-14, 23-26, 35-36;
T5S, R39E, Sections 1-36;
T5S, R40E, Sections 1-36;
T6S, R38E, Sections 1, 12-13, 24-25, 36;
T6S, R39-40E, Sections 1-36;
T7S, R38E, Sections 1, 12-13, 24-25, 36;
T7S, R39-40E, Sections 1-36;
T8S, R38E, Sections 1-2, 11-14, 23-26, 35-36;
T8S, R39-44E, Sections 1-36;
T9S, R38E, Sections 1, 12-13, 24-25, 36;
T9S, R39-44E, Sections 1-36;
T10S, R38E, Section 1;
T10S, R42E, Sections 1-6; and
T10S, R43E, Sections 1-6.

Legal description for the portion of Valley County included in this overview is as follows:

T33N, R39E, Sections 11-13, 24-25, 36;
T33N, R40E, Sections 7-36;
T33N, R41E, Sections 7-36;
T33N, R42E, Sections 7-36;
T33N, R43E, Sections 7-36;
T32N, R40E, Sections 1-4, 10-15, 23-26, 35-36;
T32N, R41-45E, Sections 1-36;
T31N, R40E, Sections 1-2, 11-13, 24-25;
T31N, R41-45E, Sections 1-36;

T30N, R41E, Sections 1-5, 9-16, 21-28, 33-36;
T30N, R42-45E, Sections 1-36;
T29N, R41E, Sections 1-4, 9-16, 21-28, 34-36;
T29N, R42-45E, Sections 1-36;
T28N, R41E, Sections 1-2, 11-14, 23-25, 36;
T28N, R42-45E, Sections 1-36;
T27N, R42E, Sections 1-5, 8-15, 22-28, 33-36;
T27N, R43-45E, Sections 1-36;
T26N, R42E, Sections 1-4;
T26N, R43E, Sections 1-8, 11-14;
T26N, R44E, Sections 1-7, 9-10, 12, 15-16; and
T26N, R45E, Sections 1, 13, 15-17.

Paleontological and cultural resources are considered to be part of the surface estate (Bureau of Land Management 1998b). However, the Bureau of Land Management owns a significant amount of subsurface mineral estate in areas where they do not own the surface. Any actions approved by the Bureau of Land Management that involve surface disturbances require appropriate resource consideration, regardless of the surface estate owner (Bureau of Land Management 1998b).

The BLM requested that cultural and paleontological sites on private land, state land, and other federal agency land be considered in this Class I overview. In part, this request was made to reduce any analytical, theoretical, and methodological biases that could result from study of an areal sample (e.g. BLM land exclusively) that was too small to be representative of the nature and context of cultural and paleontological resources of the much larger area represented by non-BLM lands within the Miles City Field Office unit. This request for including non-BLM lands in the Class I was also made because of the potentiality of circumstances where ownership of the surface and subsurface estate is split, as described in the preceding paragraph.

Several land ownership types have been excluded from the paleontological resources overview by special request, including tribal lands and U. S. Fish and Wildlife Service lands. The Bureau of Indian Affairs and the tribes have concerns about keeping specific fossil locality information confidential, and have requested that the Fort Peck and Northern Cheyenne reservations be excluded from this overview (Marv Keller, personal communication, February 25, 2005). This excludes portions of Valley, Daniels, Sheridan, Roosevelt, and Rosebud counties. Likewise, the U. S. Fish and Wildlife Service has requested that lands they own be excluded from this overview (Bill Berg, personal communication, May 9, 2005). This includes the Charles M. Russell National Wildlife Refuge along the Missouri River (portions of Garfield and McCone counties in the study area), the Medicine Lake National Wildlife Refuge (southern Sheridan County), and several small Waterfowl Production Areas in northeastern Montana (Sheridan, Daniels, and Roosevelt counties). The Lamesteer National Wildlife Refuge in Wibaux County is included, since it is private land with a U. S. Fish and Wildlife Service easement for water impoundment (Mike Rabenberg, personal communication, May 10, 2005).

Cultural resources on tribal lands are included in the cultural overview but the BIA requested that locations be restricted to township and range or to simply within the boundaries of the Fort Peck and Northern Cheyenne Reservations. Sites in off-reservation Turtle Mountain Allotments in Carter County, Roosevelt and other northern Montana counties are discussed in general terms? The U.S. Fish and Wildlife Service did not specifically request exclusion of cultural resources so historic and archaeological sites on their lands are included in the Class I.

The temporal limits of the Class I are obvious stretching from the distant geologic past to the historic era. Standards established by the National Park Service (National Register Bulletin 15) indicate that a historic site or building must be at least 50 years old to qualify for listing in the National Register of Historic Places (NRHP). Sites, buildings, or features that are less than 50 years old are not categorically excluded from listing in the NRHP, but such resources must be of obvious importance and significance. The Class I cultural resource overview thus covers the period from about 12,000 years ago to about A.D. 1955.

An overall historic context for eastern Montana historic cultural resources has not been developed by any agency or institution. Ages and classes of historic sites are discussed in general terms.