MANAGEMENT CONSIDERATIONS

Statistical Reviews of Precontact/Prehistoric and Historic Site Geographical Distributions, Densities, Ownership, and Survey Acreage

The overall distribution of the 7065 prehistoric sites in the project area by county (Table 28) 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 (Table 28) 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%).

Although it would be valuable to see prehistoric sites and site types broken out by ecological section and sub-sections (as defined in this report), this would involve a very substantial effort and was not preformed for this report. Presently the State Historic Preservation Office GIS capabilities are limited to presenting sections that contain prehistoric sites. We did go to the effort of identifying the distribution of particular site types by section and feel that the visual distributional representations presented on a variety of base maps offer a good impression of general land use patterns.

Evaluating site densities in the project area is a bit of a problem, as first addressed by Deaver and Deaver (1988). Early cultural resource project reports often did not report the actual number of acres surveyed and survey intensity varied during those early years. In using data from the State Antiquities Data Base we encountered another problem associated with multiple county projects. The data base does not break individual county acreages out for projects that exceed three counties in scope (designated "ZZ" or multiple in the data base and on the table below). Many reports that cover multiple counties do not break down project area survey acreage by county but only list total acres surveyed. To determine these acreages in many instances would have required investigation of hard copy documents and attempting to pull the acreages off of report maps. A similar problem exists on the state data base with respect to lead agencies on a project. Sometimes a lead agency does not own all the land involved with a project but it does appear that in some cases all acreage surveyed was assigned to the lead agency ownership. While these acreages do not appear to be substantial, they do affect figures for acres surveyed on lands administered by various agencies and owners. A final factor

affecting figures presented below is determining what projects involved lands with federal mineral estate. We think that factor particularly affected figures for Big Horn and Rosebud Counties where so much coal development has occurred and where a relatively substantial amount of coal-related CRM survey has taken place. Site forms and reports often indicate these "coal land" areas as privately owned when in fact the minerals are in federal estate. Whatever the reason, survey of actual BLM surface acreage for Big Horn County is underrepresented on the state data base and that acreage is probable quite substantial.

Table 28: Total number of recorded Precontact and historic sites within the project area by county.

County	Precontact Sites	Historic Sites	Total
(BH) Bighorn	957	124	**1081**
(CR) Custer	596	195	**791**
(CT) Carter	493	429	**922**
(DN) Daniels	42	49	**91**
(DW) Dawson	253	119	**372**
(FA) Fallon	333	106	**439**
(GF) Garfield	156	146	**302**
(MC) McCone	163	122	**285**
(PE) Prairie	189	150	**339**
(PR) Powder River	1641	233	**1874**
(RB) Rosebud	1301	321	**1622**
(RL) Richland	138	176	**314**
(RV) Roosevelt	263	178	**441**
(SH) Sheridan	318	398	**716**
(TE) Treasure	65	38	**103**
(VL) Valley	80	32	**112**
(WX) Wibaux	77	53	**130**
TOTALS	**7065**	**2869**	**9934**

Even considering these factors we choose to present the acreage figures (Table 29) and suggest that the agency acreage for the USFS, BLM and DNRC may be underrepresented since their lands are often involved in projects with other lead agencies or parties. As mentioned, the BLM administers the federal mineral estate on lands in the project area and acreages in Big Horn, Rosebud, and Powder River may not accurately reflect BLM lands. On the other hand MDOT acreage may be overrepresented since their Class III survey corridors are generally wide enough to encompass a fair amount of lands owned by private parties and other agencies and because gravel pit surveys, often on private lands, fall under the CRM administration of MDOT if those pits are associated with an MDOT project.

Some project area lands have been resurveyed through the years and thus some survey acreage is repeated and could bias total survey acreage in the direction of overrepresentation. However, it is still likely that the figure of 923,849 acres of total survey is a minimum figure and the actual figure for total land surveyed is estimated at about 5-10% greater. Thus about 3.6% of the surface area of the Miles City Field Office planning unit has undergone surficial survey of varying intensity. Even with the

uncertainties with respect to survey acreage on federal mineral estate, the BLM has had more land surveyed than any single agency.

Table 29. Survey Acres by Agency and County ("Other" includes private and a combination of other agencies or no data).

COUNTY	USFS	BLM	BIA	MDOT	DNRC	OTHER	TOTALS
(BH) Bighorn	0	55	12548	502	0	2508	**15613**
(CR) Custer	0	8998	0	2706	1185	23947	**36836**
(CT) Carter	20255	40276	0	2211	884	9391	**73017**
(DN) Daniels	0	129	1000	190	1577	198	**3094**
(DW) Dawson	0	2831	0	2392	465	1218	**6906**
(FA) Fallon	0	30913	0	1146	36	781	**32876**
(GF) Garfield	0	12187	0	2262	3	3007	**17459**
(MC) McCone	0	7273	0	2457	3	1017	**10750**
(PE) Prairie	0	11623	0	820	45	509	**12997**
(PR) Powder River	37292	39573	0	4781	9032	2550	**93228**
(RB) Rosebud	5349	39343	48421	3182	11348	57665	**165308**
(RL) Richland	0	1152	8	3589	22	2807	**7578**
(RV) Roosevelt	0	1245	9691	1221	52	10370	**22579**
(SH) Sheridan	0	242	676	1645	257	3102	**5922**
(TE) Treasure	0	240	870	76	842	475	**2503**
(VL) Valley	0	10	9006	902	7	2215	**12140**
(WX) Wibaux	0	25555	0	278	615	4059	**30507**
ZZ (>3 Counties)	41605	61741	30	1541	4555	12519	**121991**
Multiple	12357	133970	13584	8839	1946	81849	**252545**
TOTALS	**116858**	**417356**	**95834**	**40740**	**32874**	**220187**	**923849**

Because of the problems in determining actual acreage surveyed in each county any site density figures per county could have a substantial error factor because multiple county acreages, not assigned to a specific county, account for 40.5% of all survey acreage. Therefore we will not present individual county site density figures. Figures 79 and 80 below give a good visual impression of the distribution of both Precontact and historic sites within the project area.

The figures presented below give a strong visual impression of the bias of survey coverage and show clearly areas that have experienced far greater survey frequency. Linear arrangements of site-bearing sections generally appear to represent linear survey projects particularly those associated with the MDOT. The above graphics also indicate greater survey acreage on Custer Forest lands in the south part of the project area and on coal lands within the southwestern part of the project area.

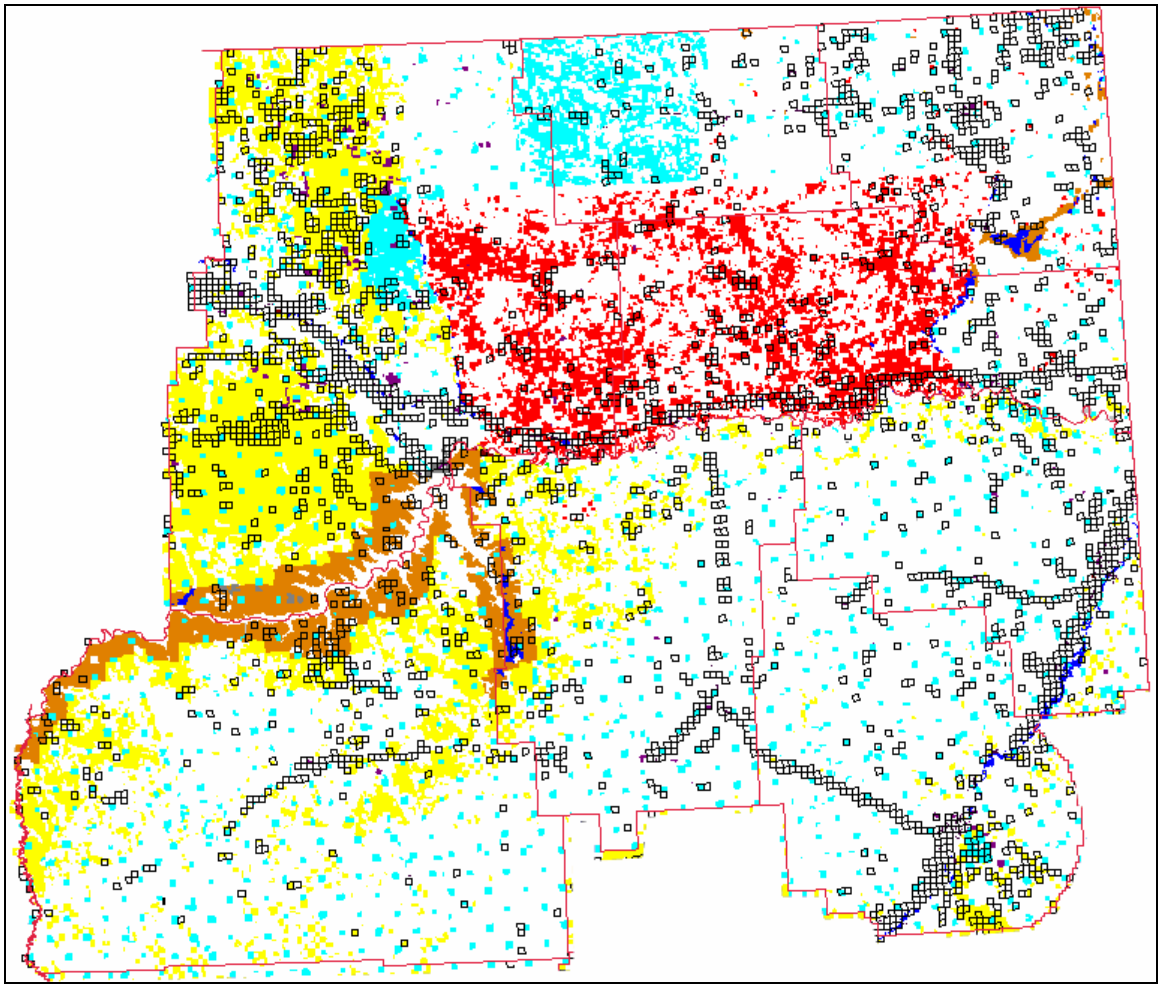

Figure 79: North half Miles City Field Office planning unit showing locations of sections containing Precontact and historic sites overlaid on ownership mosaic.
(Key: red = tribal, green = USFS/USDA, blue = state, yellow = BLM, white = private, purple = local government)

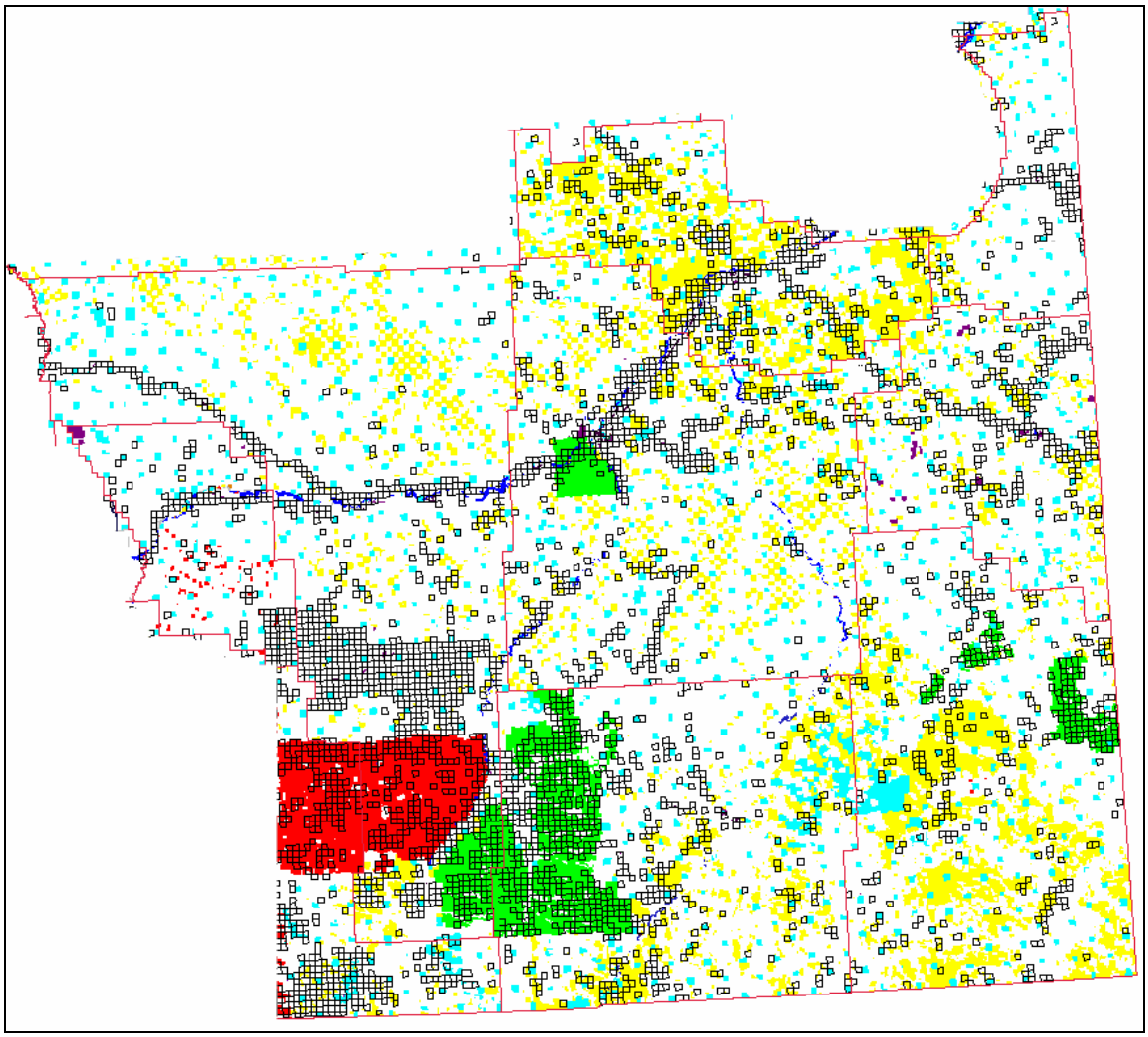

Figure 80: South half Miles City Field Office planning unit showing locations of sections containing Precontact and historic sites overlaid on ownership mosaic.
(Key: red = tribal, green = USFS/USDA, blue = state, yellow = BLM, white = private, purple = local government)

Site density figures for agencies and ownership categories are likely more accurate since they are based on figures derived from site forms, which most often include a line item observation for ownership. This is true for many of the older site forms and projects. However, sometimes permitees on BLM land are listed as owners on some site forms so ownership figures may not be entirely accurate. Site ownership as presented in the table below was determined through use of the state antiquities data base through electronic files provided by the Montana State Historic Preservation Office. Table 30 lists both Precontact and historic sites that are either entirely or partially owned by an agency or other party. Because some sites occur on lands owned by more than one party, numbers presented in the table appear to exceed the total number of sites present in the project area. In reality the table is based on all actual sites within the project area and is an accurate representation of the number of sites owned or administered, entirely or partially, by the represented agencies as listed on the state data base.

Table 30: Number of sites owned entirely or partially by each agency.

SITE TYPE	USFS	BLM & BLM and Other	BIA	MDOT & MDOT Other	DNRC State Owned & Other State Owned	OTHER Private, BOR, SCS, Corps of Engineers, National Wildlife Refuge, Other, No Data, Combination, National Park, Unknown
PRECONTACT	1289	1839	738	25	480	2756
HISTORIC	198	296	71	88	163	2079
TOTAL	**1487**	**2135**	**809**	**113**	**643**	**4835**

The combined ownership category of "Other" includes 4,835 (48.7% of all project area sites) cultural properties under full or partial ownership of any of the listed agencies and owners or owners are unknown. 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.

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. We believe far more sites have been located on MDOT projects but many of those sites, when originally recorded, lay on private land or other agency land. If ownership of these sites were updated following legal acquisition of highway right-of-way, it is likely that MDOT site ownership numbers would go up substantially.

A total of 923,849 acres have been surveyed within the project area. 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. These density figures could be higher if federal mineral estate acreage were added to the BLM total. This may be particularly true in the "coal country" of Big Horn, Rosebud, and Powder River counties where it appears that surface ownership, rather than mineral estate, has been used to determine site ownership. Intensively surveyed areas near coal mines in southeastern Montana have historically been shown to exhibit very high site densities.

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 land under the administration of agencies classified as "Other" 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. 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.

Table 31 presented below shows agency ownership percentages of each individual Precontact site type, as listed on the state antiquities data base. Individual agency percentages could be in error some considering that ownership is unknown for a number of sites. This number is relatively small and would not likely drastically alter the percentage of site types owned by a particular agency. Table 32 below shows the percentage of each Precontact site type that occur within each county encompassed by the project area.

Table 33 below, presents all historic site types listed on the state data base as they are distributed through each county in the project area. This table includes sites listed as "JJ", which designates restricted access to information on the sites. This likely indicates occurrences on reservations and/or BIA and Indian allotment lands; and probably includes other sensitive sites like historic burials. Because a number of historic sites are multi-component (i.e. multiple site types), the numbers on in the table exceed the actual number of historic sites recorded within the project area.

Table 31. Percentage of Precontact site types that occur entirely or partially on listed ownerships.

Site Types	USFS	BLM & BLM and Other	BIA	MDOT & MDOT Other	DNRC State Owned & Other	OTHER Private, BOR, SCS, Corps of Engineers, National Wildlife Refuge, Other, No Data,
Ambush Game Drives	0	11.1	22.2	0	11.1	55.6
Bedrock Quarry	12.5	21.4	5.3	0	3.6	57.2
Buffalo Jump	7.5	12.5	7.5	0	10.0	62.5
Buffalo Pound	0	40.0	0	0	10.0	50.0
Circular Wall	25.0	0	50.0	0	0	25.0
Hearths, Pits, FCR	3.4	41.8	5.5	0.3	6.0	43.0
Fortification Sites	0	0	16.7	0	16.7	66.6
Lithic Scatter	21.6	28.8	7.7	0.3	5.8	35.8
Medicine Wheel	20.0	20.0	0	0	40.0	20.0
Other Kill Sites, Trap, Jump	7.1	21.4	3.6	0	3.6	64.3
Combo. Petro. and Picto.	0	42.9	14.2	0	0	42.9
Petroglyph	33.3	13.2	15.5	0	2.3	35.7
Pictograph	30.0	10.0	10.0	0	0	50.0
Pits, Eagle Catching,	25.1	8.3	8.3	0	8.3	50.0
Processing Area	15.0	10.0	5.0	0	10.0	60.0
Rock Alignments	20.8	13.2	19.8	0	7.5	38.7
Rock Cairns	17.0	14.3	24.8	0.7	8.8	34.4
Rock Piles	1.5	16.2	10.3	0	13.2	58.8
Rock Shelter or Cave	28.6	11.3	3.8	0	6.3	50.0
Rock Structures	25.4	7.5	22.4	0	1.5	43.3
Surface Stone Quarry	24.8	8.4	6.4	3.5	8.4	48.5
Tipi Ring	8.1	18.0	18.9	0	12.7	42.2
Trail	0	0	16.7	0	0	83.3
Vision Quest	23.6	0	17.6	0	5.9	52.9
Workshop	10.3	19.9	10.3	0.7	2.2	56.6

Table 32. Percentage of Precontact site types (as listed on state data base) that occur in each project area county.

Site Types	BH	CR	CT	DN	DW	FA	GF	MC	PE	PR	RB	RL	RV	SH	TE	VL	WX
Ambush Game Drives	66.7	0	0	0	0	0	0	0	0	11.1	11.1	11.1	0	0	0	0	0
Bedrock Quarry	10.9	14.5	5.5	0	1.8	0	0	1.8	1.8	16.4	40.0	3.6	0	1.8	0	0	1.8
Buffalo Jump	12.8	5.1	7.7	0	2.6	0	12.8	5.1	2.6	10.3	23.1	7.6	5.1	2.6	0	2.6	0
Buffalo Pound	0	10.0	0	0	10.0	0	0	10.0	10.0	20.0	30.0	0	10.0	0	0	0	0
Circular Wall	0	0	25.0	0	0	0	0	0	0	0	25.0	25.0	0	0	0	25.0	0
Fire hearths or Roasting Pits, FCR	5.8	9.2	9.4	1.1	4.1	10.1	5.6	3.2	5.6	10.8	19.3	1.6	1.8	1.6	6.5	2.7	1.6
Fortification Sites	60.0	0	0	0	0	0	20.0	0	0	0	0	0	0	0	0	0	20.0
Lithic Scatter	14.4	10.1	5.3	0.1	4.5	4.5	2.0	1.6	3.2	28.8	19.2	1.5	0.5	2.1	0.5	0.4	1.3
Medicine Wheel	0	0	40.0	0	0	0	0	20.0	0	0	0	0	0	40.0	0	0	0
Other Kill Sites with Trap or Jump	18.5	14.8	7.4	0	3.7	0	0	7.4	0	22.2	11.1	3.8	0	11.1	0	0	0
Petro./Picto. Combo	0	0	0	0	0	0	0	0	0	0	100.0	0	0	0	0	0	0
Petroglyph	16.9	0	15.7	0	0	1.1	1.1	1.1	0	14.6	47.2	0	2.2	0	0	0	0
Pictograph	25.0	0	0	0	0	0	0	0	0	0	75.0	0	0	0	0	0	0
Pits, Eagle Catching, Battle, etc	18.2	0	9.1	0	9.1	0	9.1	0	0	9.1	18.2	9.1	9.1	9.1	0	0	0
Processing Area	10.0	0	10.0	0	5.0	5.0	0	5.0	5.0	15.0	25.0	10.0	5.0	5.0	0	0	0
Rock Alignments	6.9	2.0	16.8	3.0	2.0	3.0	3.0	5.0	0	10.9	13.9	8.9	13.9	6.9	0	4.0	0
Rock Cairns	10.2	3.6	11.6	2.3	1.9	3.6	1.7	3.1	0.7	13.3	12.8	4.5	12.2	15.3	0.3	2.2	0.2
Rock Piles	35.9	4.7	1.6	0	1.6	17.2	0	0	4.7	12.5	15.6	1.6	1.6	3.1	0	0	0
Rock Shelter or Cave	12.7	2.5	10.1	0	0	0	2.5	1.3	0	30.4	34.2	3.8	1.3	0	1.3	0	0
Rock Structures	23.45	4.7	21.9	0	0	0	1.6	1.6	1.6	12.5	23.4	3.1	4.7	0	1.6	0	0
Surface Stone Quarry	23.6	15.1	2.5	0	2.0	1.0	0	0	0	33.7	18.6	0	1.0	1.5	0	0	1.0
Tipi Ring	7.4	2.7	10.5	2.6	1.3	5.8	1.4	5.2	0.5	8.3	8.0	2.7	18.4	20.1	0.2	4.4	0.6
Trail	0	16.7	16.7	0	0	0	0	0	0	16.7	33.3	0	0	16.7	0	0	0
Vision Quest	23.5	0	11.8	0	0	5.9	0	0	0	29.4	23.5	0	5.9	0	0	0	0
Workshop	24.4	16.3	2.2	0	3.0	1.5	0	0	0	18.5	28.1	0.7	0.7	0.7	0.7	2.2	0.7

CONCLUDING STATEMENTS

Precontact Summary

There has been a tendency during past archaeological investigations and research within the project area to characterize the "pine breaks" of the southern part of the project area as a unique ecozone (in fact the southern part of the project area encompasses portions of 5 different ecological sub-sections as presented in this report). The "pine breaks" is often characterized as having been sufficiently different from other parts of the area to have provided opportunity for alternative subsistence adaptations distinctly different from the plains and prairies of the central and northern part of the project area. But do the perceived "unique" qualities of the "pine breaks" actually translate into a unique set of resources entirely different than those of the plains and prairies? Big game species such as bison, pronghorn, deer, and elk, as well as a variety of other mammals, were obviously present in all areas and so far as we can see habitat in the draws, coulees, creeks, Missouri Breaks and riparian zones of the plains and prairies did not preclude occupation by most primary food species found in the "pine breaks". One obvious resource present in the southern zone that is not present in the northern zone is fine-grained lithic material in abundance (e.g. porcellanite and to a lesser extent cherts and chalcedonies). But presence of this resource alone is unlikely to have produced a subsistence adaptation radically different from the plains. On the other hand it is quite possible that wide distribution of high-quality lithic material could raise the threshold of visibility in archaeological survey and create the impression that site density and land-use was more extensive and varied.

Communal bison kills are present in the southern, central, and northern zones. More such kill sites have been recorded in the southern part of the project area than in the north but this is likely a result of the dearth of excavation/investigation in the north zone and the wealth of excavation/investigation in the south zone (generally associated with coal development and management of Custer Forest lands). Based on data from the Mill Iron site it appear that communal bison killing has been in place as a subsistence adaptation within the project area since the Early Precontact Period/Paleoindian Period. If one were to assume that recorded bison kills are actually representative of communal killing of the entire area, it would appear that the southern zone had more of a true big game/bison focus than the north zone, which is typically thought of as being bison country where subsistence adaptations were the same as for bison kill-rich areas of northcentral Montana (just west of the project area). Archaeological investigations carried out along the Missouri River in northcentral Montana indicate that at times of the year a generalized hunting adaptation was in play. It does not appear to us that the archaeological record of the south part of the project area irrefutably indicates a generalized hunting adaptation year round.

Frison (1991), in arguing the case for use of the term archaic in his cultural chronology, suggests that some environments he includes in his discussions were marginal. On one hand many have argued that the "pine breaks" were unique with a rich array of plants and animals and on the other hand they have used the term archaic, which

implies a particular subsistence approach generally associated with marginal environments. So what truly sets the south zone of the project area apart from other areas? Forest cover in the south zone is obviously more substantial from much of the rest of the project area but the trees themselves do not appear to represent a resource important enough in and of itself to have afforded a unique subsistence opportunity. Some have argued that grass cover and range bison carrying capacity of the south zone no where near matches that of the northern grasslands. While that may be the case the argument appears to be entirely relative since presence of numerous bison kills in the south zone indicates that range was rich enough and extensive enough to have supported populations of bison in numbers high enough to support relatively routine communal bison-killing as a subsistence adaptation.

Maps of land cover types presented in this report as well as plant community classifications and descriptions suggest that an array of economic plants nearly as rich as though in the south is present in the north. The central zone does not appear to have the plant community variation that is present in the north and south zones but still an impressive suite of economic plants are present in riparian zones, draws, coulees, and breaks, as well as in the uplands.

To date there is no firm evidence that ceramics related to eastward horticultural groups, and present at some sites within the project area, represent groups that were actually involved in raising domesticated plant crops, which would truly be a unique subsistence adaptation in the project area. The ceramics do suggest contact with horticultural village groups and may indicate migration of some ancestral groups into the project area. There are reports of possible bison scapula hoes from a few sites in eastern Montana. Logically, it could be assumed that presence of such artifacts argues more strongly for the actual practice of horticulture. The sample size for these artifacts and sites purportedly yielding them is quite small and proposing any trends based on such a small sample is premature. However, evidence suggests that once in the project area groups with horticultural ancestral ties adopted big game hunting as a subsistence strategy.

The project area appears to have been occupied throughout prehistory. Early Precontact/Paleoindian presence is documented by numerous projectile points as well as the Mill Iron site. Dawson County, in the eastcentral part of the project area, and Sheridan County, in the northeastern part of the project area, have yielded a number of points of this age.

Altithermal period occupation of the project area is poorly documented but based on the presence of a handful of projectile points people were present. As discussed in the paleoenvironmental section of this report, there is evidence of massive post-Altithermal erosion in the central and southern part of the project area. This, together with a forced change in land use, along with lowered human and game populations brought about by increased aridity, has likely lowered the threshold of visibility of sites of this age. The most likely land use pattern that may have developed out of this arid interval would probably have forced people into the very environments that were more susceptible to

erosion (e.g. stream and river valleys and valley slopes). Presence of paleosols that date to the Altithermal within the project area suggest that some relatively prolonged intervals of increased moisture occasionally interrupted Altithermal aridity. This together with pollen data indicating a reduction only in abundance of plant species suggests that the project area was not completely abandoned by people during the Altithermal.

Precontact archaeological cultures dating from post-Altithermal times are relatively well represented. Generally the more recent the culture, the better expressed it is in the archeological record of the project area.

History Summary

The 2869 historic sites in the project area are dominated by sites that post-date 1890. Historic structures and features that date to the mid-Century period (ca. 1950 – 1960) are now being recorded as historic properties. 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.

Paleontological Summary

The 1929 paleontological sites in the project area 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.

Recommendations

Precontact Resources

Deaver and Deaver (1988: 149-161) address a number of problems and limitations in the archaeological data base of the project area. These include variable quality of site forms, variable definitions of site and isolated finds, lack of provenience and other basic information for some artifact collections, limited data on palynology of the region, extremely spotty coverage of the material culture and subsistence activities carried out by ethnographic groups in the area, the inappropriate (and inconsistent) use of point typologies, a lack of synthetic treatments in CRM works, a lack of reporting on federally sponsored projects, a general lack of excavation date, and a general lack of surveying and reporting standards.

Although agencies have attempted to address the limitations posed by variability in site form quality, there are still problems associated with such forms. Each agency has its forms and indeed these forms can change from district to district. The Montana State Historic Preservation Office developed a site form that helps standardize some observations but this form is not always allowed for use by some agencies. Some agency forms are very brief, and although it is unlikely they were developed to shortshrift some observations, they do appear to rely on individual archaeologists to "fill in the blanks" between line item observational categories. The advantage of larger site forms with more required line item entries and observations is that they at least serve as reminders to archaeologists as to what observations need to be made. The level of experience of archaeological field technicians who often fill out site forms varies considerably and some observations associated with research potential are often not second nature to them. In these cases it would seem that more observational requirements listed on a site form would be of value as mental reminders of observations that go beyond CRM considerations and provide a better base for archaeological research. We would suggest that more comprehensive site forms with at least standardized observational categories, if not a standardized form used by all agencies, would be of value to archaeologists as well as management. In our opinion, the site form advocated by the Montana State Historic Preservation Office presently is the most detailed and comprehensive site form used in the state.

One of the problems with archaeological models reviewed in this report is their inability to place sites in paleoenvironmental context. Deaver and Deaver (1988: 150) note the lack of palynological data for the project area. Since their work more such studies have occurred but can still be generally described as infrequent. Palynology is but one tool in paleoenvironmental studies and reconstructions. In this report we reviewed limnological data as an addition data source for reconstructing the project area paleoenvironment. Although limnological opportunities in all but the northern part of the project area are limited, such studies have been carried out in adjacent states and provinces in contexts relatively proximal to the project area. We also reviewed geoarchaeological data, which assists in paleoenvironmental reconstructions. We suggest that geoarchaeological analysis be required on all excavation projects and further suggest that such analysis not be limited to description of soils but include pedogenic characterizations which describe the conditions and times during which soils formed and/or were deposited. It is our hope that paleoenvironmental data presented in this report will be used as a tool to aid in placing archaeological data and land use patterning in the proper contexts. The paleoenvironmental data presented in this report suggests that some paleoclimatic schemes that have been developed in the past and often used in area archaeological reports should be used with caution and should be refined through integration of new data.

There have also been inconsistencies in environmental observations and characterizations in the past. Our hope is that the ecological, geological, land cover, and plant community classifications presented in this report will help standardize observations and classifications so that archaeological data can be reliably compared across the project area.

Lithic scatters are the most frequent site type in the project area and are most frequently considered non-significant (i.e. not eligible for listing in the National Register). In instances where adverse affect includes complete obliteration of sites, the level of documentation for non-significant sites is often limited to observations made during initial site recording and very limited subsurface testing. Since non-significant sites make up the majority of cultural resources from the project area, data retrieval from these sites has substantial consequences for interpreting and modeling the precontact/prehistoric era of the project area. Yet there are no standards for recording lithic scatters. Given the paucity of time-diagnostic artifacts and absolute dates in the project area, lithic scatters (including non-diagnostic tools) become very important in interpreting and modeling project area prehistory/precontact times; and given the argument and inconsistencies in projectile point classification, and the inconsistencies in application of environmental and paleoenvironmental variables, time-specific modeling is no less suspect than non-temporal models that assume human exploitation and settlement patterns, as expressed in the archaeological record, developed over time through much of the precontact period. The palynological record from the project area presently suggests that there were only changes in abundance of plant species from Paleoindian through historic times. We interpret this information as indicating that although there were changes in the project area environment in the past, those changes were not severe enough to have completely altered subsistence adaptations, but only limited human

populations and limited areas used by those populations. This tends to argue for the validity of non-temporal time-transgressive settlement system models. It is also our opinion that it argues for a level of importance of data contained in lithic scatters, even those with no chronological control (i.e. no time-diagnostic tools). Therefore the level of recording for lithic scatters must meet a threshold that allows for use of the data in non-temporal models at the very least. Earlier in this report we presented examples of levels of lithic scatter recording and argued for a minimum standard of recording using those examples.

The present state of variability in lithic scatter recording is not unlike that of tipi ring recording prior to implementation of standards. After consultation between various agency, university, and private sector archaeologists a tipi ring recording standard was adopted by most agencies, as well as the Montana State Historic Preservation Office. Many cultural resource management contractors augment site forms with their own lithic recording forms. However, there is considerable variability in detail and observational categories included on those forms. An approach similar to that used for tipi rings is recommended as a means of arriving at an acceptable lithic recording standard.

Deaver and Deaver (1988: 137-144,163-164) posed some hypotheses that could be tested during the course of CRM archaeology. It appears that these hypotheses have not been tested, at least beyond very limited areas. In fact, it is quite apparent that very little modeling of any sort has occurred since preparation of the 1988 Class I. Few CRM Class III reports prepared since 1988 contain models or even testable hypotheses. Deaver and Deaver (1988: 139) also expressed the need for a "theoretical umbrella" or "comprehensive archaeological framework". They went on (1988: 139) to define a general model premised on the perspective that "critical reosources and available means of procurement are the most significant factors in settlement systems within any cultural adaptation". Although they acknowledged certain limitations and assumptions in setting up the model (1988: 140-142) it still appears that such a model may be spurious in view of the absence of good paleoenvironmental data, consistent environmental and resource characterizations, and the general deficiency of consideration of site formational and site destruction processes (e.g. taphonomics, erosion, deposition) in creating observable patterns of site location and site content. In view of these variables and in view of the relative dearth of archaeologcical survey in the north half of the project area, it seems premature to be thinking of an "umbrella" model that encompasses all of prehistory/precontact over the entire project area. No theoretical framework would be valid in the absence of consistent data recovery including field observations made at the level of initial site recording. Consistency of field observations is a key to formulating a valid framework. Recording and observational standards will result in data consistency but those standards must be at a professionally acceptable level of quality and quantity.

We are not arguing against modeling. Quite the contrary, we suggest that local models based on a solid record from a geographically restricted area could provide the basis for abstracting a larger, more encompassing model. We recommend that agencies should begin to require a certain level of modeling in Class III reports. Obviously such modeling is impractical for very small scale projects but even descriptive consistency in

environmental and material culture observations from small projects would greatly enhance the opportunity for researchers and CRM archaeologists working on larger projects to extract meaningful data while piecing together a model for a larger area. No single model type is suggested here. As Klesert (1987: 233) states, "models are nothing more nor less than simplified abstractions of a variable and complex reality". That reality will become less variable and less complex if many minds are developing the abstractions. From our perspective, all models have value if they can be consistently contrasted and compared to other models. CRM archaeology in the project area must return to a minimum level of modeling, as was the case in the 1970s and 1980s when even Class III reports often posed archaeological models and hypotheses. Presently modeling appears to be for the most part restricted to mitigation reports and research projects with a particular focus. Class III surveys form the overwhelming majority of CRM work and must be viewed as an important element of the archaeological data foundation for the project area. Total reliance on infrequent excavation data will likely not give us a complete understanding of precontact times in the project area.

One of the major obstacles faced in completing this report, associates with the overwhelming amount of CRM work that has occurred within the project area and the resultant data explosion. Considering the number of reports associated with project area archaeology, it was impossible to access all of them. It was hoped that the state antiquities data base would help shortcut the research process. The research value of that data base is extremely limited. The data base does not appear to be routinely updated and errors appear frequently. An interagency effort to update, refine, and expand the state data base, and perhaps include a more extensive GIS capability, would be of unimaginable value to the archaeological community.

To date only 2 precontact properties in the project area have been nominated to the National Register of Historic Places. These two sites (the Hagen Site in Dawson County and the Tipi Hills Site in Sheridan County) have had far less documentation and investigation than many precontact sites that have been excavated and reported on over the past 30 years. A number of these sites have been determined eligible for listing in the National Register and documentation is more than adequate to facilitate nomination. Acknowledging that the level of effort required to complete National Register nomination forms is not insubstantial, there still must be a means found to facilitate nomination.

Other recommendations and directions for future research were presented in earlier sections of this report. Rather than restate those recommendations readers are referred to those sections.

Management implications derived from this Class I overview relate mostly to site densities and site types that have most often been recommended as significant in the past. There is no question that site density is generally high in the southern part of the project area, particularly in areas of the Custer Forest and in areas around coal-mining developments. It is premature to state categorically that site densities are low in the central and northern portion of the project area since survey acreage is not commensurate

to that of the south area. There is some indication that at least in portions of the northern project area, site density may be as great as that of the south.

Site types most commonly recommended as significant and eligible for listing in the National Register include tipi ring sites, bison kills, rock art, medicine wheels, and buried/stratified sites with hearths, pit ovens, bone, and lithic artifacts. As discussed earlier in this report most of these site types are not restricted to a particular portion of the project area, with the possible exception of rock art. The geology of the southern part of the project area where sandstone cliffs and other exposures are common, lent itself to the expression of petroglyphic and pictographic art. Central and northern parts of the project area are not without rock art although presently the incidence seems lower. As the amount of archaeological survey increases in central and northern areas, it would not be surprising to see the incidence of rock art found on glacial boulders increase. Tipi rings, although unquestionably more frequent in northern glaciated areas, occur in surprising numbers in the southern part of the project area. Bison kills are also found throughout the project area albeit in lower frequencies than tipi ring sites and lithic scatters. Context for deeply buried and obviously stratified sites with bone, features, and lithic artifacts is often more easily established. Lithic scatters in surficial to shallowly buried settings present problems associated with establishing context. However, it is interesting that a number of sites in the project area, originally described as lithic scatters, were later determined to have context sometimes expressed vertically and sometimes expressed horizontally. Absence of deposition or limited deposition does not necessarily translate to absence of context. Any lithic scatter, with the exception of those that occur in bedrock settings, has the potential of retaining context and even those in bedrock settings could represent a single event with potential context.

Since any one site, regardless of type, has the potential of being significant, known site densities become important in management considerations. With coal-bed methane (CBM) looming on the horizon as a significant and widespread development in southeastern Montana, the high frequency of archaeological sites in that portion of the project area poses some management problems. Over the past several years, oil and gas exploration and development in portions of the project area has been reinvigorated and has accelerated. Coal-bed methane development poses some complex and unique issues of adverse affect on cultural resources. Direct affects from well-drilling and road construction are more easily addressed. Surficial discharge of water could adversely affect (e.g. erosion, soil saturation, compression, and other disturbance) sites some distance from areas of primary development. Generally increasing vehicle traffic and generally increasing human visitation associated with CBM could also have an impact on archaeological resources, particularly high profile sites such as rock art, tipi rings, and bison kills. It would be valuable to see the affect of these CBM related processes on archaeological sites in northern Wyoming where such development has reached a high level.

Historic Resources

The most important recommendation regarding historic resources of the project area relates to the absence of a well-developed historic context. In this report we

presented only a basic thematic outline and chronology. Development of a historic context would allow for more easily considered significance evaluation of properties and would likely help reduce and integrate the confusing (and sometimes repetitive and duplicating) array of historic site types presented on the state antiquities data base. As in the case of prehistoric properties, restructuring of the state data base and standardization of observations required on site forms would probably substantially increase the research utility of the data base. There has been, and continues to be, a focus on recording, documenting, and evaluating Euro-American sites that post-date A.D. 1888. These sites by far account for the greatest percentage of properties nominated to the National Register. In part, this is explained because of more easily accessed documentation of such sites. Sites that pre-date 1888 are less easily documented through presence of artifacts and/or features. Some of these sites, such as early fur trading posts are of obvious significance in the history of settlement in eastern Montana and to both American Indians and non-Indian residents. There seems to be a fascination with the "hostile era" of the United States and its American Indian population. Documenting and researching sites where interactions between American Indians and Euro-Americans were less hostile could help explain the important transition period for both populations. Such research would likely require far more fieldwork and excavation of these poorly documented and poorly understood sites.

Paleontological Resources

A summary and synthesis of recommendations for paleontological resources is presented below. Other recommendations for paleontological resources in the project area are presented on pages 150 through 152.

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.

Despite the inherent subjectivity of this method, these paleontological resource sensitivity ratings will be useful for general management decisions and new project planning. For example, the sensitivity of particular geologic units in the Miles City Field Office unit can be used in the preliminary stage of a project to help predict the scope of a paleontological inventory and potential mitigation measures. Requirement of monitoring programs where ground disturbing activities are proposed for geologic strata with moderate or high sensitivity ratings would expedite stabilization and assessment of newly discovered fossils. Although construction delays are an inevitable result of unexpected fossil discoveries, having a specialist on-site would certainly decrease the overall delay time. In addition, if the fossil material is immediately recognized, the chances that it will be damaged beyond recognition are significantly decreased. Units with low sensitivity ratings could potentially be excluded from a monitoring program, but their exclusion should only follow an on-site evaluation and field inventory.

One surprising discovery of research carried out during preparation of this report is the apparent absence of requiring paleontological researchers to submit site forms and obtain site numbers for discovered and investigated fossil localities. The BLM apparently now has such a requirement but it does not appear that all other state and federal agencies have that requirement. Although the state data base lists some 800 paleontological properties, only 54 have been assigned site numbers. Although independently funded research projects on private lands do not need to follow federal and state guidelines and laws, a considerable amount of paleo-ontolgoical research occurs on federal and state lands where such laws are applicable. All agencies should make more of an effort to require site documentation and require application for site numbers. Management of paleontological resources would be far easier if such documentation was standard procedure.