CULTURAL RESOURCES

Introduction

The Class I presented herein is to include a treatment of both historic and prehistoric properties. The 1988 (Deaver and Deaver) Class I presented an overview of prehistoric properties only. A comprehensive context for historic sites in eastern Montana has never been attempted although a number of individual reports present some contextual development. The state antiquities data base, which was used to create a historic and prehistoric sites data base, classifies historic sites by type, and when possible by general chronological placement. A very basic discussion of historic context for the historic period of the project area is presented in this report and attempts are made to place recorded historic sites within that context based on categories developed in the state antiquities data base chronologic information.

Contexts (i.e. taxonomy and cultural chronology) for the prehistoric period in Montana and much of the northern Plains were first developed in the 1950s (Mulloy 1958) and were revised by others in later years (Reeves 1970/1983; Frison 1978/1991). Although some revisions continue, the basic cultural chronologies remain unchanged since preparation of the 1988 Class I. A discussion of prehistoric contexts and taxonomies is therefore more easily presented.

The 1988 Class I by Deaver and Deaver was a very comprehensive and well-researched report that was over two years in the making. Many sections of that report still stand as foundations for future reference and rather than restate what they have written, we will summarize some of their material. This is particularly true of sections on ethnography, archaeological history and discussions of theory.

Data and Research Limitations

Although it has been almost 20 years since the last Class I overview for eastern Montana was completed, we are dealing with some of the same data and research limitations that were described by Deaver and Deaver. Those limitations are compared and contrasted to conditions of today in Table 17. Some additional data and research limitations applicable to compilation of this report are also described. Although some of these biases and limitations are in operation, they are generally restricted to survey data. The level of detail for site mitigation and excavation is often greater and the methodological rigor applied to such reports by archaeologists is generally far greater. However, the affect of survey data limitations on the potential for interpreting the prehistoric record is substantial since fewer than 3% of all prehistoric sites have been excavated. Survey data, including those that involved small scale sub-surface testing, still accounts for the overwhelming majority of the written archaeological record in eastern Montana.

Table 17: Comparison of data and research limitations between 1988 and 2005.

1988 Data and Research Limitations	2005 Data and Research Limitations
No information from Northern Cheyenne Reservation	Northern Cheyenne information available but with restrictions in use
Upland survey bias with lowlands/valleys underrepresented	Still a bias toward upland survey but survey of mid-elevation landforms within valleys has increased; valley floor (e.g. overbank terraces) still underrepresented
No standard site form and no standard for observations and data entries	No standard site form; most agencies have a standard site form but the form varies from agency to agency; Montana SHPO developed a site form intended as a standard – most archaeologists in the state use the form but a few federal agencies, most notably some National Forests and the BIA, require use of their forms; Standards for observations and data entries still vary because standard definitions for site attributes do not exist
Field survey intensity varies and methodologies poorly documented	Generally 30-meter spaced transect intervals have been adopted by agencies as a minimum standard; Exceptions sometimes occur for steep slopes and heavily wooded areas; Most agencies either specify field methodology or require a detailed description of methodology
No standard definition for what constitutes a site and what constitutes an isolated artifact locality/isolated find/minimal activity locus	Most agencies and archaeologists have adapted a definition of site: Prehistoric – 5 or more artifacts within a $50m^2$ area or within a diameter of 50'; one or more archaeological feature with or without associated artifacts – some agencies do not require site recording for single cairns; Historic: all agencies require recording of one or more standing structure or obvious feature (e.g. irrigation canals and ditches, roads, trails, railroad grades) or one or more ruinous feature (e.g. foundation, foundation depression, depression); some agencies do not require recording of isolated prospect pits; generally archaeologists record five or more historic cultural materials of at least two different types within a $50m^2$; some variation in recording of historic debris scatters and trash dumps
No standard in recording manifestations (e.g. isolated artifact localities, isolated finds, minimal activity loci) that do not meet researchers or agency definitions of sites	Still no real standard for recording non-site manifestations although many agencies require recording of diagnostic artifacts and finished tools and most archaeologists find value in recording such artifacts
Tailored survey with a bias toward fulfilling management and compliance needs rather than achieving comprehensive data collection	Generally thoroughness of survey has improved; Some agencies still tailor surveys toward a specific compliance need (e.g. open areas in BIA timber tracts are often excluded from survey unless potentially impacted from roads/trails); areas of perceived low site density or areas of perceived low contextual integrity (e.g. steep slopes, heavily timbered areas, plowed areas on glacial surfaces or surfaces with shallow deposition) are sometimes excluded from survey
Limitations of environmental data: paleoenvironmental data/literature for SE Montana is limited; Inconsistent use of basic environmental data and descriptive terms by archaeologists	Paleoenvironmental data is still limited for eastern Montana; There are still inconsistencies in the use of basic environmental data and descriptive terms
Ethnographic data base is spotty, qualitatively variable, and restricted to horse and post-horse period	Ethnographic data limitations remain the same
	Significant error (10 to 15%) in data entry on the State Antiquities Data Base
	Inconsistencies and gaps in updating the State Antiquities Data Base to include testing and excavation data

To the list of data and research limitations compared and contrasted between 1988 and 2005 we add our own. The 2005 Class I update was linked to preparation of an RMP as discussed in an earlier section. The SOW for the RMP originally called for completion of a draft Class I within 6 months of award of the contract. ACRCS felt that this schedule might be attainable if the State Antiquities Data Base could serve as the foundation for preparation of the report. Since over 7000 reports are associated with the archaeology, history, and paleontology of the project area, ACRCS felt it impractical to focus on the "hard copy" record. ACRCS was subsequently granted access to electronic site files through the internet by the Montana State Historic Preservation Office (SHPO)

under the auspices of the BLM. Both the University of Montana and the Montana State Historic Preservation Office maintain a queriable data base but these data bases are not accessible by the internet (with the exception of limited and basic data from the SHPO Cultural Resource Information System/CRIS and Cultural Resource Annotated Bibliography System/CRABS).

Through the course of compiling this Class I report, ACRCS communicated regularly with Damon Murdo, cultural records manager of the Montana SHPO. ACRCS sent regular data base querying requests to Damon and he invariably responded quickly, sending electronic text files with query data. These files were in turn uploaded into a Microsoft Access cultural resource data base that was developed by ACRCS and this data base served as the queriable foundation for the new Class I.

After the ACRCS data base was assembled, we began cross checking data entries with the scanned site records that were accessible via the internet. It became quickly apparent that there were numerous data entry errors on the State data base. These errors include some very basic informational errors such as site type and site location. For example, the site forms for two properties classified as tipi ring sites on the State data base were checked and found to include no mention of tipi rings but were described only as lithic scatters. Data base locational information (i.e. township, range, and section) for 11 sites did not match locational information on site forms on a random sample of 100 site forms checked through the internet. Locational information for two of the 11 data base sites that were in error were found to be off by over three townships and/or ranges. We also performed a random check of projectile point styles and cultural chronology as represented on the data base and found that 12 of 60 entries either did not match information on the site form or did not match information on written reports associated with the sites and artifacts. Some of these errors are obvious mechanical data entry errors while others appear to associate with failure to update the data base to include excavation and/or subsurface testing data. It also appears that data entry technicians occasionally made "judgment calls" on projectile point classification and other more subjective site form observations.

We have no way of reliably quantifying the statistical error represented by data entry mistakes since time did not allow us to cross check all forms and all data base entries for the 7065 prehistoric sites and 2756 historic sites that occur in the project area. We do think it reasonable to assume a 10 to 15 percent error factor for all statistics derived from the State data base. The error factor notwithstanding, it was impractical to completely disregard the State data base as a tool for assembling the updated Class I given the time constraints on completion of this report. However, after discovering the error factor on the data base we felt it prudent to make more of an effort to investigate a greater sample of written reports associated with the project area. Although Deaver and Deaver focused on the written record, it was never the intent of ACRCS to focus on hard copy to the same degree. As mentioned earlier, there are over 7000 reports associated with cultural resource investigations of the project area. As noted earlier, the Deaver and Deaver report was over two years in the making and dealt only with prehistoric sites. Faced with problems represented by State data base errors, it became obvious that the

updated Class I could not be completed in 6 months and the BLM allowed some flexibility in scheduling and completion of the report.

Additional limitations with the State data base include those associated with cultural resource projects and reports that encompassed multiple counties. The data base for multi-county projects includes overall acreage of survey but does not break down acreage by county. In fact many written reports do not list acreage by county although such figures could likely be derived through analysis of report maps and figures. There are many multi-county reports, and again, given restrictions on time it was not practical to access all those reports and extract individual county survey acreages that were not necessarily easily retrievable in the written reports.

Data Collection Methods

As stated by Deaver and Deaver (1988: 7-8), the intent of a Class I inventory is "to collect, organize, and synthesize existing information" on, in the case of the 2005 Class I, the history and prehistory of the Miles City Field Office area. As mentioned above, we relied heavily on the State Antiquities data base for some of the basic survey data for this report. A sample of publications and technical reports for the project area were reviewed but given the staggering number of such sources associated with the area it was not possible to review all of them. Additional facilities used for compilation of the data base include the State BLM Billings Curation Center library, the BLM Miles City Field Office library, the Montana SHPO library, and the ACRCS reference library. Additional fieldwork was not a part of the 2005 Class I project.

Although artifact collections were examined for the 1988 Class I, such an approach was not employed during compilation of the updated Class I. It appears that this strategy was employed by Deaver and Deaver primarily to point out the subjectivity in projectile point classification and to demonstrate the variability in perception, ideas, theories, and hypotheses of area archaeologists with respect to many aspects of the archaeological record. This analytical approach did not resolve any of the posed questions and issues that emerged from the process but simply documented that disagreement and critique are an inherent and necessary part of the scientific process. There is little question that such disagreement and critical attitudes remain among researchers of the project area and it is seen as unnecessary to re-document what should be viewed as a "healthy" phenomenon in archaeology.

The internet also played an important role in data compilation, particularly the State Natural Resources and Information System (NRIS). Although individual cultural sites and site attributes have not been comprehensively integrated into a Geographical Information System (GIS), all sections containing cultural properties are included as a limited GIS application on the NRIS website. Therefore project area sections containing cultural properties can be downloaded and overlain on a variety of environmental backgrounds (e.g. geological map, ownership map, county maps, drainage system maps). Some site distributional maps were developed using the limited cultural property GIS capabilities available through NRIS.

Some other websites were also used to develop maps, particularly those presented in the environmental and paleoenvironmental sections of this report.

Prehistoric Resources

Cultural Chronology

Early in the history of archaeological research on the Plains (and throughout the world) it became apparent through stratigraphic analysis of excavated sites that trends and changes in prehistoric lifeways through time were indicated by the material culture record and by differences in land use (i.e. where sites occur on the landscape and at what time particular areas of the landscape were occupied and exploited). It was obvious, through seriation analysis, that some artifacts were sensitive indicators of change through time. Projectile points and ceramics in particular were found to be the most sensitive of human artifacts as indications of changes in human settlement systems, adaptations, and possibly of population movements through time. Archaeologists began developing classificatory schemes and cultural chronologies relatively early in the history of archaeology in Montana and those chronologies are constantly being refined as investigations continue.

Deaver and Deaver (1988: 70-77) discuss in detail descriptions of taxonomic terms (e.g. period, subperiod, complex, phase, horizon/tradition, region locality) and approaches that have been used in developing cultural chronologies applicable to the project area. Rather than restate these terms and descriptions readers are referred to Deaver and Deaver. They also discuss in general terms a number of cultural chronologies that have been developed for areas adjacent to the project area. However they focus in more detail on two chronologies that were, and continue to be, applied most often to the project area. Those chronologies include that developed by Frison (1978/ 1991) and that developed by Reeves (1969, 1970, 1979, 1983, 2003). Both these chronologies were developed from a basic chronological outline first proposed by Mulloy (1958; 1965). Mulloy's earliest chronology was largely developed in the absence of radiocarbon dating and was based primarily on project point seriation for specimens found in good stratigraphic context. By 1965 Mulloy (1965) had the advantage of at least a few radiocarbon dates to help refine his chronology a bit.

Reeves and Frison followed Mulloy in dividing prehistory into three primary periods. Reeves adapted Mulloy's Early, Middle, and Late Prehistoric period divisions although recently Reeves (2003) has substituted the term Precontact (i.e. pre-Euroamerican contact) for Prehistoric. Originally Reeves divided prehistory into traditions within which complexes and phases occurred. More recently it appears Reeves has de-emphasized these broad traditions and has moved toward defining local phases and sub-phases, particularly for the Northern Rockies and east slopes of the Rockies (Reeves 2003).

Frison subdivided the Middle Prehistoric into three sub-periods he termed the Early Plains Archaic, the Middle Plains Archaic, and the Late Plains Archaic. Frison also

applied the term Paleoindian to what had been the Early Prehistoric Period first used by Mulloy (1965). Both Reeves and Frison were able to refine the temporal limits of Mulloys periods because of a substantial increase in radiocarbon dating and because of similar increase in reported archaeological excavation data and documentation.

Citing Willey (1966), Deaver and Deaver (1988: 74) suggest that "periods" are "non-overlapping chunks of time" that "reflect an internal continuity of basic adaptation in southeastern Montana". Archaeological excavations and radiocarbon dating since 1988 tend to suggest that the period boundary between the late Middle Prehistoric Period/Late Plains Archaic and the Late Prehistoric Period may not be as static as first assumed. Projectile points and associated radiocarbon dates seem to overlap this period boundary in both directions. Period divisions appear to have been developed out of what were perceived to be patterns in the material culture and lifeways of people occupying the Plains region during prehistory. The Early or Paleoindian Period was characterized by a focus on big game hunting (an emphasis on mega-fauna during the early part of the period) and use of relatively large lanceolate projectile points. The Middle Precontact/Prehistoric Period or Plains Archaic saw the replacement of lanceolate projectile points with smaller side-notched and some corner-notched varieties. Mega-fauna had long-ago disappeared although big game hunting continued as a primary focus. Frison (1978, 1991) sees more emphasis on broad-based foraging and hunting with increasing importance of plants in diet during the Middle Prehistoric/Precontact/Plains Archaic. Aaberg (1993a) argues that the importance of plants in diet, as well as in ceremony, medicine, and industry, was well-established by mid- to late-Paleoindian/Early Precontact times. He suggests that the importance of plants in Paleoindian/Early Period times is expressed in the formality of features associated with plant food preparation at the Barton Gulch Site in southwestern Montana. In Aaberg's view plant macrofossils contained in the many patterned feature clusters at Barton Gulch suggest well-planned plant collecting and preparation rather than casual plant exploitation. The Late Prehistoric/Precontact Period is generally recognized by the reduction in size of projectile points thought to associate with introduction of the bow and arrow. Some researchers believe that projectile point size and basal/haft width should not necessarily be interpreted to indicate use on an arrow shaft or on an atlatl dart shaft. Lahren (2005) discussed results of projectile point replication and use with traditional bow and arrow systems and found that even the large lanceolate projectile points of the Early Precontact/Paleoindian Period functioned well as arrow points and did not interfere with trajectory or any other elements of the physics of arrow flight. Hughes (1998) suggests that there was a change in dart shape and size that led to reduction in size of atlatl shaft diameter and the advent of fletching around 7500 B.P.

Through the years of archaeological investigations in the southern part of the project area there appears to be a tendency to employ the Frison (1978, 1991) chronology although this is not universally the case. Deaver and Deaver (1988: 75) suggest that the use of "archaic" as a sub-period term is not appropriate since archaic is often used to define a stage of subsistence adaptation rather than a temporal period. Frison (1991: 20-21) argues that the use of archaic is valid because the plains of Wyoming differ from the plains of Alberta and northern Montana in that many areas of the former were "relatively

marginal and required close attention to gathered resources". He also suggests that few areas of his subject region "were rich enough in plant and animal resources to have supported a true hunting economy comparable to the Northern Plains". The archaeological record from the southern part of the project area in our view indicates that big game hunting was a primary focus during the Middle Prehistoric Period. Bison bone dominates most assemblages from the area and bison kills dating to the late Middle Prehistoric Period are relatively frequent. Some researchers suggest that the environmental diversity of the southern part of the project area distinguishes it from the northern part and equate this diversity to what must have been an archaic adaptation. We assume that the perceived environmental diversity of the southern part of the project area is based on topographic relief and variability, the presence of pine forest, and a greater array of plant communities. In actuality plant community variation is about as varied in the northern part of the project area as it is in the southern part. Presence of Ponderosa pine forest and its sometimes varied understory give the impression that the south zone is richer and more varied in plants than the north zone. In our estimation, the archaeological record from the project area does not yet support an archaic adaptation in the Middle Prehistoric Period. Given that topographic relief and forest cover is generally greater in the south zone, resource procurement strategies (particularly big game) could have been different than those used in the north zone. However, big game hunting appears to have been as important in the south as it was in the north.

During a 2004 meeting of the Montana Historic Preservation Review Board, it was brought to the attention of the board that some American Indians find the use of the terms prehistoric and archaic offensive or prejudicial. It is likely this sensitivity that moved Reeves to begin using Precontact in his chronology. The two primary chronologies for the project area, along with some revisions proposed by others, are presented below (Figure 41) and are overlain on the paleoclimatic schematic presented earlier in this report (see Paleoenvironmental Background section). The Reeves chronology is presented with his most recent revisions (2003) and includes the use of Precontact rather than Prehistoric. Substitution of these terms did not affect the basic period divisions of his earlier chronology. Considering the debate on validity of using

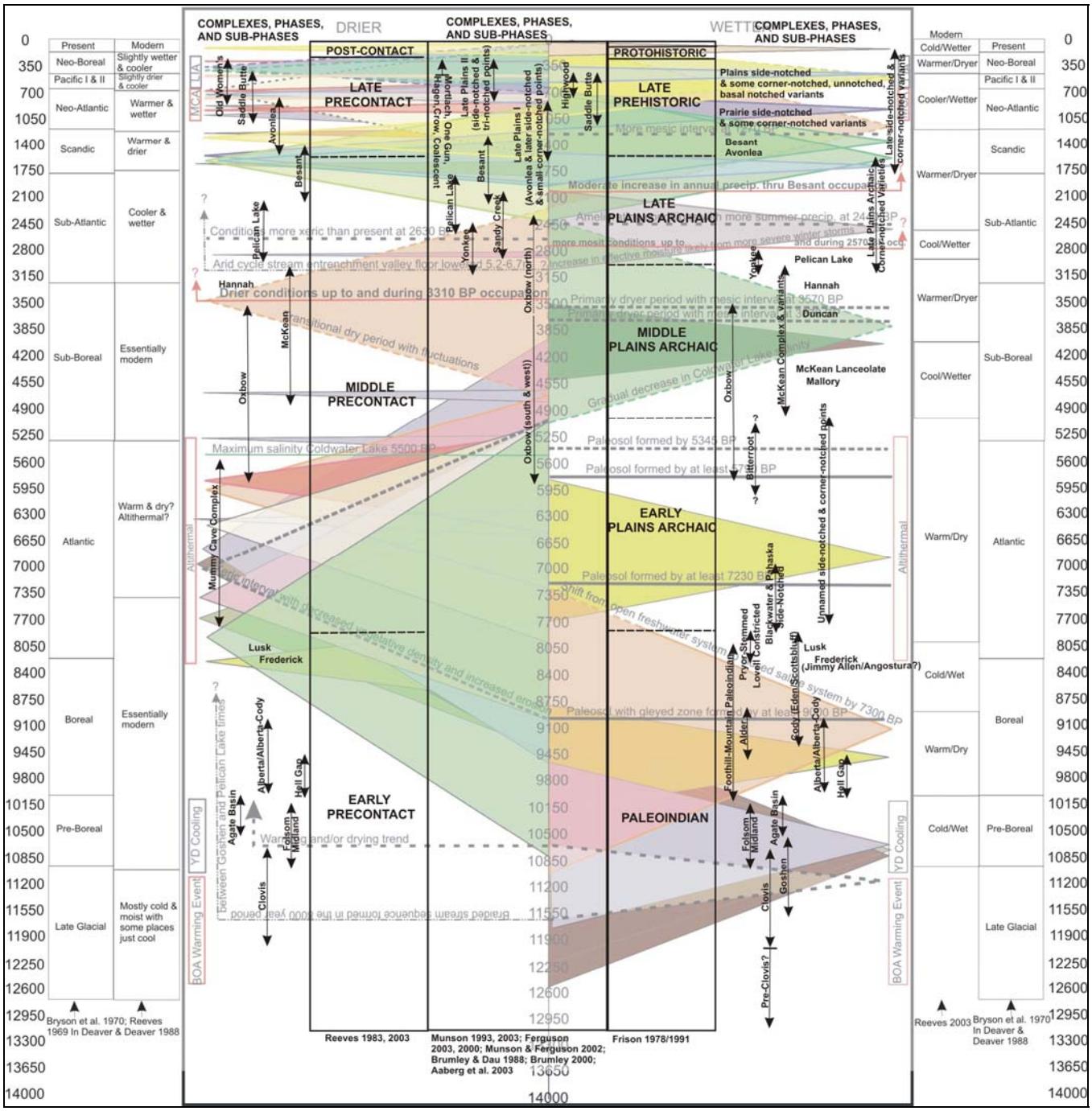

Figure 41: Cultural chronologies for the project area overlain on time-paleoclimatic schematic.

the term archaic in a chronology for the project area, and considering issues of American Indian sensitivity, it may be more appropriate to use the recent Reeves chronology.

Projectile point classification played a large role in the development of chronologies for the project area. However, point type attributes and definitions (i.e. a template) as established through analysis of artifacts from type sites often do not carry through the region as tightly as initially thought. It is becoming increasingly apparent that point variation through much of Precontact time is extreme. As Deaver and Deaver (1988) noted, perceptions of individual archaeologists on what is or is not a particular projectile point type also vary considerably. Therefore in the discussion of periods, phases, and complexes presented below we present only basic outlines of projectile points (outlines developed from photographs of documented points). Researchers are referred to Frison (1991) and to individual archaeological reports and documents to get an idea of projectile point styles and variations for the various complexes and phases. We will present general discussions on the gross morphology of points known to associate with particular phases and complexes.

Early Precontact/Paleoindian Period (ca. 12,500 BP – 7800 BP)

This period of human occupation began shortly after retreat of the Continental Glacier from the northern part of the project area. In the earlier part of this period people appear to have focused on big game hunting including now extinct "mega-fauna" like mammoth and bison that were on average much larger than the modern bison. Mass bison killing, perhaps communally undertaken, was in place by at least 11,000 years ago as is evidenced by the Mill Iron Site in Carter County where a bison bone bed was found. However, the method of bison procurement at this site remains unknown. Early Precontact peoples generally used large lanceolate projectile points thought to have been used on thrusting spears or perhaps atlatl darts. By the middle part of this period changes in projectile point manufacturing technology were apparent. Stemmed point forms began appearing. Toward the end of the period many changes in projectile point manufacture are evidenced by a number of point styles. Climate immediately following retreat of the glacier was characteristically much wetter than now although a warming and drying trend likely began sometime around 11,000 years ago. Climate change created change in vegetation and mega-fauna species had largely disappeared by about 9500 years ago although some larger and intermediate forms of bison apparently persisted in some areas until at least 6400 years BP (Frison 1991: 86). Data suggests that the Altithermal had likely begun by about 8200 years ago during the terminal part of the Early Precontact Period. Although just one Early Precontact Period site in the project area has been excavated and intensively investigated, we assume from data acquired from adjacent areas that there was an emphasis on bison hunting through much of the period. However, a more generalized hunting and gathering approach may have developed at about the time the Altithermal began. Slight modifications to the Paleoindian chronology have been proposed by Frison (1998).

Pre-Clovis

Frison (1991) discusses support for pre-Clovis occupations on the Plains and suggests that only circumstantial faunal evidence has surfaced. To date evidence of pre-Clovis occupations or human activity is known from the project area is not known but tenuous evidence (human hair and a $\pm$ 14,000 BP date) from False Cougar Cave in the Pryor Mountains suggests Pre-Clovis occupations (Bonnichsen et al. 1986). Arguably

other Pre-Clovis evidence exists in eastern North America. Re-evaluation of radiocarbon dates and data from Pennsylvania's Meadowcroft Rockshelter (Adovasio et al. 1990, 1992, 1998) and the discovery of apparently intact cultural levels below Clovis occupations at the Topper Site in South Carolina (Goodyear et al. 1999; Goodyear 2000) and Saltville and Cactus Hill in Virginia (McDonald and Kay 1999; McAvoy and McAvoy 1999; McAvoy 2000) suggest pre-Clovis occupations.

Clovis Complex

As reviewed by Frison (1991:25), dates for Clovis and possible Clovis from Montana, Wyoming, and Colorado range from about 12,000 years BP to about 10,500 years BP. The best known Clovis site in Montana is the Anzick Site (a burial) located well-outside the project area in west-central Montana. Within the project area the Lindsay Mammoth Site (24DW501) in west-central Dawson County produced mammoth remains. Although cultural artifacts were not found with the mammoth bone, human predation is inferred from taphonomic study and bone breakage analysis. Dates associated with the Lindsay Mammoth range from 11,925 to 9,490 years BP (Appendix A) suggesting that the remains may associate with Clovis. At 24DW278 one complete Clovis point and one flake were found eroded from a cutbank on an upland surface in the badland terrain of southeastern Dawson County on a BLM tract. A buried paleosol was exposed in this cutbank and a sample of the paleosol, collected from immediately above the eroded Clovis point, returned a date of 7230 BP (Eckerle and Aaberg 1990). The paleosol is overlain and underlain by loess and subsurface testing of this site is worth undertaking given the possibility that additional Clovis cultural materials could be present. Other know occurrences of project area Clovis projectile points are one or two in the Oscar T. Lewis collection at the Museum of the Rockies in Bozeman. These specimens were collected from the surface at localities in southeastern Dawson County. Jerde (1981) also reports a possible Clovis or Folsom mid-section from a surface locality in Sheridan County. Birney (1991) reports a Clovis point, as well as other lanceolate Paleoindian points, from Walstein Reservoir in Carter County.

Clovis archaeological materials from the Plains area indicate an emphasis on procurement of mammoth although pronghorn antelope and bison bone have also been recovered from Clovis sites (Frison 1991: 39). Caching of points and artifacts during Clovis times is also indicated. The association of human remains with red ochre and what appear to be unused and beautifully prepared points and bifaces at the Anzick Site in Montana suggest that Clovis people had a well-developed funerary or mortuary complex (Lahren and Bonnichsen 1974; Lahren 2001). Clovis points are characteristically well-thinned with percussion flaking often carrying across the blade body and pressure finishing often irregularly applied to the edges (Figure 42). Bases are typically concave with a short flute or flute-like flake scar on at least one surface.

Figure 42: Clovis point example.

Although data is limited, there is some indication that during Clovis times in the project area, a warming and drying trend had begun although precipitation was likely greater than that of today (see Figure 41 above).

Goshen Complex

Prior to excavation of the Mill Iron Site (24CT30), located in eastern Carter County within the project area, the Goshen Complex was poorly understood. Analysis of the points recovered from this site suggests that points identified as Plainview in the Northern Plains area are likely Goshen (Frison 1991: 46). Frison (1991: 45) states that "Goshen projectile points are technologically and morphologically neither Clovis nor Folsom but do retain some characteristics of both". They are lanceolate in form, are well-flaked exhibiting good pressure-flaking and edge-retouching, and are not fluted but basally thinned (Figure 43).

The Mill Iron Site, where a bison bone bed was discovered and is presumed to associate with a bison kill, provides the best picture of subsistence of Goshen peoples. Radiocarbon dates from the Goshen occupation at the Mill Iron Site include a series that averages over 11,000 years BP and another series that averages just under 11,000 years BP (Appendix A) suggesting that Goshen was contemporaneous with Clovis and possibly extended into the earliest part of Folsom times (Frison 1991: 45). Pollen studies of the Mill Iron Site suggest that just after the Goshen occupation a warming and drying trend likely began (Scott-Cummings in Frison 1996).

Figure 43: Goshen point example (Mill Iron Site).

The proximal half of a Goshen point was found during subsurface testing of 24DW272 (OTL Ridge) in southeastern Dawson County within the project area (Davis and Aaberg 1988; Davis et al. 1989; Eckerle and Aaberg 1990). Radiocarbon dating of a paleosol at this location returned a date of about 9000 years BP (Table 18). Initially it

was hoped that this site contained intact Early/Paleoindian deposits but subsequent testing suggests cultural materials at the site may be redeposited (Leslie B. Davis, personal communication). An isolated complete Goshen point was recovered from the surface of a locality in southeastern Dawson County (Davis and Aaberg 1988). Just west of the project area Munson and Ferguson (1998) report a possible Goshen point from 24BH1117. Arguably, a few other Goshen point or Goshen-like point occurrences are know from in or near the project area.

Folsom and Midland Complexes

Frison (1991: 50) indicates that Folsom was of relatively long duration on the Plains and in the intermountain region extending from about 10,900 to 10,200 years BP. Folsom projectile points are lanceolate in form with a long flute extending from the concave base (Figure 44). Folsom lithic technology is recognized as perhaps of the highest quality of the Precontact period (Frison 1991: 51). Both fluted and unfluted points are reported from Folsom occupations at Lindenmeier, Colorado and at the Hanson and Agate Basin sites in Wyoming. These occurrences lead Frison (1991: 51) to suggest that Midland points may be part of Folsom assemblages. Although Folsom sites have not been excavated within the project area, such sites from Wyoming, Colorado, and western Montana indicate Folsom people hunted bison and elk antler artifacts are also reported (Frison 1991). Finally made bone needles and delicately incised bone suggest that sophisticated craftsmanship as expressed in lithic technology also carried through to bone, wood, and other perishable materials (Frison 1991: 51).

Folsom sites with good buried context are not reported from the project area but the state data base lists 6 Folsom points as occurring within the area. Several Folsom points are among the Oscar T. Lewis collection from southeastern Dawson County. A Folsom and "Yuma" point were reported from 24RV0001 recorded in 1946 in the vicinity of Medicine Lake, Roosevelt County. This is a multi-component site that includes surface features as well as potential buried/stratified deposits. Although the original recorders recommended substantial testing it appears that the site has never undergone such investigation. What was originally described as a Plainview point fragment but later judged to be Folsom was found on a BLM tract at 24CR410 in Custer County. Other lithic materials and fire-cracked rock were also reported for this site but materials appeared to be restricted to the surface or very shallowly buried contexts. A Midland point is reported from the surface of a Sheridan County locality (Joyes 1990) and Jerde (1981) also reports a Folsom or Clovis mid-section from Sheridan County. Taylor (n.d.) reports an isolated Folsom point from the Fort Peck Reservoir area in McCone County.

The climate during Folsom times was likely wetter than present although a warming and drying trend may have begun.

Figure 44: Folsom point example.

Agate Basin Complex

Frison (1991: 57) indicates that the temporal range for Agate Basin was originally proposed to fall between 10,000 and 10,500 years BP. Several radiocarbon dates for Agate Basin components fall outside this range (from ca. 9350 to ca. 9990 BP in Frison 1991: 26) and if these dates are accepted it is possible that Agate Basin persisted longer than was first proposed. Frison (1991: 59) indicates that although in excavated sites Agate Basin always occurs stratigraphically above Folsom, radiocarbon dates suggest there may be some overlap. Agate Basin points are typically long, narrow, unfluted lanceolate forms with straight to slightly convex bases (Figure 45). Like Folsom, lithic workmanship is of very high quality. Agate Basin people were big game hunters and bison trapping was part of the subsistence strategy. Project area data suggests that although a warming and drying trend had begun during Agate Basin times, wet cycles occurred.

Figure 45 Agate Basin point example.

Excavated Agate Basin sites are not known from Montana or the project area. The state data base indicates that 10 Agate Basin points are reported from sites in the project area. All reported occurrences are surface finds and to date associated buried deposits have not been identified. Agate Basin points are present in the Oscar T. Lewis collection from southeastern Dawson County. Two other Dawson County sites yielded 3 Agate Basin points and 2 are reported from Wibaux County, 1 from Powder River County, 2 from Custer County, 2 from Big Horn County, 1 from Sheridan County and 1 from Rosebud County. Jerde (1992) reports 2 additional Agate Basin points, not listed on the state data base, from two sites in Sheridan County. Four of the sites yielding Agate Basin points occur on BLM land: 1 in Wibaux County, 1 in Custer County, and 2 in Dawson County.

Hell Gap Complex

Frison (1991: 26) reports radiocarbon dates for Hell Gap components that range from about 9600 BP to about 10,000 BP. Bradley (in Frison 1991: 382-385) suggests that Hell Gap projectile point technology "was a continuation of the well-developed Agate Basin technology". The Hell Gap point was produced through biface technology and the preform was well-thinned through percussion flaking. Finishing includes pressure flaking largely restricted to margins and pressure thinning that extends over much of the faces. The Agate Basin point typically appears as a lanceolate form with edges that expand from the base to at least the median, forming a shoulder (Figure 46). Bases are often straight to slightly convex. Presently Hell Gap peoples are viewed as big game hunters with an emphasis on bison. In the project area data suggests that although a warming and drying trend was in place, there were cycles of increased precipitation.

Figure 46: Hell Gap point example.

Excavated Hell Gap sites are not known from the project area. Site 24DW79 in Makoshika State Park, Dawson County, yielded three Hell Gap points from road ruts on an upland bench surface. Eckerle and Aaberg (1990) noted a paleosol exposed in a cutbank at the site and this sampled paleosol returned a date of 5790 BP. Montana State University carried out subsurface testing at this site but failed to identify intact Hell Gap deposits (Les Davis, personal communication).

The state data base lists 8 sites that have yielded Hell Gap projectile points in the project area but the data base does not include 24DW79. The listed sites include 2 from Powder River County, 2 from Carter County, 1 from Custer County, 1 from Sheridan County and 1 from Big Horn County. Two of the sites containing Hell Gap points are on BLM tracts in Custer and Carter County and 24CR0297 yielded two Hell Gap point bases. The BLM carried out limited testing of 24CR0297 but did not identify intact Hell Gap deposits but recommended further testing. Jerde (1992) lists 3 additional Hell Gap points from Sheridan County that are not on the state data base. The site form for 24RB868 also lists a Hell Gap point find and Greiser (1981) indicates a few Hell Gap points have been found in the upper Tongue River area.

Alberta/Alberta-Cody Complex

Frison (1991: 62-63) discusses the Alberta Complex and mentions that a range of 9500 to 9000 years BP was first suggested but goes on to reference the Hudson-Meng site in Nebraska where dates from 9000 to 9800 were obtained. He also describes the projectile points from a component dated to about 10,000 BP at the Horner site in Wyoming. He indicates that these dates are too old for the Cody Complex and that the

Horner points were similar to Alberta points with some distinct differences and he tentatively named the Horner points Alberta-Cody. Alberta specimens represent the first truly stemmed Early/Paleoindian points and they exhibit a short, straight-edged stem that terminates in an abrupt shoulder (Figure 47). Bison bone dominates faunal assemblages from Alberta/Alberta-Cody sites. In the project area data tends to indicate that the climate was wetter as is indicated in part by presence of a well-developed paleosol with gleyed zone at a site in southeastern Dawson County (Eckerle and Aaberg 1990). Alberta points are not listed on the state data base for the project area. However, Jerde (1992) mentions one site in Sheridan County that yielded an Alberta point and Fredlund and Fredlund (1977) also describe an Alberta point from 24TE30 in Treasure County. Site 24PR405 also yielded an Alberta point (S. Deaver 1981).

Figure 47: Alberta point example.

Cody Complex

The Cody Complex is represented by two projectile point styles: Eden and Scottsbluff. Bradley (in Frison 1991: 389-393) indicates that the exceptionally workmanship of Cody points were produced by a technology that began with Agate Basin and was further refined. Based on Bradleys descriptions and illustrations both Eden and Scottsbluff point are stemmed with stems generally more pronounced in Scottsbluff specimens and less so with Eden specimens (Figure 48). Several distinct stemmed knives are also associated with the Cody Complex. Frison (1991: 66) reports some variation in radiocarbon dates for Cody sites with the most likely range from about 8800 BP to about 9200BP. A warming and drying trend that had begun earlier in the Paleoindian/Early Period may have been interrupted by a wet cycle during Cody times.

The McHaffie Site in western Montana contains a Cody complex component but buried Cody Complex components with good context and radiocarbon dates are not known from the project area. The state data base lists 5 sites with Scottsbluff points and 4 with Eden points. These include 3 sites in Sheridan County, 2 in Wibaux County, 2 in Custer County, 1 in Carter County, and 1 in Rosebud County. A Scottsbluff point is reported from 24RB1605 by Meyer and Munson (1998) and although the site was excavated context for the Scottsbluff point is questionable with no associated radiocarbon dates. The BLM is not listed as an owner on any of the state-listed Cody occurrences. Cody complex points are represented in the Oscar T. Lewis collection from southeastern Dawson County and one Eden midsection is reported from the same area by Davis et al. (1989). Jerde (1992, 1981) describes 4 Scottsbluff points and 5 Eden points from sites and localities in Sheridan County and only 3 of these site localities are listed on the state data base. Site forms also list Cody Complex artifacts from 24DW9 and 24DW10 in

Dawson County and 24RB1073 on Custer Forest land in Rosebud County (McLean 1976). Cody Complex points are also listed for 24WX1003 and 24WX1007 in Wibaux County and 24BH1726 in Big Horn County. Greiser (1981) reports isolated Cody Complex points from the Decker-upper Tongue River area.

Figure 48: Scottsbluff point example.

Frederick Complex

Frison (1991: 66) indicates a suggested range of 8400 to 8000 years BP for the Frederick Complex. He also states that at this time there "is an abrupt change from stemmed points with transverse pressure flaking" to lanceolate forms with parallel-oblique flaking. Frison further indicates that what are called Jimmy Allen points from the type site in Wyoming are very similar to Frederick points. The Jimmy Allen point as it appears in Frison (1991: 63) is lanceolate with a deep basal concavity. Neither Frederick nor Jimmy Allen points are listed on the state data base. Wettstaed (1990) states that Jimmy Allen points have been reported from the Custer Forest within the project area. Paleoclimatic data from the project area suggests that the Altithermal was just beginning to take effect about the time of the Frederick Complex.

The Angostura point, originally named from the Ray Long site in western South Dakota, may be of similar age as Frederick Complex points and may be a local expression of the terminal Paleoindian/Early Period (Frison 1991: 74). Angostura points are not listed in the state data base but Wettstaed (1990) indicates they have been found on the Custer Forest in the project area. Although not in the data base, Angostura points are reported from 24CR1004, 24PR1184, and 24BH1877. Sometimes reported as related to the Frederick Complex are Brown's Valley points, which are reported from 24BH1075 and 24RB1075. Frederick points are also reported from 24BH1726.

Lusk Complex

The Lusk Complex is poorly understood and was proposed out of analysis of a small assemblage from the Hell Gap and Betty Greene sites in Wyoming (Frison 1991: 66-67). Frison indicates that Lusk points are very similar to Frederick points "with a somewhat degenerate appearance" and are plano-convex in cross-section. Context for a 7900 year BP radiocarbon date from the Betty Green site is questionable so Frison does not present a temporal range for the complex. Lusk points are not listed on the state data base for the project area and the authors do not know of other reported occurrences although some researchers argue that Agate Basin points in the project area are sometimes mid-identified as Lusk (Greiser 1981).

Foothill-Mountain Groups

Frison (1991: 67-71) mentions that from about 10,000 BP "there were apparently two concurrent and separate Paleoindian occupations with different and mutually exclusive subsistence strategies, one of which was oriented toward an open plains, part-time bison-hunting way of life, whereas the other favored a more hunting and gathering subsistence in foothill and mountain slope areas and were more Archaic in terms of subsistence strategies". The project area, including the higher relief southern portion, is generally considered to be part of the open plains. A variety of lanceolate projectile point forms are known from mountain and foothill settings but as far as we know these points have not been found in the project area.

Pryor Stemmed Complex

The Pryor Stemmed projectile point is another manifestation originally thought to have been restricted to the Pryor and Bighorn mountains and foothills. Frison (1991: 71) reports that its distribution is wider with occurrences in central Wyoming, in the Laramie Range and in the Hartville Uplift area of Wyoming. Temporal range for Pryor Stemmed is 8300 to 7800 years BP and the Altithermal was likely well underway during the latter part of that temporal range. As presented in Frison (1991: 72-73) Pryor Stemmed points display a variety of forms with most exhibiting some degree of low-blade stemming. Bradley (in Frison 1991: 393-394) states that Pryor Stemmed and Lovell Constricted points (about the same time period and found in similar settings) have a variety of shapes but share "a characteristic parallel-oblique flaking style". Neither Pryor Stemmed nor Lovell Constricted point occurrences in the project area are known to the authors and are not listed on the state data base. The southwestern part of the project area is proximal to the Bighorn and Pryor Mountains so it is possible that these point styles could occur in the project area.

Middle Precontact (early portion)/Early Plains Archaic Period (ca. 7800 – 5000 BP)

Reeves does not subdivide the Middle Period although Frison does. Thus the temporal span presented above is that proposed by Frison for the Early Plains Archaic. The Altithermal was well underway by the beginning of the Middle Precontact Period. At one time researchers thought that much of Northwestern Plains was completely abandoned (i.e. cultural hiatus) during the generally hot dry Altithermal. Now however, both paleoenvironmental data and archaeological data suggest that the area did not experience a complete hiatus. As reviewed in the Paleoenvironmental section of this report, evidence indicates that in the project area there were wet cycles during the Altithermal. So the duration, intensity, and geographic distribution of the Altithermal, even within the project area was likely not universal. There is little question of an overall pattern of aridity during this interval and it likely had a substantial effect on game carrying capacity and lowered human populations. Most data indicates that the Altithermal ended by about 5200 years ago in the project area.

The Middle Precontact Period saw the disappearance of lanceolate and large stemmed points and the appearance of side-notched and corner-notched types. In the project area there are no radiocarbon dates with associated cultural materials or excavated

sites that reliably associate with the early part of Middle Precontact times. Arguably a few points possibly associate with this interval. However, as Deaver and Deaver (1988: 84-86) state, "…..there are few, if any point attributes from this subperiod that don't overlap with the normal range of variation for Pelican Lake or Besant phase points (i.e. younger, more recent points)". Therefore a picture of Precontact lifeways for the period cannot be reliably reconstructed.

Considering that early Middle Precontact points and sites are known from areas proximal to the Miles City Field Office planning unit, it is likely that such sites are present in the project area. As mentioned in an earlier discussion of paleoenvironmental conditions (i.e. cycles of erosion and deposition) in this Class I, it is quite possible that early Middle Precontact sites are very difficult to locate and some may have been deeply buried or were eroded away.

The evidence of early Middle Precontact occupation from adjacent areas within or more proximal to mountains and foothills is stronger and indicates big game hunting was still an important element in subsistence. Frison sees an increase in the frequency of ground stone tools thought to associate with plant processing and representing increased importance of plants in diet. Two bison kill sites (Hawken and Hawken III) associated with large side-notched points in the Wyoming part of the Black Hills produced quantities of an "extinct variant" of bison and produced radiocarbon dates of 6400 to 6000 years BP (Frison 1991: 86). Bison hunting in some areas was obviously a viable subsistence strategy during the Altithermal and obviously some parts of the Plains at some times during the Altithermal were able to support bison in numbers large enough to facilitate mass killing. Deaver and Deaver (1988: 84) review data from other sites adjacent to the project area and indicate that exploitation of a variety of animals (both big game and smaller species) was part of local adaptations wherein "groups used whatever was abundant, at least seasonally". One significant development during the early Middle Precontact Period was the appearance of pit houses during the latter part of the period (Frison 1991: 84). Although most area pit house sites are located in Wyoming one pit house site (24CB1332) was discovered in southcentral Montana and dates from about 3365 B.C. to 1690 B.C. (Walker-Kuntz 1999). Data from this Montana pit house site indicates occupants exploited many non-bison species such as rabbit, deer, and pronghorn. Use of plant species in diet is also indicated by a variety of macro- and micro-fossils.

The picture of Early Precontact settlement and subsistence is derived from a sample of sites that includes a high percentage of bison kills and mega-fauna procurement localities. Until a larger number of non-kill sites from this period are investigated it seems to us that the real differences between subsistence adaptations of the Early Precontact Period and the Middle Precontact Period on the Northwestern Plains cannot be clearly elucidated.

In his discussions of the Early Plains Archaic/early Middle Precontact, Frison (1991: 79-88) does not use complexes or phases to describe archaeological manifestations but instead focuses on projectile point types and data from individual

sites. Reeves (1978, 1983) defines the Mummy Cave Complex to accommodate a side-notched projectile point (Figure 49) and associated assemblage. This complex was defined in part from data obtained from the Mummy Cave Site of northwestern Wyoming (Husted and Edgar 2002). Side-notched points from western Montana and Idaho with a similar temporal range have been termed Bitterroot. Husted and Edgar (2002) named two side-notched point styles (Pahaska and Blackwater side notched varieties) from the lower levels of Mummy Cave early Middle Precontact layers and they present radiocarbon dates for these layers that range from 6780 to 7630 BP (2002: 23-26). Pahaska and Blackwater as point types have not come into wide usage largely because more recent data indicates that corner-notched and corner/basally notched forms are also associated with the early Middle Precontact Period/Early Plains Archaic Period (Figure 49).

Figure 49: Mummy Cave/Bitterroot side-notched and Mummy Cave Complex corner-notched point examples.

The Oxbow point was first described by Nero and McCorquodale (1958) and Wettlaufer and Mayer-Oakes (1960) from southern Saskatchewan with radiocarbon dates centered around 5200 BP. Theses dates would have placed the Oxbow Complex at the end of the early part of the Middle Period/Early Plains Archaic. A range of dates from about 6800 BP to about 3500 BP were obtained from a stratified site with multiple Oxbow levels at the Sun River Site in westcentral Montana (Greiser et al. 1983, 1985). Melton (1988) sees the early date from the Sun River Site as the earliest acceptable date for Oxbow. This early date places origins of Oxbow well within the early part of the Middle Precontact Period of the Early Plains Archaic. It is also apparent that the Oxbow Complex extended through the Middle Precontact Period to about 3400 BP as is evident from radiocarbon dates from the Harder Site in southern Saskatchewan (Dyck 1977) and from radiocarbon dates from the Cree Crossing Site (24PH3396) on the Milk River in southcentral Montana (Aaberg et al. 2003). Although dates as recent as 2000 BP (in a few cases even younger) are reported from southern Canadian Prairie Province contexts (Syms 1983; Pollock 1981; Quigg 1975), some researchers feel there is some question on projectile point typology associated with these recent dates (Buchner 1979; Melton 1988). More recent dates (ca. 2880 and 3050 BP) were also obtained from the Cree Crossing Site but these dates came from buried occupations which did not yield projectile points. In reviewing radiocarbon dates for sites containing Oxbow points, Aaberg et al. (2003) see strong evidence that the earliest Oxbow Complex occupations tend to occur in western and southern contexts, including Wyoming and western Montana, and that more recent Oxbow occupations tend to occur in northern contexts, including northcentral and northeastern Montana and the Prairie Provinces of Canada.

Summarizing projectile point references for the early Middle Precontact/Early Plains Archaic, types known from in or near the project area include Hawken, Pahaska side-notched, Blackwater Draw side-notched, Mummy Cave Complex side- and corner-notched and Oxbow.

Identifying discrete region-wide cultural complexes with a typical point style and associated assemblage has proven difficult for the early Middle Precontact Period. It is possible that Altithermal aridity restricted mobility of lowered human populations and diminished the resource base to the extent that groups occupying the project area were more isolated from one another than in previous or later periods. A forced focus on local resources brought about by more severe climatic conditions may have resulted in local and varied expressions of the "tool template" and subsistence adaptations.

As mentioned above, the early Precontact Period in the project area is represented by a handful of projectile point surface finds and from one excavated, shallowly buried site. Fraley (1980) reports possible Hawken points among 4 side-notched forms from BLM sites in the Glendive area. Birney (1995) also reports a possible Hawken (or Besant) point from 24PR1663 on a BLM tract in Powder River County. McLean (1976) reports early Middle Period points from Custer Forest tracts in Powder River County. Wilde et al. (1985) report 3 Bitterroot points from 24RB978. Although these 3 specimens were not actually viewed by us, the report point illustrations in our view appear to be Late Prehistoric Period side-notched varieties. Campbell et al. (1986) report a Hawken point and a Mummy Cave corner-notched point from sites in Carter, Fallon, and Powder River Counties. Wettstaed (1990) indicates that three sites on the Custer Forest have yielded points described as Oxbow. Birney (1995) reports one Oxbow isolate from a BLM tract in Powder River County. An Oxbow or McKean point isolate is also reported by Hubbel (1994) from a BLM project area covering Musselshell, Rosebud, Treasure, and Yellowstone Counties. Shane et al. (2004) describe one possible Oxbow or Yonkee point from 24RB2108 on a BLM tract in Rosebud County. One Oxbow point (24BH2983) is also reported by Fandrich (2003) from a project in Big Horn County. Davis et al. (1994) also report two Hawken projectile points among the multi-component artifact assemblage from the Coyote House Site (24PR601) on the Custer Forest within the project area. This site included a cribbed log and sandstone structure, but a definite association between the structure and the purported Hawken points could not be established and the present structure was suggested as 300 to 500 years old (Davis et al. 1994: 50). A few other surface finds are also known from the project area.

Middle Precontact (middle portion)/Middle Plains Archaic (ca. 5000 BP-3000 BP)

The beginning of this time interval saw an end to the Altithermal and it is generally believed that both big game, particularly bison, and human populations increased. Recent paleoclimatic data suggests that moisture regimes varied during this interval but generally conditions more moist than the Altithermal prevailed. A spike in wet cycles is indicated between about 4000 BP and 3500 BP and a spike in dryer conditions of undetermined duration is indicated around 3300 BP. A proliferation of projectile point forms, which were first apparent in the early part of the Middle

Precontact Period, continued into the middle part of the Middle Precontact Period. As discussed above, the Oxbow Complex, at least as expressed by a particular projectile point type continued into this sub-period. Bison figured prominently in the diet of Oxbow peoples although bison kills of this age are not presently known from areas within or proximal to the project area. Pronghorn, deer, elk, and moose, as well as a variety of smaller species, are reported from sites dating to the earlier portion of this interval. Bison kills are known from later times during the period. Tipi rings, although believed to be even older, are well-represented by about 4000 years ago based on associated projectile points and a few radiocarbon dates (Brumley and Dickerson 2000). In portions of Wyoming pit houses continue to appear (Frison 1991; Walker-Kuntz 1999).

Oxbow Complex

Deaver and Deaver (1988: 86-87) use the term Oxbow Phase when describing this archaeological culture. However, others (Frison 1991: 86; Greiser et al. 1983; Melton 1988; Aaberg et al. 2003) consider Oxbow a complex. Aaberg et al. (2003) review 74 radiocarbon dates associated with Oxbow points or components. Of those dates about 69% fall between 5000 and 3000 BP, about 16% are older than 5000 BP, and 15% are more recent than 3000 BP. Although the Oxbow Complex began in the early part of the Middle Precontact/Early Plains Archaic, it appears to have been best expressed and most widespread during the middle part of the Middle Precontact/Middle Plains Archaic Period. It also appears to have persisted into more recent times in northern areas, particularly in Boreal forest and parkland settings of Canada. It is conceivable that the northern part of the project area could have Oxbow sites that fall within the recent end of the temporal range and the southern part of the project area could have Oxbow sites that fall in the earlier to middle range of the period.

The most accepted temporal range of Oxbow indicates that it overlapped a portion of the temporal span of the McKean Complex (to be discussed later). Brumley (1975b; 1981) presents data from two sites in Alberta where both Oxbow and McKean diagnostic artifacts were recovered from stratigraphically discrete contexts. In light of this data he suggests that "the Oxbow and McKean phases reflect two different cultural traditions rather than serial phases of a single cultural tradition" or in other words Oxbow and McKean phases represent distinct cultural groups that at times were geographically and temporally contemporaneous (Brumley 1981: 136; Brumley and Rennie 1993).

The Oxbow point is characterized as having shallow side-notches, a broad incurved base with varying degrees of grinding and thinning, and rounded lugs or ears (Figure 50). Wormington and Forbis (1965) suggest that the critical attribute for Oxbow points is the great neck thickness or distance between the notches, which they believed to be half again as great as other points from the period. Greiser et al. (1983) and Aaberg et al. (2003) also indicate broad neck-width as an important attribute of Oxbow points. Lanceolate biface forms with an indented base are known to co-occur with components producing Oxbow points and these specimens are now widely accepted as Oxbow projectile point preforms (Aaberg et al. 2003; Melton 1988; Greiser et al. 1983; Brumley and Rennie 1993; Brumley 1981; Dyck 1977). These lanceolate preforms are distinguished from lanceolate projectile points such as McKean by the absence of

finished pressure flaking and by more subtle basal and edge characteristics. Other stone tools associated with the Oxbow Complex include oval bifaces knives, lanceolate bifaces, small end scrapers, thin uniface knives or side-scrapers, pebble hammerstones, crude choppers, irregular polyhedral cores, perforators, and flake tools (Melton 1988; Aaberg et al. 2003). Heat-altered rock and small basin-shaped hearths are also found in Oxbow sites (Melton 1988; Aaberg et al. 2003). Fauna exploited by Oxbow peoples includes bison, elk, wolf, coyote, dog, fox, rabbit, marten, goose, frog, mussel, pronghorn antelope, mountain sheep, birds, and small mammals (Melton 1988; Aaberg et al. 2003). Melton also suggests that bone tool production was part of Oxbow tool industry.

Figure 50: Oxbow point example.

As reviewed in the previous sub-period discussion, excavated Oxbow sites are unknown from the project area. Only a few projectile points that are possibly Oxbow specimens have been reported from in or near the project area and they include 3 sites in Big Horn County, one in Custer County, 2 in Dawson County, one in McCone County, 3 in Powder River County, one in Rosebud County, one in Richland County, one in Treasure County, and several in Sheridan County (Melton 1988). The earliest occupation of the Kobold Site (24BH406), located on Rosebud Battlefield State Monument property within the project area, is believed to be an Altithermal age occupation although radiocarbon dating was not carried out (Frison 1970). Brumley and Dickerson (2000) interpret this early Kobold occupation as either Mummy Cave or Oxbow. We would exclude Oxbow as a possibility since the points attributed to Level I (earliest occupation) illustrated in Frison's report do not in our view appear to resemble Oxbow points.

McKean Complex

Frison (1991: 88-91) considers the McKean Complex to form the bulk of occupations dating to the middle part of the Middle Precontact Period or Middle Plains Archaic Period. Sites of this age and association are more frequent than any from preceding times and their appearance "occurred quite rapidly" (Frison 1991: 88). Based on radiocarbon dates a temporal range of about 5000 to 3000 BP is indicated although others (Wettstaed 1990) suggest a range of 4500 to 3000 BP.

Frison (1991: 89) sees an emphasis on plant foods based on increased frequencies of grinding stones in components of this age. This, together with a varied faunal assemblage from many McKean components, has been interpreted as indicating a more archaic economy. However, as reviewed by Keyser and Davis (1984: 57), McKean sites include communal bison kills that suggest an emphasis on bison procurement in overall subsistence strategy on a level comparable to "classic bison hunting complexes such as Besant and Avonlea". McKean adaptations also include hunting of individual species as

well as communal killing of deer, pronghorn, and mountain sheep (Keyser and Davis 1984: 57). Cooking and/or heating features are varied and frequent in McKean age sites and plant macrofossils have been discovered from McKean contexts (Keyser 1986). Artifacts recovered from McKean contexts at Wyoming's Leigh Cave and Mummy Cave include basketry, cordage, clothing, bone tools and ornaments made from incised and cut bone, plant fiber, leather, and shell (Husted and Edgar 2002; Frison and Huseas 1968). Tipi rings associated with McKean points are known from the project area and adjacent areas and appear to begin a general increase in frequency during McKean times. The earliest radiocarbon-dated tipi ring in Montana yielded a date that falls within the McKean temporal range.

McKean Complex projectile point variants include the "true McKean lanceolate" (Frison 1991), which is generally smaller and less well-finished than lanceolate forms from the Early or Paleoindian Period (Figure 51). Points that are often considered to be McKean Complex variants include two stemmed types: Duncan and Hanna. The primary difference between these two points is that the shoulders of Duncan types are in-sloping and not sharply-defined (Figure 51) while the Hanna shoulders are slightly barbed or more abrupt (Figure 51). Both Duncan and Hanna points exhibit generally concave or indented bases. Frison (1991: 91) also includes the Mallory point, a side-notched variant with either straight, slightly concave, or deeply indented bases, in the McKean Complex. The Mallory point co-occurred with the McKean lanceolate at the Scoggin site in central Wyoming (Lobdell 1973).

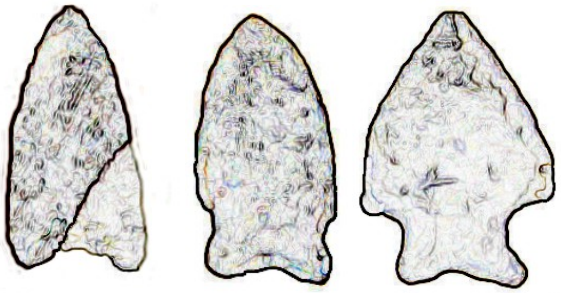

Figure 51: McKean lanceolate, Duncan, and Hanna point examples.

Although some view all projectile points described above as part of the McKean Complex observed to include a variety of subsistence adaptations and seen as part of an overall generalized subsistence strategy, others think this view is flawed because it does not address the variability of the archaeological record (Keyser and Davis 1984). Keyser and Davis (1984: 56-60) suggest that the McKean Complex should be investigated from the perspective of local group adaptation to subsistence strategies suitable to their area.

Although the purported McKean variants discussed above include lanceolate, stemmed, and side-notched types, corner-notched points (not presently assigned a name, phase, or complex) are also known from the early part of the Middle Precontact/Middle Plains Archaic and from the latter part of the same period (Frison 1991: 101).

In the project area site 24RB1164, an open campsite, contained a McKean Complex component that occurred in a buried paleosol that was stratigraphically separated from an overlying Pelican Lake (to be discussed later) component (Munson 1992b). The McKean component yielded points identified as Mallory, Hanna and Duncan but did not contain lanceolate points. The McKean component at 24RB1164 yielded two radiocarbon dates (Appendix A): about 2200 BP and about 3310 BP (Munson 1992b: 14). Munson considered the more recent date to be unacceptable attributing it to a very small and unreliable charcoal sample. Both bison and deer were represented in the site faunal assemblage with bison more numerous and a canid-size rib fragment also identified. All hearths at this site were surface type features, which Munson considered unusual given that pit hearths and pit ovens are common at other McKean age sites. He further suggests that the exclusive presence of surface hearths may indicate winter occupation, reasoning that frozen ground or the need for "radiant heat" could explain the absence of pit type features.

Munson (2003) also reports a Duncan point found during excavations at 24BH1120 (Hailstone Site) although apparently it was not associated with any dateable material. In that same report (Munson 2003) he also discusses excavations at 24BH2635 (Westside Site) where 3 untypable point fragments were found and a radiocarbon date of 3190 BP (Appendix A) was obtained. This date could associate with McKean but with no associated projectile points such an association was not posed. Munson and Ferguson (2000b) also report a Duncan point from 24BH1118 where excavations were carried out. This site was found to be primarily occupied during a later period and the Duncan point was not associated with dateable materials. Munson and Ferguson (2000c) also report a radiocarbon date of 3850 BP (Appendix A) for the Dagan Site (24BH2622). Although this date fits in the range for McKean, projectile points from the site only include later corner-notched varieties and one possible Late Prehistoric Period point leading Munson and Ferguson to reject the 3850 BP date. At the Janney Rockshelter (24BH1117), just outside the project area, Munson and Ferguson (1998-Janney) report a radiocarbon date of 4040 BP (Appendix A) associated with a Mallory point variant of the McKean Complex. A Duncan point was also recovered from the Janney Rockshelter.

In the project area portion of Big Horn County, Munson (1992a) reports dates of 3790 BP and 3600 BP at 24BH1048 and he attributes those dates (Appendix A) to the McKean Complex although irrefutably McKean points were not found at the site. A stone arc or partial tipi ring was also noted at this site. At 24BH1726 Fredlund (1979, 1988) suggests a McKean association with a date of about 4338 BP (Appendix A) although McKean Complex projectile points were apparently not found.

Of particular note is a McKean age date of about 3900 years BP (Appendix A) that was obtained from a hearth within a tipi ring at the Rattlesnake Point Site (24BH2317) in the project area part of Big Horn, County (Brumley and Dickerson 2000). As far as the authors know this is the earliest radiocarbon date obtained from a tipi ring in Montana.

The state data base lists 42 sites that have yielded McKean points within or immediately adjacent to the project area. These sites include 5 in Big Horn County, 3 in Custer County, 2 in Carter County, 1 in Fallon County, 1 in Garfield County, 1 in McCone County, 8 in Powder River, 9 in Rosebud County, 1 in Richland County, 1 in Roosevelt County, 8 in Sheridan County and 2 in Wibaux County. Of those 42 sites 10 (23.8%) occur on BLM lands. Eight of the sites containing "McKean" points also contained Duncan and/or Hanna points.

It is not clear if all these McKean occurrences are lanceolate forms although this may be the case since the data base has separate listings for Duncan (n=39 sites) and Hanna (n=42 sites) variant occurrences.

Of the 39 sites listed as containing Duncan points, 8 occur in Big Horn County, 1 occurs in Custer County, 6 occur in Carter County, 1 in Garfield, 1 in McCone, 2 in Prairie County, 11 in Powder River County, 5 in Rosebud County, 3 in Sheridan County, and 1 in Treasure County. Those Duncan-yielding sites include at least 15 (38.5%) that occur on BLM land. Of the 39 Duncan-yielding sites, 5 also contained Hanna and/or McKean lanceolate points.

Of the 42 sites listed as containing Hanna points, 2 occur in Big Horn County, 1 in Custer County, 1 in Carter County, 1 in Dawson County, 2 in Fallon County, 1 in Garfield County, 1 in Prairie County, 4 in Powder River County, 9 in Rosebud County, 2 in Richland County, and 18 in Sheridan County. At least 7 (16.7%) of these sites occur on BLM land. Of the 42 Hanna-yielding sites, 8 also contained Duncan and/or McKean lanceolate points.

Middle Precontact (late portion)/Late Plains Archaic Period (ca. 3000 BP-1500 BP)

This sub-period saw a continuation of big game hunting with an emphasis on bison. Based on the archaeological record and the increasing frequency of bison kill sites, communal game procurement continued to develop and expand as an important subsistence adaptation during this interval. Other than the Paleoindian/Early Precontact Period Mill Iron site, the earliest evidence of communal bison-killing in the project area dates to this period. Use of the tipi as a primary domicile apparently increased substantially during this sub-period as inferred from numerous tipi ring sites and associated projectile points and radiocarbon dates. Toward the end of the period ceramics first appear. Although some researchers suggest domestication of the dog occurred earlier, the best Montana evidence for domestication comes from this period. Projectile point forms from this interval are dominated by corner-notched varieties but include some side-notched types. Paleoclimatic data indicates moisture regimes fluctuated during the period with wetter conditions between about 2600 BP and 2400 BP. Data also indicates a strong spike in arid cycles with greatest data overlap between about 1700 BP and 1500 BP. Wet cycles may also have occurred during this interval but data overlap is not as strong as that for arid cycles.

Yonkee Phase

A projectile point type with unique attributes that distinguished it from other types of the period was first recognized from the Powers-Yonkee site (24PR5) in southwestern Powder River County (Bentzen 1961, 1962a, 1962b). A radiocarbon date of ca. 4450 BP (Table 18) was obtained from this purported bison trap during these early investigations. This early date and similarities of the point to some McKean variants led researchers to include it in the McKean Complex. Similar points were discovered at a multi-component bison jump (Kobold Site – 24BH406) now located within the Rosebud Battlefield State Monument in eastern Big Horn, County within the project area (Frison 1970). Radiocarbon dates for the Kobold Site were not obtained. Since those early investigations a number of other bison kills and campsites in Montana and Wyoming have been investigated. These investigations resulted in the definition of a new projectile point type initially referred to as the Powers-Yonkee point but more recently known as the Yonkee point. Radiocarbon dating has been carried out at a number of Yonkee sites and the most acceptable temporal range of this phase is now seen as ca. 3100 BP to 2300 BP [(Table 18) Ferguson 2003; Roll et al. 1992; Bump 1987]. The original date of 4450 BP has been rejected as has been an initial identification of an intermediate form of bison first reported for the Powers-Yonkee site. Still the Powers-Yonkee site represents the earliest radiocarbon date associated with a bison kill in the project area, with the exception of the Mill Iron Site (Early Precontact/Paleoindian Period).

Based on analysis of specimens recovered from the Powers-Yonkee Site, Roll et al. (1992) define a relatively tight set of attributes for the Yonkee point, which is noted as "……a long slender projectile point with notches placed low on the lateral edges creating the impression of a corner-notched or corner-removed point. Maximum width and blade width typically coincide; base width falls about ten percent lower. Bases are either notched or thinned to produce a small but obvious basal concavity….Most points have a bi-convex blade" (Figure 52). Their point analysis included specimens in collections made by others through the many years since the site was first discovered. Ferguson (2003) notes that what he identifies as Yonkee points from several non-kill sites depart some from the Roll et al. attribute description particularly with respect to overall length to width ratios. He suggests these differences are a result of resharpening and re-use. It appears that Yonkee points from kill sites, particularly Kobold and Powers-Yonkee, generally fit a tighter range of attributes. While we can only speculate as to reasons for this, it is possible that the lower range of point variability at such sites indicates that many of the points were produced by fewer people perhaps in preparation for a planned communal killing event.

Figure 52: Yonkee point example.

Ferguson (2003: 41-44) summarizes Yonkee Phase lifeways based on data from a number of sites including bison kills and campsites. He sees Yonkee groups as sophisticated bison hunters who planned seasonal communal kills, perhaps during summers as suggested by Frison (1991). Communal bison procurement included jumping, trapping, and impounding/corralling although Roll et al. indicate that arroyo trapping at the Powers-Yonkee site does not appear to have been the mechanism of procurement, which presently remains undetermined. Bison processing at kill sites is typified by focus on meat removal and not by complete disarticulation of skeletons or reduction of bone for use in bone-grease production (i.e. stone boiling) or marrow extraction. Ferguson (2003: 41) also suggests Yonkee campsite assemblages indicate a broad diet that included exploitation of "a variety of mammals, plants, eggs, and shellfish". Roll et al. note that although bison dominated the Powers-Yonkee site assemblage a few medium ungulate (e.g. deer/sheep/pronghorn) bones were recovered as was some canid material. Frison (1991: 105) describes a campsite with a Yonkee component in northeastern Wyoming that was dominated by pronghorn and suggests that the site assemblage may indicate more of a hunting and gathering orientation although he allows that the site could also be a seasonal expression of groups who at other times may have focused on communal bison procurement. Ferguson (2003: 43) also indicates that Yonkee "components contain a variety of shallow basin-shaped hearths, slab-lined hearths, unprepared surface hearths, and basin and barrel-shaped rock-filled ovens". He also states that Yonkee points occur in association with a large stone circle (i.e. tipi ring) and a stone arc (i.e. partial tipi ring). The tool kit of the Yonkee Phase includes ground stone tools, flake tools, drills, scrapers, bifacial cores, and beveled edge bifacial knives, which Ferguson (2003) and Frison (1991) consider to be diagnostic of the Late Plains Archaic.

Ferguson (2003: 43) firmly refutes any association between Yonkee and McKean and states: "Stratigraphically and temporally, Powers-Yonkee is associated with the Late Archaic Corner-Notched Tradition (commonly called the "Pelican Lake" Phase)". He goes on to suggest that the Yonkee Phase may "represent a regional adaptation by the same culture that also manufactures the Late Archaic Corner-Notched projectile point". Ferguson bases his position on a review of excavation data that shows a relatively routine co-occurrence of corner-notched points with Yonkee points, particularly at campsites. The problem with this hypothesis is it seems to ignore the fact that corner-notching as a projectile point attribute and technological element extends largely uninterrupted from the early part of the Middle Precontact or Early Plains Archaic Period through to the Late Prehistoric Period. There is little question that corner-notched point frequency increases dramatically during the Late Archaic but without knowing the relationship of corner-notching to earlier archaeological phases and/or complexes it is difficult to completely dismiss possible origins or associations with other manifestations. In fact Gregg (1985) argues that the Pelican Lake Phase is related to the McKean Complex and/or Duncan and Hanna Phases. Co-occurrence of corner-notched points with other point types is not exclusive to the Late Archaic period.

Three sites in Big Horn County within or immediately adjacent to the project area are reported as containing dated Yonkee components (Appendix A). These sites include

24BH1117 (Munson and Ferguson 1998), 24BH117 (Munson 1992a), and 24BH2521 (Munson and Ferguson 2002). In Rosebud County, Munson and Ferguson (1997) report a dated (Appendix A) Yonkee component at 24RB975 and a dated Yonkee component is also reported from 24RB1059 (Munson 1988).

The state antiquities data base does not include Yonkee as a point type therefore it is not possible at this time to account for project wide distribution of the point. It is well documented in the southern part of the project area and Ferguson (2003) indicates it is relatively common in Powder River, Rosebud, and Big Horn counties. Wettstaed (1990: 117) indicates that Yonkee sites are poorly represented on the Ashland District of the Custer Forest with only 3 campsites documented at the time of his report. Both the Kobold Site (24BH406) and the Powers-Yonkee Site (24PR5) occur in the project area and Ferguson (2003) discusses two sites in Rosebud County (24RB1059 and 24RB975) and two in Big Horn County (24BH2634 and 24BH2521). Three of these sites are within the project area and 24BH2634 occurs just west of the project area. Munson and Ferguson (2000a) also report Yonkee points from 24RB1831 within the project area although it is not clear if some radiocarbon dates from the site are specifically associated with they Yonkee points. Generally the incidence of reported Yonkee points north of the Yellowstone River drops dramatically as far as is known by the authors. Other Yonkee point yielding sites include Benson's Butte (24BH1726,) 24CT008, 24GF251, 24BH1611, and 24RL35. A possible Yonkee point was also been found in the Cherry Creek Dam area of Prairie County (Doug Melton, personal communication).

Pelican Lake Phase

Originally the definition of a Pelican Lake Phase was derived from cultural materials and large corner-notched projectile points from lower levels of the Mortlach Site of southern Saskatchewan (Wettlaufer 1955). Among the early investigations of Pelican Lake sites in Montana was that of the Keaster Site (24PH401), a bison kill in the Missouri Breaks of northcentral Montana (Davis and Stallcop 1965). These early investigations saw presence of relatively large corner-notched points with distinctive barbed shoulders as a relatively tight attribute of points associated with the Pelican Lake Phase (Figure 53). Since those early investigations corner-notching has been documented as occurring from near the beginning of the Altithermal through much of the Late Prehistoric Period (Frison 1991). Attribute variation for points coming from what have been described as Pelican Lake components is now seen as extreme (Keyser and Davis 1984). Reeves (1970) proposed local sub-phases to account for point variation and apparent differences in subsistence adaptations and one of those sub-phases, the Upper Miles, was proposed for the project area. Reeves' sub-phases never came into popular use and it appears now that even definition of local sub-phases cannot account for the variation in the perhaps most widely distributed point form in Plains prehistory. To a get a grasp on the nature and context of the Pelican Lake Phase, considering its wide geographic and temporal distribution, it will likely be necessary to continue what Reeves started, and that is the definition of local sub-phases. As mentioned above some researchers feel that the Pelican Lake Phase is related to the McKean Complex but considering the long history of corner-notching this may not be the case. Considering the

number of sites attributed to the Pelican Lake Phase, as a discrete archaeological manifestation, it remains poorly understood.

Figure 53: Pelican Lake point example.

Evidence from the project area and adjacent areas suggests an emphasis on bison procurement including hunting, trapping, and jumping (Frison 1970; Reeves 1970; Davis and Stallcop 1965; Bump 1981; Clark and Wilson 1981; Roll et al. 1993) by Pelican Lake peoples. Generalized big game hunting is also indicated as is high altitude big horn sheep procurement.

It does appear that sites with corner-notched points, and often assigned to the Pelican Lake Phase, dramatically increase in frequency during the late Middle Precontact/Late Plains Archaic and researchers suggest that this equates to a dramatic increase in population (Deaver and Deaver 1988: 94). Fraley et al. (1982; Clark and Wilson 1981) suggest that this population increase may have been "in response to wetter conditions during the Sub-Atlantic climatic episode" (Deaver and Deaver 1988: 94). Paleoclimatic data reviewed for this report indicates fluctuating moisture regimes with perhaps a slight favoring of more moist conditions during Pelican Lake times with arid cycles also operating.

The Pelican Lake Phase has generally been assigned a temporal span of between 3000 BP and 2000 BP. However some radiocarbon dates from western Montana and Wyoming indicate Pelican Lake components as early as 3500 BP and possibly as early as 3900 BP (Frison 1991; Davis 1982; Davis et al. 1982). At least in western Montana it appears that the Pelican Lake Phase predates the Yonkee Phase. As discussed above Ferguson (2003) suggests that the Pelican Lake point and the Yonkee point were manufactured by the same cultural group.

Terminal dates for Pelican Lake are more tenuous and rest on acceptance of corner-notched points as representative of the Pelican Lake Phase. Gregg (1985) sees Pelican Lake as persisting to about 1700 BP and also indicates a transition of the Pelican Lake Phase to the Besant Phase based on the co-occurrence of these point types.

Project area sites attributed to the Pelican Lake Phase include three important bison kills (Ayers-Frazier/24PE30, Koepke/24GF270, Seline/24DW250), all on BLM land and all with associated radiocarbon dates (Appendix A). The Kobold kill site (24BH406), on state property, also contains a Pelican Lake Component (Frison 1970).

Munson (2003) reports the proximal end of a corner-notched point associated with a date of 3190 BP (Appendix A) at 24BH2635 just outside the project area. At 24BH2634 Pelican Lake points and Yonkee Points were found in close association and some of the dates (Appendix A) from this site fit in the range for Pelican Lake. Munson and Ferguson (2001) report 9 "Late Archaic" corner-notched points (no associated radiocarbon dates) from 24BH2626 from another site just outside the project area. Munson and Ferguson (2000a, 2000b) also report Late Plains Archaic corner-notched points they attribute to Pelican Lake from 24RB1831 (within the project area) where a number of radiocarbon dates (Appendix A) within the range of Pelican Lake were obtained and from 24BH2622 (just outside the project area) where they accepted a radiocarbon date of 2622 BP in association with "Late Archaic" corner-notched points. The site form (Munson 1980) for 24RB1005 also indicates Pelican Lake points and associated radiocarbon dates (Appendix A). Site 24RB1059 contained both Yonkee and Pelican Lake points and radiocarbon dates [(Munson 1988) Appendix A]. At 24RB1605 Meyer and Munson (1998) also report 3 large corner-notched points "likely" from the Pelican Lake Phase although radiocarbon dates were not obtained. Pelican Lake points were reported by Fredlund (1993) at 24RB165 (no C-14 dates with corner-notched points). Seven sites on the Custer Forest were reported as having Pelican Lake components (Beckes and Keyser 1983).

Sites too numerous to mention in detail have yielded points attributed to the Pelican Lake Phase or Late Archaic Period from throughout the project area. The state data base lists 173 project area sites as containing Pelican Lake points with 18 in Big Horn County, 14 in Custer County, 14 in Carter County, 1 in Daniels County, 1 in Dawson County, 5 in Fallon County, 7 in Garfield County, 5 in McCone County, 13 in Prairie County, 22 in Powder River County, 35 in Rosebud County, 1 in Richland County, 2 in Roosevelt County, 31 in Sheridan County, 1 in Valley County, and 3 in Wibaux County. At least 60 (34.6%) of these sites occur entirely or partially on BLM lands.

The state data base also maintains a category for corner-notched points with an additional 127 sites listed as containing such points. This includes 28 in Big Horn County, 13 in Custer, 7 in Carter, 1 in Daniels, 2 in Fallon, 2 in McCone, 1 in Prairie, 28 in Powder River, 41 in Rosebud County, and 4 in Sheridan County. Of these sites 22 (17.3%) occur on BLM lands.

Besant Phase

The Besant Phase has been included in the Late Precontact/Prehistoric Period (Reeves 1970, 1983; Gregg 1985; Deaver and Deaver 1988) but others place it in the Middle Precontact/Late Plains Archaic (Frison 1991; Beckes and Keyser 1983; Ruebelmann 1983). Considering the range of dates now known for Besant and considering that the Besant point is likely an atlatl dart point, it is reasonable to consider it part of the Middle Precontact/Late Plains Archaic although Besant obviously continued as an archaeological manifestation into the Late Precontact/Prehistoric Period. As discussed above there also appears to be a relationship between Pelican Lake and Besant as these point types co-occur at some sites, including some within the project area.

Ferguson (2000a: 7-9) presents radiocarbon dates for Besant components in Montana (including 9 sites from the project area), Wyoming, North Dakota, and Alberta and the listed range is from 2090 BP to 1030 BP. Hughes (1987) dates from Besant-associated 24DW85 (not in the Ferguson list) range from 2160 BP to 1520 BP with two even earlier dates (2360 BP and 2720 BP) that were rejected.

Excavated and dated sites with purported Besant components in the project area include 24BH2521, 24BH2621, 24DW83, 24DW85, 24DW140, 24DW1001, 24PR158, 24PR1599, 24RB1831, 24RB1181, 24RB1145, 24RB1069, 24RB1011, and 24RB878 (Appendix A).

Frison (1991: 105) considers the Besant Phase to be "a sophisticated bison hunting manifestation" and mentions that bison corrals associated with Besant components are present at a Wyoming site that dates from about 1700 BP to about 1800 BP. As reviewed by Deaver and Deaver (1988: 98) Besant bison kills outside the project area in northcentral Montana and southern Alberta, as well as the Antonsen Site in southwestern Montana (Davis and Zeier 1978) support Frison's characterization of Besant peoples as emphasizing bison procurement. However, the Mini-Moon site (24DW85), within the project area, is a campsite with 2 and possibly 3 Besant components (Hughes 1987) from which bison, pronghorn, rabbit, and canid bone was recovered. Although bison procurement was emphasized, it appears that at least at times a more generalized big game hunting and resource procurement strategy may have been a part of Besant adaptations. Although irrefutable bison kills associated with Besant are not known from the project area, a bison bone "midden" from the Jannsen site (24PR1599) leads researchers to believe that a kill site occurred nearby (Ferguson 2000a). Hughes (1987) also reports 24DW83 with a radiocarbon date of 2010 BP as a likely Besant bison kill. The Jannsen site faunal assemblage also included pronghorn and small ungulate suggesting that non-bison species were exploited at least incidentally. Munson (1992a) also reports relatively varied faunal remains (bison, deer, canid, pronghorn, mussel shell, small mammal or large bird) from site 24BH2521 an open campsite that contained Yonkee and Besant components.

Ferguson (2000a: 7-9) also notes the presence of a variety of features (e.g. rock-filled pit hearth, surface hearth, slab lined pit oven, rock filled oven, and fire-cracked rock dumps) associated with Besant components. Tipi rings are also documented at sites associated with Besant. Ground stone tools as well as a variety of chipped stone tools are present in Besant components although it appears that the projectile point is the only stone tool diagnostic of the phase. The Besant point was once thought to be side-notched form with side-notches placed relatively low on the blade although the form now includes descriptions of corner-removal. In the case of side-notching notches are often much broader than they are deep (Figure 54). Bases are generally straight and are often ground. Deaver and Deaver (1988: 101) note that attributes for side-notched Besant points often overlap with those of Hawken and Mummy Cave or Bitterroot side-notched forms. They also see Besant attribute overlap with Pelican Lake and Hanna points. Deaver (1997: 26) undertook statistical analysis of Besant projectile points and suggests that much of the variation in Besant points is a result of recycling or reworking. She indicates that points

were also used as knives for bison processing and states "both the life history of points and the way they are used accounts for much variation in the points…….This type of variation is atemporal and probably can be documented in all phases". Another point variant during the Besant Phase has been termed Samantha (Reeves 1970, 1983). Samantha points are similar to Besant points in that they are generally side-notched with the notches placed low on the blade but differ in that they are on average smaller and may represent early arrow point forms (Deaver and Deaver 1988: 101).

Ceramics first appear in the project area during the Besant Phase. The issue of whether ceramics from the Besant Phase represented a distinct type was first addressed by Johnson (1977) who analyzed ceramic specimens collected from cutbank exposures at the Whiskey Hill site (24DW1001) located within the project area. Besant projectile points were collected from this site and a radiocarbon date of 1550 BP was also obtained from a charcoal-bearing hearth (Johnson 1977: 35). She states that cord-marked ceramics

Figure 54: Besant point example.

are characteristic of Woodland culture and suggests that Besant ceramics fit that description. She also suggests that the distinction between Besant and Woodland ceramics is spurious and assigns the Whiskey Hill ceramics to the Plains Woodland Tradition (Johnson 1977: 39). More recently Johnson (in Ferguson 2000a) analyzed ceramics that were reported as in stratigraphic association, and within 2 meters, of "three large, side-notched Besant points" (Ferguson 2000a: 6-37). These ceramics were classified as Late Plains Woodland "based upon the cord roughened surface treatment" along with the globular vessel form with a developed neck (Ferguson 2000a: 6-37). Deaver (1997: 22-26) reviews ceramic finds associated with Besant and sees extensive variation in surface treatments that overlap "with attributes traditionally associated with late period ceramics". She suggests that use of net impressing, simple-stamping and check-stamping, which appears on some Besant ceramics, can no longer be used solely to assign ceramics to the Late Prehistoric/Precontact Period. Of 9 Besant sites that have been excavated or more intensively investigated within or very near the project area, Ferguson (2000a: 7-9) indicates that just 2 have yielded Woodland ceramics.

The state data base lists 75 sites as having yielded Besant points and that list does not include any of the excavated sites mentioned above. Counties containing Besant-yielding sites include Big Horn with 3, Custer with 8, Carter with 4, Daniels with 1, Dawson with 1, Garfield with 2, McCone with 3, Prairie with 7, Powder River with 18, Rosebud with 9, Richland with 2, Roosevelt with 1, Sheridan with 11, Treasure with 2, and Wibaux with 3. Of those 75 sites, at least 28 (37.3%) occur entirely or partially on

BLM land. Sites 24DW85 (Mini-Moon) and 24DW83 (Over-the-Moon) also occur on BLM land.

Late Precontact/Prehistoric Period (ca. 1500 BP – 200 BP)

The beginning of the Late Precontact Period saw introduction of the bow and arrow, or at least saw widespread use of this weapons system. Big game hunting, with an emphasis on bison procurement that included communal kills as well as hunting, was the primary subsistence adaptation of this period. However, exploitation of other big game and smaller species is also indicated. Pronghorn bone is often represented in Late Period components and one likely pronghorn kill site is known from the Missouri River area just west of the project area (Davis and Fisher 1988). There is some evidence suggesting that diet breadth increased during late fall, winter, and early spring, in the Late Period indicating that at times of reduced mobility groups adapted a broad-based hunting strategy wherein many animal species were exploited (Aaberg in Davis 1989). Bison kills from the Late Precontact Period in the project area are relatively common and include Foss Thomas (24BH1001), Munson (24BH2613), Kobold (24BH406), Sam Lei (24PR1032), BLM Bison Trap (24BH1021), Sly Site (24RB267), Old Homestead (24BH1014), and 24GF270. Although Avonlea bison kills are common in northcentral Montana just west of the project area, none have been irrefutably identified within the project. A number of ceramic types appear in the Late Precontact Period.

As originally conceived the Late Precontact Period was only subdivided into the Besant Phase, Avonlea Phase and the following Old Women's Phase although some sub-phases for Avonlea and Old Women's were proposed (Reeves 1970, 1983). Kehoe (1966) perceived differences in side-notched arrow points from the latter part of the period and divided them into the Prairie Side-Notched and succeeding Plains Side-Notched complexes, which he further sub-divided. Although most data does not support Kehoes sub-divisions of Prairie and Plains side-notched point, some archaeologists have followed Kehoe in distinguishing point attributes among side-notched points from what were generally included in the Old Women's Phase and have proposed local phases or sub-phases (Munson various; Munson and Ferguson various; Brumley and Dickerson 2000; Brumley and Rennie 1993; Brumley and Dau 1988). In this report we included Besant in the late Middle Precontact Period because of more recent radiocarbon dating that extended its temporal range to an earlier time. Besant also continued into the Late Precontact Period.

Avonlea Phase

The Avonlea Phase is thought to represent the first true bow and arrow culture on the Northwestern Plains although smaller points from earlier late Middle Precontact contexts may suggest earlier introduction of the bow and arrow. Characteristic points of the Avonlea Phase are small to medium length, are generally very thin, usually exhibit slight to moderate concave bases, and are often very well-flaked and finished (Figure 55). Although side-notching dominates (notches generally narrow and shallow and placed low on the blade), corner-notching is represented. Corner-notched Avonlea specimens tend to exhibit the same delicate flaking and other attributes of side-notched specimens (Figure 55). Reeves (1970, 1983) proposed a temporal range of Avonlea from about 1800 BP to

about 1050 BP with earlier dates tending to occur in northern locales and later dates tending to occur in southern locales. West of the Continental Divide in Montana Roll (1982) indicates that points essentially identical in appearance to Avonlea are associated with what he defines as the Warex Phase, which persists until about 600 BP. Avonlea appears to overlap with the terminal portion of the earlier Besant Phase and with initial portions of later Late Period manifestations.

Fredlund (1988: 173) presents data that indicates Avonlea was expressed as early as about 1600 BP and persisted to about 950 BP in southcentral and southeastern Montana. Fredlund also sees differences in Avonlea material culture from the "pine breaks" region of southcentral Montana and northern Wyoming and proposed the Benson's Butte-Beehive Complex for sites containing points that otherwise would be considered Avonlea. She (1988: 178) suggests that peoples of this complex did not rely on "dwellings that produced tipi rings". Indeed Avonlea tipi rings are not common anywhere on the Northwestern Plains (Deaver and Deaver 1988: 103). Fredlund further indicates that southern Avonlea peoples did not use ceramics, another trait that distinguished southern Avonlea from northern Avonlea. Fredlund indicates that based on two investigated burials, southern Avonlea/Benson's Butte-Beehive peoples considered grave goods as important to the dead. She also states, "Sites are characterized by large quantities of projectile point preforms and points, large numbers and varieties of bone and sandstone tools, faunal remains of large ungulates and small rodents….". Although southern Avonlea points are nearly identical in technological attributes to northern Avonlea points, Fredlund sees the absence of ceramics, presence of a variety of bone and sandstone tools, and a well expressed land use pattern as distinguishing southern Avonlea from northern Avonlea. Although an Avonlea age bison kill is present in western Wyoming (Frison 1991: 113), the infrequency of Avonlea kills in southern areas, including the project area, may be another characteristic that distinguishes northern Avonlea from southern Avonlea. Use of the term Benson's Butte-Beehive Complex has not come into wide usage in distinguishing northern Avonlea from southern Avonlea.

Figure 55: Avonlea side-notched and corner-notched point examples.

Ceramic styles represented in northern and western Avonlea sites outside the project area include net impressed, spiral channeled/parallel grooved, smooth surface finishes, constricted neck and minor shoulder with cord-wrapped rod impressions, and knotted cord impressed (Quigg 1988; Johnson 1988). It is obvious that ceramic variation in Avonlea is extreme and presently ceramic styles have not been used to further sub-divide Avonlea in Northwestern Plains settings.

Northern expressions of Avonlea include an emphasis on bison procurement and communal killing was a significant part of subsistence adaptations. One pronghorn procurement site is known from the Missouri River of northcentral Montana just west of the project area. Smith and Walker (1988) see evidence of a more diverse subsistence adaptation wherein a variety large and small animal species, along with plants, were exploited. Within the project area, bison bone tends to dominate Avonlea assemblages but other species were also exploited in what appears to be a more generalized hunting adaptation.

Generally Avonlea-associated sites are far less frequent in the project area than in areas to the west and north and their numbers are far less than for the preceding Besant and Pelican Lake Phases and are also far less numerous than succeeding periods. Fredlund (1988) lists 6 investigated Avonlea sites within or immediately adjacent to the project area and they include Benson's Butte (24BH1726), Drifter's Shelter (24BH1727), Lone Ring (24BH1085), Arrowhead Rock, Colt 45 III (24RB1012) and Lookout Point (24RB1007). Munson and Ferguson (2000b) report Avonlea occupations at the Second Point Site (24BH1118) with accepted radiocarbon dates of 930 BP and 1010 BP. Munson and Ferguson (1999) also report 13 likely Avonlea points from the East Pillar site (24BH2630). Although this site contained other Late Period point specimens, a number of dates in the 8 radiocarbon samples (420 BP to 1140 BP) fit within the temporal range of Avonlea. The Goheen site (24WX30), located on BLM land in Wibaux, County, is a ceramic-bearing Avonlea occupation that dates to between 1510 BP and 1080 BP (Fraley and Johnson 1981).

Appendix A lists 14 sites with dated Avonlea components and they include: 24BH1118, 24BH1726, 24BH1727, 24BH2630, 24BH2883, 24BH2884, 24RB165, 24RB878, 24RB1007, 24RB1012, 24RB1069 (associated dates unclear), 24RB1145 (associated dates unclear), 24WX23 and 24WX30.

The state data base lists 17 additional sites that have yielded Avonlea points. These sites include 3 in Custer County, 1 in Carter County, 1 in Dawson County, 1 in Fallon County, 1 in Garfield County, 2 in McCone, 1 in Prairie, 2 in Powder River, 3 in Rosebud, 2 in Sheridan, and 1 in Wibaux. Five of those state data base sites occur on BLM land.

Other Late Precontact Manifestations

What are perceived as distinctive ceramics in Late Period were also used to further refine local phases and sub-phases by some researchers (Brumley and Rennie 1993; Brumley and Dickerson 2000; Joyes et al. 1999). Brumley and Rennie (1993) and Brumley (2000) describe these local phases and subphases as the Saddle Butte Phase, which they assign to their Western Alsask tradition, the Mortlach phase of their Mondak tradition, and the Highwood phase of the Wymont tradition. Brumley and Dickerson (2000) state that the Highwood phase is distinguished from "other Late Prehistoric assemblages based on the presence of distinctive ceramics, specific bison butchering methods, and patterns of lithic raw material utilization". He indicates that Highwood ceramics have in the past been referred to as Intermountain tradition ceramics. These

phases and traditions have not come into wide usage and literature defining them is limited. Therefore they will not be discussed in detail herein except to say that the Saddle Butte Phase predates the Mortlach Phase and the Highwood Phase and appears to overlap with them during the terminal portion of Saddle Butte.

After years of archaeological investigation, including many excavations, Munson (1993; 2003) and Munson and Ferguson (various) have sub-divided the Late Period into Late Prehistoric I/LPI (1600 BP to 750 BP) and Late Prehistoric II/LPII (750 BP to 250 BP). They followed classificatory sub-divisions first begun by Fredlund (1979, 1981). They see differences in "material culture, settlement patterns, and associated radiocarbon dates" for the Late Period. Their LPI includes the distinct Avonlea projectile point and associated ceramics and includes a succeeding, and discrete, manifestation with small side-notched and corner-notched arrow points. They suggest that the non-Avonlea points of LPI "fit into the range of variation described by Kehoe as Prairie points" (Munson 1993: 39). They suggest that LPII points fit in the range of Kehoe's Plains points. Munson (2003) indicates that the small corner-notched points of the LPI are not as common as side-notched types and suggests these corner-notched points may be associated with Plains Woodland occupations or influences from the east. However, he goes on to allow that these small corner-notched points fall in the range of Rose Spring types (see Frison 1991: 114) indicating possible influence from the west. Munson (2003) also states that LPI and LPII side-notched points can be distinguished from one another by the distance of the notch from the base of the point (i.e. notch height) with the LPII specimens generally exhibiting greater notch height and slighter narrower notch width than those of LPI specimens (Figure 56).

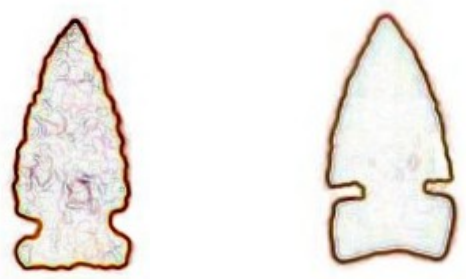

Figure 56: Prairie side-notched (LPI) and Plains side-notch (LPII) point examples.

Munson (1993: 43) also suggests that "the incorporation of rockshelters into the local settlement pattern is thought to be one of the major characteristics marking the beginning of the local Late Prehistoric Period". He also sees a difference in rockshelter use between LPI and LPII with the former suggesting rockshelters used as base camps and the latter suggesting use as task camps. Munson (1993: 43) concludes his discussion by stating, "This behavioral shift from base camp to task camp use of rockshelters is considered as an indicator that the Late Prehistoric II represents a new group(s) of people occupying the local Pine Breaks area".

Based on materials recovered from a single site (24PR627-Highwalker site) Davis and Keyser (1982) proposed a Powder River Ceramic Tradition that they believed developed in place and spanning an interval of about 1000 BP to 300 BP. They

characterize this pottery as lump modeled with paddle and anvil and indicate the vessels "are well-made, relatively thin-walled globular jars with vague shouldering and restricted orifices" (1982: 64-65). They suggest that these Highwalker ceramics are distinct from Mortlach and Intermountain Tradition ceramics and also exclude ceramics from the Hagen site, Ash Coulee, and Ludlow Cave. They acknowledge that the Highwalker vessels most closely resemble what has been called Crow ceramics (Frison 1976) but suggest the concept of Crow pottery is of limited value "in understanding the dynamics of the groups that used this pottery". They do however go on to include "Crow" ceramics reported by others from sites in areas adjacent to the Powder River in their Powder River Tradition. Unfortunately the Highwalker site is shallowly buried with questionable stratigraphy and several projectile point types were recovered. It appears that the ceramics from this site cannot be reliably associated with much of the rest of the recovered material culture. Defining a ceramic tradition on the basis of a single occurrence (inclusion of other reported "Crow" ceramics notwithstanding) with no reliably associated material culture is risky. Although the Powder River Ceramic Tradition was proposed it has not been widely accepted as a legitimate ceramic tradition and will not be further discussed herein other than to say the ceramics apparently bear some resemblance to Middle Missouri ceramics.

It is interesting that Davis and Keyser (1982) specifically excluded Hagen site ceramics from their Powder River Tradition, which otherwise included "Crow" ceramics identified by others in area sites. The Hagen site (24DW2-note that Kinney refers to Hagen as 24DW1 but the site form for Hagen is 24DW2) is a Late Prehistoric Period site that was excavated in the late 1930s through funding by the Works Project Administration (Kinney 1996). The site purportedly contained the remnants of an earth lodge or some other type of lodge but good documentation of such a structure is lacking. The site also yielded a large sample of ceramics, bone and stone tools, scapula hoes and other materials (Kinney 1996). There has been speculation and argument for years on whether the site represents an early Crow or ancestral Crow site that was occupied as the Crow moved westward from the Middle Missouri area retaining some elements of their village-horticultural origins. Charcoal samples collected from the Hagen site excavations in the 1930s were eventually submitted for radiocarbon dating in 1975 and Kinney (1996: 20) presents the corrected ages as: 540 BP/A.D.1410 (Wis-863), 740 BP/A.D.1210 (Wis-864), and 740 BP/A.D.1210 (Wis-865). Ahler and Swenson (1993) undertook analysis of the ceramics from the Hagen site and suggested that indeed the ceramics were similar to Scattered Village ceramics from the Middle Missouri area and the site could represent an early Crow site. Kinney (1996) used data from the Ahler and Swenson study and carried out additional analysis, including spatial analyses, of the Hagen ceramics and concluded (1996: 65):

> Although the spatial analysis does not conclusively indicate temporally or spatially distinct occupations, the data from the final two maps…….suggests that Ahler and Swenson's interpretation of the site is quite viable. It can be suggested that in the early 1400s, a group of Mountain Crow separated from the Awatixa Hidatsa while living in the upper Knife-Heart region of North Dakota. Among these peoples at this

> time, some common ceramic attributes included: S-rims, cord-impressions, the rainbow motif, and small occurrences of the cord-wrapped-tool-impression technique. After the separation and probably before they settled at the Hagen site, the Mountain Crow adopted cord-wrapped-tool-impressions as their dominant decorative technique. They did, however, retain the S-shaped rims and rainbow motifs common to Scattered Village complex sites.

As with Davis and Keyser (1982), Kinney (1996) makes note of other Plains area sites that have been reported as containing ceramics that appear to be of Crow origin. Among those sites is one reported by Taylor (1960) on East Redwater Creek in the central part of the project area. Kinney (1996: 19) does not suggest that all "Crow pottery" is identical to Hagen ceramics and in citing Frison (1980) he indicates that "perhaps the origins of Crow pottery may be too complex to attribute to a single source". Kinney goes on to state that, as Frison suggests, westward movement of many groups at the same time the Crow were moving may have been brought about by cultural and/or ecological conditions and that "What we recognize archeologically as Crow may be an aggregate of a number of these groups". Finally Kinney says, "Indeed, some groups may actually represent other separations and migrations of Hidatsa into areas to the south and southwest in South Dakota and eastern Wyoming". So the jury is still out on whether ceramics from sites other than Hagen are of Crow origin. Given the absence of a systematic treatment of all purported "Crow pottery" it would be spurious to suggest use of Crow pottery as a classificatory tool given the range in reported.

Complicating ceramic matters even more is the recovery of a number of specimens from the Nollmeyer site on private cultivated land along the Yellowstone River in Richland County. Although this site is not far downriver from the Hagen site, the ceramics appear to be different. Krause (1995) suggests that the Nollmeyer ceramics are a northern expression of the Extended Variant of the Coalescent Tradition with similarities to the mid- to late 16th century Le Compte phase. Krause indicates that Nollmeyer decorative elements include incising, trailing, stab-and-drag trailing, punctuating, tool impressing, nodes, lugs, cord impressing and finger impressing. Unlike Le Compte, cord wrapped rod impressing is present in the Nollmeyer collection and wiping or smoothing scars are present on about a third of the Nollmeyer ceramics. Presence of these Extended Coalescent ceramics along the Yellowstone River could be used to support Frison's (1980) and Kinney's (1996) suggestions that origins of Northwestern Plains pottery that resemble easterly and southeasterly ceramics developed by horticultural peoples may not have a single source but could represent different westward migrations/movements of different peoples at different times.

A very late precontact ceramic tradition has been defined as the Mortlach Phase, which seems to be restricted to the northern part of the project area and to southern Saskatchewan and northwestern North Dakota (Joyes 1973; Joyes et al. 1999; Johnson 1977b). Mortlach Phase sites within the project area include Shippe Canyon (24SH514), Eagles Nest (24SH690) and Dune Buggy (24RV1). The suggested range for the Mortlach Phase is from about A.D.1450 to the historic period. Joyes et al. (1999: 19)

suggest possible Mortlach associations with the Assiniboine. Walde (in Joyes et al. 1999: 16) describes Mortlach pottery as:

> Relatively thin and compact earthenware pottery formed and decorated in a wide variety of manners. Four major vessel profiles (Vertical, Angled Rim, S-Rim, and Wedge Rim) are usually present. Exterior rim surfaces may be roughened with impressions from paddles wrapped with cord or fabric or incised with diamond shaped or square shapes to produce check-stamped surfaces or surfaces may have smoothed finish which hides the type of paddle used to form the vessel. Tools used to form decorations included dentate stamps, cord-wrapped objects, quills, solid tools, pointed tools, notched tools, and fingers. Vessels frequently show evidence of quartering marks which, when viewed from the top of the vessel, divide the pot into quartered circles. The ceramic assemblages everywhere are extremely heterogeneous with vessel forms, exterior surface finishes, and approaches to decoration mixing freely. These assemblages are, however, quite distinct from those in surrounding areas.

Nearly all the ceramic types describes above generally have small side-notched arrow points associated with them, which in the absence of ceramics might be assigned to another phase or complex of the Late Precontact Period. The state data base lists 131 sites as having yielded ceramics but most of these sites have only undergone surface recording and analysis of ceramics in most instances has not progressed far enough to assign those ceramics to a phase or tradition. Of the counties in the project area, only Treasure and Daniels do not have ceramic-bearing sites listed on the state data base.

Defining of phases and sub-phases in the later portions of the Late Precontact Period is an on-going process and, with perhaps the exception of the Avonlea Phase (along with Besant the earliest of the Late Precontact manifestations) there is not always agreement among archaeologists on the legitimacy of these definitions. We have described in general terms some of these proposed classificatory schemes but will not discuss them in detail.

Excavated non-Avonlea Late Period sites are far too numerous to mention in detail. They include a number of bison kills (as mentioned above), open campsites or occupations, rockshelters, and ceramic-bearing sites. The radiocarbon table (Appendix A) lists 58 sites that have been tested, excavated, or sampled with Late Precontact Period components: 24BH1001, 24BH1052, 24BH1117, 24BH1118, 24BH1610, 24BH1726, 24BH2023 (listed by Deaver and Deaver 1988 but not on state data base), 24BH2518, 24BH2613, 24BH2622, 24BH2626, 24BH2630, 24BH2883, 24BH2884, 24CR400, 24CR418, 24CR498, 3 burials in Carter County, 24CT35, 24DW2, 24DW121, 24GF250, 24GF271, 24GF423, 24MC71, 24PR152, 24PR442, 24PR601, 24PR607, 24PR627, 24PR1032, 24PR1599, 24PR2167, 24PR2173, 24RB253, 24RB262, 24RB267, 24RB878, 24RB975, 24RB978, 24RB1012, 24RB1014, 24RB1020, 24RB1024, 24RB1069, 24RB1073, 24RB1145, 24RB1176, 24RB1181, 24RB1702, 24RL1225, 24RV418, 24SH690, 24WX000A, 24WX21, and 24WX22.

The state data base lists 150 sites in the project area as having yielded "Plains side-notched" points. Counties with these Late Period sites include Big Horn with 9, Custer with 13, Carter with 9, Dawson with 1, Fallon with 5, Garfield with 1, McCone with 3, Prairie with 4, Powder River with 23, Rosebud with 50, Richland with 3, Roosevelt with 2, Sheridan with 21, Treasure with 1, Valley with 1, and Wibaux with 4. Of these 150 sites, at least 38 (25.3%) occur entirely or partially on BLM. The actual number of these Late Period sites within the project area is probably 10 to 15 percent higher since many of the site forms have not been updated to include testing and/or excavation results.

Protohistoric Period (ca. 250 BP -100 BP)

The beginning of the Protohistoric Period is generally defined as the time at which the horse and European trade goods reached native cultures. Obviously the initial Protohistoric Period could be fluid and changeable from area to area. Introduction of the horse in the Northern Plains area probably occurred sometime between A.D.1700 and A.D.1750 and appears to have occurred earlier in localities just south of Montana and later in northern localities. Of area tribes, the Shoshone are believed to have acquired the horse first, resulting in a dramatic northward increase in their range. The Crow are believed to have acquired the horse not long after the Shoshone (Frison 1991: 122). Once northern tribes acquired the horse and guns, the Shoshone were driven southward. Earliest European venture into the project was likely that of the Frenchman Sieur de la Verendrye in 1742 and Francois Larocque, of the Canadian-owned NorthWest Company, journeyed through the area in 1805. Substantial contact and white settlement of the area did not occur until after Lewis and Clark visited the area in 1805 and 1806. Establishment of Manual Lisa's post at the mouth of the Big Horn River in 1807 was the beginning of a period of increasing fur trade in the area. The frequency of European and EuroAmerican trade goods among project area native groups probably increased substantially from this time on, although there is little question that some trade goods the area at earlier times.

Acquisition of the horse dramatically altered Plains Indian lifeways not just by increasing mobility. Hunting and subsistence strategies changed, contact with other tribes likely increased, and political structures among many tribes were likely altered by status attached to accumulating horses. Trade beads, guns, ammunition, blankets, and metal weapons (e.g. arrow points, lance points, knives, axes, hatchets) and household items (e.g. iron pots and pans) were among the more popular trade items. Interestingly there is some evidence that suggests use of stone arrow points along with metal points and guns may have persisted into the Protohistoric Period and possibly into the historic period. The bow and metal-pointed arrow were unquestionably part of the weaponry of American Indian groups at the battle of the Little Bighorn. Stone points have been found at the Little Bighorn but there is no conclusive proof that they were used in the battle.

The state data base does not list metal points as a diagnostic category. We did not attempt to review all site forms and reports to determine recorded instances of sites with metal points. A few radiocarbon dates from the area date to the Protohistoric Period but generally dates and diagnostics from this period are infrequent. Very little archaeological

excavation has occurred in areas where the material culture of American Indians during the historic era may be expected to occur (e.g. early fur trading post localities, treaty meeting and signing localities, early agency localities). Such investigations would be useful in determining what elements of American Indian culture persisted into the historic era and might help address questions on the transition from stone arrow points to metal points.

Radiocarbon Table Summary and Cultural Chronology Summary

The table of radiocarbon dates (Appendix A) lists 353 dates obtained from 114 sites or localities within or very near the project area. In summarizing these dates we used projectile points or other diagnostics as reported by researchers in associating the dates with a cultural period. We did not use traditional ranges of dates for cultural periods as presented by Frison (1991) or Reeves (various) unless that approach was specified by the researcher (usually done in the absence of time-diagnostic artifacts). For instance, if findings by particular researchers in the project area are accepted, the range for Besant extends into the Late Precontact Period and the range for Avonlea extends back to the latter part of the late Middle Precontact or Late Plains Archaic Period. In one column of the table ("Projectile Points & Other Attributes"), we included reported projectile points from a site although not necessarily all of the reported points are associated with the radiocarbon date. Cultural period as listed in the last column of the table was generally assigned by the reporting author or reference on the basis of the radiocarbon date.

Twenty-three (n=23/6.5%) of the dates fall within the Early Precontact Period or Paleoindian Period. These 23 dates include 2 non-cultural paleontological localities and 2 dates that are likely contaminated with coal. Thus 19 dates are likely cultural but include soils dates from paleosols found within site boundaries that yielded early projectile points although the points were not necessarily in direct association with the soil. The Mill Iron site and the Lindsay Mammoth site are the only Early Precontact Period sites with good dated context, although the Lindsay Mammoth site is not irrefutably associated with human activity.

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 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).

Excluding the 2 paleontological specimens, only 44 (12.5%) of the dates predate 3000 BP. Albanese (in Frison 1991) indicates that over 40% of recorded radiocarbon dates in Wyoming post-date 2000 years BP and he suggests that the beginning of a more arid climate was accompanied by an "influx of prehistoric peoples". The radiocarbon dates we assembled for the project area are even more skewed in that direction with about 71% post-2000 BP dates. Although Albanese was basing his suggestion of an arid cycle on data from the Mill Iron site, paleoclimatic data we have assembled indicates both arid and wet cycles for this period. A definite spike in aridity with strongest data overlap between about 1650 and 1750 BP is also indicated and the range of data includes 2000 BP. Whether or not the frequency of post-2000 BP cultural components indicates an "influx" of people at the beginning of an arid interval in the project area is arguable. There is no question that dated archaeological sites older than 3000 BP are infrequent in the project area and no sites with good cultural context have been dated to the Altithermal interval.

The Early Precontact Period (or Paleoindian Period) is represented by about 9% of all reported 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).

Ethnographic Background

Deaver and Deaver (1988: 32-49) present a discussion of the ethnographic background of the project area focusing mainly on the material culture and subsistence activities of ethnohistoric groups who occupied eastern Montana. Deaver and Deaver (1988: 32) chose this focus because of its immediate archaeological relevance to "site formation processes and site placement/distribution". In that section, Deaver and Deaver discuss the methodological and theoretical basis for use of the ethnographic record in analyzing and interpreting prehistoric archaeological sites. They also discuss limitations

and biases in use of ethnographic data and analogy. As with Deaver and Deaver, we choose to present the ethnographic section prior to a discussion of prehistory. We do so because of the logical connection between adaptive skills and lifeways of historic/ethnohistoric peoples and prehistoric peoples occupying a landscape that has had essentially the same resources for the past 9,000 years or so. Herein we will review the ethnographic section of the 1988 Class I. We will also present brief summaries of the histories of some native groups who occupied eastern Montana.

The project area occurs within the Plains Culture Area and the Northwestern Plains sub-area, which was inhabited during the protohistoric and historic periods by the Assiniboine, Sioux, Gros Ventre or Atsina, Cheyenne, Crow, Shoshone, Blackfeet and Arapaho. The Cree and Chippewa also likely utilized portions of the project area later in the historic period, as did the Metis, a unique cultural group of French, Scottish, Irish, English, Chippewa and Cree descent.

Eastern Montana Area Tribal Histories

Much of the following several paragraphs, which deal with American Indian movements in the project area during the late prehistoric, protohistoric, and early historic times, were excerpted from *An Ethnographic Overview of Southeast Montana* (Peterson and Deaver 2001: 6.2-6.3):

> According to Peterson and Deaver American Indian movements prior to the 1500s are difficult to trace because of varied and conflicting theories of distribution. Linguistic data generally agrees that the Blackfeet reached the Canadian plains north of central Montana by the 1400s. The Shoshone are believed to have come from the Idaho, California, and Nevada area reaching the Rocky Mountains of Wyoming.
>
> The 1500s saw marked migrations into eastern Montana from the west. In about the 1550s the Mountain Crow separated from the Hidatsa in the area of present-day North Dakota. The Crow began a westward movement and by the 1600s had expanded along the Yellowstone River drainage. In about A.D. 1670 the River Crow separated from the Hidatsa and began a westward movement ultimately occupying portions of central Montana. By about A.D. 1720 the River Crow were concentrated in the Yellowstone and Bighorn drainages.
>
> In the 1600s and 1700s, groups related to the Eastern Shoshone extended their range into eastern Montana. The Shoshone, who were among the first native groups to obtain the horse, were able to quickly expand northward to the area of the southern Prairie Provinces of Canada.
>
> The Gros Ventre and Blackfeet acquired horses and guns by the 1750s and began pressuring the Shoshone southward. Although early movements and history of the Gros Ventre are not well known they are Algonquian speakers related to the Arapaho. The Gros Ventre and

Arapaho ranged westward into eastern Montana from the area North Dakota by the 1700s. The Gros Ventre and Arapaho split in the 1720s with the Gros Ventre occupying northeastern Montana and the Arapaho occupying southeastern and central Montana (ibid.).

The Kiowa ranged west of the Black Hills in the 1500s but were pushed southward and westward by the Arapaho, Lakota Sioux, and Cheyenne. For a brief period the Kiowa occupied south-central Montana along with the Crow and Shoshone but by 1790 the Kiowa had moved well south of present-day Montana (Peterson and Deaver 2001).

The Cheyenne, with origins in the Ontario area and headwaters of the Mississippi River area, began moving westerly and southwesterly in the 1700s eventually reaching the area of the Dakotas. By about 1780 they had reached the Black Hills area and continued westward expansion brought them into conflict with the Crow. In the early 1800s the Cheyenne split into two groups, with the Northern Cheyenne remaining in northwestern South Dakota and southeastern Montana and the Southern Cheyenne moving southward into Wyoming and Colorado.

The Fort Peck Reservation lies in the northern third of the project area occupying portions of Daniels, Roosevelt, Sheridan, and Valley counties. It was created primarily for the Assiniboine tribe and the Yanktonai and Sisseton Wahpeton Sioux. The northern portion of the project area including the area now occupied by the Fort Peck Reservation had become strongly associated with the Lower Band of the Assiniboine, as well as with the Blackfeet, and Gros Ventre by around A.D. 1840. The Stevens or Lame Bull Treaty of 1855 defined "Blackfeet territory" in Montana as east of the Continental Divide and north of the Musselshell and Missouri Rivers and an Indian agency was established at Fort Benton. The extensive Blackfeet territory included that occupied by the Blackfeet, Gros Ventre and Assiniboine because the U.S. Government viewed these tribes as related.

After creation of the agency at Fort Benton members of the Assiniboine tribe who had survived a decimating smallpox epidemic in 1838 focused their activities around Fort Benton where treaty annuities were distributed (Bryan 1985). Although the Blackfeet, Gros Ventre, and Assiniboine were closely allied at the time the Fort Benton agency was created, hostilities soon developed, likely because of the added pressures and cultural changes brought about by increased contact with Euro-American culture. After a battle between the Blackfeet and Gros Ventre in 1867 the Gros Ventre and Assiniboine developed a closer alliance and spent much more time in the Milk River and lower Missouri River areas of Montana (Bryan 1985).

Increasing hostilities between whites and the Blackfeet led the U.S. Government to negotiate a new treaty in 1865 in which lands south of the Teton River were ceded by the tribes. Although neither this treaty nor a subsequent similar treaty in 1868 were ratified by congress, lands identified for cede were rapidly settled by whites. In 1873,

despite knowing of the hostilities between the Blackfeet and the allied Gros Ventre and Assiniboine, President Grant signed an executive order establishing a common reservation for the Blackfeet, Gros Ventre, Assiniboine, and River Crow that included all Montana land east of the Continental Divide and north of the Missouri and Sun Rivers. Facilities, known as Fort Belknap, were constructed in 1873 on the Milk River not far from present day Chinook. Fort Belknap served a duel purpose as a trading establishment and a point of distribution for government annuities due area American Indians including the Gros Ventre and Assiniboine (Spritzer 1999). In 1888 the vast northern reserve was divided by treaty with separate reservations established for the Blackfeet, Gros Ventre and Assiniboine of the Milk River Valley area (Fort Belknap Reservation), and Assiniboine and Sioux of northeastern Montana (Fort Peck Reservation). The Fort Belknap agency was then moved to its present location near Harlem.

Partners Colonel Campbell Kennedy Peck and E.H. Durfee had in 1867 constructed a trading post on the north bank of the Missouri River near the present location of Fort Peck Dam (Spritzer 1999). The post came to be known as Fort Peck and by the 1870s it served as an agency for the Sioux and the "Lower Band" of the Assiniboine, so called because they frequented the lower reaches of the Missouri River in Montana (Spritzer 1999; Bryan 1985). The Fort Peck agency was moved in 1877 from the Missouri River to the Poplar River near the present town of Poplar.

Hoping to escape a similar fate, the Lower Band spent even more time in the lower Missouri River area when a smallpox epidemic hit the Gros Ventre and the Upper (Milk River area) Band of the Assiniboine in 1869 (Bryan 1985). During this time the Lower Band shared the same territory and lived with the Yanktonai Sioux who had earlier established themselves in portions of the North Dakota and who routinely ventured into northeastern Montana for bison hunting opportunities.

The Sioux consist of three divisions, the Santee or Eastern Division, the Yankton and Yanktonai of the Middle Division, and Teton or Western Division (Walker-Kuntz et al. 2002). All three divisions were Woodland adapted in the prehistoric period. Distinct variations of the Siouan language evolved among the divisions with the Yankton and Yanktonai associated with Nakota, the Teton Sioux with the Lakota (or Lakhota), and the Santee Sioux with Dakota (Bryan 1985). Sioux groups were located in the area of Minnesota by the middle of the 1600s. During the 1800s the Yanktonai ranged through much of North Dakota and by the middle of the 19th Century they were frequenting the rich buffalo county of what is now western North Dakota and eastern Montana. Two bands of the Santee Dakota Sioux, the Wahpeton and Sisseton, also reached the North Dakota area during the 1800s and like the Yanktonai made journeys into eastern Montana for hunting opportunities. These forays into eastern Montana brought these Sioux groups into contact with the Assiniboine with whom they developed a close relationship, sharing territory and communities.

Following the Battle of the Little Bighorn, bands of Teton Sioux journeying to Canada often found themselves with the Assiniboine and Yanktonai Sioux of Fort Peck.

Many Teton stayed on at Fort Peck. The Fort Peck Reservation was created as a separate and independent reserve for the Assiniboine and Yanktonai Sioux in 1888 with the agency already located on the Poplar River. Initially the U.S. Government attempted to pressure the Teton Sioux groups in the Fort Peck area back onto reservations in North Dakota (Bryan 1985). The Teton refused and the government, realizing they were no longer a threat, acquiesced and allowed the Teton to remain on the Fort Peck Reservation.

The Northern Cheyenne Reservation lies in the southwestern part of the project area occupying portions of Big Horn and Rosebud Counties. The Cheyenne were originally woodland dwellers, and then semi-sedentary agricultural people associated with ancestors of the Mandan, Arikara, and Hidatsa. Later they moved westward and developed into nomadic buffalo hunters. They were very adaptable and eventually allied with the Dakota Sioux. The Cheyenne lived along the Red River valley and Sheyenne River in southeastern North Dakota perhaps as early as A.D. 1300 to 1600 (Walker-Kuntz et al. 2001).

Prior to this time, the Cheyenne occupied the western Great Lakes region at the edge of the Eastern Woodlands and referred to themselves as *Tsistsistas* (Hoebel 1978). Under pressure from the Woodland Sioux and the Assiniboine and Cree, the less well-armed Cheyenne moved southwesterly to the prairies along the Minnesota River by at least A.D. 1700. By the mid-1700s the Cheyenne had built a number of semi-permanent villages along the Sheyenne and Red Rivers of present day North Dakota where they engaged in a mixed economy of hunting and horticulture. By the mid to late 1700s the Cheyenne had been forced from their villages in North Dakota farther to the southwest. Many had already adapted to a nomadic, equestrian hunting economy in the area of northwestern South Dakota where, by the early 1800s, the Black Hills had become a spiritual center. Westward expansion of the Cheyenne brought them into conflict with the Crow and Shoshone of southern Montana and to the southwest the Cheyenne fought with the Ute, Comanche, and Kiowa tribes. To the east were the Sioux. In the 1830s, the Cheyenne incorporated a linguistically related but numerically smaller tribe called the Suhtaio (Weist 1977; Moore 1996).

The Cheyenne tribe split into northern and southern divisions in the mid-1830s (Weist 1977). The Southern Cheyenne desired to trade directly with whites for European goods at Bent's Fort (established in 1832 on the Arkansas River in southeast Colorado). In the north, the Northern Cheyenne, consisting of part of the original *Tsistsistas* and most of the Suhtaio, formed an alliance with the Sioux against the Shoshone and Crow.

The Fort Laramie Treaty of 1868 was the first U.S. Government treaty to formally recognize the Northern Cheyenne as a separate tribal entity (Bryan 1985). This treaty acknowledged that the Northern Cheyenne, Arapaho, and Sioux would cease opposition to construction of a railroad through their traditional lands and the government in return would close the Bozeman Trail and would establish most of the Northern Cheyenne hunting grounds as Indian Territory (Bryan 1985). Discovery of gold in the Black Hills and the ensuing rush of white miners and settlers resulted in numerous violations of the treaty which the U.S. Government essentially ignored. By 1875 tensions were already

high when all western tribes were ordered to move to existing reservations. The Northern Cheyenne were among a group of tribes who repeatedly refused orders for placement on reservations. These refusals led the government to order the U.S. Army to force tribes onto reservations and these orders led to the well-known Battle of the Little Bighorn where the allied forces of the Sioux and Northern Cheyenne defeated George A. Custer in June of 1876.

Public outcry that followed the Battle of the Little Bighorn led to relentless pursuit of participating tribes by the U.S. Army. Although bands of Northern Cheyenne scattered through the area, they eventually surrendered in 1877. One band led by Two Moons remained in the Tongue River area while another group under Little Wolf and Dull Knife was forced to relocate to the reservation of the Southern Cheyenne and Arapaho in Oklahoma (Bryan 1985). In 1878 the latter group escaped from Oklahoma and began the long trek northward toward their former home in the Tongue River area. Of the approximately 300 Northern Cheyenne who left Oklahoma, only about 100 survived and reached the Tongue River region.

Although no reservation existed for the Northern Cheyenne, they began to settle in the Lame Deer area in 1880. The Northern Cheyenne Reservation (originally called the Tongue River Reservation) was created in 1884 by President Chester A. Arthur but did not include land in the Tongue River Valley. In 1886 land was set aside for Indian homesteads in the Tongue River Valley by the Secretary of the Interior in an attempt to further acculturation (HRA 1979). In 1900 the boundaries of the reservation were expanded to their current size.

According to some, the Crow have ancestral origins in the Upper Midwest area of the United States and the Lake Winnipeg area of Manitoba, Canada (Deaver and Peterson 2001). The Crow are part of the Siouan language family and share origins with the Hidatsa (Bryan 1985). The ancestral horticulturists of these people began migrating westward as early as the late 1300s and for about 100 years occupied the area around Devil's Lake North Dakota (HRA 1980). Westward movement continued and by about A.D. 1600 this ancestral group (or groups) had reached the area around the confluence of the Yellowstone and Missouri Rivers where they continued raising crops, primarily corn, beans, and squash. Bison hunting gradually became more important to a segment of these people who were to become known as the Crow. Those who remained along the Missouri and its tributaries in western North Dakota and extreme eastern Montana continued horticultural subsistence and became known as the Hidatsa.

By the early 1600s the Crow had become established along the upper Yellowstone River, the entire Big Horn River valley and upper reaches of the Tongue and Powder Rivers in Montana and northern Wyoming. In about 1825 differences of opinion on important issues among leaders led to the Crow dividing into two groups (Heidenreich 1971). One group, under Arapooish became known as the River Crow who frequented areas of the Judith and Musselshell drainages of central Montana. The other group, under Long Hair, often occupied the Bighorn and Clark's Fork of the Yellowstone valleys south of the Yellowstone River.

White trapping and trading activity began in Crow country soon after the Lewis and Clark Expedition (i.e. Corps of Discovery) of 1805 and 1806. By the mid-1830s trade in beaver pelts had declined considerably and trading for buffalo hides increased. Diminishing bison herds and introduced diseases dramatically affected the Crow Tribe during the 1840s and 1850s. An estimated 20% of the Crow population died during this period (Palladino 1922).

Indian Territories were established and recognized by western tribes and the United Sates government with the signing of the Fort Laramie Treaty of 1851. Crow country was generally recognized as stretching from the Musselshell River of central Montana southward to central Wyoming and from the upper Yellowstone River near Livingston, Montana on the west to the Powder River on the east. This area of 39 million acres was never officially promulgated. Some members of the Crow tribe interpret the boundary definitions of the Fort Laramie Treaty as encompassing a much larger area that extended westward to the Continental Divide, northward to the Great Falls of the Missouri, eastward to the Yellowstone and Missouri Rivers confluence, and southward to the Black Hills (http://www.mt.blm.gov/mcfo/cbm/eis/ CrowTribeNarrativeReport/ history.pdf).

The discovery of gold in the 1860s led to increased migration of whites through Crow territory (as wells as through territorial lands of other Plains tribes). The Bozeman Trail was a primary route for whites passing through Indian lands. Hostilities between the Sioux and whites increased and the Sioux further encroached on Crow territory from the east. The Crow, as well as several other area tribes, requested that the Bozeman Trail be closed. In 1868 the United States government agreed to the closing if a new treaty were signed. The treaty was signed by both the Crow and the U.S. government and the reservation boundaries were established. The 1868 reservation stretched from the Yellowstone River on the west and north to the Wyoming border on the south, while a line just east of the Big Horn River formed the eastern boundary. By 1869 the first Crow Agency was established on the south bank of the Yellowstone River near its confluence with Mission Creek east of present-day Livingston, Montana.

Increased white demands and intrusions on Crow lands in the western part of the first reservation eventually resulted in the U.S. government pressuring the Crows to relocate to a new reservation in the Judith Basin area. This effort was resisted by the Crow Tribe but new pressures forced them to cede western and northern portions of the reservation. In the spring of 1875 Crow Agency was relocated to the East Rosebud Creek valley well to the southeast of the Mission Creek agency. By 1880 the Crow agreed to cede a narrow strip along the Yellowstone River for use as a railroad corridor. The Crow signed this treaty in 1880 but it was not ratified by Congress until 1882.

In 1883, the decision was made to again move Crow Agency and in 1884 the agency was moved to its present location on the Little Bighorn River. In 1891 the Crow ceded most of their land west of Pryor Creek. In 1904 the final Crow cede included a large part of the northern part of their reservation.

Although the Arikara (or Sahnish), Hidatsa, and Mandan spoke different languages, observed different customs, and lived miles apart, there were numerous similarities in their buildings and farming methods (Walker-Kuntz et al. 2002). These three tribes, identified today as the Three Affiliated Tribes, lived in permanent earthen lodges along the Missouri River in central North Dakota. Primarily they were farmers who grew corn, sunflowers, pumpkins, beans, and squash. They also regularly hunted buffalo and other animals and hunting forays occasionally took them westward into the extreme east-central and southeastern part of what is now Montana. Partly because of their strategic homeland location on the Missouri River, these groups established themselves as intermediaries to facilitate trade among various native groups in the region.

The Hidatsa were (and are) residents of the Missouri River valley in what is now west-central North Dakota. These semi-sedentary, gardening Indians had a lifeway resembling their neighbors, the Mandan. The historic Hidatsa were divided into three closely related subgroups, each of which occupied individual villages near the mouth of the Knife River from early historic times to about 1845. These groups were the Hidatsa-proper, the Awatixas, and the Awaxiwis (Bowers 1965). They are collectively a tribe, sharing a common language with dialects, common traditions, and a sodality system for integration (Deaver 1986).

Both the Awaxawi and the Hidatsa-proper claim to have come to the Missouri valley from what is now eastern North Dakota, with specific traditions of having emerged from beneath the ground or beneath Devil's Lake (in North Dakota), and having lived near the lake before moving to the Missouri River (Wood 1993).

The Awaxawi tradition states they originated beneath the earth, and they came to the surface on a vine that broke under the weight of a pregnant woman. Two culture heroes, First Creator and Lone Man, had already created the earth's surface. The combined Awaxawi, Hidatsa-proper, and River Crows then moved north to Devil's Lake. Following a celestial fire, the Hidatsa-proper and River Crow separated from the Awaxawi and moved farther north, where then lived near a large lake. The Awaxawi continued to live near Devil's Lake, where they grew corn. Some of the Awaxawi later escaped an approaching great flood and fled to the Missouri River, arriving near the Square Buttes, in North Dakota. Still living as corn-growing gardeners at the time of their arrival, they found the Awatixas already on the Missouri River, but they arrived before the Hidatsa-proper made their way to the river (Bowers 1965; Wood 1993).

The Hidatsa language is distantly related to the Siouan language family, as is the Crow language, which is closely related to Hidatsa (Lowie 1954). The migration of the Crow-Hidatsa was similar to other groups pressured from the northeast onto the Plains (Bowers 1965). The Crow continued across the Plains settling finally in eastern Montana and northeastern Wyoming (Medicine Crow 1992). Temporary campsites and villages along the Red River and the headwaters of the James and Sheyenne Rivers show the movement of the Hidatsa from the woodlands of the east, across the prairies, and finally to the Missouri River (Bowers 1965).

The Mandan, Hidatsa and Arikara participated in the Fort Laramie Treaty of 1851. The Three Affiliated Tribes, although recognizing the area of their villages heartland as on the Missouri River and some tributaries in central North Dakota, interpret their territory as "commencing at the mouth of the Heart River; thence up the Missouri to the mouth of the Yellowstone River; thence up the Yellowstone to the mouth of Powder River, thence in a southeasterly direction to the headwaters of the Little Missouri River, thence along the Black Hills to the headwaters of the Heart River; thence down the Heart River to the place of the beginning" (Three Affiliated Tribes 2006 at website http://www.mhanation.com/main/history/history_laws_treaties.html). Their territory was further reduced by the Fort Berthold Agreement of 1866 and by Executive Order in 1870, which established the Fort Berthold Reservation (Three Affiliated Tribes 2006 at website http://www.mhanation.com/main/history/history_laws_treaties.html). The tribes interpret the 1870 agreement as including "most, if not all of the territory claimed by them at Fort Laramie" and further indicate that "because the Sioux had claimed possession of a parcel of the land in question the previous year, the Government took off the southern boundary of the Mandan, Hidatsa and Sahnish territories" (Three Affiliated Tribes 2006 at website http://www.mhanation.com/main/history/history_laws_treaties.html). The tribes also state that "the southern boundary of the reservation became a straight line from the junction of the Powder River from the Little Powder River to a point on the Missouri River four miles below Fort Berthold" and that "in order to accommodate the villages then occupied by the Mandan, Hidatsa and Sahnish, the United States Government included a strip of land east of the Missouri River" (Three Affiliated Tribes 2006 at website http://www.mhanation.com/main/history/history_laws_treaties.html). In 1880, an Executive Order reduced the size of the Fort Berthold Reservation to about 10% of the territory established by the Fort Laramie Treaty. Substantial western and southern lands of the territory were lost by this Executive Order although the Mandan, Hidatsa and Arikara did not sign an agreement ceding these lands (Three Affiliated Tribes at website http://www.mhanation.com/main/history/history_laws_treaties.html). A congressional act in 1910, reduced the Fort Berthold Reservation to roughly its present size, although construction of Garrison Dam on the Missouri River by the U.S. Army Corps of Engineers in the 1940s forced a number of Indian families from their homes and flooded a number of small communities.

Review of the Use of Ethnographic Analogy and Modeling in Archaeology

Deaver and Deaver (1988: 32-36) reviewed the ethnographic literature for tribes of eastern Montana focusing on material culture and subsistence activities and also offered a number of caveats to use of ethnographic data in archaeology. Observations they made during literature review were guided by four elements of the ethnographic record that they judged as relevant to the prehistoric archaeological record of eastern Montana. Those observations included the following:

> 1) tools: types, manufacturing processes, who made and used tools;
> 2) housing: types, when used, by whom, for shat duration, and variation in forms;
> 3) siting decisions: external/camp placement relative to environmental variables, seasonal and/or yearly cycles,

internal arrangement within the camp, personal placement of material items within habitation structures and;
4) subsistence activities: the utilization of plant and animal resources.

A summary of ethnographic approaches and limitations as discussed by Deaver and Deaver (1988: 32-35) is presented in Table 19 It is interesting to note that despite the limitations of ethnographic analogy, its essential approach as an aid in interpreting the archaeological record has influenced the evolution and development of processual archaeology and ethnoarchaeology. Ethnoarchaeology is the study of contemporary living cultures with a goal of understanding behavioral relationships that underlie the production of material culture (Kramer and David 2001; Kramer 1979). Processual archaeology argues essentially that you cannot understand an archaeological site without knowing how it was created. Processual archaeology developed out of the "New Archaeology" of the 1960s and 1970s and views the past as a system, not unlike nature, with many parts interlinked by feedback relationships between individuals, societal and cultural elements, and the environment. As noted by Deaver and Deaver (1988: 57), general biological systems theory and use of ecological models are often used in processual archaeology. The relationship and affect of paleoenvironmental factors on prehistoric cultures and settlement systems is important in processual approaches, as is the affect of such factors on the appearance, distribution, and final arrangement (i.e. taphonomic arrangement) of archaeological materials and sites.

Ethnoarchaeology uses archaeological techniques and data, accompanied by informant interviews, to study living cultures. Artifact manufacture, distribution, and use (Item 1 of the Deaver and Deaver list of observations), along with the remains of various cultural processes (Items 2 and 3 of the Deaver and Deaver list) that might be expected to survive are primary elements in the ethnoarchaeological approach. Ethnographic data acquired through the ethnoarchaeological approach is used to inform the examination and interpretation of the archaeological record. The ethnoarchaeological approach compares the patterns apparent in material culture from archaeological contexts with patterns recognized through the study of contemporary societies. Through comparative techniques, ethnoarchaeologically acquired data assists in addressing questions on, among others, subsistence strategies (Item 4 on the Deaver and Deaver list), technological development, social evolution, and land use and patterning. In the project area and in many parts of the Plains, Binford's (1980) seminal ethnoarchaeological volume on the Nunamiut is perhaps the most often referenced work in developing models for prehistoric hunter-gatherers.

Table 19. Summary of Limitations and Approaches of Ethnographic Analogy and the Ethnohistoric Approach as presented in Deaver and Deaver (1988).

Data and Methodological Limitations	Methodological Approaches	
Spotty coverage of material culture in general	Continuous analogy – drawn directly from antecedent peoples of the immediate area of the archaeological data	Basis for the direct historical approach, which in the project area is limited to a very short time period
Lack of quantitative data on diet		
Data generally collected during equestrian and post-equestrian era		
Data and observations are incident specific		
Observations by ethnographers and early travelers made from an individual perspective on a day- to-day level		
Assumption of a one-to-one correlation between the ethnographic and archaeological data bases	Discontinuous analogy – drawn from a different place or distant time	Can be used to formulate explicit and specific testable hypotheses about site formation processes
Informant gender bias – historically skewed toward males		
Disparity between the real and the ideal of subsistence adaptations rarely noted in ethnographic record		
Non-systematic use of the ethnographic record in general		

It appears that one of the primary difference between ethnohistoric observations (and to a degree ethnographic observations), and processual archaeology and ethnoarchaeology, is that the former were carried out in the absence of a rigorous systematic and archaeological framework. Ethnohistoric observations were made on living cultures and ethnographies were also developed from observations on living cultures. It is the qualitative and quantitative elements of ethnohistoric observations that limit their utility in archaeology. Ethnohistoric observations should not be viewed as inherently suspect but archaeologists should carefully consider the detail and quality of such observations when determining whether to use them as serious analogs as aids to interpreting the archaeological record.

Ethnohistoric Material Culture

Deaver and Deaver (1988: 36-43) discuss the ethnographic context for certain items of the material cultural of Plains area historic tribes. A tabular review of their discussion is presented below (Table 20). Deaver and Deaver essentially developed this section to demonstrate the limitations of ethnographic analogy but also to elucidate the many socio-cultural processes that could influence the archaeological record. In other words although ethnographic and ethnohistoric observations may not be quantifiable, they at least can show that form may not necessarily be an exclusive result of function.

For chipped stone technology Deaver and Deaver (1988: 37) note that referenced ethnographic descriptions include “multi-staged reduction sequence, the use of direct percussion and pressure flaking, antler/horn pressure flakers and the use of padding to protect the craftsman’s hand”. They go on to indicate that none of the ethnographic descriptions support subjective classification of flake types or statistical analysis of debitage. They note that technological strategies cross ethnic boundaries and suggest that

quality and availability of particular lithic material may be significant in considering tool form variation.

Citing a case with the Northern Shoshone, Deaver and Deaver (1988: 37) note that flakes were produced as a desired end product for specific purposes. They go on to suggest that the over-focus of area archaeology on formal tools (i.e. high-energy investment tools – tools more formally shaped by finishing flaking) creates a bias in the record. The ethnographic/ethnohistoric record certainly makes a case for use of unmodified flakes or slightly modified flakes (low energy investment tools). To this we would add that much has made of the dearth of formal tools in tipi ring sites, particularly those in the glaciated plains of north-central and northeastern Montana and the southern Prairie Provinces of Canada (Burley 1990; Keyser 1979). Others indicate that cobble spalls, cobble flakes, teshoas, and cobble core-choppers, are common and at times abundant in tipi ring sites and campsites in such settings and that in the absence, or at least scarcity, of fine-grained lithic material these quartzite low-energy investment tools served the same functions as many formal tools (Aaberg et al. 2003; Crofutt and Aaberg 2003a; Deaver and Peterson 1999). Deaver and Deaver (1988: 38) suggest that low energy investment tools were produced for immediate use and because they were produced with little energy and time investment they were more readily discarded than were more formal high energy investment tools. They further suggest that more detailed analysis of low energy investment tools is necessary since they may be the most sensitive indicators of site function and activity.

Deaver and Deaver (1988: 38) briefly discuss ground stone tools and their ethnographic context indicating they are a variety of large tool class that includes unmodified stone mortars and pestles, wooden pestles, hide mortars, and basketry. They note that this tool class was used to process bone, mineral, clay, and ceramic temper, as well as for processing plant products. They mention the variety of tasks ground stone tools were used for to contrast interpretations that the appearance of ground stone tools in the archaeological record has been interpreted as evidence of a shift to an archaic or foraging adaptation. They also note that some see ground stone tools as evidence of Middle Missouri influence and seasonal occupation of summer sites.

Deaver and Deaver (1988: 38-43) spend a great deal of time discussing ethnographic references to pottery creation. They also discuss basic native pottery production techniques applicable to eastern Montana. They note that in western North Dakota Plains Village campsites have a much lower frequency of ceramic use than do earth lodge villages and indicate this is attributed to the “premium put on mobility” by Plains Villagers. Summarizing North Dakota data they noted that ceramic vessel use is much lower in Besant tipi ring sites than in Late Plains village campsites. Deaver and Deaver also cite sources suggesting that ceramic pots would only have been used by semi-nomadic bison hunters when such vessels became functionally superior to hide containers for boiling foods. They also cite North Dakota data that suggests small pots from Plains Village campsites were used for the production of bone grease, offering that wide orifices

Table 20: Eastern Montana area elements of material cultural as referenced in Deaver and Deaver (1988).

Material Culture (key words)	**Referenced Observations and Contexts**
Chipped Stone Ritual Reduction Flake tools Celts Heat-treating Knives Arrow points Lithic manufacturing tools Scrapers Arrows	*Assiniboine*: learned special technique for lithic manufacture by fasting on hill; would pick up choice stone and carry for 100s of miles; *Shoshone*: broke up larger masses of obsidian or other stone and selected flaw-free pieces and heat-treated them in damp earth covered by fire then reduced the material with sharp blows and for shaping and finishing used mountain sheep, deer, or antelope horn; few people were skilled at lithic manufacture and they exchanged them for other items; teshoas used by females and produced out of cobble technology; cobble spalls used by modern stone workers for platform grinding or scrubbing are identical to teshoas; *Cheyenne*: celts produced with small stone hammer; knives and arrow points were finished first with a small stone punch and hammer, and finally pressure-flaked with a pointed piece of antler or bone; *Northern Shoshone*: obsidian broken up and pieces, even those an inch or so long, with sharp edges selected for use, edges "renewed" with elk or deer horn, sometimes wood or horn handle attached to tool but often lacking; arrow points varied depending on intended function with those for hunting wider and those for war lacking this feature; *Plains Indians*: thin quartzite scrapers made by sharp blow and were oval, sharp-edged, convex on one side and flat on the other; hide scraper is elk-horn adze or small elliptical sharp-edged stone; *Arapaho*: man accumulated necessary materials then invited several old men to his lodge, men worked all day with one making points and another feathering shafts; *Mandan*: only certain men were arrow makers and others in need bought them
Ground Stone Mortars Pestles Grooved Maul/hammerstone	*Assiniboine*: berries placed on flat rock 8"-diameter and were crushed by smaller rock with handle; clubs and hammers made from round stones grooved around middle to hold handles that were sometimes encased in rawhide
Pottery Manufacturing process Material Forming tools Fired and Unfired Greased Pots Ears/lugs & bails Temper & heat-altered rock Rights & traditions	*Cheyenne*: pots made from mixture of pounded stone and clay worked from single lump of clay and not coiled; flattened bent stick used to hollow out and shape mass, ornamentation made with string of twisted grass or twisted sinew pressed into surface with grass string sometimes left on pot; pots burned on ground with bark or dried willow; half dozen women might make and fire pottery at one time; some pots unfired and repeatedly greased for use as platters and dishes but not for cooking; clay pots for cooking and carrying water often had perforated ears through which rawhide string bail passed; only women made pots; *Mandan and Hidatsa*: fire-cracked rock from sweat lodges crushed for use as temper; women heat-treated stones with intent of thermal alteration to aid in breaking down for temper; paddle/anvil technique employed with interior support on the pot interior as it is paddled or pounded on outside, pot periodically dried between episodes of paddling; pottery-making a secret art and women bought rights and knowledge of mothers or clans women using only instructed designs; *Project Area native groups*: paste produced by dry method of drying raw clay, pulverizing it with hammerstone, picking out inclusions, and sifting; *Assiniboine*: only men made earthen ware containers
Architectural Forms (key words)	**Referenced Observations and Contexts**
Sweat Lodge Wooden Lodge Council Lodges Special structures Tipi Fasting structures Sun Dance structures Cairns Petroglyphs	*Mandan*: wooden lodges conical in shape used in connection with eagle trapping and size dependent on number of men in trapping party, when 14 to 20 men involved lodge enlarged to 25-35" diameter; *Plains Indians*: council lodge large (9-15m interior diameter), most often arcs of stone created by overlapping rear poles of 2 or 3 base frames and adding remainder of poles on one side only, covers spread across this large frame creating large open shade, these structures usually not furnished with each participant bringing in his own robe; *Cheyenne*: large lodge placed in center of camp circle and faces opening of camp, lodge is similar to Medicine-Arrow lodge with 40-50 poles and two tipi covers, twice as large as good-sized Cheyenne tipi; special structure consisted of two tipis connected by canvas corridor supported on ridge pole; *Blackfeet*: multi-tipi structure of 3 tipis joined by hallway; *Assiniboine*: large ceremonial ring-structure or circle of boulders better than 10 paces in diameter, within circle near west or northwest side is large boulder that may have served as altar; *Crow*: fasting structure usually low-walled arc with opening to the east, usually located in unique place of varied setting where spirits would most likely be attracted, the "bed" might recycled if used by a person who had received a good vision; cairns used to mark spot of fallen warrior and through time the cairn became a shrine where people added rocks; *Plains Indians:* cairns also built to mark fasting places, trails, and to serve as trash pits in habitation sites; *Sioux*: many men who fasted for power made drawings of their visions in sand rocks

and thin vessel walls (greater thermal conductivity) may be evidence of use for bone grease rendering. Furthering the discussion of vessel wall thickness they indicate that to increase structural strength vessel walls are thickened and to increase thermal conductivity and thermal shock resistance walls are thinned. Thus thin-walled vessels were used for cooking and thick-walled vessels for storage. They also present models for explaining differences between vessels of semi-sedentary groups and those of more mobile hunter-gatherers suggesting that the latter may have reduced the overall size of pots to decrease breakage. The assumption is that with more mobile groups, routine movements and transporting pots would result in more jarring and shaking or more potential for mishandling accidents. They suggest the same as an explanation for a change from flat bottom vessels to globular vessels. These thoughts tie to another Deaver and Deaver (1988: 42-43) suggestion relating to their thought that pottery making was a specialized craft practiced by a small segment of society and therefore technological variation may not have societal significance.

In some of their final discussions on ceramics Deaver and Deaver (1988: 43) suggest that ceramic analysis in the project area "is restricted to sterile typological arguments over temporal variants of styles/wares". They go on to suggest that these typologies are often used to argue for ethnic affiliation and "migration scenarios" offering the "Crow pottery" argument, which began in the 1930s and continues today, as an example. They further offer that the reason little real progress has been made in project area ceramic analysis is because, 1) there are few ceramic-bearing sites, 2) ceramic artifacts are generally few in number, generally dominated by non-diagnostic sherds, 3) ceramic typologies based on ethnic affiliation are flawed. Indeed the frequency of ceramic-bearing sites in the project area remains low with 131 (1.9%) out of 7004 sites as compared to 40 (1.02%) out of 3935 sites in 1988. Although descriptions for all ceramic artifacts for all ceramic-bearing sites were not reviewed for this report a sample of such reports suggests that, as was the case in 1988, ceramic artifacts are dominated by non-diagnostic sherds. It also seems that there has been more acceptance of an ethnically derived ceramic tradition and typology in the project area, particularly "Crow pottery" since such an affiliation is presented in a standard reference for archaeology in the project area (Frison 1978/1991: 222).

Although care should be taken in use of ethnic affiliation and migration scenarios in ceramic analysis and interpretation, these approaches cannot be completely dismissed since movement of peoples in and out of the Plains through prehistory is obviously supported by various elements of the archaeological record and is accepted by most archaeologists. Few elements of prehistoric material culture offer the potential for reliably tracing movements and/or cultural influences. There is little question that ceramics in areas other than the Northwestern Plains can be linked to particular archaeological cultures and to historic and protohistoric American Indian groups. To argue against migrations or movements of people is to argue against the whole premise that changes in archaeological material cultural represent anything other than responses to changes in the environment or the evolution/progression of technologies. As an example of the importance of technical approaches to ceramic analysis we cite Krause (1995) who analyzed and reported on "228 ceramic fragments broken from an estimated

30 pots, all of them mass modeled", from the Nollmeyer Site on the Yellowstone River within the Miles City project area. Krause suggests these ceramics are "a northern expression of the Extended Variant of the Coalescent Tradition". The implications of this finding should be obvious considering the potential connections to horticultural peoples of the Middle Missouri sub-area and areas to the southeast of the project area. The Nollmeyer Site is not far down the Yellowstone River from the Hagen Site, purportedly an earthlodge village with unusual ceramics that have been linked to Middle Missouri peoples and/or the Crow or ancestral Crow (Mulloy 1942; Deaver and Deaver 1988).

In a final discussion of ceramics, Deaver and Deaver (1988: 43) suggest that ceramic analysis could be revived and advanced by treating "pots as tools worthy in and of themselves of systematic analysis" with breakage frequency, pot size, wall thickness, orifice size, and phosphate analysis (to aid in pot function) recommended. They also pose three testable hypotheses: 1) Within the same site type, ceramics are more common in Old Woman's than in Besant and/or Avonlea sites, 2) Within ring sites, Old Woman's ceramics occur in a greater number of the habitation units than they do in Besant and/or Avonlea sites, 3) Vessel size and frequency in any one site type within southeastern Montana do not change over time. As far as we can determine, these hypothesizes have not been addressed in the over 17 years since preparation of the 1988 Class I.

In the section on *Architectural Form and Archaeological Implications* Deaver and Deaver (1988: 45) review some ethnographic data and also present ekistics data for tipi occupants based on ethnographic and archaeological literature. They also present formulae for determining the number of poles used on tipis of variable size and for determining the number and weight of hides used in tipi lodge covers. Using some of these formulae they present a basic model for calculating transportation costs, contrasting the equestrian period with the pre-horse or dog period. These formulae have far more potential than has been realized to this point. Energy loss and capture modeling in particular could provide information on limitations of movement and could thereby allow for establishing a supportable determination of the annual range of pre-horse peoples. Few researchers have followed Deaver and Deaver's lead with respect to energy and transportation cost modeling although use of ekistics formulae in tipi ring analysis has become more common.

Finally, in their section on ethnographic background Deaver and Deaver (1988: 47) summarize the range of subsistence activities associated with hunters and gatherers on the Plains and provide some ethnographic examples. They also discuss some archaeological theory applicable to the ethnographic record.

The ethnographic and ethnohistoric record from the Plains is rather substantial. It is simply not possible to list all elements of this record that might be of value to interpreting the archaeological record. The 1988 Class I only listed a few examples from areas proximal to the project area. However, the record from areas more distant ("discontinuous analog") from the project area can be of value. Even some of the generalized observations made by Euro-American explorers during the historic era can have qualitative value.

For instance Aaberg (2002) cites observations made by Meriwether Lewis and the Corps of Discovery in 1806 during their return journey that placed them among the Nez Perce in the spring (Biddle 1962; Coues 1965; Cutright 1969; DeVoto 1953; Hosmer 1924; MacGregor 1997; Moulton 1988; Thwaites 1904-05; Wheeler 1904). Lewis made observations of the Nez Perce at Camp Chopunish on the Clearwater River during processing and preparation of the root "cous" or "cow", which is a species of *Lomatium.* Lewis describes the Corps of Discovery stay at Camp Chopunish as occurring at the height of "cous" season in late April and May. Lewis observed the root being collected and prepared. Lewis also recorded that Chief Neeshnepahkee (the Cutnose) who had been journeying with them along the river one day, left the Corps at one point to visit a group of his people who were collecting roots "in the plain". Noted methods of preparation included pounding fresh roots into flour that was formed into long thin cakes that were then sun dried and stored for future use with no additional preparation or submersed in boiling water to make porridge as needed. Lewis also noted fresh roots being baked in earth ovens, fresh roots being eaten raw, and fresh roots being dried and stored for later use. The qualitative elements of Lewis' observations include documenting seasonality of root collecting and specific scheduling associated with it. Documenting processes of preparation could also assist researchers with inferring expected archaeological evidence associated with those processes (i.e. earth ovens, grinding implements – or no grinding implements when fresh roots were baked or eaten raw). Species of *Lomatium* are widespread in Montana both in the western mountainous portion and the eastern plains as was documented by Eckerle in Deaver and Deaver (1988: Volume II). These root resources could have been important to prehistoric people occupying the project area. Arguably Lewis' observations could be interpreted to include elements of hunter-gatherer subsistence strategy with his notation of Chief Cutnose visiting a group of his people collecting roots in the plain (i.e. collector strategy versus foraging strategy; base camps versus satellite camps).

Ethnoarchaeological studies have not generally occurred in Montana, primarily because native culture has changed so much and does not employ a traditional or historic subsistence strategy. However, some elements of traditional culture among Montana area Indians survive and likely hold information important to interpreting the archaeological record. Among the Confederated Salish-Kootenai collecting of bitterroot and camas remain important. Some of those people continue to construct traditional camas ovens and observations on construction methods have helped understand how prehistoric cooking features were used and why certain construction elements were employed (Malouf 1979).

Ethnoarchaeological projects range from the broad, with substantial theoretical implications, as in the case of Binford (1980) to small event-based projects that in some respects are no less important. Greenhouse, Gasser and Gish (1981) observed and documented collection and preparation of cholla buds among the Pima Indians of the Gila River Reservation in Arizona. Among the underlying principles of hearth construction that emerged from this small study was the use of seepweed in the cooking features to provide moisture for steaming the buds and to provide insulation from charring. Aaberg (1993a) used these identified principles of cooking to assist in explaining the presence of

charred seeds of *Scirpus* and *Carex* in cooking features interpreted as earth ovens at the late Paleoindian Barton Gulch Site in southwestern Montana. He suggested that these seeds, which are strongly associated with the cooking features, occur as a result of use of the moist green plants of these species to provide insulation and steam for faunal and floral remains found in the Barton Gulch earth ovens. So even though the Greenhouse, Gasser and Gish study might fall into Deaver and Deaver's discontinuous analogy, the small ethnoarchaeological study identified underlying conditions (e.g. steam and insulation as one element) that have a range of variation (e.g. seepweed in the American southwest and bulrush and sedge in southwestern Montana) that can likely greatly aid in interpreting the archaeological record.

We would suggest that although ethnoarchaeological studies are rare in the Montana area, researchers should not shy from looking at such literature from other areas of North America (or from other areas of the world for that matter). The ethnoarchaeological literature has vastly increased since 1988 and studies have a broad range in scope.

Summary Review of Archaeological History, Method and Modeling of the Project Area

History and Theory

Deaver and Deaver (1988: 50-70) provide a detailed review of the archaeological history of southeastern Montana and that history is generally applicable to eastern Montana. For the most part they use the developmental divisions of American archaeological history as first presented by Willey and Sabloff (1974). The Deaver and Deaver history covers 5 periods (they construct and name the last period - Post Explanatory Period - extending from 1980 to present). There is no real reason to revisit the first four periods of archaeological history in detail since they were so adequately treated by Deaver and Deaver. We have excerpted salient elements of the archaeological history from Deaver and Deaver and present them in tabular form below (Table ?). We also added a few more elements of history applicable to the project area, most notably the publication of cultural chronologies/outlines by Mulloy (1958), Reeves (1970/1983), and Frison (1978/1991). We feel these are important events because the publications continue to serve as primary references for presenting cultural context for archaeological manifestations of the project area. Significantly, there is still no agreement among area archaeologists on which of these classificatory schemes is most appropriate. It is also notable that all these schemes are derived from a culture historical approach rather than a cultural processual approach. However, processual models are often presented in area archaeological literature and often appear to expand beyond the culture historical limitations of time-stage progressions.

Our Class I is not intended as a primer in the history of American archaeology. Therefore post-1988 developments are only highlighted. For details on recent changes and developments in American archaeology readers should refer to Trigger (1989), Hodder (1991), Preucel (1995), and Johnson (1999). It is important to note that nationally processual archaeology (including ethnoarchaeology) remains as the dominant approach although in the project area culture historical approaches are probably as often

employed as processual approaches. Neo-Marxism, cognitive archaeology, feminist archaeology, and gender archaeology have all emerged as important elements but generally do not appear to receive significant attention in the project area. In adjacent areas gender archaeology (study of roles both men and women played in past cultures and how gender may be expressed in the archaeological record) receives some treatment. Attempts at identifying activity areas in excavated sites of Montana (the project area and elsewhere) are relatively routine (Munson; Ferguson; Munson and Ferguson; various). However, serious consideration of gender is generally not attained.

It is also worth noting that post-processual archaeologists argue that regardless of the degree of "empiricism" used to interpret the archaeological record, we can never know with certainty exactly how past cultures organized and interacted with the environment. Therefore relative approaches and culture history approaches are just as valid as processual approaches.

A significant development in Cultural Resource Management has been a requirement for consultation with American Indian tribes proximal to project areas or with tribes that have a historical connection with a project area. Generally consultation is only required if investigative undertakings (i.e. excavation) will disturb archaeological manifestations. However, it is becoming increasingly common on CRM projects to address the potential of particular archaeological site types to be of significance to American Indians. This can only be attained through direct consultation with tribal groups. Peterson and Deaver (2001) list a number of archaeological site types that could be of importance to American Indians of eastern Montana. They developed this list through consultation with tribal groups of southeastern Montana and adjacent areas. This list is presented below (Table 21). The list also includes some natural resources and elements of the landscape, which although not archaeological sites, could figure in prehistoric and early historic settlement patterns.

Deaver and Deaver (1988: 58-67) discuss the early history and consequences of Cultural Resource Management on the archaeological record for the project area during the Explanatory Period (1960-1980) and subsequent period. They discuss some of the problems associated with even basic archaeological survey statistics from the Explanatory Period. Early in the CRM survey phase of the period, there was no explicit definition of what constituted a site and note that eventually the BLM instituted a definition (see above for current standard for site definition) that distinguished a site from an isolated artifact or isolated find locality (also referred to by a few archaeologists as a minimal activity loci). Deaver and Deaver (1988: 59) present statistics that suggest variability in site definitions were extreme early on with a range of 2.4 to 16.1 sites per 1000 acres. Those densities changed to 5.0 to 5.9 sites per 1000 acres with imposition of a standard site definition. Obviously prior to establishing a standard site definition, what were recorded minimally as sites ranged from localities with isolated artifacts to localities with well over the minimum of today. Deaver and Deaver also mention the inconsistencies in recording isolated artifact localities, something that continues to be the case today. With the obvious exception of localities with diagnostic tools, some researchers and agencies feel that the information values of isolated artifact finds are too

Table 21. Outline of the archaeological history of the project area.

Period	Prominent Achievements, Events, Publications, and Traits
Speculative (1492-1840)	armchair speculation on the origin of the American Indian; tool function defined through analogy; no analytical separation between morphology and function
Classificatory Descriptive (1840-1914)	focus on description of archaeological materials, particularly architecture and monuments; earliest attempts at classification; first systematic lithic use-wear analysis; most lithic studies centered on speculation on function with morphological typing uncommon; ethnographers of area (Lowie and Kroeber) generally historical particularists; formal algebraic analysis of graphic and plastic arts (beadwork and parfleche designs) in attempts to identify assumed symbolism; formal treatment of art tended to isolate it from cultural context; rock art sites essentially excluded from systematic analysis; *Areas of American Culture Characterization Tentatively Outlined as an Aid in the Study of Antiquities* published in American Anthropologist by William Holmes – North America divided into geographic regions based mostly on presence or absence of particular pottery types – Great Plains and Rocky Mountains in Region 5; publication of Clark Wissler's "Diffusion of Culture in the Plains of North America," in *Proceedings, International Congress of Americanists* – beginning of Wissler's elaboration of Plains culture area concept – Wissler's works more often cited as major influence in Plains culture area studies
Classificatory Historical I (1914-1940)	First professional archaeological activities in Montana during depression era under auspices of WPA and Montana archaeological survey; survey in lower Yellowstone; excavations at Pictograph Cave (1937-41), Hagen (1937-38), and Ash Coulee (1936) Sites; unusual ceramics of Ash Coulee noted; nationally an emphasis toward chronological control; seriation and stratigraphic excavation developed and elaborated; areal and regional classifications based on pottery typologies developed; direct historical approach became critical part of Missouri Valley archaeology; Cultural Area concept developed – eastern Montana part of the Northwestern Plains sub-area of Great Plains; 1938 publication of *Basin-Plateau Aboriginal Socio-Political Groups* by Julian Steward – this work critical to development of ecological approach in anthropology and archaeology; lithic analysis included first systematic replication experiments with emphasis on tool manufacture and tool morphology; William Duncan Strong's *An Introduction to Nebraska Archaeology* published in Smithsonian Miscellaneous Collections in 1936 – his work represents some of earliest application of direct historical approach in the Plains; 1936 publication of Waldo Wedel's "An Introduction to Pawnee Archeology," in *Bulletins of the Bureau of American Ethnology* – this and later works influenced application of direct historical approach in the Plains; Anthropology courses offered at the University of Montana with Dr. Harry H. Turney-High as the first professor
Classificatory Historical II (1940-1960)	American archaeology concerns remained classificatory and historical (context and function); artifacts studied as products of behavior; concern with settlement patterns; emphasis on relationship between cultural and natural environments; lithic analysis and replication studies advanced; "new school" of cultural ecology develops with focus on how cultures adapted to environmental change; collaboration between paleontologists, geologists and archaeologists in documenting early man in North America; studies of art dominated by historical analysis and concerned with origins and development of art styles with Plains focus on history of whit influence on Indian art; River Basin Survey (RBS) project develops site significance ranking system; RBS survey begins in Montana (Moorhead Reservoir and Big Horn Canyon projects); discussion of distributional and locational patterning of sites found during RBS survey of Powder River/Moorhead; 1959 publication of Alice Kehoe's *Ceramic Affiliations in the Northwestern Plains*; site in project area found on East Redwater Creek with ceramics similar to Hagen Site; 1958 publication of Mulloy's *A Preliminary Historical Outline for the Northwestern Plains* – served as the foundation for future projectile point typologies and cultural chronologies; founding of the Montana Archaeological Society in 1958 provided both professionals and avocationalists with publication outlet for Montana area archaeological investigations – also provided institutional base for articulating the needs and concerns of archaeology and archaeologists in Montana; Dr. Carling Malouf arrives at the University of Montana as the first archaeologist in the Department of Anthropology – Malouf influenced many archaeologists who went on as professionals in the academic and CRM arena in Montana – CRM work in southeastern Montana was dominated by UM archaeologists through the 1970s; first summer course in anthropology/archaeology taught by C. Malouf at Montana State University (College)
Explanatory (1960-1980)	American archaeology becomes extremely diverse in the 1960s; archaeological chronologies established in most areas including project area; cultural ecology still important and often combined with Leslie White's evolutionary scheme (cultures developmental product of environment and technology); fusion of concepts whereby cultural stages defined by levels of technology and rates and/or techniques of energy capture; general systems theory applied to cultures stressing importance of

Period	Prominent Achievements, Events, Publications, and Traits
Explanatory (1960-1980)	interrelatedness of cultures and environments with ecosystems approach increasingly important; empiricism, systems theory, and use of biological systems theory led to development of what was termed New Archaeology; term processual archaeology applied to those who view culture as a natural system interrelated to the environment; 1963 publication of Emma Lou Davis' "The desert culture of the western Great Basin: a lifeway of seasonal transhumance" in *American Antiquity* – her model influenced early transhumance and seasonal movement models in Montana; ethnoarchaeology begins to develop in latter part of period; 1969 – publication of "Bighorn Canyon Archeology" by Wilfred M. Husted in *Smithsonian Institution River Basin Surveys Publications in Salvage Archeology* – his work influenced the perception that projectile point typologies and cultural chronologies for parts of south-central Montana might vary some from Mulloy's chronology; 1969 – B.O.K. Reeves completes dissertation later (1983) published in Archaeological Survey of Alberta Occasional Papers as *Culture Change in the Northern Plains: 1000 B.C. – 1000 A.D.*1980, Reeves' work refined and elaborated on Mulloy's cultural chronology and these two works became the standard cultural chronologies used in the project area; 1978 – publication first edition of G. Frison's *Prehistoric Hunters of the High Plains* – his cultural chronology and classificatory scheme also based primarily on Mulloy but with important revisions – Frison's cultural chronology comes into wide application in the project area although many archaeologists holding to the Mulloy/Reeve's scheme – such is the case today with no consensus on which is more appropriate; L. Binford's *Willow Smoke and Dog's Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation* published and viewed as seminal event in development of processual and ethnoarchaeology; new emphasis on fine-grained lithic analysis; study of art in prehistoric emphasizes the sociological context, cognitive archaeology develops from this approach whereby understanding the development of human cognition figures in interpreting prehistoric art and archaeology (i.e. symbolic structure represented/perceived) in material culture; call by avocational archaeologists in 1968 to consider affects of increase in large-scale coal mining to the archaeology of southeast Montana; more "teeth" put in antiquities laws and Cultural Resource Management (CRM)/Public Archaeology and contract archaeology see rapid and exponential growth in the 1970s; archaeological data associated with CRM begins to accumulate rapidly; anthropology and archaeology courses offered at Montana State University and anthropology degree option established in the Department of Sociology – Dr. Leslie B. Davis arrives in late 1960s and Dr. Tom Roll arrives in early 1970s – both archaeologists very active in field archaeology and influence many students who continued in academic and CRM arenas
Post Explanatory (1980 – to present)	Ethnoarchaeology continues to develop as an important tool in interpreting the archaeological record; processual archaeology remains the most dominant force in American archaeology; hunter-gatherer foraging strategies and models developed and often applied in the Plains; Postprocessual archaeology emerges as a counter to processual archaeology and argues that cultural change can never be experimentally replicated, thus empiricism and scientific method can be artifice that simply mask a particular researcher's bias, postprocessualism emphasizes relativism; neo-Marxism, feminist archaeology (attempts to understand past culture through recognition of androcentrism); gender archaeology (study of roles both men and women played in past cultures and how gender may be expressed in the archaeological record); concerns of American Indians about treatment of archaeological properties, graves, and associated grave goods become incorporated into laws and regulations requiring consultation with tribal groups on Federal lands and Federal projects; project area archaeology still includes substantial elements of culture history with increasing use of processual methods and models

low to be of interpretive value and are not worth management considerations. Others feel that at the very least, isolated artifact localities hold clues to how settlement and subsistence systems operated, particularly with respect to individual and small group movements and activities.

Table 22: List of archaeological site types and elements of nature of potential importance to American Indian groups.

FEATURE/MANIFESTATION	SIGNIFICANCE CONSIDERATIONS
Battlefields and Raiding Sites	Potentially eligible under Criterion A as important event in tribal history; Possibly eligible under B if event contributed of reputation of important tribal leader; Could be eligible under C if features or other evidence present
Burials	Associated features could include rockshelters, crevices, scaffold or tree burials, stacked rock walls, medicine wheels and cairns;
Cairns	Potentially important because used to commemorate or honor individuals, past events, or locations; could be associated with burials; Large cairns (3+ meter diameter) most likely to be perceived as important; Eligible under A, B, or C
Communal Animal Kills	Bison kills, antelope kills, sheep kills etc.; Important to tribes under A because representative of important event in their history and prehistory
Fasting Beds	Structures used for fasting or vision questing and evidence may or may not be present; Stone beds (oval, u-shaped, or circular) common; Rare instances eligible under A but also possibly eligible under B
Homesteads	American Indian homesteads on or off reservation could be significant under Criteria A or B
Medicine Lodges	Large stone structures sometimes with multiple cairns; sacred to all tribes
Rock Art	Most common belief – meant to evoke or obtain power; could eligible under A and B but more commonly under C
Settlements	Early tribal settlements could be important and could be identified by presence of stone rings; potentially significant under A & B
Stone Rings	Significance similar to that of settlements with other possible scared or commemorative features
Spirit Homes	Some tribes recognize presence of spirits or powers in springs, rivers, hills and mountains; oral histories of little people and giants often associated with spirit homes
Water	Some tribes emphasize spiritual nature of water
Landscapes	Some landscapes or elements of landscapes considered sacred; high mountains or places, waterfalls, geysers, mountain ranges, canyons etc.; important in American Indian religion
Fossils	Bacculites & ammonites in particular shapes called buffalo stones/rocks or thunderstones; used for ritual and power and sometimes found in medicine bundles
Minerals	Soapstones and clays often used in ceremony; collecting areas could be significant
Paint Sources	Mineral or earth pigment sources could be significant
Plants	Some plants very important in medicine, curing, and ritual; collecting areas could be significant

The 1988 Class I also discusses archaeological models relevant to the project area that were posed during the Explanatory Period noting that most were limited to "statements about site distribution and placement". Such site distributional models continue to be the most common form of archaeological interpretive models generated from survey data. Deaver and Deaver also discuss limitations of survey data and survey approaches, and include small sample size and assumptions that surficial projectile point finds represent adequate measures of site distribution through time, as problems with interpretations. The issue of projectile points as adequate time-transgressive indications of time and distribution continues to be an issue with survey data. To a degree, this problem is inherent in the limitations of surficial recording of archaeological sites. In CRM survey, sites that will not be affected by proposed undertakings and sites that are judged as non-significant are often only visited once, at the time of initial survey. Thus archaeological surveyors are limited to what can be seen on the surface at the time of site

recording. Obviously, aside from assumptions on individual site chronological and cultural associations, natural and modern-cultural factors can influence the visible nature of any site (i.e. erosional cycles, depositional cycles, vegetative cover, artifact collecting, looting, and vandalism). However, data from surficial site recording cannot entirely be dismissed. Within the context of hypothetico-deductive reasoning, modeling and discussions should not be limited, only set in testable terms, if not by the researcher posing the model, then by future researchers. Although this may sound like a post-processual argument, any modeling has value inherent in the scientific process. If such modeling evokes argument and discourse, then it should be viewed as a successful contribution to the archaeological record and understanding the past. On the other hand, models that are not reworked and refined should not be used as stock applications to interpretation without thorough discussion of project specific variables.

Deaver and Deaver (1988: 60) also note the inconsistencies in application of standardized ecological terms to survey data and site records. This still seems to be the case. One of the reasons we went to great effort to present various environmental data and classifications in earlier sections of this report, was the hope of providing a standard reference for at least some of those ecological observational variables.

Modeling and Theory

Deaver and Deaver (1988: 61) present a list of site distribution interpretations and models from the project area. We excerpted this list from the 1988 Class I and added several models presented in the project area written record that has accumulated since 1988 and also elaborated upon one of the earlier models (Table 23).

A review of reports associated with the project area indicates that there has been almost no modeling developed for the northern third of the Miles City administrative unit since 1988. The obvious reason for this disparity is the fact that so little survey and archaeological investigation has occurred in that area. Indeed there has been little modeling development for even the southern portion of the project area since 1988. This is partly a result of the focus of CRM projects, which as mentioned by Deaver and Deaver, are often carried out and completed to meet compliance requirements for clients. Site location, recording and significance evaluations constitute the bulk of the written record of the overwhelming majority of CRM reports. The many cultural resource laws and statutes that have been passed through the years specify some field methodological treatments of cultural properties and clearly state the necessity of considering the significance and information values of those properties. But the laws do not suggest that application of archaeological theory and development of local or regional archaeological models is necessary to fulfill compliance obligations. In the competitive world of "private sector" archaeology and CRM, many projects are limited in scope by practical considerations of budget and by an ethical perspective driven by terms of compliance (i.e. clients are required to underwrite costs for locating, recording, determining significance, and mitigating adverse effects of proposed undertakings to sites; they are not required to underwrite the costs of developing archaeological theory and modeling). It is rare in the project area to find application or development of archaeological modeling at the level of

Class III survey. When modeling occurs it is generally when site treatment reaches the level of mitigation.

Later in the 1988 Class I (137-144) Deaver and Deaver further discuss archaeological model development in southeast Montana and classify them into four types (Table 24). They allow that all models facilitate organization of data and enable analysis "in particular circumstances". Some models incorporate elements of several of the types described in the 1988 Class I. Increasingly, models set or acknowledge limitations of the data base or the written archaeological record; and citing Metcalf et al. (1988) Deaver and Deaver suggest that no single model could ever be applicable and appropriate for organizing data from an area as large as eastern Montana.

Review of Select Models For Southeast Montana

In general one of the most recurrent problems of models, particularly environmentally based models, is explaining the relationship between the correlative and behavioral elements of models. For instance in Table 23 some details of the Campbell et al. (1986) are presented. Ignoring problems inherent with a very small data base developed from a very small research area, there are explanatory gaps in the model. Campbell et al. suggest that it is possible that Early Archaic sites occur in hardwood draws possibly indicating groups coalesced within desirable ecozones. What are desirable ecozones? If there was a preference for exploiting a particular ecozone why would that ecozone have been preferable to another ecozone? Would such preference indicate a cultural preference or a normal adaptive response to changes in the environment? Would changes in the environment result in a dramatic change in subsistence adaptations? What changes in human populations would be associated with a diminution of dietary resources and would those changes influence site distributional patterns (i.e. would lowered human populations during the Altithermal result in fewer sites in general and would such lowered populations have been focused in particular ecozones out of necessity with less focus – but not abandonment - on other ecozones where dietary resources were less predictable)?

Wettstaed (1990) uses a Co-Influence Sphere model (Syms 1977) to aid in interpreting prehistoric settlement and land use in the "pine parklands" of southeastern Montana (see Table 23). He establishes definitions for the model that include core area (where a group spends most of the year and returns for part of the year), secondary area (area exploited for a particular resource), tertiary areas (areas that are infrequently used), and intrusion (an infrequent visit to an area by a distant group of people). Essentially the Co-Influence model assumes contemporaneous groups will interact in positive or negative manners, with for example one group adopting some trait or behavior from another, or one group attempting to avoid another (Wettstaed 1990: 134). He further suggests that interactions "affect the subsistence-settlement systems of the various groups who interact". Among conclusions Wettstaed came to was that "One Bear Complex" sites occur most frequently in mesic grasslands close to water and that "contemporaneous" Besant sites occur most frequently in xeric grasslands, on ridges, and away from water sources. Thus One Bear and Besant peoples exploited different parts of

the environment with Besant people exploiting xeric "winter range" of big game and One Bear groups.

Table 23: Sample of archaeological models that have been developed for eastern Montana.

References	Interpretation
Fredlund 1971, 1972, 1973; Munson and Munson 1980	Man = predator who lived in the pine breaks overlooking the grasslands inhabited by the herbivores he hunted
Loendorf et al. 1972; Fredlund 1977a, 1977b; Gregg 1977	Upland terrain around heads of side streams exhibit heaviest occupation
Fredlund and Fredlund 1973, 1974, 1976; Fredlund and Clark 1975; Beckes 1976; Fredlund 1977b; Gregg 1977; Munson and Munson 1980; MRC-CRD 1980; S. Deaver 1981	Sandstone remnant-Ponderosa pine association most heavily used
Haberman 1973; Beckes 1976, 1979; Gregg 1977; Beckes and Keyser 1983	Late Middle Period sites located in pine breaks, Late Period sites in the lowlands, introduction of the horse accounts for shift (Haberman only)
McLean 1975	Lower slope fan/terrace and scoria sandstone outcrop ecozones show the highest site densities
Beckes 1979; Greiser 1981, 1985; Fox 1977	Seasonal transhumance, altitudinal variation of site placement corresponds to seasonal procurement strategies (McLean 1983 explicitly rejects)
Waldman 1979	Most sites are located Ponderosa/sandstone grassland, grassland, and Ponderosa/sandstone zones
Fraley 1980	Densely littered base camps noted in or adjacent to badlands and all located in lower two-thirds of topography on benches or terraces but rarely on alluvial floodplains; Grassland zone contains high density of small camps and activity areas in higher 2/3 of topography
Greiser and Fredlund 1981	Site density is highest near porcellanite sources, within 1 km of water
Munday 1982: S. Deaver 1981, 1982; K. Deaver 1983b; Fraley 1983; Taylor et al. 1984	Site density is highest in area of topographic diversity, good visibility and ecological diversity
K. Deaver 1983	Pierre Mowry unit has lowest site density, highest IF density and substantial site diversity, Tongue River has highest site density but low IF density and low site diversity, Lebo-Tullock and Fox-Hill units have intermediate site and IF densities
Greiser et al. 1985	Campsites tend to cluster within 0.25 miles of drainage at mid-elevation, lithic procurement sites cluster on ridges in uplands
Campbell et al. 1986	*Optimal foraging theory* – 5 functional site types: target camps, base camps, transitory camps, ephemeral camps, work stations; *Early Archaic period:* sites (based on two points) occur in hardwood draw ecozone possibly indicating groups coalesced within desirable ecozones; *Middle Plains Archaic* (based on 4 sites): their model stresses importance of hunting but allows for broad spectrum utilization of resources; original elliptical settlement model not supported rather they suggest oscillatory settlement pattern in which migratory patterns is wide-ranging and based on highly nomadic family groups searching for game in the grasslands with consumption of other resources as needed and over greater part of year "perhaps a retreat to distant mountain areas might be included"; seasonal agglomeration of groups at certain locations where bison abundance could be predicted; emphasis on mass kills probably in fall for securing winter stores of meat and hides; pattern of widely-dispersed transitory camps and ephemeral camps with fewer base camps along water courses my reflect low population levels caused by poor game productivity or generally lo levels of edible biomass; *Late Plains Archaic* (based on 5 sites): changing settlement pattern including shift to base camp and ephemeral camp occupations along streams and exploitation of arid land and sub-montane biomes using short-term or overnight camps; seasonal agglomeration of foraging groups identified with summer camps along streams and fall camps in hardwood draws; more intensive or fully annual exploitation pattern is suggested although population levels cannot be predicted; Exploitive focus of Late Plains Archaic was lowlands rather than uplands; elliptical settlement system indicated except that target camps replace base camps for fall occupations; *Early Late Prehistoric Period*

	(Plains Woodland): during this period new groups (based on presence of small corner-notched points and more lithics from the Black Hills and eastern Wyoming) enter from south, east and north and quickly establish themselves within the on-going bison-dependent economy; east and north groups represented by Besant and Avonlea complexes respectively; elliptical-oscillatory patterns of settlement and subsistence developed by Pelican Lake groups continued into the Early Late Archaic; infrequency of Prairie side-notched points and Avonlea may indicate affects of the xeric Scandic episode; *Terminal Late Prehistoric Period (Plains Village Period)* (based on 10 sites): period represented by Plains side-notched points and "Plains Village-like" ceramics; occupation continued at target camps, majority of sites are base camps located on terraces overlooking flowing or ponded streams and marshes; frequency of ground stone tools increases dramatically (attributed to possible Middle Missouri immigrants or that floodplain horticulture saw some attenuated or transitory form and comprised one component of dietary regime
Rood 1988	Tipi ring sites generally in higher settings but also on terraces along streams
Wettstaed 1990	Co-influence Sphere model seen for pine parklands of southeast Montana where interaction of groups of people was major (but not sole) causal factor in land use patterns; pine parklands seen as secondary or tertiary resource area for groups whose core/home areas were elsewhere; time of heaviest utilization of pine parklands was between 1000 B.C. and A.D. 1000; environmental matrix of elevation, distance from water, slope, setting, ecozone, aspect, soil types used as predictive model for site occurrence
Crofutt and Aaberg 2003b	On the Northern Cheyenne Reservation there is a correlation between site size and tool diversity with largest sites exhibiting highest tool diversity and smallest sites exhibiting lowest tool diversity; site density lowest at high elevation and highest at mid-elevation; mid-elevation sites are on the average larger while sites in drainage settings are smallest with medium-size sites at highest elevation; Basic optimal foraging theory applied suggesting that seasonal or cyclical use of mid-elevation settings would be greatest by virtue of positioning strategy (i.e. occupying lowlands or uplands for extended periods by large groups of people would raise pursuit and/or extraction costs for other resources; occupying mid-elevation settings would allow for energy optimizing and would still allow for smaller groups and/or specialized extractive groups to exploit uplands and lowlands; lowland and upland site patterning suggests seasonal and specialized use)
Munson (various); Munson and Ferguson (various)	Two prehistoric economies existed in southeast Montana during Late Prehistoric Period: 1) focus on pursuit and exploitation of bison, 2) hunting wide variety of animals and wide variety of plant foods; Rockshelter Use Model: sub-divide Late Prehistoric Period into Late Prehistoric I/LPI (A.D. 350 – A.D. 1200) and Late Prehistoric Period II/LPII (A.D. 1200 – A.D. 1750); rock shelters were base camps (large and varied material culture indicating long period of use) used by small family units during the winter or early spring and were possibly used in conjunction with some specialized activity suggesting evidence (several shelters) being used as task specific hunting camps (small and less varied material culture indicating shorter period of use); Overall there is a shift in local shelter use from LPI to LPII with use emphasis as base camps in LPI and use emphasis as task camps in LPII; LPII point styles are also different and suggests land use and subsistence patterns were different; Some suggestion of identifiable male and female activity patterning
Aaberg et al. 2005	Site density greatest in areas with "high quality" porcellanite sources and a combination of other environmental attributes that would have been attractive to prehistoric people (i.e. no single resource attribute explains density but rather a suite of environmental attributes)

Table 24: Archaeological model types.

Model Class	Model Elements
Origin or Membership Models	Where groups from and to whom related (e.g. classificatory models related to culture area and geographical regions); Comparative analysis of cultural attributes between areas (i.e. similarities and differences)
Temporal Framework Models	Organization of sites and data into temporal units rather than place or ethnic origin; description of artifact types and cultural elements for each temporal unit takes priority over relationship between cultural elements at any particular time
Environmental Models	Explores adaptation of culture(s) to particular environmental variables; these models are seen as often unable to bridge the gap between the correlative and the explanatory aspects of the modeling process
Cultural Dynamics Models	Attempt to show relationship between elements within a particular culture or sometimes the impact to the rest of the culture when one element changes; mostly applied to specific behaviors and associated manifestations (e.g. artifact caching, lithic manufacturing/stone tool-making and detailed analyses of tools and debitage produced as a result of the process)

Munson (2004, 2005) synthesizes data from a number of excavated sites in the pine parklands and Tongue River Breaks area of southeast Montana and breaks the Late Prehistoric Period into two sub-periods: Late Prehistoric Period I (LPI: A.D. 350 – A.D. 1200) and Late Prehistoric Period II (LPII: A.D. 1200 – A.D. 1750). He indicates that there are differences in both the material culture and subsistence economies of these sub-periods with LPI focusing on the pursuit of Bison and LPII focusing on a wide variety of plants and animals. Point variation in the LPI is described as much greater than that of LPII with Avonlea, later side-notched varieties, and small corner-notched points characterizing LPI. Munson suggests that LPII points are typically side-notched but are distinguished from LPI side-notched points by the distance of the notch from the base (i.e. notch height) and the notch width with LPII points exhibiting greater notch height and narrower notch width than those of LPI. Munson also notes that during the Late Prehistoric Period there was extensive use of rockshelters with a shift in local shelter use from LPI to LPII with use emphasis as base camps in LPI and use emphasis as task camps in LPII.

We mention the Wettstaed and Munson models because, in our opinion, they represent advances in bridging the gap between model correlation and the explanatory element. However, there are still explanatory gaps in these models. The One Bear complex as a discrete archaeological culture is not widely recognized in the archaeological literature. Point variation at particular intervals in prehistory has been well-documented particularly from the end of the Altithermal to about 800 years ago. Some of the projectile point types commonly identified in project area typologies were once thought to be temporally discrete and morphologically distinct. This does not appear to be the case. The variation in point types of Munson's LPI appear to include some side-notched varieties that could be included in the One Bear complex yet they at times co-occur with corner-notched varieties and Besant varieties. Wettstaed did not account for point variation within the era associated with the One Bear Complex but he also did not have the advantage of another 15 or 16 years of data accumulation. Of course there is the fundamental question that all archaeologists deal with, and that is how

does material culture in general, and projectile points in particular, relate to identity of cultural groups. Some would argue that language is the only realistic method of identifying distinct cultural groups and since that can never be achieved for most of the prehistoric period on the Plains it must be assumed that changes in material culture represent some degree of influence from "other" groups. Whether that influence is actual movement of a discrete cultural/language group into an area or whether it means borrowing or adopting certain traits of adjacent groups can likely never be proven. This is not to suggest that some projectile point styles are very limited in areal distribution; but explaining what a localized development or regional adaptation means in terms of cultural identity will remain elusive.

Both Munson and Wettstaed admit to the limitations of modeling because of the dearth of paleoclimatic and paleoenvironmental data relevant to the area. As mentioned above such data could be extremely important in furthering model development and presenting alternative hypothesizes for interpreting land use patterns and settlement systems. For instance the Wettstaed model offers the interpretation/hypothesis that Besant sites often occur in xeric settings and may represent exploitation of big game winter range. He does not offer a definition of winter range nor is there documentation that such environments would have been suitable as winter range (through either modern wildlife analogs or modern environmental and climatic trait analysis); nor is there a discussion of use of such areas by both game and people in other seasons. Some basic issues of past environmental conditions could offer more support or alternative explanations for land use patterns observed by Wettstaed. For instance would xeric winter range have been attractive to both game and people during the One Bear-Besant interval? Although paleoclimatic data from the immediate project area is limited there is substantial data from adjacent areas proximal to the project area and that data was presented in the Paleoenvironmental Background section of this report. Proposed models need to incorporate potential paleoenvironmental scenarios that could have affected both human and game populations and/or movements.

Similar explanations are necessary for the Munson model. Defining a "subsistence economy" in the context of potential paleoenvironmental conditions is necessary. Was a "focus on bison hunting" a result of a conscious preference for bison and conscious development of an associated procurement system or did environmental conditions favor expanding bison populations making this game resource available in greater numbers in a greater variety of settings thereby increasing the efficiency of energy capture and reducing pursuit costs? Are there environmental variables (e.g. arid interval) or seasonal elements that favored or forced an increase in diet breadth?

Although paleoenvironmental changes and their relationship to past cultures is important in interpreting the archaeological record in terms of human behavior, the affect of past environmental factors on the final distribution of archaeological materials and archaeological sites is no less important. Discussions of the processes of erosion, deposition and other geomorphic phenomena as expressed in the physical context of a site or series of sites could be important in interpreting the archaeological record. Such natural factors could produce patterns of site and/or artifact preservation that emerge as

non-random patterns during interpretation and analysis carried out in the absence of paleoenvironmental considerations or considerations of geomorphic or other processes of disturbance. As an example we earlier discussed what appears to be strong evidence of major erosion that likely has affected lowland and valley slope settings in eastern Montana over the past 9,000 or more years. That erosion may have destroyed significant numbers of sites from the Paleoindian and early Middle/Archaic period. If a researcher looked at the archaeological record without considering the affects of major erosion, an interpreted "false pattern" might suggest that sites and groups of this age only used particular settings or ecozones or that populations were substantially reduced.

One of the better examples of consideration of the affect of past and on-going natural factors to archaeological sites involves the Powers-Yonkee bison kill site of southeastern Montana. Because this site occurs in what is now a drainage bottom in the Ponderosa pine parkland or Ponderosa pine breaks, it was assumed that bison were trapped or killed in an arroyo setting. With considerable effort applied in documenting the soils, stratigraphy, and paleotopography of the site area, researchers have determined that the site originally occurred in a shallow basin with entrenchment of the present arroyo occurring sometime after the site was used (Roll et al. 1992). The method of procurement at that site has not yet been determined but the previous assumption of arroyo trapping as an element of Yonkee phase procurement strategies has been proven false (at least at one site). Affects of natural forces range from macro in scale (as just described) to micro (e.g. false size-grading of stone tools by fluvial and/or gravitational processes). These natural elements need to be considered when developing archaeological models and when interpreting the record.

One distributional pattern presented in the table above was developed by Crofutt and Aaberg (2003b) from Class III survey carried out in the eastern half of the Northern Cheyenne Reservation. They analyzed the surficially documented material culture of 69 prehistoric sites in the project area. They looked at the relationship between site size, site setting, site elevation, stone tool diversity, and lithic material diversity. They found that larger sites have both greater tool diversity and greater lithic material diversity. The mean size of sites with high tool diversity and high lithic diversity is listed as 180,280 square meters. Both the large site size and the diversity of tools (including several sites with more than one projectile point type) suggest that the sites were repeatedly occupied. The area of greatest site density was found to be the mid-elevation settings that occur between the outer edge of the Tongue River valley floor and base of the final steep slopes that rise to the high divide between the Tongue River and Rosebud Creek. Larger sites with high tool and lithic diversity were found to occur most often in the mid-elevation setting. Larger sites in highest elevation settings were often specialized lithic procurement or reduction sites; but overall high elevation sites were smaller with a mean of 58,613 square meters as compared to the mean of 116,895 square meters for sites at mid-elevation. They cited elements of positioning strategy and optimal foraging theory, as developed by various processual and ethnoarchaeological sources, as possible explanations for the occurrence of large, repeatedly occupied sites in mid-elevation settings. The cited element of positioning strategy involves preferential selection of an area that would optimize energy exchange between human groups and the environment

and its essential resources. Essentially, they suggest that repeated and/or long-term occupations would be greatest in mid-elevation settings because it would facilitate exploitation of all settings with the least amount of energy expenditure. Repeated and long-term occupation of high elevation settings is seen as impractical because it would take groups farther from other necessary resources at lower elevation and resource procurement costs would go up. This model is viewed as time-transgressive although projectile points were not used to temporally delineate the sites. Other than suggestions of certain elements of hunter-gatherer settlement and subsistence theory, this model does not carry the explanatory very far.

Applying the same analytical variables of site size, site setting, site elevation, stone tool diversity, and lithic material diversity to two survey areas within the Ashland District (Timber Creek and Roundup Creek fire restoration tracts), Crofutt et al. (2005) found some patterns to be similar to that of the eastern part of the Northern Cheyenne Reservation and some to be different. They found little correlation between increasing site size and lithic tool diversity and good correlation between increasing site size and lithic material diversity. They also found that the Timber Creek/Roundup Creek project tracts share a pattern of generally smaller sites at lower elevation with the Northern Cheyenne Reservation. However, they also found that larger sites occur more frequently in higher elevation settings in the Ashland District projects as opposed to the Northern Cheyenne area where larger sites occurred most frequently at mid-elevation. They offer a possible explanation for decreasing site size at lower elevations as being related to the fact that mid-elevation landforms are simply smaller in size because the scale of all stream valleys and their associated landforms in the project area is substantially smaller than that of the Tongue River valley.

The issue of defining site size and site assemblage variability within an environmental matrix is important in modeling. The Wettstaed model described above mentions that a possible explanation for his observed pattern of more Besant sites in xeric grassland settings was exploitation of big game winter range. Although Wettstaed may have figured site size and assemblage variability into his model, his report and thesis (Wettstaed 1989, 1990) do not explicitly describe the material culture or size of the sites in his Besant sample. Site function, even it is limited to general interpretations such as greater activity diversity as inferred from greater tool diversity, is important in modeling that involves seasonality. So we are left wondering what defines a "Besant site" in his sample. Wettstaed does address site definitions as used in modeling citing Thomas (1973, 1975) in developing a siteless survey approach wherein "it is not the distribution of sites which must be examined, but rather the distribution of individual artifacts" (Wettstaed 1990: 32). Wettstaed argues for the importance of what have been called isolated finds, isolated artifact localities, indistinct sites, and minimal activity loci in analyzing site distributions. The presumption then is that Wettstaed used the occurrence of Besant points, irrespective of the quantity and variety of cultural material, to identify a proposed winter-use pattern. This may be carrying the "siteless survey" concept a bit too far. One could certainly draw different conclusions on settlement and land use from sites consisting of a projectile point and a few flakes of porcellanite as compared to those with

projectile points and a number of other tools as well as a varied lithic material type assemblage.

Wettstaed does note that generally site density is greater in mid-elevation settings than in high-elevation settings. Thus there is correlation between Wettstaed's observations and Crofutt and Aaberg's observation of greater site density in mid-elevation settings. Caywood et al. (1986) also noted greater site frequency in mid-elevation settings with a tendency of larger sites with more varied lithic assemblages to also occur at mid-elevation. In general survey data from the Ponderosa pine hills and breaks of southeastern Montana tends to show greater large site (i.e. campsites or base camps) frequency in mid-elevation settings. However, there are differences in landform variability within what can be described as mid-elevation settings throughout the Ponderosa pine hills and breaks of southeastern Montana. For instance the mid-elevation setting of the west side of the Tongue River on the Northern Cheyenne Reservation is dominated by the Tongue River Bench and its extensive grasslands and numerous perennial and intermittent streams. This area is generally without pine cover and dense tree and shrub cover are most often restricted to drainage bottoms and slopes. This area is also adjacent to a river that was likely less affected by arid cycles since its source is in high mountains. There probably is not an analogous setting within the Custer Forest proper. Drainage valleys of even some of the larger streams like Otter Creek are much smaller, and although there are grasslands within the valley, they are not on a scale as those of the Tongue River valley. Landform variability within the smaller valleys seems to be greater within a smaller area than the Tongue River. Beckes (1976, 1979) noted greater site densities in such settings near Otter Creek within the scoria/sandstone zone and areas near the confluence of major tributaries with Otter Creek. He suggested that these areas were more heavily used for habitation (base camps?) because they provided most efficient access to the greatest diversity of resources (we interpret this as elements of positioning strategy and optimal foraging theory). Beckes also indicates that all ecozones were used and proposed seasonal transhumance as a settlement model. The Beckes model is similar to that suggested by Crofutt and Aaberg (2003b) although their model does not suggest seasonality as a principal factor in site distributional patterning.

Two notable exceptions to greater use of mid-elevation settings on the Ashland District of the Custer Forest were discussed by Wettstaed (1993) and Walker-Kuntz and Aaberg (2001). They noted high site frequencies, including some described as base camps, along the high Beaver Creek Divide and the King Mountain Road/Lonesome Rock Divide. In the case of the Beaver Creek Divide within the Schiller Fire survey area, Wettstaed saw a steady decrease in site frequency with decrease in elevation. In the case of the King Mountain Road Divide within the Tobin and Fort Howes Fire Complex survey area, Walker-Kuntz and Aaberg observed nearly equal distribution of sites at high elevation and those at lower elevation. Both Wettstaed and Walker-Kuntz and Aaberg attribute the high site frequency for these higher elevation settings to use of the divides as trails. However, Walker-Kuntz and Aaberg elaborate on the concept of a trail, particularly as used by pre-equestrian people. They suggest that a trail should more appropriately be viewed as an "interactive system serving the purpose of logistical mobility, with respect to a variety of resources that were sought during seasonal rounds",

rather than simply a route to get from one place to another (Walker-Kuntz and Aaberg 2001: 53-54). They suggest that environmental resource considerations were at least as important in selecting a trail as considerations of travel efficiency (i.e. paths of least resistance, the shortest distance). The implications of their discussion is that prehistoric people would not simply set out on a trail, particularly one at high elevation that requires substantial energy expenditure to get to and from, without having familiarity with resources available along that trail and when those resources would be available.

One of the problems in archaeological modeling in southeast Montana may associate with the failure of most models to incorporate data from the Tongue River valley with data from the Ashland District of the Custer Forest where so much survey has occurred. Many of the Custer Forest models were generated from the perspective of utility to management on the forest. Likewise modeling from the Tongue River valley, particularly in areas proximal to coal strip-mining, focuses on those areas without incorporating data from forest settings. It is hard to imagine that the Tongue River, the largest perennial stream in the area, and its substantial valley and associated grasslands, would not have figured prominently in prehistoric settlement systems that encompassed the higher Ponderosa pine settings on the Ashland District, all of which occur within about 50 miles of the Tongue River valley. The observation by Crofutt and Aaberg (2003a) of a high correlation between larger site size, high tool variability, and high lithic variability on the eastern part of the Northern Cheyenne Reservation may have implications for how the Tongue River valley fits in an overall settlement system that encompassed the Powder River Basin/Scoria Hills/Breaks ecological sub-section. The average site size for prehistoric sites recorded on two project areas of the Ashland District is 6,238m^2 and 15,011m^2 (Walker-Kuntz and Aaberg 2001; Crofutt et al. 2005). The average site size for a project that reviewed site distribution in the Hanging Woman Creek and Moorhead area indicates an average site size of 7957m^2 (S. Deaver 1981). A Rosebud County survey of the Big Sky Mine area indicates a site density of 1689m^2 (Greiser et al. 1985). These average site sizes compare to the site average of 63,209m^2 (more than 4 times larger than any of those compared above) on the eastern part of the Northern Cheyenne Reservation (Crofutt and Aaberg 2003a). The Northern Cheyenne Reservation statistics are even more impressive when high tool variability and high lithic material variability enter the equation. Size averages for sites with high tool variability and high lithic material variability are over 150,000m^2. Crofutt and Aaberg suggest that this pattern likely results from repeated occupation (probably through time) of sites where a greater variety of activities were being carried out. It is thus possible that the Tongue River valley was a key element in regional prehistoric settlement and subsistence in the Powder River Basin/Scoria Hills/breaks, Wolf Mountain ecological subsections and the southern portion of the Montana Sedimentary Plains ecological subsection.

There are a number of other models that have been proposed for the southeastern Montana area encompassed by the Powder River Basin ecological section. Most models break the major ecological zone into sub-zones that are difficult to translate/correlate across models as has been stated by Wettstaed (1990) and others (Deaver and Deaver 1988). The use of ecozones is sometimes used but with no classificatory description attached to the terms; or if a description is presented it is not derived from standard

ecological classificatory requirements. The same is true of use of vegetation communities in many models. Sometimes vegetation and certain physiographic characteristics are combined to develop analytical zones. In principal there is nothing wrong with developing modeling units or zones based on vegetation, elevation, and landform, but they should be couched in standard terms. One of the primary reasons new standard ecological section and sub-section descriptions, vegetation communities (associations and classes), and land cover types were presented in an earlier part of this report was with the hope that researchers would begin to standardize analytical units based on environmental characteristics. The intent is not to disregard all previous analytical units derived from environmental characteristics. However, since it has been stated by others that it is very difficult to compare and correlate models, perhaps it is time to institute standards and translate previous analytical units into environmental classificatory standards.

Review of Modeling From Other Parts of the Project Area

Deaver and Deaver (1988: 123-137) note that modeling in areas other than on the Custer Forest-Ashland District and areas associated with coal mining in the southwestern part of the Miles City Field Office unit, is generally restricted to correlative observations comparing site density and site types with several environmental variables (e.g. landform type, ecozone/setting, distance from permanent water, geological formation, relief, elevation). Among those models was one developed by Fraley (1980) who synthesized archaeological data from the BLM Wibaux Planning Unit in east-central Montana in the vicinity of Glendive, Montana (the Missouri Plateau and Pierre Shale Plains sub-sections of the Northwestern Glaciated Plains Ecological Section). He noted that densely littered based camps often occurred in or adjacent to the badlands and all were located in the lower 2/3 of the topography, generally on benches and terraces but rarely on alluvial floodplains. He also noted that small campsites and activity areas were present throughout the topographic range with nearly equal site densities in the lower third and upper third of the topography and lower densities in the middle third. The settlement pattern in what he called the grassland zone was distinctly different with mostly small camps and activity areas in the higher 2/3 of the topography. Fraley suggested that these patterns seem to be related to resource diversity and availability of particular plants.

Deaver and Deaver (1988: 138-139) also note the attempt by Clark (1979) to develop an “organizational umbrella” for archaeological investigations in the old BLM Miles City District. Clark focused primarily on environmentally based models developed by Reher (1977, 1979). This model was not specifically re-investigated as a part of the Class I presented herein. However, Deaver and Deaver reviewed the model and addressed its limitations and failings in application over an area as large as the Miles City District.

The area within the Miles City Field Office unit that occurs north of the Missouri River is still largely unknown as was the case in 1988 as noted by Deaver and Deaver. Some models have been developed for the glaciated prairie along the north side of the Missouri and Milk Rivers to the west of the project area although they generally apply to tipi ring sites. The central part of the project area also remains poorly understood

although as also noted by Deaver and Deaver, site frequency appears generally to be much lower than the southern and northern areas.

Post-1988 models that go beyond site locational patterning (and few of those) for the area north of the southern third of the Miles City Field Office administrative unit could not be found in the reports reviewed for the 2005 Class I.

In the 1988 Class I, Deaver and Deaver (139-144) discuss the need for a "theoretical umbrella" or framework for both data collection and data integration and modeling. They also present an outline for developing models. Although many archaeologists chafe at attempts to engineer, limit, or otherwise control intellectual approaches to data interpretation and modeling, the Deaver and Deaver "umbrella" appears sufficiently general and flexible to allow for creativity and independence in applications of theory and modeling. Their framework addresses many of the issues that remain important today. The basic premise of that framework suggests that "Critical resources and available means of procurement are the most significant factors in settlement systems within any cultural adaptation" (Deaver and Deaver 1988: 139). Although they offer that this general model incorporates attempts at integrating environmental data as discussed in their Type 3 model and elements of cultural dynamics of their Type 4 model, they do not explicitly address the importance of paleoenvironmental data although this may be assumed in the general term environmental data. The Deaver and Deaver archaeological framework is presented in tabular form below (Table ?). Deaver and Deaver (1988: 141-142) also present 4 testable hypotheses based on their theoretical framework and assumptions. These hypotheses and whether attempts to test them have occurred, either explicitly or implicitly, will be discussed later in this report.

Archaeological Site Types, Archaeological Material Culture, and Methodological/Observational Trends and Directions

In this section we will review site types as used in observational constructs presented in various reports and site forms through the years of archaeological recording and investigation in the project area. Some elements of the observed and described material culture of archaeological sites will also be reviewed. Some statistics related to these observations will be presented. The primary source for much of the data presented below was the State Antiquities Data Base. Site forms filed with Archaeological Records in the Department of Anthropology at the University of Montana at the time of request for site numbers form the basic source for much of the information on the data base. The data base was sometimes amended, by the Montana State Historic Preservation Office and Archaeological Records, to include site form updates or updates based on further investigation of sites (e.g. subsurface testing results, excavation results). There appear to be some inconsistencies in site updates so not all sites (i.e. site numbers) necessarily represent the most current site data. Some site information was updated through archival research of a select number of reports and articles from the project area. Given time constraints on preparation of this Class I it was not possible to access each of the over 7000 reports associated with cultural resources within the project area.

Lithic Scatters

The term lithic scatter appears to have come into use in the project area during the late 1970s. The term chipping station or flaking station appears to pre-date use of the term lithic scatter and appears on some site forms from the early and mid-1970s. Initially it seems chipping station was intended for use as a descriptive term to characterize sites with few stone artifacts in apparent surficial or shallow depositional settings. However the term itself implied some assumption of function where activities were limited to some element of chipped stone or flaked stone technology. These sites were generally viewed as having low information values. Use of the term lithic scatter came into fashion likely because it presents a less presumptive tone with respect to site function.

Lithic scatter is still the most commonly applied descriptor for sites identified through surficial survey and sites characterized by surficially visible lithic artifacts. However, it appears that through the years the term has been applied to sites with a greater variety of data attributes (both material culture and environmental) than was perhaps originally intended in the earlier years of use. For example there 67 instances (i.e. sites) of the occurrence of bone observed at sites described in the state data base as lithic scatters. Obviously the potential information values of lithic scatters with bone are greater than at sites within which the observed material culture consists only of lithic artifacts. Even in the absence of discernible stratigraphic context, presence of bone provides the opportunity for determining some context (either vertical or horizontal) for the material culture present at some sites. Interestingly of the 4302 project area sites described as lithic scatters in the state data base, only 4066 are listed as containing chipped stone artifacts. Ground stone or pecked stone tools were also noted at 70 sites described as lithic scatters and ceramics were noted at 87 sites with artifact classes lumped together as "other" noted at 237 sites. So at least on the state data base lithic scatter has come to be a catchall for sites with varying information values.

There is some disparity between the written archaeological record (i.e. compliance reports, site forms, and journal articles) and the state antiquities data base. For instance the Paleoindian-Goshen age Mill Iron Site (24CT30) is described as a lithic scatter ("Site Type 1") and a fire hearth or roasting pits or fire-cracked rock site ("Site Type 2") in the state data base. The original site form by Clark (1979) does not use lithic scatter as a descriptor for the site but does mention presence of chipped stone artifacts, bone and buried features. So it appears that whoever made state data base entries for the Mill Iron Site made some subjective judgment calls on how this important site should be classified in the data base. It is obvious even from the original site form that the Mill Iron Site is not a lithic scatter but was observed from the start to be a stratified site with high information values. It also appears that the state data base has not been updated to include the substantive information obtained during University of Wyoming excavations at the Mill Iron Site under the direction of George Frison (Frison 1996).

Problems with the state data base notwithstanding, it is also obvious after inspection of a sample of site forms that many archaeologists and field technicians continue to classify sites as lithic scatters when some of those sites have data and artifact classes, and attendant information values, that go beyond chipped stone materials. The

original site forms for 6 subsequently excavated sites in Rosebud and Bighorn Counties were inspected and these sites when initially recorded were described as lithic scatters. Reports describing subsequent excavations indicate that the lithic scatters were shallowly buried sites with a variety of cultural materials including bones and intact features that provided radiocarbon dates. Yet these sites are still classified as lithic scatters in the state data base.

Although it has become routine for many agencies to require subsurface testing of lithic scatters in project areas associated with potential site-disturbing undertakings, a substantial portion of so-called lithic scatters are often only visited once and the original observations made on visible surficial attributes at the time of initial recording forms the basis for data derived for archaeological modeling and interpretations.

Because of the limitations of the observational record associated with lithic scatters that do not experience investigation beyond surficial recording, the term lithic scatter has become a bit of a prejudicial moniker in terms of the potential information values of such sites. Observational limitations are even more acute on the state data base. Although the written archaeological record should be the focus of any in depth archaeological modeling, analysis, and interpretation, there are some areas of research and management where overall synthesis of the record is a necessary focus. Such is the case with Class I overviews. With 7065 prehistoric sites and over 7000 reports (those numbers are even higher now) associated with the archaeology of the Miles City Field Office project area, it simply was not possible to access and correlate the written record, with the state data base. Use of the data base was absolutely essential in developing an updated Class I within the required time schedule.

Faced with problems in the classificatory scheme used in the state data base we made some decisions associated with incorporating data into our internal data base with respect to reviewing lithic scatter sites. First of all we combined the site type chipping station with the site type lithic scatter. Where obvious on the state data base we excluded sites with cultural features (e.g. tipi rings, hearths, fire-pits, heat-altered rock, cairns) that had been classified as lithic scatters, either as site type 1 or site type 2, based on surficial observations. We assume that these excluded sites have potential information values that far exceed the observed information values of sites perceived to consist for the most part of stone artifacts. As noted in a preceding paragraph, we did not exclude those lithic scatters that contained some cultural materials that fall outside the class of chipped stone artifacts (e.g. ground stone/pecked stone, bone, ceramics). We did not exclude all sites that were initially recorded as lithic scatters but were later found to include other materials and features. The state data base lists 469 sites as lithic scatters with an additional site type for these 469 properties listed as fire hearths, roasting pits, or fire-cracked rock. Sections containing these 469 sites are also shown on the following map figures. We assume that the majority of these 469 sites have undergone testing, been excavated to some extent, or yielded obvious evidence of a more varied material culture at the time of recording. Lithic scatter sites that have undergone advanced forms of sub-surface investigation that would alter perceived information values and substantially expand artifact classes are accepted as a small minority of the 4302 sites we have

included as lithic scatters. Lithic scatters account for 60.9% of all prehistoric sites that have been recorded in the project area.

The following 4 map figures give visual impressions of the distribution of lithic scatters through a matrix of environmental and administrative/ownership variables. These graphic figures were developed using the limited GIS capabilities of the present state data base. The GIS data base presently only includes sections that contain at least one site. Individual site locations have not been included in the extant GIS application and it was far beyond the scope of this report to incorporate locations of all 4302 lithic scatters into a GIS application. On the following maps the smallest digitized square represents a section. Multiple conjoining sections containing sites appear as larger configurations of squares and rectangles. Although some may feel these graphic representations are misleading, present limitations of the GIS data base prevent further visual density analyses. However, we assume that the impression obtained by graphic rendering of conjoining site sections, each of which contains at least one site, is overall representative of general lithic scatter distributions. We have also augmented these graphic representations with statistics based on site distribution by county. It would have been very useful to have a GIS application that showed areas surveyed within the project area but that data is not presently available. Graphic representations of survey areas would have assisted in visually interpreting site distribution and densities. However considering the variability in survey intensity visual representations of areas survey could lead to biased interpretations.

Figure 57 shows the distribution of lithic scatters overlain on a color relief map that also shows ecological sub-sections, major rivers and major perennial and intermittent streams, as well as project area county outlines. It is quite obvious that the Powder River Basin/Breaks/Scoria Hills (PRBSH) ecological sub-section contains the greatest number of lithic scatters although the westward-lying Wolf Mountains sub-section also contains high frequencies of lithic scatters as does the southwest portion of the Montana Sedimentary Plains sub-section, which adjoins the PRBSH and Wolf Mountains sub-sections.

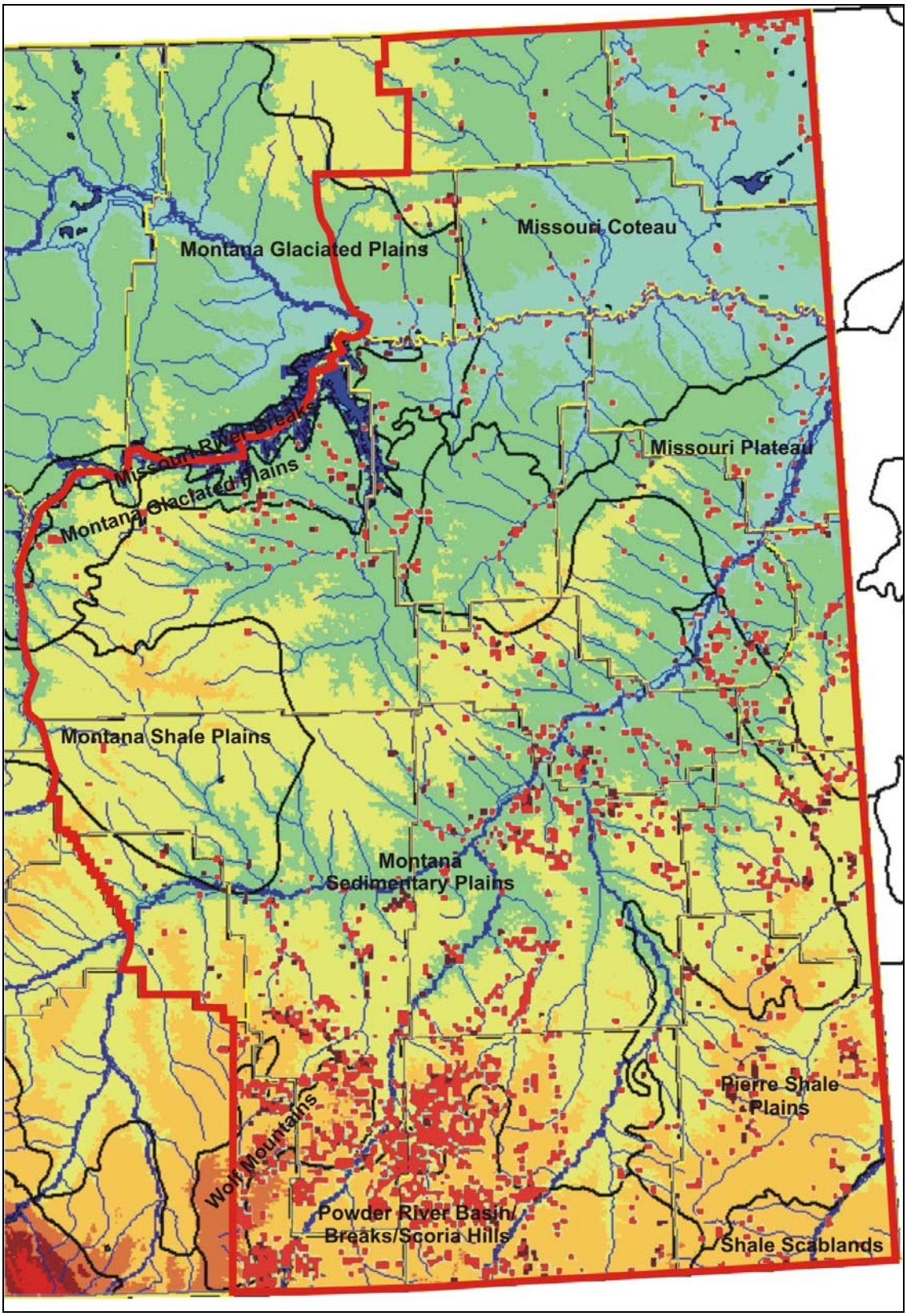

Figure 57: Sections with lithic scatter sites (red = lithic scatters; dark red = lithic scatters with hearths, fire-pits, or fire-cracked rocks) overlain on project area ecological sub-sections, color relief map, drainages, and counties.

Frequency of lithic scatters in other ecological sub-sections is more variable although this is quite likely a result of the amount of survey that has been carried out. The PRBSH, Wolf Mountains, and southern portion of the Montana Sedimentary Plains sub-sections encompass lands of the Custer Forest and Northern Cheyenne Reservation, and lands associated with coal strip-mining where the acreage of archaeological survey is substantially greater than in other areas. The southeastern portion of the project area, encompassed by the Pierre Shale Plains sub-section exhibits some localized areas of high lithic scatter frequency including the Long Pine Hills of the Custer Forest and upland breaks in the BLM Powder River Resource area of central Carter County. Lithic scatter frequency is lower in the Shale Scablands in the extreme southeast corner of the project area. Lithic scatter frequency is also moderately high in the east-central portion of the Montana Sedimentary Plains sub-section and in the portion of the Pierre Shale Plains that encompass the Cedar Creek Arch. The greater amount of survey associated with oil and gas development in the Cedar Creek Arch area may be skewing the pattern some but overall the lithic scatter frequency is greater along the south side of the Yellowstone River.

North of the Yellowstone River to the north boundary of the project area frequency of lithic scatters is much lower than to the south of the river. There are several spikes in lithic scatter frequency in the northern portion of the project area most notably in the extreme northeast corner in the Brush Lake basin, which occupies the pre-glacial channel of the Missouri River. This increase in frequency may be a result of higher survey acreage in undisturbed U.S. Fish and Wildlife Service Lands and private and state lands associated with oil and gas development. Elsewhere in the northern third of the project area, lithic scatter numbers are low but less survey has occurred and more lands are under cultivation.

Lithic scatter frequency also increases on the south side of the Missouri River in the vicinity of Big Dry Creek where it is likely greater survey acreage in the BLM Big Dry Resource Area has somewhat biased the distributional pattern. Another small spike in lithic scatter frequency is apparent on the Redwater Divide, the high remnant of the Flaxville Bench that separates the Yellowstone and Missouri Rivers. This site increase may associate with an increase in survey activity associated with the presence of more extensive BLM lands. The Redwater Divide is also a known source of nodular cherts, chalcedonies, agate, opalized/petrified wood, and porcellanite, which occur in Flaxville gravels (see Geology and Lithic Source sections earlier in this report). Thus the increase in lithic scatters could also associate with presence of lithic material sources.

Although the GIS application does not provide site numbers, there is general correlation between ecological sub-section lithic scatter distributions and county lithic scatter frequency. Those counties that encompass the Wolf Mountains, PRBSH, and southern Montana Sedimentary Plains sub-sections account for 62.4% (n=2684) of all lithic scatters with 624 in Bighorn County, 1236 in Powder River County, and 824 in Rosebud County. The spikes in lithic scatter frequency in the Long Pine Hills and the uplands and breaks are mirrored in statistics for Carter County, which contains 226 (5.3%) lithic scatters that occur primarily in the Pierre Shale Plains sub-section. Lithic

scatters account for 13.1% of total project area sites of this type in Custer (n=426) and Prairie (n=138) Counties and these lithic scatters occur almost entirely in the east-central portion of the Montana Sedimentary Plains sub-section. Lithic scatters in Garfield and McCone Counties number 154 (3.6%) of the type total and they occur primarily in the south part of the Montana Glaciated Plains sub-section and the northern part of the Montana Sedimentary Plains sub-section. The spike in lithic scatter frequency in the Missouri Coteau sub-section occurs entirely within Sheridan County where 2.1% (n=89) of the type total is present. The final noted increase in lithic scatter numbers encompasses much of the area along the Cedar Creek Arch in Fallon, Wibaux, and Dawson Counties, which account for 10.3% (n=444) of the project area type total. The remaining counties in the project area (Daniels, Richland, Roosevelt, Treasure, and Valley) account for a combined total of only 3.2% of all lithic scatters.

Figure 58 shows the distribution of sections containing at least one lithic scatter overlain on drainage basins within the project area. The distribution and frequency of sites within the Upper Tongue River and southern portion of the Lower Tongue River basins is striking. As discussed above, this high frequency is no doubt biased by the greater acreage of survey carried out on Custer Forest lands and lands associated with coal mining. What may be worth noting is the fact that most of the Ashland District of the Custer Forest is encompassed by the Upper and Lower Tongue River basins. In an earlier section of this report a review of archaeological modeling was presented. In that section we suggested that one of the failures of models developed for the Custer Forest may be in not including the Tongue River valley archaeological data. We also reviewed a model that indicates sites with greater tool diversity and greater lithic material diversity tend to occur more frequently in the Tongue River valley and also tend to be considerably larger than in the hills and breaks outside the valley. This observed pattern along with the distributional graphic in Figure 58 may suggest a basin focus rather than a forest focus in the PRBSH, Wolf Mountains, and Montana Sedimentary Hills (southern portion) ecological sub-sections. Lithic scatter frequencies are also high in the Rosebud Creek basin and the upper Powder River basin. Other basin patterns are not as strong although additional survey could change that pattern. The Brush Lake basin of extreme northeastern Montana contains a slight spike in lithic scatter frequency. A site size, site elevation, lithic diversity, and tool diversity matrix analysis for other parts of the project area may provide insights into prehistoric land use.

Figure 59 shows lithic scatter sections overlain on a geological map of the project area. Over 80% of lithic scatters occur on the Fort Union Formation, which encompasses about 60 to 65 percent of the project area. Presently we are uncertain of the utility of this statistic although there could be patterns associated with vegetation communities and/or relief associated with certain formation exposures. There could also be a pattern of prehistoric lithic material use and preference associated with site patterns expressed on the geological map. However, this issue will be discussed later in the report.

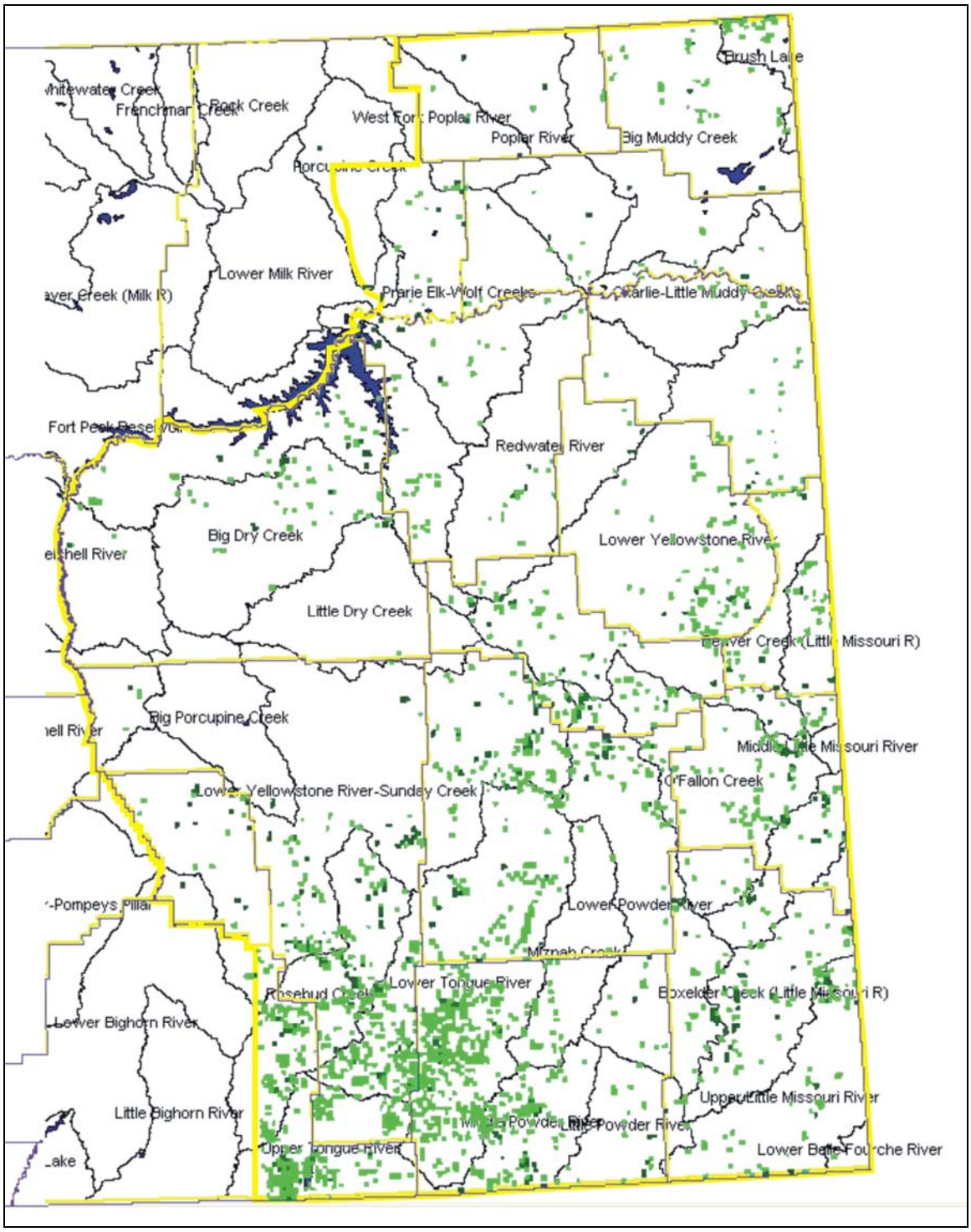

Figure 58: Sections with lithic scatter sites (lithic scatters = green; lithic scatters with hearths, fire-pits, or fire-cracked rock = dark green) overlain on project area drainage basins and counties.

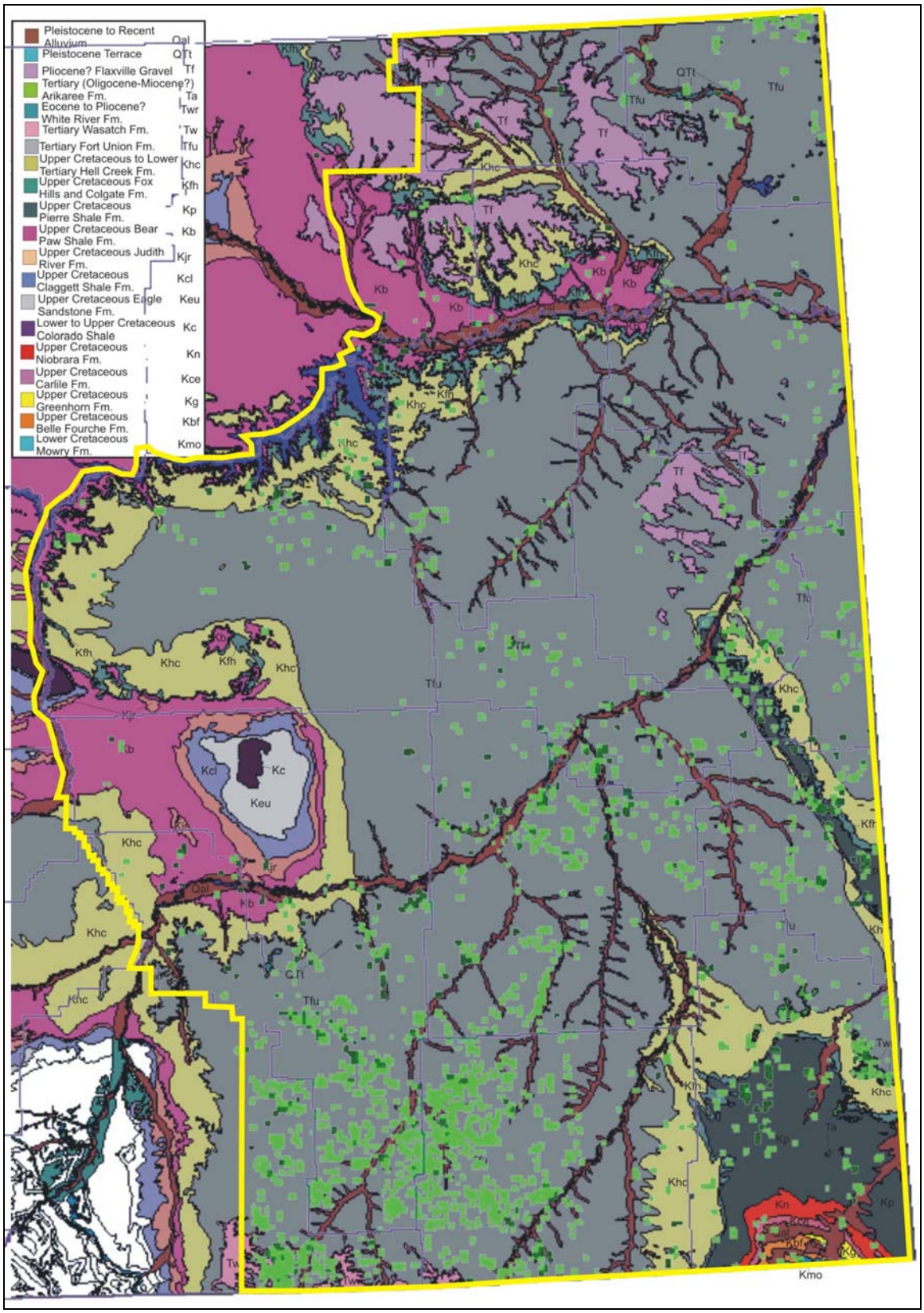

Figure 59: Sections with lithic scatter sites ((lithic scatters = green; lithic scatters with hearths, fire-pits, or fire-cracked rock = dark green)) overlain on a geologic map of the project area.

Figure 60 is a land ownership mosaic of the project area (BLM=yellow; Tribal/Reservation lands=red; USDA/Custer Forest lands=pale green; US Fish and Wildlife Service lands=teal; State lands=pale blue) overlain by lithic scatter sites. Aside from showing the general distribution of sites this map shows the strong association of site distribution with Custer Forest and Northern Cheyenne lands in the south part of the project area. Other spikes in site frequency tend to associate with BLM lands or federal mineral reserve lands.

Lithic scatters are by far the most common site type in the project area. Because of the perception by many culture resource managers and archaeologists that this site type has informational values that are less easily extracted in surficial to shallow depositional settings, lithic scatters receive variable and inconsistent observational treatment. There is a general presumption that context for such sites is poor and thus information values are low. However there has been no systematic and analytical treatment to define the term context or to even define what is a buried site or what is a surficial site. A burial model for archaeological sites has been developed for portions of Wyoming (Ingbar et al. 2005). This model was developed primarily as a tool to assist land managers in areas of intense energy related developments. The model was developed using soil, geomorphological, and land setting (e.g. slope, landform) variables and archaeological site and contextual variables that were acquired from inspection of a number of written and electronic data forms. This in-depth model also considered occupational and post-occupational factors (e.g. occupational trampling in particular soil/sediment types, cryoturbation, bio-turbation, post-occupational translocation – fluvial forces – gravity-etc.). A site burial sensitivity scale was developed for particular settings.

Such a model would be very useful to cultural resource and land use managers in the project area. It is important to note that this Wyoming model was developed to assess potential occurrence of archaeological sites with good buried context but not to exclude areas from archaeological survey. Ingbar et al. (2005) also note that there will be exceptions to the model wherein some shallowly buried sites could contain elements of archaeological context and specifically address tipi ring sites as a surficial site type where context could be preserved regardless of depth of burial.

Within the Miles City Field Office planning unit there are instances of site occurrences in surficial to shallow depositional setting where context based on surficial observations was thought to be poor but was found to be at least partially preserved in some site areas after sub-surface testing and/or mitigative excavation (Brumley and Dickerson 2000; Aaberg et al. 2005). Obviously any surficial to shallowly buried site with preserved features offers the potential for determining context to some degree.

Even in the absence of observable context, surficial and shallowly buried lithic scatter sites have information values that are not always addressed during surficial recording. Although generally most archaeologists give adequate descriptions of formal (i.e. high energy investment tools), descriptions of lithic debitage, which often form the bulk of observed surficial cultural material at lithic scatters, are extremely variable and

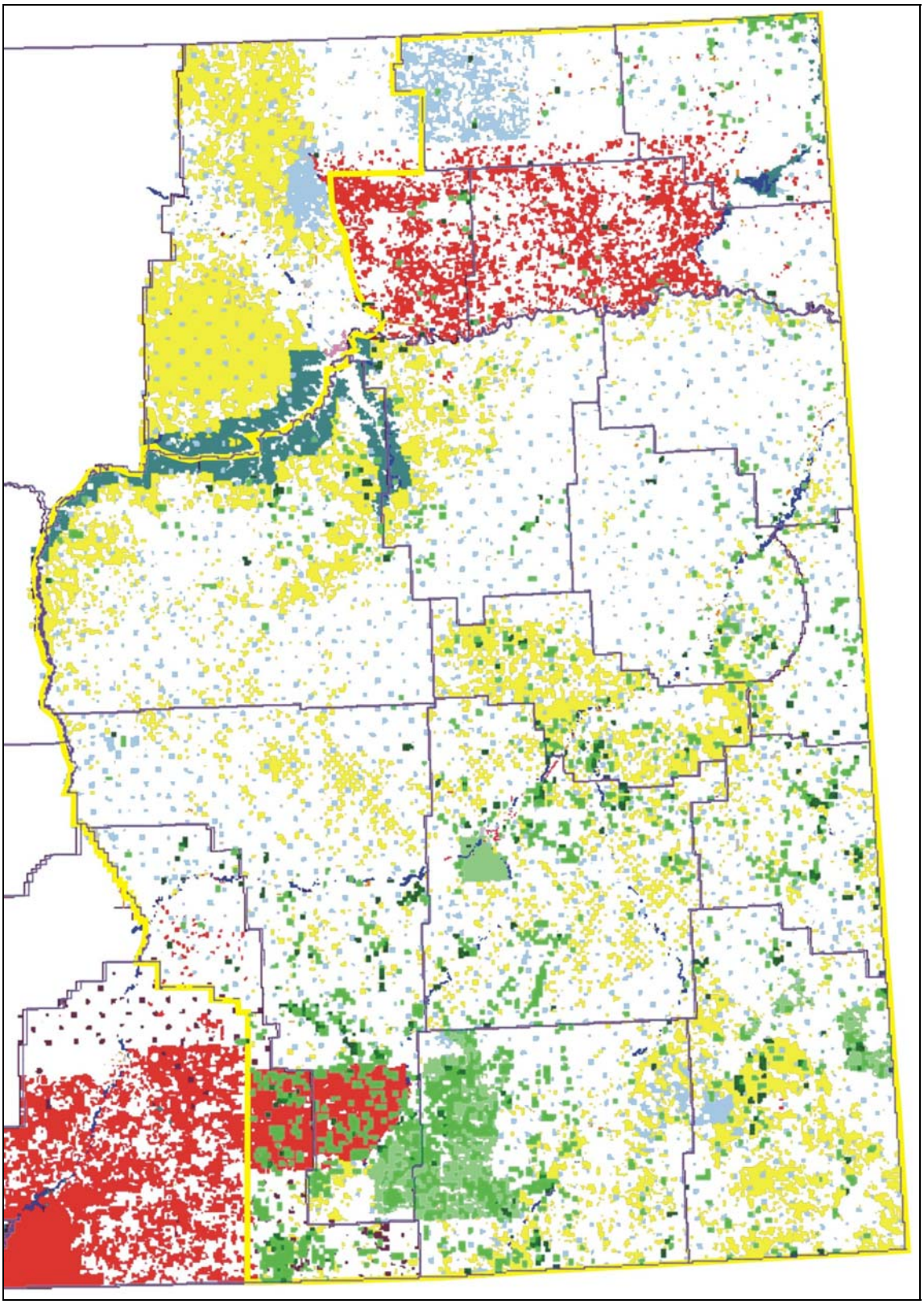

Figure 60: Sections with lithic scatter sites (lithic scatters = green; lithic scatters with hearths, fire-pits, or fire-cracked rock = dark green) overlain on ownership mosaic of the project area (U.S. Dept. of Agriculture/U.S. Forest Service shown as palest green).

inconsistent. Analytical treatment of lithic debitage is frequently much more involved at the level of site mitigation but as mentioned earlier the majority of lithic scatters are documented only through initial surficial site recording at times augmented through shovel and/or small-scale subsurface testing. Project area recorded surficial observations of lithic debitage generally fall into two broad analytical techniques. One uses gross technological classification, characterizing flakes as primary, secondary or tertiary and is usually achieved by general impressions of flake size and thickness along with the presence or absence of cortex. The other technique uses mass analysis and size-grading to categorize debitage as primary decortication, secondary decortication, internal percussion, or pressure flakes or shatter. General impressions of site activities are inferred through both techniques and are based on the percentages of the technological and size-graded classes (e.g. dominance of tertiary ore pressure flakes is interpreted as indicating that final stages of tool manufacture and/or maintenance were primary site activities; dominance of primary flakes with cortex is interpreted as indicating reduction and early stages of tool manufacture occurred at the site). Both techniques appear to have a significant flaw in that flake condition (i.e. complete flake – bulb, platform and flake body complete; broken flake – bulb, platform and partial flake body; flake fragment – no bulb, no platform) is almost never recorded. Absence of these observations could lead to assumptions that smaller flakes represent final stages of tool manufacture when in fact small flake fragments could actually be part of a much larger flake of a different technologic stage.

Deaver and Deaver (1988: 62-64) note that lithic analysts are often criticized for generating "massive amounts of relatively worthless data" that have little relevance to prehistoric human behavior. Lithic analysis has progressed substantially since 1988 and there is little question that detailed analysis of lithic debitage can lead to a better understanding of not only the tool making process but activities (e.g. meat processing, bone working and processing, hide working, wood working) likely associated with particular tool types that were being produced or maintained. Observations on flake morphology and condition, flake platform morphology, as well as size-grading have answered questions on frequency of particular tool type production (e.g. late biface/tool production, core-reduction, uniface production, point-finishing, point manufacture, flake tool production, point and biface re-sharpening) from which behavioral and activity patterning can be derived (Douglas 1991; Andrefsky 1998; Odell 2004; Baumler and Davis 2000; Dickerson 1998). Analysis of debitage discard patterns as represented in the archaeological record and contrasted with ethnoarchaeological studies has also assisted in interpreting prehistoric behavior and activity patterning (Baumler and Davis 2000). Advances have also occurred in the use of mass analysis and aggregate analysis of chipped stone debris but such analyses generally go beyond size-grading and move aggregate lithic analysis beyond the descriptive and toward behavioral inferences (Hall and Larson 2004).

In our view the question with respect to recording and documentation of lithic scatter sites lies not in the utility of detailed lithic analysis but in the overall context of cultural resource management. There is no question that lithic micro-analyses (e.g. platform morphology) require a substantial investment of time and money; but at the

level of surficial survey is it appropriate to require clients to underwrite the costs of such analysis? Academic archaeologists have argued for years that the failing of CRM archaeology is that it is driven primarily by compliance requirements and not science and research. It seems after almost 18 years that the same argument can be made against CRM archaeology, at least at the level of Class III inventory. It also seems unlikely that agency cultural resource managers will require expensive analysis/data recording for sites that may ultimately be determined as not eligible (i.e. non-significant) for listing in the National Register of Historic Places (NRHP).

A primary concern with lithic scatters is that they, more often than not, are recommended as not eligible for listing in the NRHP and the documented record of such sites is often limited to surficial recording. The question then becomes how can we institute documentation/recording standards that ensure optimal data recovery that will be of consistent value to future researchers. Understanding that as analytical methodologies evolve and improve it may be necessary to view standards as dynamic, it still appears necessary to institute standards for recording of lithic scatters. In our view those standards must include at a minimum characterizations of flake size, flake condition (i.e. complete flakes, broken flakes, flake fragments, shatter), flake morphology, and presence or absence of cortex. Surficial recording should also include metric and non-metric (descriptive) characterizations of formal tools (e.g. projectile points, bifaces, unifaces). Although we may be expressing personal biases, there seems to be region-wide correlative value in developing diversity indices that incorporate site size, site setting and/or elevation, tool variation, and lithic material variation. At the level of individual site documentation it is important to note these attributes. Whether or not archaeologists agree with our recommended minimum recording standard for lithic argument, there should be no disagreement on the need for a standard. Agency archaeologists may want to begin soliciting comments from archaeologists who work in the project area as a step toward developing an acceptable recording standard for lithic scatters.

Approaches to evaluating NRHP eligibility for lithic scatters should include both surficial and subsurficial attributes. Absence of detectable subsurface context is most often used to recommend non-significance for a site. Yet a very large and densely littered lithic scatter with a varied tool and lithic material assemblage has information values that go beyond context particularly when site attributes are viewed through consistently described environmental parameters (as for example presented by Crofutt and Aaberg 2003a and discussed in an earlier section). Deaver and Deaver (1988: 157-160) argued for expanded sub-surface testing standards at all archeological sites but particularly at large lithic scatters. They presented statistical and ethical arguments against shovel-testing and suggested that formal 1m x 1m tests would be a more appropriate method of evaluating sub-surface contexts of sites. Although use of formal tests has become more common, the standard is not 1m x 1m but ranges from 0.5m x 0.5m to 1m x 1m. There is still no standard for prescribing the minimum amount of testing for a site of any particular size.

Fire hearths, Roasting Pits, and Fire-cracked Rock

Deaver and Deaver (1988:129) set up a site type they called a "Cultural Material Scatter". This site type was described as properties that contain a combination of lithics and other cultural material (e.g. bone, fire-cracked rock, ground stone, ceramics). They established this site type to distinguish lithic scatters, which they define as containing only lithic artifacts, from other site types with different and presumably more varied and higher information values. Although this was a logical and useful site classification it has not been consistently applied by archaeologists during site recording and it is not used as a site type in the state data base. Lithic scatter, lithic scatters with hearths, roasting pits and fire-broken rock, and fire hearths, roasting pits, and fire-broken rock are site types in the state data base that appear as if they could have been broken down to include a number of what Deaver and Deaver suggested as cultural material scatters. For the purposes of analysis and review we will discuss the occurrence of sites that contain fire hearths, fire pits, and/or fire-cracked rock.

Of the 7065 prehistoric sites recorded in the project area 556 (7.9%) are shown on the state data base as containing one or more of the three feature types listed above. Those sites with any combination of these features include 469 lithic scatters and 21 tipi ring sites. Other site types with these features are fewer in number and include rockshelters or caves, bison kill sites, processing areas, lithics workshops, a lithic quarry, a "rock structure" and a petroglyph site.

Sites with fire hearths, roasting pits, and/or fire-cracked rock occur in all project area counties including Bighorn (n=33/5.9%), Carter (n=52/9.4%), Custer (n=51/9.2%), Daniels (n=6/1.1%), Dawson (n=23/4.1%), Fallon (n=56/10.1%), Garfield (n=31/5.6%), McCone (n=18/3.2%), Powder River (n=60/10.8%), Prairie (n=31/5.6%), Richland (n=9/1.6%), Roosevelt (n=10/1.8%), Rosebud (n=107/19.2%), Sheridan (n=9/1.6%), Treasure (n=36/6.5%), Valley (n=15/2.7%), Wibaux (n=9/1.6%). The overall trend in the occurrence of sites with these cooking or thermally related features appears to reflect the amount of survey that has been carried out in the project area. The seven southern counties of the project area (Treasure, Bighorn, Rosebud, Custer, Powder River, Fallon, and Carter) have a combined total of 395 sites accounting for 71% of all sites with this combination of features. The six counties in the central portion of the project area (Garfield, McCone, Prairie, Dawson, Richland, and Wibaux) contain a combined total of 121 sites or 21.8% of sites with these features. The four northern counties (Daniels, Valley, Roosevelt, and Sheridan contain 40 sites with these features accounting for just 7.2% of all recorded occurrences.

Tipi Ring, Stone Circles, and Ring Sites

This site type includes circles of stones that most often are presumed to have been used to hold down tipi lodge covers or lodge covers from other features. It includes configurations of sometimes conjoining circular to ovoid features and some large circles or ovals, which may not actually represent domestic lodges but medicine lodges, dance lodges, and other ceremonial lodges.

There are 934 (13.2% of the 7065 project area total) prehistoric archaeological sites with stone circles within the project area. Although some stone circle/tipi ring sites have been found in all 17 project area counties, there are distinct differences in frequency. Of the 934 sites with rings, 67(7.2%) occur in Bighorn County (project area portion), 25(2.7%) occur in Custer County, 98(10.5%) occur Carter County, 24(2.6%) occur in Daniels County, 12(1.3%) in Dawson County, 54(5.8%) in Fallon County, 13(1.4%) in Garfield County, 49(5.2%) in McCone County, 5(0.5%) in Prairie County, 78(8.4%) in Powder River County, 75(8.0%) in Rosebud County, 25(2.7%) in Richland County, 172(18.4%) in Roosevelt County, 188(20.1%) in Sheridan County, 2(0.2%) in Treasure County, 41(4.4%) in Valley County (project area portion), and 6(0.6%) in Wibaux County.

It is no surprise to researchers working in the project area that a majority of stone ring sites occur in the Missouri Coteau and Montana Glaciated Plains ecological sub-sections (Figure 61) where glacial cobbles were a ubiquitous resource for holding down lodge covers. The four counties north of the Missouri River (north zone) in the project area (Daniels, Roosevelt, Sheridan, and Valley) have a combined total of 425 sites with tipi rings amounting to 45.5% of all such sites in the project area. The six counties in the central portion/zone of the project area (Garfield, McCone, Prairie, Dawson, Richland, and Wibaux) contain 110 stone circle sites, or 11.8% of this site type total. The seven counties encompassing the southern part/zone of the project area (Bighorn, Treasure, Rosebud, Custer, Powder River, Fallon, and Carter), have a combined total of 399 tipi ring sites accounting for 42.7% of all such sites in the project area.

In a study area immediately west of the BLM Miles City project area, Deaver and Peterson (1999) note a steady diminution of ring site frequency toward the south. In the Miles City project area the frequency of tipi ring sites in the southern zone is nearly as great as that of the northern zone; but it appears that the frequency of individual tipi rings (i.e. the average size of tipi ring sites) is far lower in the south than in the north. Recording forms for a sample of 445 tipi ring sites (47.6% of all Miles City BLM project area tipi ring sites) were examined. However, 15 of the site forms did not have observations on tipi ring frequency or diameters. The 430 sites for which there was adequate descriptions on tipi ring numbers and diameters contain 2,717 rings (Table 25). The northern zone site sample contains 1895 rings or 69.7% of all rings in the project area sample. The southern zone sample contains 606 rings or 22.3% of all rings in the sample and the central zone sample contains only 216 rings (7.9% of sample total). This pattern is dissimilar to that observed by Deaver and Peterson (1999) who note that the average number of rings in each site varies only slightly from north to south with an overall average of 11 rings per site. In the Miles City BLM project area the average rings per site in the examined sample varies from a high of 9.92 in the north zone to a low of 3.07 in the south zone.

The Deaver and Peterson (1999) study indicates an average tipi ring diameter of 4.9 meters. Based on Figure 4.10 (1999: 4-12) of their report it appears that only about 11% of rings in their sample exceed 6 meters diameter. The analyzed sample from the Miles City BLM project area presents similar statistics wherein only about 9% of tipi

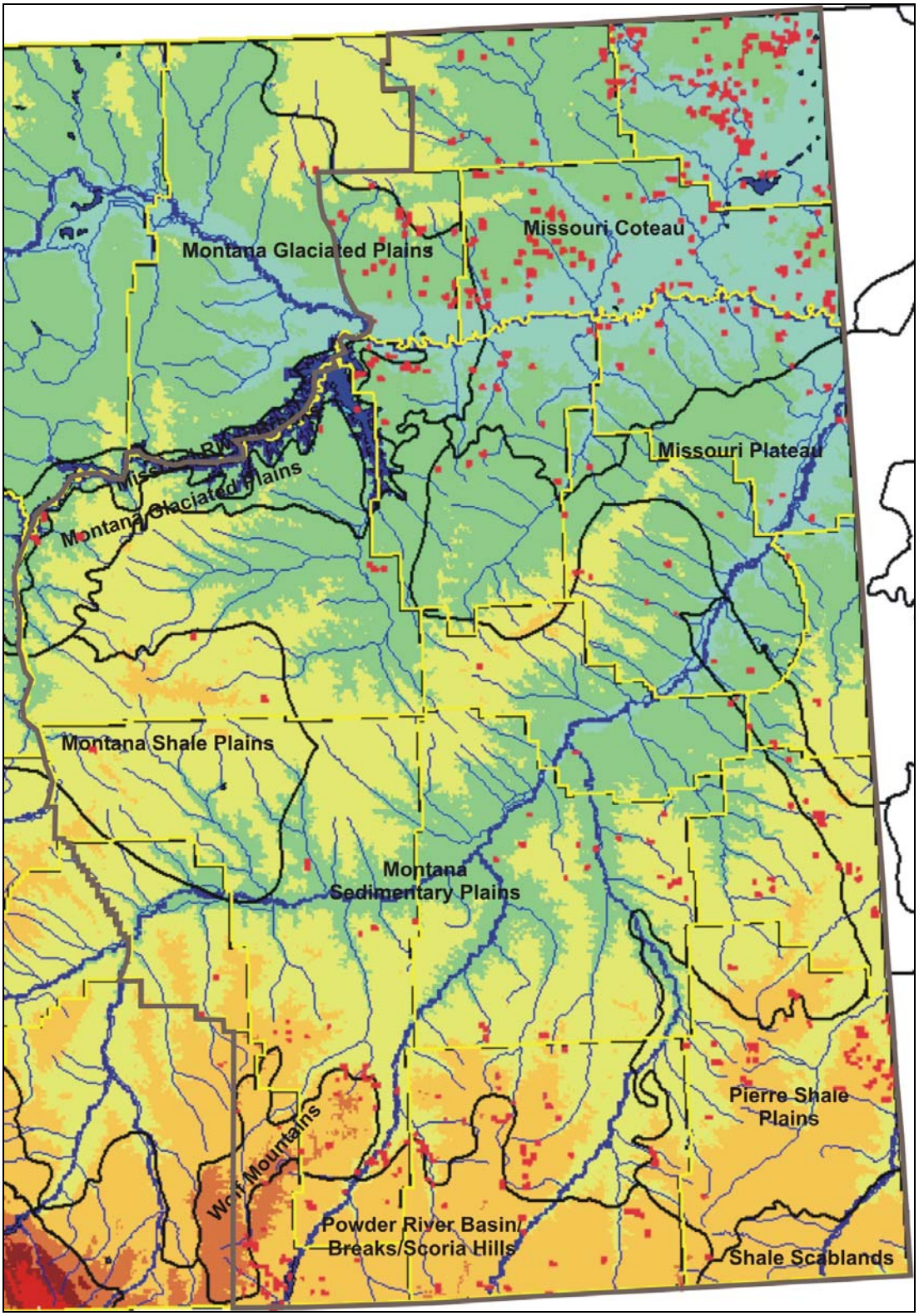

Figure 61: Sections (in red) containing stone circle sites overlaid on drainage, ecological sub-sections, color relief, and county map.

rings exceed 6 meters in diameter and the overall average diameter is about 5.1 meters. However, the Miles City sample also indicates that the frequency of rings with diameters exceeding 6 meters is greater in the southern zone (17.5% of rings >6m) than in the northern zone (6.3% of rings >6m). This statistic tends to contradict Deaver and Peterson findings wherein the average diameter increases in sites of large size (i.e. greater numbers of rings). In the Miles City sample, site size decreases in the southern zone where the frequency of rings over 6 meters in diameter also increases.

Table 25. Distribution of tipi ring sites with individual tipi ring frequencies and average rings per site in the three zones of the project area.

*Total Tipi Ring Sites in Sample: 445

**Total Tipi Rings from 430 (15 sites had no feature descriptions/numbers) selected sites : 2,717

Tipi Ring Site Details:	North Zone	VL	DN	RV	SH	Cent. Zone	GF	MC	RL	DW	PE	WX	South Zone	TE	RB	CR	FA	PR	CT	BH
Tipi Ring Sites	**191**	20	12	87	72	**57**	7	25	13	5	3	4	**197**	1	37	23	26	38	39	33
Tipi Rings (total)	**1,895**	87	110	687	1011	**216**	34	91	58	13	4	16	**606**	4	99	74	108	105	152	163
Tipi Rings (average) per Site	**9.92**	4.35	9.16	7.89	14.04	**3.78**	4.85	3.64	4.46	2.6	1.3	4	**3.07**	4	2.67	3.21	4.15	2.76	3.89	4.93
Tipi Rings (median)	**2.25**	2	2	2.5	6	**2**	2	2	2	3.5	1	2.5	**2**	4	1	1	2.5	1	2	2

Deaver and Peterson also note a general correlation of an increase in average ring diameter size with an increase in annual precipitation. However this pattern apparently breaks down when annual precipitation exceeds 14" per year. The pattern in the analyzed sample of rings from the Miles City project area also tends to contradict the Deaver and Peterson findings on precipitation and ring diameter. Figure 62 shows sections with tipi ring sites overlain on a precipitation map of the project area. Generally tipi ring sites are far more frequent in the zones that receive 14 to 16 inches per year in the southern part of the project area including Fallon County, which contained the greatest percentage (53.7% of county sample total) of rings over 6 meters in diameter.

For the BLM project area we had hoped to see a correlation in tipi ring distribution with average annual wind speeds in Montana (Figure 63). We could detect no clear pattern with the exception of the east-central part of the project area where there appears to be a slight correlation between tipi ring site distribution and areas of higher wind speed. The southern part of the project area also shows a fair concentration of tipi ring sites in the upper Tongue River valley where average annual wind speeds range from low to moderate. If anything the wind map in Figure 63 suggests an inverse relationship between areas of highest average wind speed and low frequency of tipi ring sites. Without knowing the amount of archaeological survey encompassed by each wind speed zone it is difficult to carry explanations for this correlation very far. However, it is possible that areas of highest average wind speed may not have been "tipi friendly" and native groups may not have routinely erected tipis in those areas.

Stone circles are assumed to occur because weight was necessary to hold lodge covers down during wind and other inclement weather. Presumably this objective was more important than what was used (i.e. the weight resource) to reach the objective. It is thus possible that resources other than stone were used to hold lodge covers down (e.g. wood). From the perspective of energy modeling proximity of any resource that would facilitate weighting of the lodge cover would have been more important than preference for a particular, and possibly more distant, weighting resource. Wood tent pegs or fire wood piles may have been lodge cover weighting or stabilizing alternatives for prehistoric people if those resources were more common in particular areas. We overlaid sections with tipi ring sites on a vegetation map showing the distribution of Ponderosa pine land cover type (Figure 64). Obviously pine cover is heaviest in the southern part of the project area, which also contains relatively high frequencies of tipi rings. Although a pattern is not extremely clear it does appear that stone circle sites in the southern part of the project area tend to occur in settings away from dense pine cover in valley or basin settings (Figures 61 and 64).

Stone circle frequency drops in central portions of the project area along with frequency of Ponderosa pine cover. If the hypothesis that states stone circle frequency will rise in areas of less forest cover then why is there a discrepancy in the central area (issues of survey coverage aside)? It is certainly possible that shrubs, deciduous trees, and Rocky Mountain juniper cover in central unglaciated portions of the project area could have served the same purposes (e.g. tent pegs or wood piles) as Ponderosa pine.

It may be demonstrating the obvious but in unglaciated portions of the project area, tipi ring frequency goes up in areas of exposed bedrock (Figures 65 and 66). Erosion of bedrock in the southern portion of the project area provides stones adequate for use as lodge cover weights in a variety of settings. Although we do not have definite statistics of particular stone types used in ring sites, it does appear (from inspection of a number of CRM reports) that the use of sandstone or geothermally altered sandstone, mudstone, claystone and porcellanite is far greater in the southern part of the project area than is use of river cobbles. There are spikes in tipi ring frequency along the Cedar Creek anticline (Figure 65) where either more bedrock is exposed or where weathering has created more available “free rock” suitable for use as lodge cover weights. There is also a spike in frequency along the lower part of the Black Hills Uplift (Figure 65) where again more weathered rock is likely available. A few ring sites have been documented on the Redwater Divide north of the Yellowstone River where small cobbles are available in the Flaxville gravels.

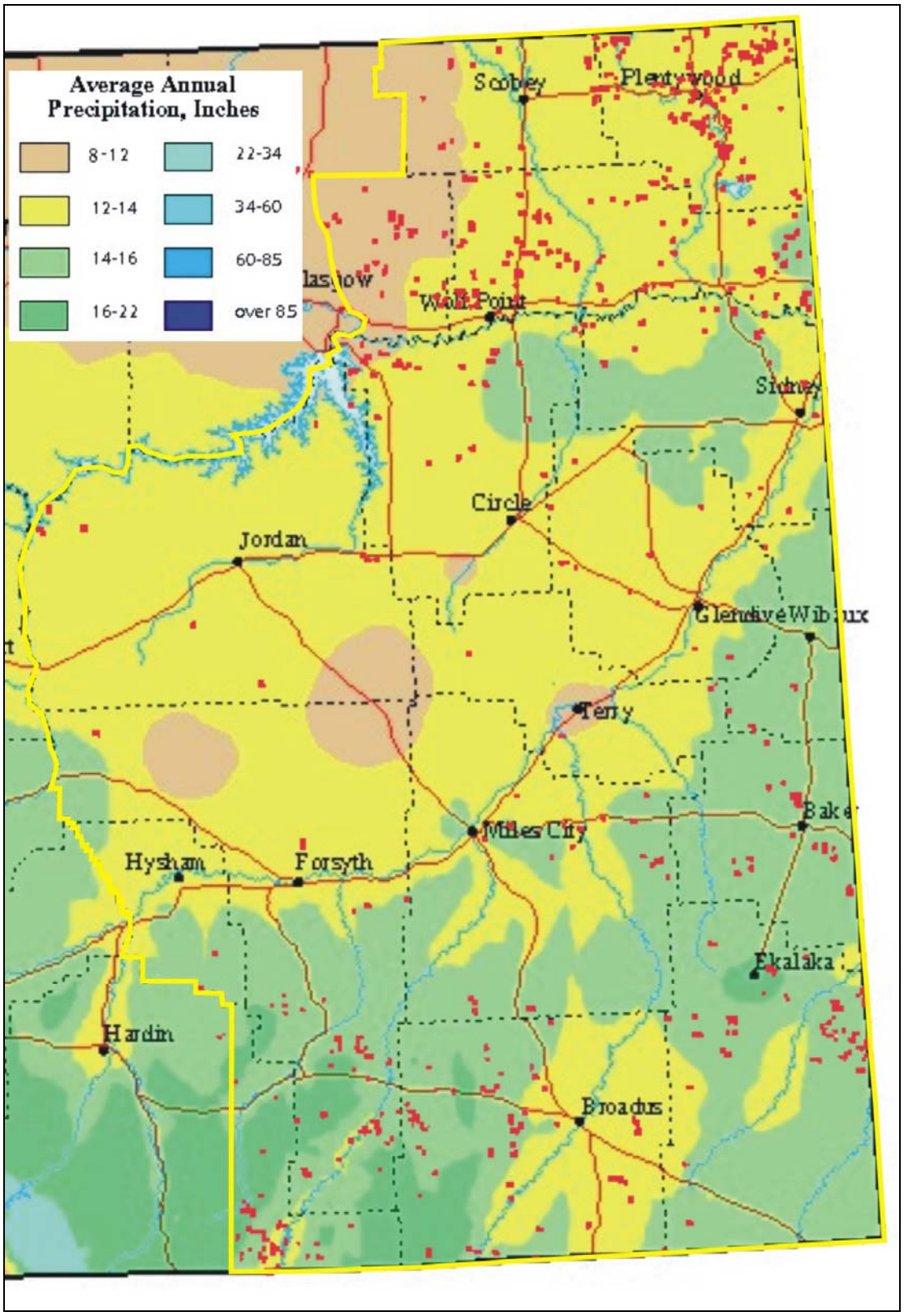

Figure 62: Sections with tipi ring sites (in red) overlain on project area precipitation map.

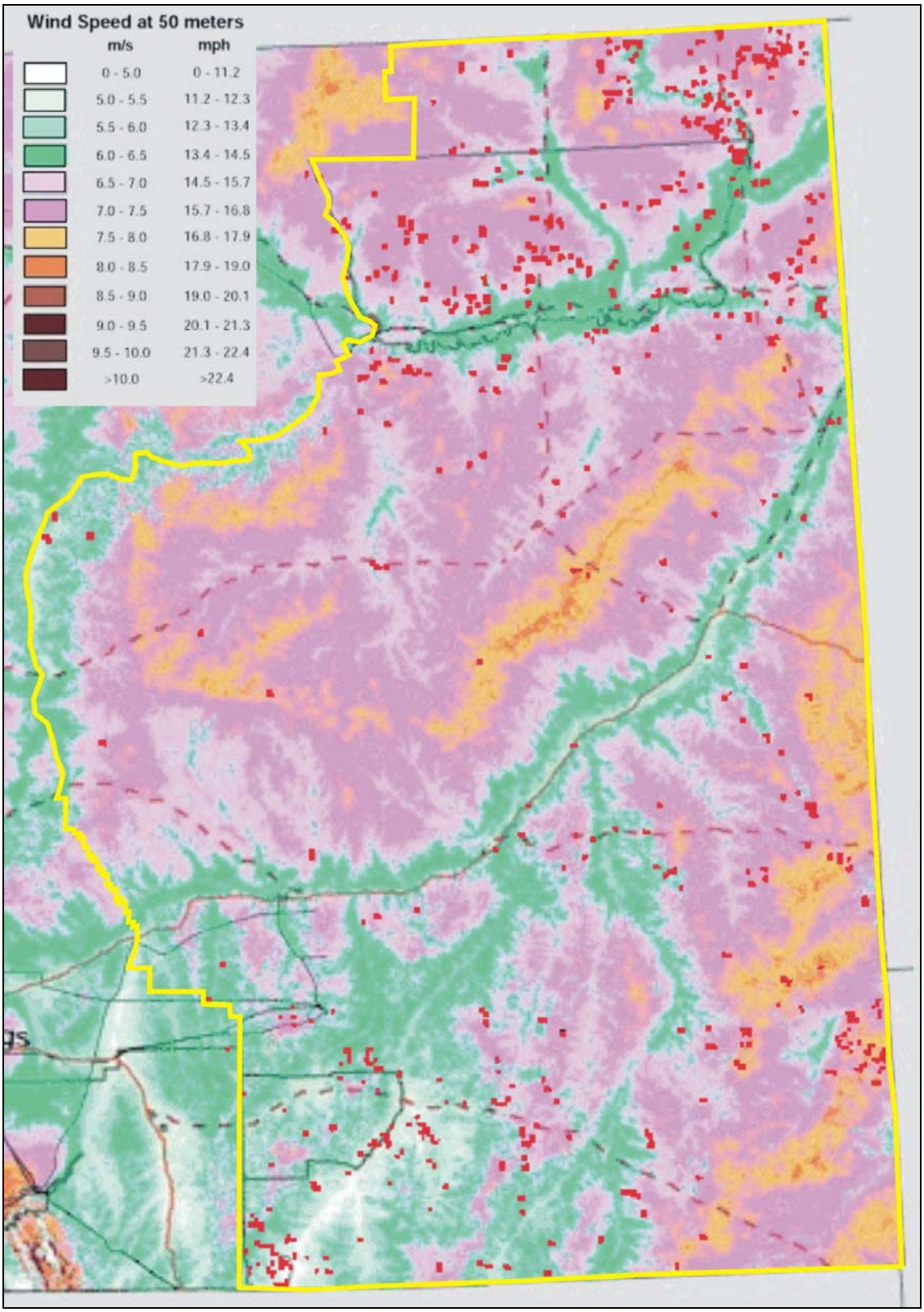

Figure 63: Sections with tipi ring sites (in red) overlain on project area annual average wind speed map.

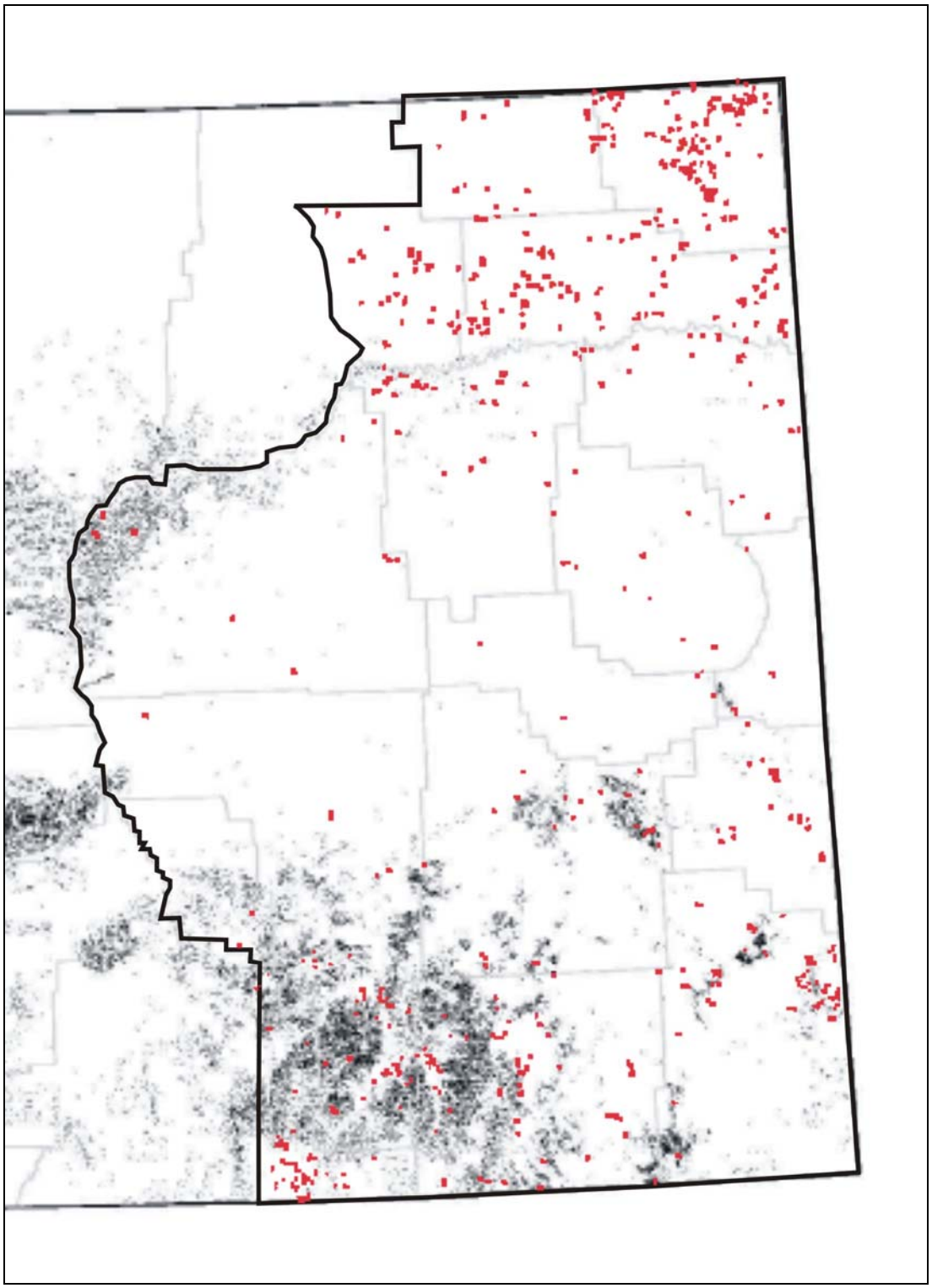

Figure 64: Project area sections (in red) containing stone circle sites overlain on Ponderosa pine land cover type (in black/grey) distributional map.

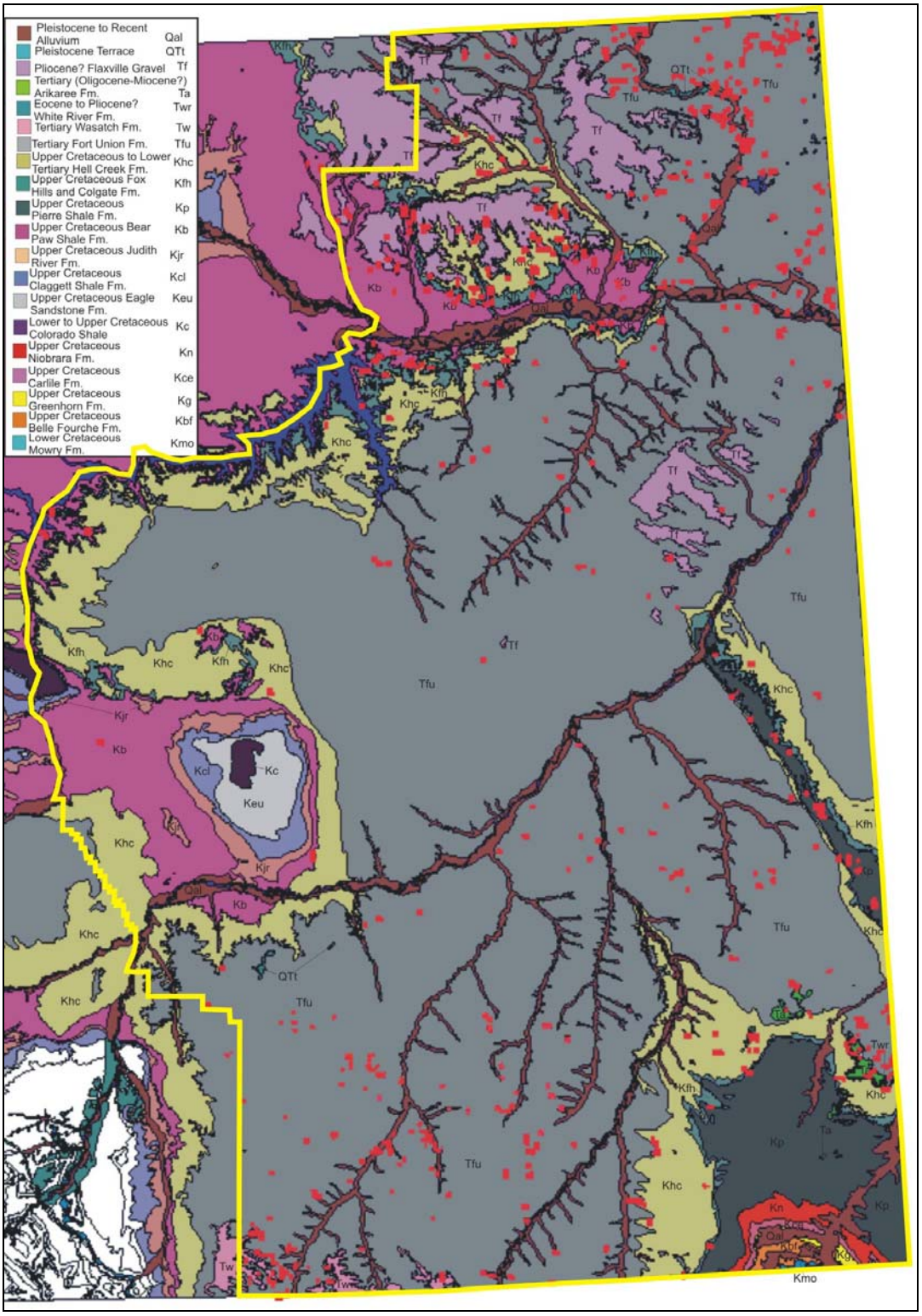

Figure 65: Project area sections (in red) containing tipi ring sites overlain on a geological map.

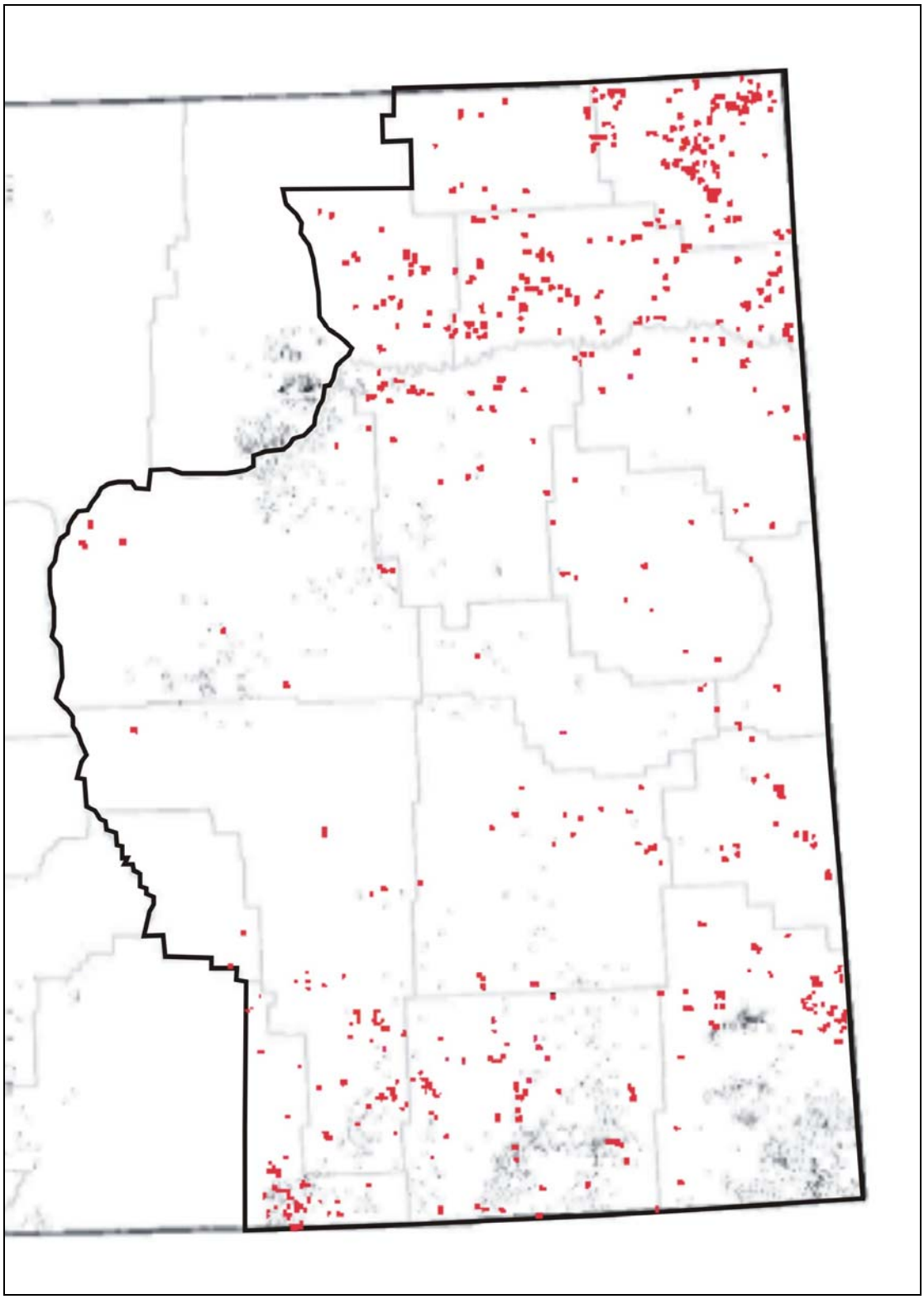

Figure 66: Project area sections (in red) containing tipi ring/stone circle sites overlain on a distributional map of rock exposures (in black/grey).

There is very strong evidence that tipi rings were in use from post-Altithermal times through the protohistoric and historic periods. Projectile points found in tipi ring sites but not within tipi rings could be interpreted to indicate use of tipis beginning in Paleoindian times (Deaver and Peterson 1999). Although much of that evidence is based on the co-occurrence of projectile points with rings there are a few radiocarbon dates that document use in the Middle Period. Dates include the earliest radiocarbon dated tipi ring (ca. 3940 B.P.) in Montana from 24BH2317 along the upper Tongue River Reservoir within the project area (Brumley and Dickerson 2000). Two stone arcs or possible partial rings were identified at two project area Big Horn County sites (24BH1048 and 24BH2521) and these rings could associate with the McKean Complex or with Late Archaic components (Munson 1992). It is probably safe to say that most archaeologists assume that the tipi was the primary domestic structure of the Plains during the Late Prehistoric, Protohistoric and Historic Periods and likely the primary domestic structure dating well back into the Middle Prehistoric Period. In our view, one of the presumptions that affects views of settlement, is that stone circle sites are the only expression of use of tipis as the primary domestic structure of Plains area prehistoric peoples. Whereas stone circles offer the opportunity of clearly identifying living spaces associated with tipis it is unlikely they define the only areas, occupations, or sites where tipis were erected. There was probably far more use of tipis in the project area than is indicated by presence of stone circles. It was probably the use of particular perishable or non-static resources for holding lodge covers down, or occupations that occurred during climatic conditions that did not require lodge weights, which lowers the threshold of visibility or documentation of greater tipi use in the project area.

Of the 934 ring sites in the project area 260 (27.8%) are listed in the state data base as having a lithic scatter component. Rock cairns and rock piles are present at 159 (17.1%) of the tipi ring sites while rock alignments are present at 22 (2.4%). Other "rock structures" occur at 8 (0.86%) of the sites while thermal features (e.g. hearths, fire pits, or heat-altered rock) are present at 21 (2.2%) tipi ring sites. Tipi rings are also found at 6 (0.7%) bison kill sites. What is listed as lithic workshop occurs at 4 (0.43%) ring sites and 2 (0.21%) tipi ring sites co-occur with Medicine Wheels. One tipi ring site is found to co-occur with each of the following site types as listed in the state data base: "Pits, Eagle Catching, Battle, etc", "Processing Area", "Surface Stone Quarry", "Trail", "Vision Quest Structure", "Petroglyph", and "Paleo Isolate". Five tipi ring sites co-occur with historic Euro-American sites.

(Simpson 2001) carried out an analysis of 232 prehistoric sites on the Fort Peck Reservation in the northern part of the project area. These sites included 162 tipi ring sites, one of which co-occurred with a bison kill. She carried out a multivariate statistical analysis of these sites. Her analysis found that 91% of sites with tipi rings lacked tools and 6% of sites without tipi rings lacked tools. Although the occurrence of faunal remains at sites is listed as only 6 occurrences, she statistically stated that 50% of sites with faunal materials also contain tipi rings. Cairns were documented at 20% of tipi ring sites but this same co-occurrence figure accounted for 52% of all instances of cairns. Lithic detritus was documented at 33% of ring sites and those co-occurrences accounted for 56% of all instances of lithic debris. She also found that 95% of tipi rings lacked fire-

cracked rock but also indicates that of all sites with fire-cracked rock 33% co-occurred with tipi ring sites. In summarizing additional statistics she noted: 61% of sites with cairns lacked lithics whereas 58% of sites with no cairns also lacked lithics; 95% of sites with cairns lacked fire-cracked rock whereas 88% of sites without cairns also lacked fire-cracked rock; 79% of sites with lithics lacked fire-cracked rock while only 17% of sites with fire-cracked rock lacked lithics.

There are some similarities between Simpson's (2001) statistics and statistics overall for tipi ring sites in the project area. She documented cairns or rock piles at 20% of sites compared to 17.1% project wide perhaps indicating a slightly greater tendency for cairns to be found with ring sites in the northern part of the project area. Instances of tipi ring association with lithic debris are similar between the Fort Peck Reservation sample (33%) and the project area (27.8%). Fire-cracked rock and hearths were found in 5% of the Fort Peck sample compared to 2.2% of all project area ring sites. This statistic may suggest a greater frequency of fire-cracked rock in tipi ring sites of the northern area but many researchers have also commented on the difficulties of surficially identifying heat-altered rock derived from sandstone (heat-altered sandstone likely continues to weather sometimes destroying the oxidized surface and rounding heat-fractured edges), which dominates the southern part of the project area. On the other hand the oxidation and heat fracturing of glacial and river cobbles (often formed of more resistant quartzite and other igneous rock) is more easily observed particularly on the site surface.

One statistic from the Fort Peck sample is troubling in the broader context of tipi ring documentation and interpretation by many archaeologists, particularly those working on the glaciated plains of Montana. Only 9% of tipi ring sites on Fort Peck were found to have documented "tools". Presumably the term "tools" means formal patterned tools or high energy investment tools. The infrequency of such tools has been documented by many (Deaver and Deaver 1988; Deaver and Peterson 1999). The infrequency of formal patterned tools has led many researchers to assume that inferences on human behavior and activities at tipi ring sites are correspondingly limited. Others (Crofutt and Aaberg 2003a; Aaberg et. al 1999, 2003) argue that quartzite, the dominant lithic of the glaciated plains of northern Montana, does not lend itself (particularly moderate to coarse-grained orthoquartzite) to the manufacture of finely-flaked tools. Fine-grained lithic material sources are generally limited to the glacial and Flaxville gravels in the northern part of the project area. Those sources are limited in distribution and in size (generally occur as pebble-size clasts). Aaberg et al (1999, 2003) argue that size of those fine-grained lithic materials limits the size and type of tools that can be produced from them. Aaberg et al. (1999, 2003), Crofutt and Aaberg (2003a) and Deaver and Deaver (1988) also argue that some of the same activities that were executed with fine-grained highly patterned tools in areas within, or more proximal to, fine-grained material sources, were likely carried out using quartzite flake tools and quartzite core tools on the northern glaciated plains. They further argue that these quartzite tools often fall below the threshold of visibility for some researchers. Deaver and Deaver (1988) also note that use of flake tools of any lithic material type is likely a general analytical short-coming when interpreting site activities.

It would be valuable if in future tipi ring documentation, particularly in the northern part of the project area, more attention was given to analysis and description of the quartzite artifact assemblage particularly flakes and potential flake tools. Although some archaeologists feel that the reliability of cross-over immunoelectrophoresis (CIEP) is still in question, it has become a routine analytical tool in archaeological investigations as an aid in interpreting the exploitation of both animals and plants. Since few tipi ring sites ever reach the level of full excavation, it would be of value to include CIEP analysis on flake tools and core tools at the level Class III inventory. If archaeologists are to begin to fill in the observational gaps for tipi ring sites, some additional analysis must come at the Class III level of investigation. Although few doubt that the stones in most tipi rings represent lodge cover weights, it would be interesting to see if CIEP analysis could document protein residues on the ring stones themselves. This analysis could easily be accomplished at the Class III level and it could help document use of the hides of species used to obtain lodge covers. We assume bison were primarily used for hide covers but even documenting bison residues on ring stones would be valuable and it is conceivable that other species also provided hides for lodge cover use, as for instance in parts of the North American Boreal Forest where moose hide was sometimes used for lodge covers. Although heat is known to break down protein residues form both plants and animals, the Laboratory of Archaeological Science at Cal State – Bakersfield has suggested that sediment beneath hearths and or clusters of heat-altered rock could contain preserved protein residues. This analysis could also be accomplished at the Class III level assuming that clusters/features of heat-altered rock are visible on the surface.

Both the Bureau of Land Management State Office and the Montana State Historic Preservation Office have instituted minimum tipi ring recording standards and sub-surface testing standards. These standard requirements are available from both these agencies so they will not be reviewed here. Suffice it to say that they attempt to ensure that morphological and spatial patterns and relationships likely present in surficially derived attributes are recorded. They also established minimum testing and excavation standards. These standards were reached by compromise among a group of professional archaeologists brought together under the sponsorship of the Bureau of Land Management.

Spatial patterning and ring stone morphological patterning have been the most popular forms of surficial analysis over the past 20 years. Use of ring stone counts and weights have been used to infer season of occupation operating under the hypothesis that greater amounts of stone would have been distributed on the windward side of a lodge. Instrumental climatic records that record daily and monthly wind speeds have been used as proxy data for determining the most likely season of occupation. Brumley and Dicerson (2000) actually refine potential periods of occupation of individual rings to from 30 day to 90 day periods using astronomy software to determine azimuth of sunrise through various seasons. They assume that observable gaps in stone ring perimeters represent doorways, and that based on ethnographic analogy, lodge doorways always faced eastward toward the rising sun. After analysis of over 1000 tipi rings in northcentral Montana, Aaberg (1995) found that identification of doorways was subjective at best. Aaberg also indicated that there was some spatial clustering of rings

with particular morphological attributes (e.g. rings of a particular range in diameter tended to cluster, particularly very large diameter rings) and that clustering could represent contemporaneity and/or activity patterning. These types of data continue to form the bulk of surficial documentation of stone circles.

One form of modeling that has not been furthered is use of energy systems to postulate a range of movement for prehistoric people using tipis. Deaver and Deaver (1988: 44-46) presented some good data on lodge cover weights and tipi pole weights based on the diameter and circumference of tipi rings. Use of this data could be quite valuable in modeling energy expenditure and energy capture requirements for prehistoric cultural systems, particularly pre-equestrian people. This form of modeling could use extant tipi ring data based on surficial recording. Ken Deaver (1983b; 1987) and Deaver and Morter (1981; 1983) obviously had energy system constraints in mind in the bubble modeling they proposed with respect to tipi ring distribution and locational patterning based on ring site size. However as far as we know, researchers have not gone to the extent of determining how much energy expenditure would be required for a cultural group of any size to pack up and move any number of tipis along with all other furnishings, equipment, and so forth. Such modeling would need to account for all aspects of energy expenditure based on all elements of the cultural system (i.e. humans and domestic dogs and the environment within which they interact). Rates of energy expenditure (i.e. calories burned) could be determined for various human and dog tasks including walking and heavy transport of lodge elements (or without lodges for that matter). Rates of energy acquisition (i.e. caloric intake) necessary to maintain mobility could also be determined. Aaberg (1989 *in* Davis 1989) used elements of ethnoarchaeological modeling from the Boreal Forest along with elements of optimal foraging theory to develop a hypothesis that suggests mobility of foot nomads on the northcentral Montana plains was restricted during cold weather. Essentially he suggests that the currency of energy exchange in that setting was extremely cold temperatures during which energy requirements for mobility were driven up considerably. He goes on to suggest that during times of extended cold weather (i.e. winter season) prehistoric groups may have focused occupation in more protected, resource-varied, environments with game species that were more static than bison. Energy modeling would have to take into consideration movement during all seasons. Perhaps such modeling could assist in determining seasonal settlement and/or subsistence cycles that are apparent in tipi ring locational patterning. One value of such modeling is that it could be accomplished used the substantial existing body of tipi ring data.

What we have presented above has not been formulated into testable hypotheses but is presented as ideas from which researchers can extract, construct, and test more specific hypotheses. Deaver and Peterson (1999) address some of the same issues with respect to future tipi ring research and state (1999: 7-3 – 7-4):

> "In addition to specific research questions at individual sites, aggregate studies of all feature sites in concise regions are also likely to produce valuable contextual data. If future site recording is done more consistently and completely, it will be possible to examine site placement and size in

relation to a number of environmental variables. This will permit investigation of settlement and subsistence strategies for local areas which may approximate the activities and movements of specific prehistoric groups".

Cairns and Rockpiles

This site type includes piles of rock that can range in size from a few stones to larger cairns up to 3 meters in diameter. The function of cairns and rockpiles in Montana has not been clearly demonstrated. Deaver and Peterson (1999: 4-29 – 4-42) note that larger cairns may associate with ceremonial or other important functions such as burials, commemoration of people and/or events, or trail marking. Functions of smaller cairns are even less clear although clusters of some are thought to possibly represent effigies, the form of which is not always easily discerned. Bone fragments found in some cairns is thought to indicate use as a dumping station or discard pile but this is more of a subjective argument than one based on hard evidence. Although cairn tests and excavations in the project area are rare, Deaver and Peterson indicate that artifact yield is typically low in cairns that occur in an area adjacent and west of the BLM project area. Cairns in the northern glaciated prairies tend to have more associated artifacts, including lithic debris, tools, points, and bone, than do cairns in central and southern Montana (Deaver and Peterson 1999: 4-42). In fact, testing or excavation of 7 cairns the central and southern portion of the Express Pipeline project failed to yield any cultural material at all (Deaver and Peterson 1999: 4-43). They also note that the frequency of cairn sites is highest in the northern glaciated prairie and decreases toward the south.

Although we do not have statistics for the actual number of cairns in the Miles City project area, the frequency of sites with cairns is considerably higher in the southern third (Missouri Coteau and Montana Glaciated Plains ecological sub-sections) and lowest in the central portion (Figure 52). Sites containing cairns within the project area occur in all 17 counties and number 580, occurring at 8.2% of the total prehistoric sites. The highest frequency of sites with cairns or rockpiles (n=321/55.3%) is in the seven southern counties (Bighorn n=59/10.2%, Treasure n=2/0.3%, Rosebud n=74/12.8%, Custer n=21/3.6%, Powder River n=77/13.3%, Fallon n=21/3.6%, and Carter n=67/11.6%). The four northern counties contain 189 (32.6%) sites with cairns (Daniels County n=16/2.7%, Valley n=13/2.2%, Roosevelt n=71/12.2%, and Sheridan n=89/15.3%). The central counties contain 70 (12.1%) sites with cairns or rockpiles (Garfield n=10/1.7%, McCone n=18/3.1%, Prairie n=4/0.7%, Dawson n=11/1.9%, Richland n=26/4.5%, and Wibaux n=1/0.2%). It is likely a result of amount of surface survey that accounts for a project area pattern that appears to be in contradiction to greater frequency of cairn sites in northern glaciated prairies and lower frequencies in southern areas as noted by Deaver and Peterson.

Of the 580 sites with cairn or rockpiles recorded within the project area 149 (25.7%) are associated with tipi ring sites (occur within site boundaries). Additional prehistoric site types associated with rock cairns or rock piles include 2 (0.3%) "Ambush Game Drives", 1 (0.2%) buffalo jump, 1 human burial, 1 "Circular Wall" feature, and 7 (1.2%) "JJ" sites (JJ sites are restricted access sites found on the 2 American Indian

reservations in the project area and these cairn types are most likely burials). Cairns or rockpiles are also associated with 126 (21.7%) lithic scatters, 1 medicine wheel, 1 petroglyph site, 26 (4.5%) rock alignments, 3 (0.5%) "Rock Structures", 3 surface stone quarries, 1 sweat lodge, 1 vision quest structure, and 1 lithic workshop. The state data base lists 286 (49.3%) sites that consist entirely of cairns or rockpiles with no other associated components or cultural material based on the use of "null" as Site Type 2. Seven historic sites also have associated cairns or rockpiles and 1 "other" site type co-association. These statistics include some multi-type sites (e.g. historic/prehistoric, stone quarry/lithic scatter) so frequency numbers and percentages will be higher than the actual total cairn site occurrence.

Figure 67 shows all instances of sites containing cairns overlain on a distributional map of tipi ring sites. Cairn instances are shown in transparent pink, rockpiles in transparent blue, and sites with cairns and rockpiles in transparent green. The state data base distinguishes between cairns and rockpiles although it is not clear what this distinction is. A sample of site forms with cairns and rockpiles was inspected and it appears that there is a tendency to define rockpiles as smaller and less distinct than cairns. However, this seems to be a very subjective observation. Generally Figure 67 shows the strong co-occurrence of tipi rings and cairns and also tends to indicate that a majority of non-ring cairn sites occur in the general proximity of ring sites. It also tends to show that isolated cairns, sometimes with lithic scatters occur in higher elevation settings or on bluffs bordering drainages.

Rock Alignments and Mass Kill Sites

Rock alignments are generally linear straight to curving arrangements of piled stone and are of various lengths. Some alignments are known to associate with mass communal animal kills and are referred to as drive lines, believed to have been used to guide animals toward the kill site. Drive lines associated with bison kills can be quite long, if discontinuous, and have been documented in segments over 5 miles from the kill site (Reeves 1978). It is conceivable that some segmented drive lines associating with a distant kill site occur in the project area, as some linear alignments have been found with no obvious associated features or bison bone deposits. The function of other shorter linear alignments is not clear.

Within the project area 105 sites (1.5% of all project sites) with rock alignments have been documented on the state data base (we added 1 more since an alignment is associated with the Kobold kill site). Of the 105 alignments 22 are associated with tipi ring sites, 17 are associated with lithic scatters, and 26 have associated cairns. Additional prehistoric site components associated with rock alignments include 1 "Ambush Game Drive", 1 combination prehistoric/historic site, 1 "Lookout", 1 "Medicine Wheel", 2 kill sites, 1 "Rock Pile" site, 4 "Rock Structure" sites, and 1 vision quest structure. Thirty (n=30/28.8%) rock alignments are not associated with any other site component.

It is interesting that the state data base does not include alignment associations with more purported kill sites. Figure 68 shows all kill sites (n=77) and all alignments overlain on a drainage basin and stream course map. Some kill

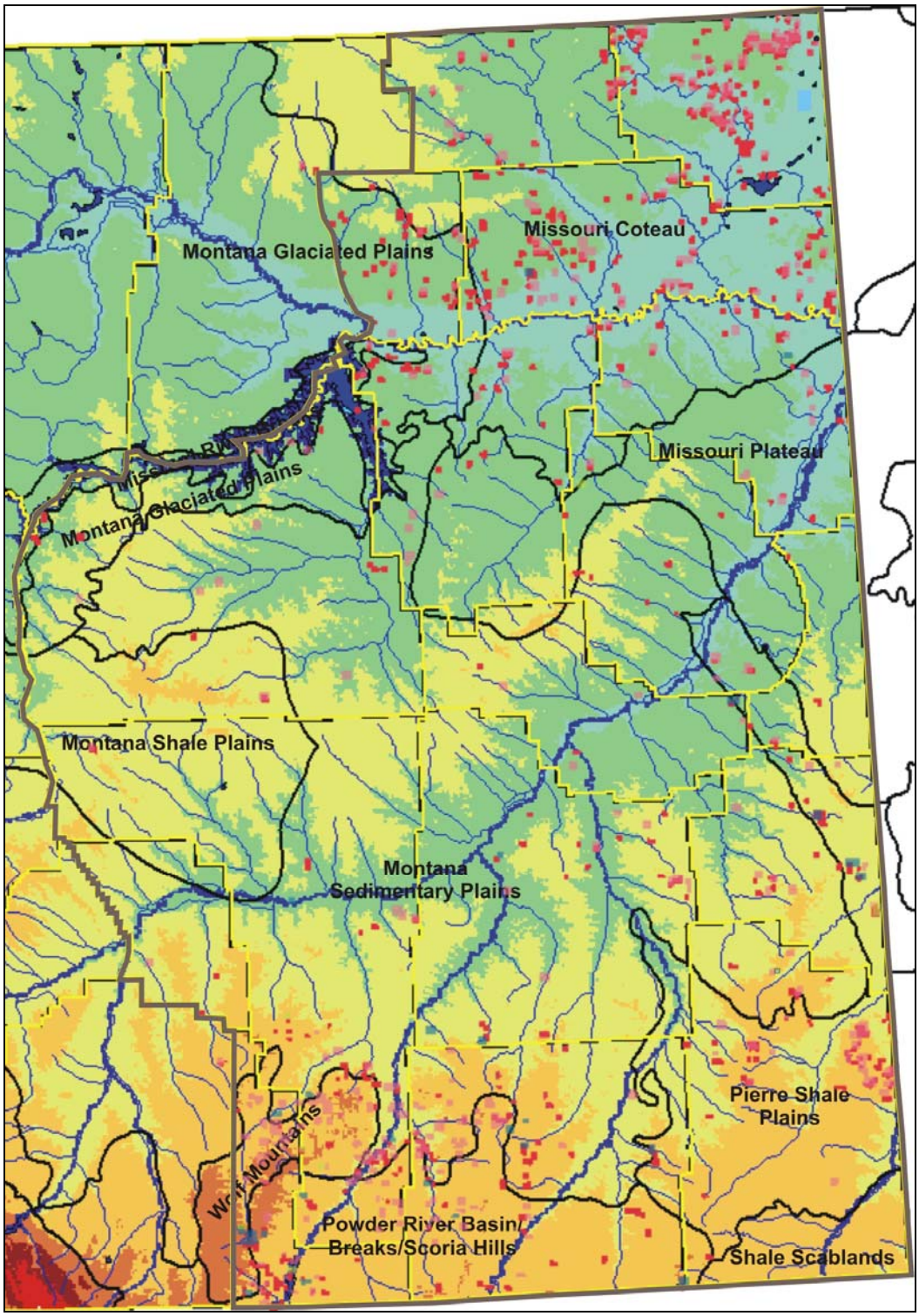

Figure 67: Sections with sites containing cairns (transparent pink), rockpiles (transparent blue) and both cairns and rockpiles (transparent green) overlain on color relief map showing drainages, ecological sub-sections, and sections containing tipi ring sites (red).

sites that have received more intensive study are also shown on the map. This graphic shows 7 kill sites and alignments that are either in the same section or in adjacent sections. It also shows that some alignments, although at times some distance from kill sites, could be associated with segmented drive lines that may have been used in a sequenced plan for moving bison or other big game animals some distance toward a kill location. In the central part of the project area fewer alignments have been identified and kill sites appear to have fewer associated alignments. This of course ignores surface survey variability and intensity, and the possibility that alignments were destroyed by cultivation. Since we did not discriminate rock alignments based on site form descriptions some of these features may not represent what could be construed as drive lines. The distribution of rock alignments with respect to known kill sites deserves more attention (e.g. distance analyses, morphological analysis, environmental variables, communal killing modeling) and could be a direction for future research.

Only Prairie, Treasure and Wibaux Counties do not have rock alignments recorded on the state data base. Frequencies in other counties include Bighorn (7/6.7%), Custer (2/1.9%), Carter (17/16.3%), Daniels (3/2.9%), Dawson (2/1.9%), Fallon (3/2.9%), Garfield (3/2.9%), McCone (5/4.8%), Powder River (14/13.5%), Rosebud (14/13.5%), Richland (9/8.7%), Roosevelt (14/13.5%), Sheridan (7/6.7%), and Valley (4/3.8%). The southern seven counties (Bighorn, Treasure, Rosebud, Custer, Powder River, Fallon, and Carter) have a combined total of 57 alignments (54.8% of all alignments). The four northern counties (Daniels, Valley, Roosevelt, and Sheridan have a combined total of 28 alignments (26.9% of all alignments). The six central counties (Garfield, McCone, Prairie, Dawson, Richland, and Wibaux) have a combined total of 19 alignments (18.3% of all alignments). The distribution of kill sites by county includes Bighorn (10/12.9%), Custer (7/0.9%), Carter (5/6.5%) Dawson (3/3.9%), Garfield (5/6.5%), McCone (5/6.5%), Prairie (2/2.6%), Powder River (13/16.9%), Rosebud (15/19.5%), Richland (4/5.2%), Roosevelt (2/2.6%), Sheridan (5/6.5%), and Valley (1/1.3%).

The southern seven counties (Bighorn, Treasure, Rosebud, Custer, Powder River, Fallon, and Carter have a combined total of 50 recorded kill sites accounting for 64.9% (compared to 54.8% of all alignments) of all such sites within the project area. The six central counties (Garfield, McCone, Prairie, Dawson, Richland, and Wibaux) have a combined total of 19 kill sites accounting for 24.7% (compared to 18.3% of all alignments) of all such sites within the project area. The four northern counties (Daniels, Valley, Roosevelt, and Sheridan) have a combined total of 8 kill sites accounting for 10.4% (compared to 26.9% of all alignments) of such sites within the project area. Thus although the southern part of the project area contains the greatest frequency of both alignments and kill sites the northern part of the project area has a higher frequency of alignments and lower frequency of kill sites than does the central part of the project area.

We included sites described in the state data base as processing sites in Figure 68 (below). The term processing site seems a bit ambiguous as used in the data base. Some site forms describe bison bone in quantities sufficient enough to allow for an interpretation of a processing area. In fact 5 of the processing components are associated

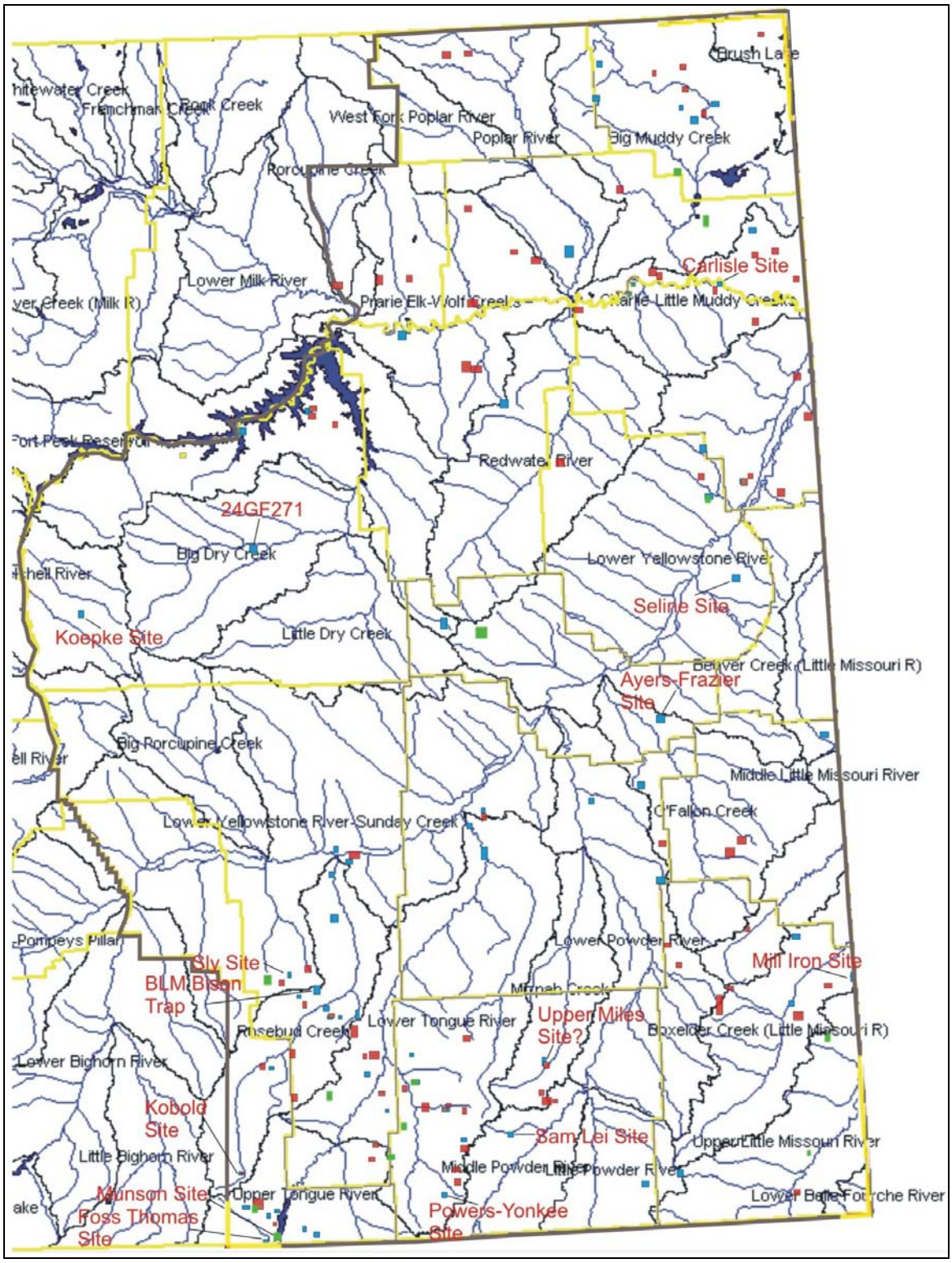

Figure 68: Sections with kill sites (blue), rock alignments (red) and processing sites (green) overlain on drainage and drainage basin map of the project area with some prominent, more intensively investigated kill sites.

with site types described as buffalo jumps on the data base. Other forms indicate a mixture of bone elements and fragments, sometimes in small numbers, that seem to represent less intense activity patterning. Twenty (n=20) sites in the data base have a processing component they occur in Bighorn (2), Carter (2), Dawson (1), Fallon (1), McCone (1), Prairie (1), Powder River (3), Rosebud (5), Richland (2), Roosevelt (1), and Sheridan (1) counties. A strong association between processing areas and kill sites and/or alignments is not discernible other than for the 5 documented kill site associations.

The problem with interpreting these statistics relates to the variability in survey coverage and the assumption that site densities are similar. However, it is possible that the greater frequency of alignments in the northern area may associate with the rolling to flat glaciated terrain of the area, which lends itself to sequential game driving wherein more distant alignments could associate with a kill site or sites. The central part of the project area is more broken where it is conceivably more difficult to assemble a sequential drive line system that would be interrupted by many drainages and breaks. It seems logical that envisioning and planning a communal kill in the southern portion of the project area and in parts of the central portions with their numerous topographic breaks (sometimes with considerable relief) would require consideration of a number of environmental variables and animal behavioral variables quite different from the more topographically homogeneous terrain of the glaciated prairie north of the Missouri River.

The tested, excavated or radiocarbon dated kill sites shown in red print in Figure 68 include 6 Late Prehistoric Period sites (Sam Lei, BLM Bison Trap, Sly, Foss Thomas, Munson, and 24GF271). Recently Late Period dates were returned from the Twitchell Site (24MC70) in McCone County (Doug Melton, personal communication). Also shown are 6 Middle Prehistoric Period sites (Powers-Yonkee, Seline, Koepke, Kobold, Ayers-Frazier, and Upper Miles) and 1 Paleoindian site (Mill Iron – presumed to represent a kill site through presence of bison processing area). Projectile points associated with these kill sites include Late Prehistoric Period side-notched forms typically associated with the Old Women's Phase (all Late Period sites), corner-notched varieties typically associated with the Pelican Lake Phase (4 sites: Seline, Koepke, Ayers-Frazier, Upper Miles) of the Middle Prehistoric Period and corner-notched and basally indented varieties typically associated with the Yonkee Phase of the Middle Prehistoric Period. The Paleoindian lanceolate points, generally with a concave base, recovered from the Mill Iron site bison processing component associate with the Goshen Complex.

Vision Quest Structures and Medicine Wheels

Vision quest sites and medicine wheel sites are considered likely associated with ceremony and religion. Archaeologists generally identify vision quest sites on the basis of stone structures. They most often are formed by piled or placed stones that form low-walled or single-tiered structures. Structures are often ovoid or u-shaped and sometimes are open to the east. Area American Indian tribes consider vision quest sites sacred and also note that among historic and contemporary tribal peoples vision quest localities were sometimes used without construction of a feature, or at least a feature that would preserved through time. Vision quest sites are often found on prominent parts of the landscape such as mountains, bluffs, hills, cliffs, rock outcrops, and buttes.

Medicine wheels are also structures that are constructed of piled and placed stones. Brumley (1986) developed a typology based on attributes of known medicine wheels. He indicates that for structures to be defined as medicine wheels they must have at least two of the following general elements: (1) a central stone cairn, (2) one or more concentric stone circles, and/or (3) two or more stone lines radiating outward from a central point. He furthered this general classificatory requirement by defining a number of medicine wheel types based on variations and combinations of the basic elements. The function of medicine wheels is not always clear except that most researchers and American Indians agree that such features are associated with ceremony and ritual. Brumley et al. (1993) indicate that among the Blackfeet some medicine wheels were constructed as memorials to prominent warriors at the time of their death. Some medicine wheels were constructed in phases over long periods of time, as in the case of the well known Bighorn medicine wheel. Others appear to have been constructed in a single event (Brumley et al. 1993). Medicine wheel ages range from around 5000 BP to historic (Brumley et al. 1993) although ages of such features in the project area have not been firmly established.

Vision quest structures occur at 17 (0.2%) of the 7065 sites in the project area. The counties in which vision quest structures occur include Bighorn (4/23.5% of vision quest sites) Carter (2/11.8%), Fallon (1/5.9%), Powder River (5/29.4%), Rosebud (4/23.5%), and Roosevelt (1/5.9%). The state data base does not show vision quest sites in Custer, Daniels, Dawson, Garfield, McCone, Prairie, Richland, Sheridan, Treasure, Valley, and Wibaux Counties. Of the 17 vision quest site components recorded within the project area, 1 is associated with a tipi ring site, 1 with a rock alignment, 1 with a rock cairn, 1 with a rock pile site, and 8 with other rock structure site components. Five (n=5) vision quest structures appear to occur without any other associated components. All but one of the 17 vision quest structures occur in the southern portion of the project area and all of them occur on elevated landforms or in prominent topographic positions (Figure 69). Some of the site forms for localities defined as containing vision quests on the state data base include descriptions of features that are unusual but are not described as vision quests on the site form. Presumably either data entry personnel made a subjective decision on entering these sites as vision quests or use was suggested or inferred in reports or associated with the site. For the purposes of analysis we included all purported vision quests as listed on the state data base although some may not be such features.

The single vision quest structure in the northern portion of the project area occurs in a setting that overlooks the Missouri River valley. It seems unlikely that the frequency of vision quest structures in the southern part of the project area and the dearth of such structures elsewhere represents a cultural pattern wherein the practice of vision-questing was restricted to groups in the southern part of the project area. It is possible that some of the many stone rings or partial rings that have been identified in the northern part of the project area could be vision quest structures. Indeed, the one vision quest site reported from Roosevelt County contains 2 cairns and an “arc”, which has obviously been interpreted as a possible vision quest structure. It is also possible that the lesser amount of survey in areas other than the southern part of the project area has not been focused in

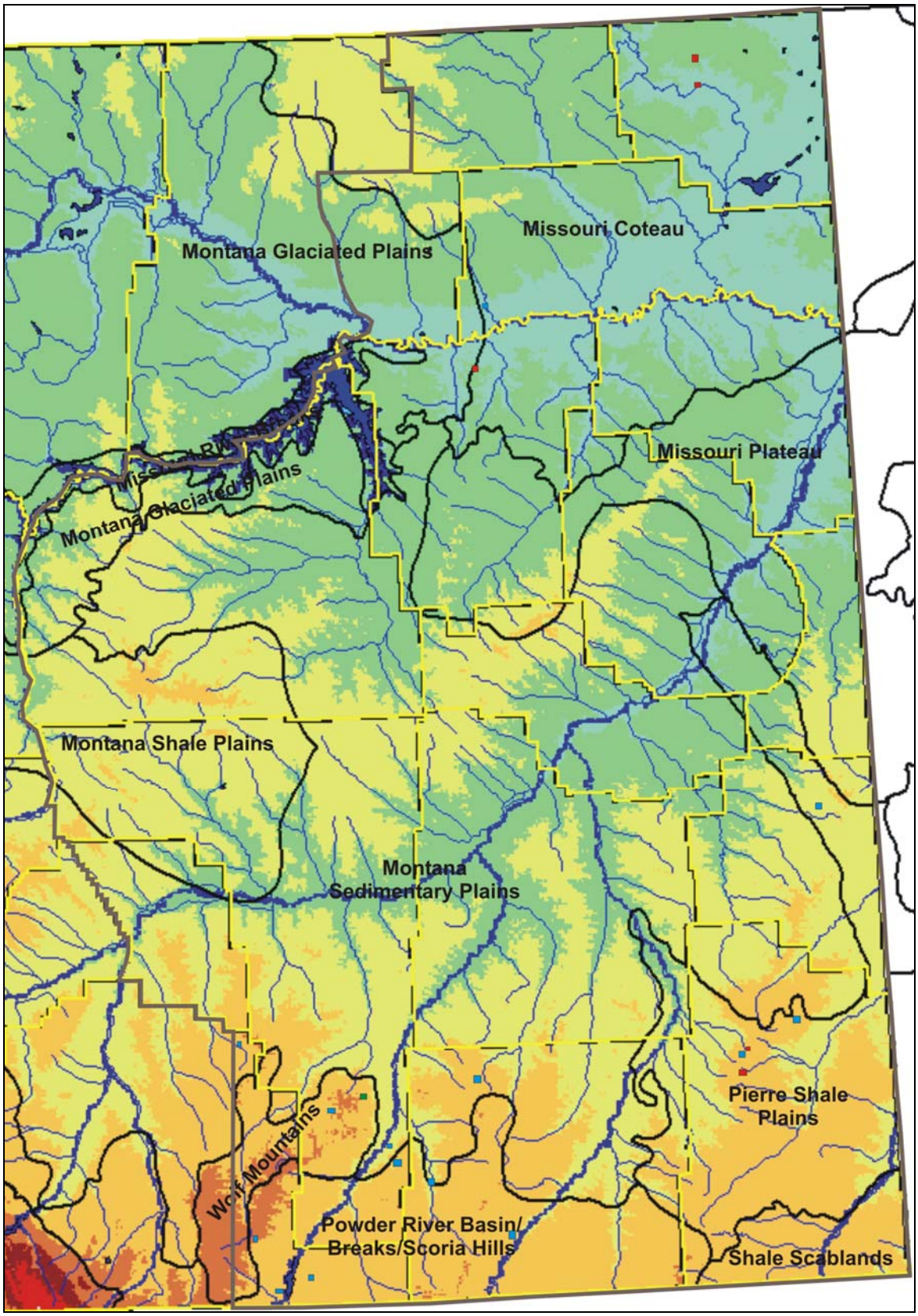

Figure 69: Sections containing vision quest sites (in blue), medicine wheels (in red), and one cairn burial (in green – not all burial sites shown because of confidentiality issues).

areas more likely to contain vision quests. Topographic landforms with greater relief and/or prominence are more common in the southern part of the project area where discernible vision quest structures are more obviously located. It is conceivable that a different land use pattern associated with vision questing exists in areas of less topographic diversity.

The 5 purported medicine wheels in the project area occur in Sheridan County (n=2), McCone County (n=1), and Carter County (n=2). The best documented medicine wheel in the project area occurs in McCone County and was described by Brumely et al. (1993). This medicine wheel had a diameter of 25.6 meters and contained a central cairn and arc and a conjoining small stone circle. Descriptions of three of the other 4 medicine wheels appear to fit the requirements for categorization of medicine wheels as described by Brumley. The remaining medicine wheel, although first described as a large circle with radiating spokes formed of cairns, is not as clearly defined as initially thought. The largest of these medicine wheels is a 14.3 meter diameter circle with a central cairn (disturbed by vandals) and 2 smaller interior cairns. Another medicine wheel is described as a 12 meter diameter circle with a 3 meter diameter interior circle. Yet another medicine wheel is described as a "large" (no diameter given) circle with "internal divisions" and a disturbed rock cairn. The fourth medicine wheel is a 20' diameter circle with radiating spokes formed of cairns (this feature is further described as unclear and may be just an "unusual pattern of stones".

Although Brumley attempted to establish standards for defining medicine wheels, it is apparent there is a considerable amount of subjectivity involved in observations and definitions of vision quest structures. It appears from site form descriptions that when some structures do not fit the perceived morphological pattern of a tipi ring they often are categorized as associating with a special purpose and/or ceremony. It seems that the departure from an "observational template" or "observational norm" for stone features, and to a lesser extent their environmental setting, leads to assumptions that such features associate with a special purpose. Association of a particular feature with vision-questing or fasting seems to be assumed by the general morphology of the feature (i.e. small in diameter – room for one person, piled or placed stone with perceived opening to the east) and location in an unusual or prominent topographic setting (e.g. hill, butte, bluff, cliff, ledge, mountain top).

It is difficult to determine when the term vision quest structure came into use as an observational and descriptive construct in archaeology. It is also difficult to ascertain what ethnographic references were first used to aide in identifying or associating structures with vision questing. Certainly Benedict (1922, 1923) documented the phenomenon of vision seeking among Plains Indians but information on specific structures was generally lacking. One of the earliest references to a vision quest related structure in the Montana area comes from Lowie (1935: 239-240) who indicates that the Crow Indians "followed a well-established norm" when seeking supernatural aid in the form of a vision quest or revelation. He goes on to state that a Crow seeking a revelation would "set out for a lonely mountain peak" to "fast, thirst and wail". The vision seeker would "cover himself with a buffalo robe…..as he lay on his back facing the east, his

resting place being framed by rocks". Later Lowie (1958) elaborated some on the vision quest among North America. While there are other ethnographic references for vision questing and fasting in North America, the Lowie description seems to be one that has affected the perception of archaeologists working in Montana on what constitutes a vision quest site. The notable elements from the Lowie description that appear to have influenced archaeological observations are: 1) selection of an appropriate prominent or isolated location (i.e. lonely mountain peak), 2) size (i.e. resting place framed by rocks), and 3) directional orientation (i.e. lay on his back facing the east).

Additional references to rock structures associated with vision seeking, fasting, and sacrifice come from the Crow Tribe and those descriptions are similar to that of Lowie's (Nabakov 1967, Medicine Crow n.d.). Fredlund (1969) suggests that emphasis on supernatural power was perhaps emphasized more among the Crow than in other Plains tribes and resulted in a more elaborate ritual or complex associated with vision-questing. It is possible that the morphological "template" for stone vision quest structures used in project area archaeology is derived from Crow vision quest descriptions, more so than from any other group. Since 16 of 17 sites recorded as vision quest sites occur in the southern part of the project area proximal to the present Crow Reservation and in areas that were historically part of Crow traditional territory, it is possible that piled or placed stone vision quest structures relate to historic Crow activities. As mentioned above, the one vision quest site in the north part of the project area consists of 2 cairns and an arc of stones and it may not actually be a vision quest site. It may be timely to assemble information from ethnographic sources that document the processes, and associated features, of vision seeking/revelation, fasting and personal sacrifice among tribes from or near the north part of the project area.

Hughes (1985 in Reeves and Kennedy 1993) reviews vision-seeking and vision quest structures on the northern Plains and demonstrates some variation in structure form based ethnographic and ethnohistoric descriptions.

In summary it appears that archaeologists generally have assumed function for features of a particular size and location based on ethnographic references and not from any data obtained from excavation. Indeed, considering that most ethnographic references emphasize that fasting and vision-seeking required the participant be denied any comforts of material culture, it is unlikely that any evidence beyond a structure would remain at a vision quest site. Archaeological excavation could possibly assist in verifying use of a structure for vision questing. Presence of stone tools, animal bone, and perhaps other artifacts typically associated with routine tasks could be used to argue against use as a vision quest structure. Vision-questing was generally a personal ceremony that required a departure from "normal" daily routines under conditions of hardship and sacrifice.

Because of the potential importance of vision quest structures and sites to contemporary American Indians, it is important to determine if in fact a feature is such a structure. Once a feature or site is associated (whether by assumption or hard evidence) with ceremony or religion, its potential importance to American Indians can be assumed.

Laws like the American Indian Religious Freedom Act (AIRFA) and the Native American Graves Protection and Repatriation Act (NAGPRA) make it unlikely that archaeological investigation beyond surficial observations will occur once religious function has been attached to a site or structure. From the perspective of cultural resource protection and conservation, proven function of a potential religious/ceremonial site is not as important as preserving a site that is perceived as significant to American Indian groups. From the perspective of archaeology, there will always be an "evidentiary" gap in the record of a class of sites whose function is assumed and not demonstrated.

Eagle Catching Pits/Traps, Battle Pits, Other Pits, Fortifications, and Ambush Game Drives

For purposes of this discussion a number of sites have been grouped together. Generally these site types are derived from subjective observations and assumptions of function based on feature form as observed on the surface as well as topographic setting. Ethnographic and ethnohistoric references form the basis of inferred function of these site types although particular sources are often not cited in reports or site forms where such functions are presented. In some instances American Indian oral histories can be related directly to locations where battles occurred and where rock structures believed to represent fortifications are also found. Descriptions of eagle catching techniques are also recorded in ethnographies and ethnohistoric documents and these descriptions are often used to infer function of some features based on form and location.

Eleven (n=11) sites, or 0.2% of all project area sites, contain features described as eagle catching traps or pits or possible eagle catching traps or pits. Descriptions of these features include unlined depressions, stone-lined depressions, stone-rimmed depressions, and stacked-stone ovals. Nearly all of these sites occur on landforms that rise well above the surrounding landscape. Counties (Figure 55) where eagle catching features have been recorded include Bighorn (n=2/18.2%), Carter (n=1/9.1%), Dawson (n=1/9.1%), Garfield (n=1/9.1%), Powder River (n=1/9.1%), Rosebud (n=2/18.2%), Richland (n=1/9.1%), Roosevelt (n=1/9.1%), and Sheridan (n=1/9.1%). Counties with no recorded eagle trapping features include Custer, Daniels, Fallon, McCone, Prairie, Treasure, Valley (project area portion), and Wibaux.

Five (n=5) sites contain features described as fortifications or possible fortifications (Figure 70). Descriptions include piled or stacked rock circles or semi-circles, horseshoe-shaped rock slab structures, piled slab rock incorporated with natural bedrock exposures, and/or natural exposures. One site is strongly associated with a battle between Sitting Bull's Hunkpapa Sioux group and the Crow. These sites all occur on prominent landforms. Three sites occur in Bighorn County and one in Garfield County. A fifth historic fortification site is associated with Fort Howes in Powder River County.

Nine (n=9) sites have components that are described as ambush game drives in the state data base (Figure 70). This classification seems extremely arbitrary and extremely subjective. Included in the sites with this component are several for which site forms do not mention anything about game drives or ambush game drives. Some sites on

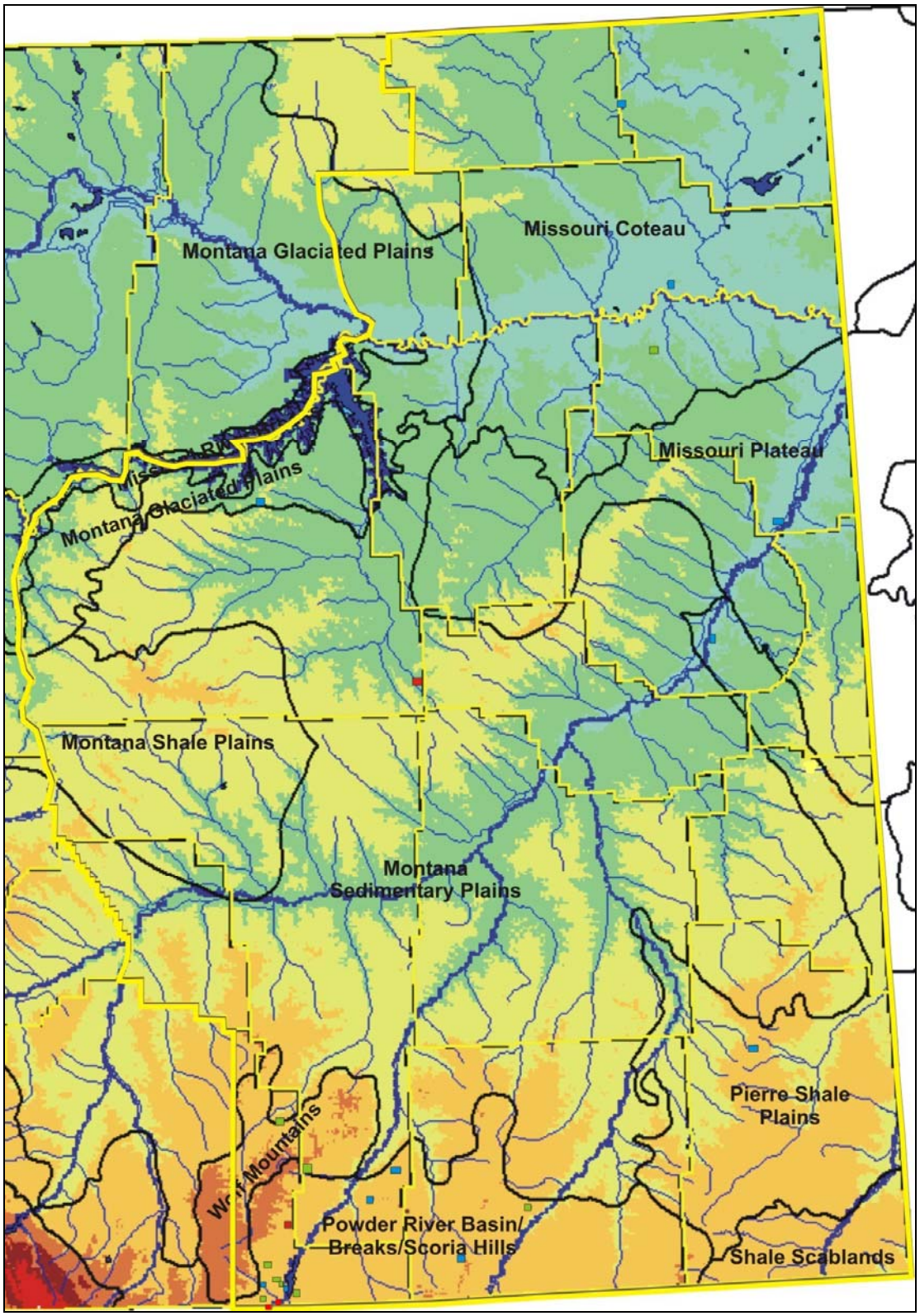

Figure 70: Sections containing eagle catching features (in blue), fortification features (in red) and ambush game drive components or features (in green).

the data base are described as lithic scatters that occur on knolls or hills in site forms. It is not clear if there have been data entry errors on the state data base or if a technician made a subjective judgment on function based on where the site occurs (e.g. hillock, knoll). Some of the sites included in this type have alignments or arrangements of cairns and one form mentions that natural sandstone blocks may have served the purpose of a game blind. Areas below or near two alignments in this category were tested with negative results. As mentioned in the section on rock alignments, some drive line systems are known to occur miles from the kill site. Absence of bone deposits near an alignment does not necessarily preclude association of that alignment with a more distant kill site. Counties containing sites with ambush game drive components include Bighorn (n=6), Richland (n=1), and Rosebud (n=1). Even though we suspect some of these sites may be data entry errors, we did not exclude them from this discussion.

Lithic Procurement Sites (bedrock and surface)

The state antiquities data base classifies lithic procurement sites under the site type headings of bedrock or surface quarry. Of the 7065 sites in the project area 261 (3.7%) have lithic procurement components (Figures 71 - 73). From an examination of most site forms it appears that lithic procurement sites have been classified as bedrock quarries if bedrock exposures are described in a site form, even if there is no mention of evidence of direct use of the bedrock exposures. It also appears that surface quarries are defined by areas where bedrock exposures are not apparent but where targeted lithic material occurs as “free rock” in cobble, nodular, or pebble form.

Counties with sites recorded as containing a lithic procurement component include Bighorn (n=53/20.3%), Custer (n=36/13.8%), Carter (n=8/3.1%), Dawson (n=5/1.9%), Fallon (n=2/0.8%), Garfield (n=1/0.4%), McCone (n=1/0.4%), Prairie (n=1/0.4%), Powder River (n=82/31.4%), Rosebud (n=62/23.8%), Richland (n=2/0.8%), Roosevelt (n=2/0.8%), Sheridan (n=3/1.1%), and Wibaux (n=3/1.1%). Only Daniels, Treasure and Valley counties do not have any sites described on the state data base as containing lithic procurement components.

To assume that the northern part of the project area has just 3 lithic procurement sites or components would be an error. Most lithic scatter and tipi ring sites in Daniels, Roosevelt, Sheridan and Valley counties occur on the glaciated plains and lithic material types are dominated by quartzites that are derived from glacial cobbles that are ubiquitous in glacial deposits. Presumably most of the quartzite-bearing tipi ring sites and lithic scatters in the north zone could be considered as having surface quarry components since those materials were likely obtained locally.

Porcellanite sources dominate (91.3%) procurement components in the project area. Porcellanite sources are most frequent in the southern part of the project area but some sources have been recorded in Roosevelt and Sheridan counties in the extreme northern part of the project area. Non-glacial fluvial gravels (e.g. stream gravels, bench gravels, lag gravels) containing cobbles or pebbles of porcellanite, chalcedony, agate, chert, silicified wood, Tongue River silicified sediment, and quartzite account for about 6% of the recorded procurement components. Quarry sources have been recorded for 2

localities (0.8%) in Flaxville gravels where silicified wood, porcellanite, quartzite, chalcedony, and chert were documented. It is likely that tipi ring and lithic scatter sites located in areas of the Flaxville Bench could also contain locally obtained lithic artifacts. Although just one procurement source in glacial gravels is listed in the data base, that number should be higher as discussed above. Non-volcanic glass sources are specifically noted at 3 sites (1.1%) although it is likely that more sources are present in cobble or pebble form at documented sites. Although porcellanite dominates bedrock sources of the project area, one (0.4%) chert (white to grey) bedrock source has been documented in the Long Pine Hills of Carter County. Formal quarry features are rarely mentioned in site forms but at least 6 porcellanite sources are suggested as containing pits or depressions.

Geologic patterns apparent in the distribution of quarries indicate that porcellanite sources dominate throughout the project area as does the Fort Union Formation wherein porcellanite originates (Figure 71). Although porcellanite sources dominate in the southern part of the project area, gravels found in stream beds, on benches, and in lag deposits in the extreme southeast corner of the area tend to have a far more varied lithic assemblage than other areas. The area of the Black Hills uplift contains recorded surface/gravel quarries that include chert, chalcedony, agate, silicified wood, quartzite, Tongue River silicified sediment and porcellanite. White and grey chert in tabular form that is "almost petrified wood-looking chert" is described from 24CT416 in the Long Pine Hills. This locality appears to rest in the White River Formation where plate chalcedony is known to occur. The "chert" at 24CT416 was observed in a bedding plane beneath a cap of coarse sandstone. These observations tend to suggest that the "chert" is actually the translucent to milky chalcedony known from the White River Formation. Presence of porcellanite, chalcedony, and silicified wood is documented in bench gravels at 24WX116 which occurs on the edge of the Cedar Creek Anticline. It is likely that erosion associated with the anticline has created fluvial and/or lag gravels that contain a relatively varied lithic assemblage. At site 24DW227 tested pebbles and flakes of porcellanite, chalcedony, chert, and silicified wood were noted in the Flaxville gravels that form part of the Redwater Divide. A Flaxville gravel source for quarry 24SH675 is reported. The geological map (Figure 72) does not show the Flaxville formation at this location but does show several remnants of a Pleistocene terrace. It is possible that a small unmapped remnant of the Flaxville occurs at this location but it is also possible that the gravels of the Pleistocene terrace remnants contain some of the same lithic material as the Flaxville, which once covered the entire region.

Documentation of lithic procurement sites suffers from the same inconsistencies and lack of standards as recording of lithic scatters. Documentation of lithic procurement localities definitely offers challenges in recording because of the generally immense quantities of associated artifacts. Size-grading and noting presence/absence and degree of cortex is often noted but flake condition (complete, broken, fragment) is not generally recorded. Sullivan and Rozen (1985) argue that flake condition is important is important in distinguishing between core-reduction and biface manufacture and late-stage tool production. At the level of initial site recording (i.e. Class III survey), the quantities of lithic debris at quarry/procurement sites make comprehensive attribute recording prohibitively costly in terms of time and effort. However, attribute recording of a

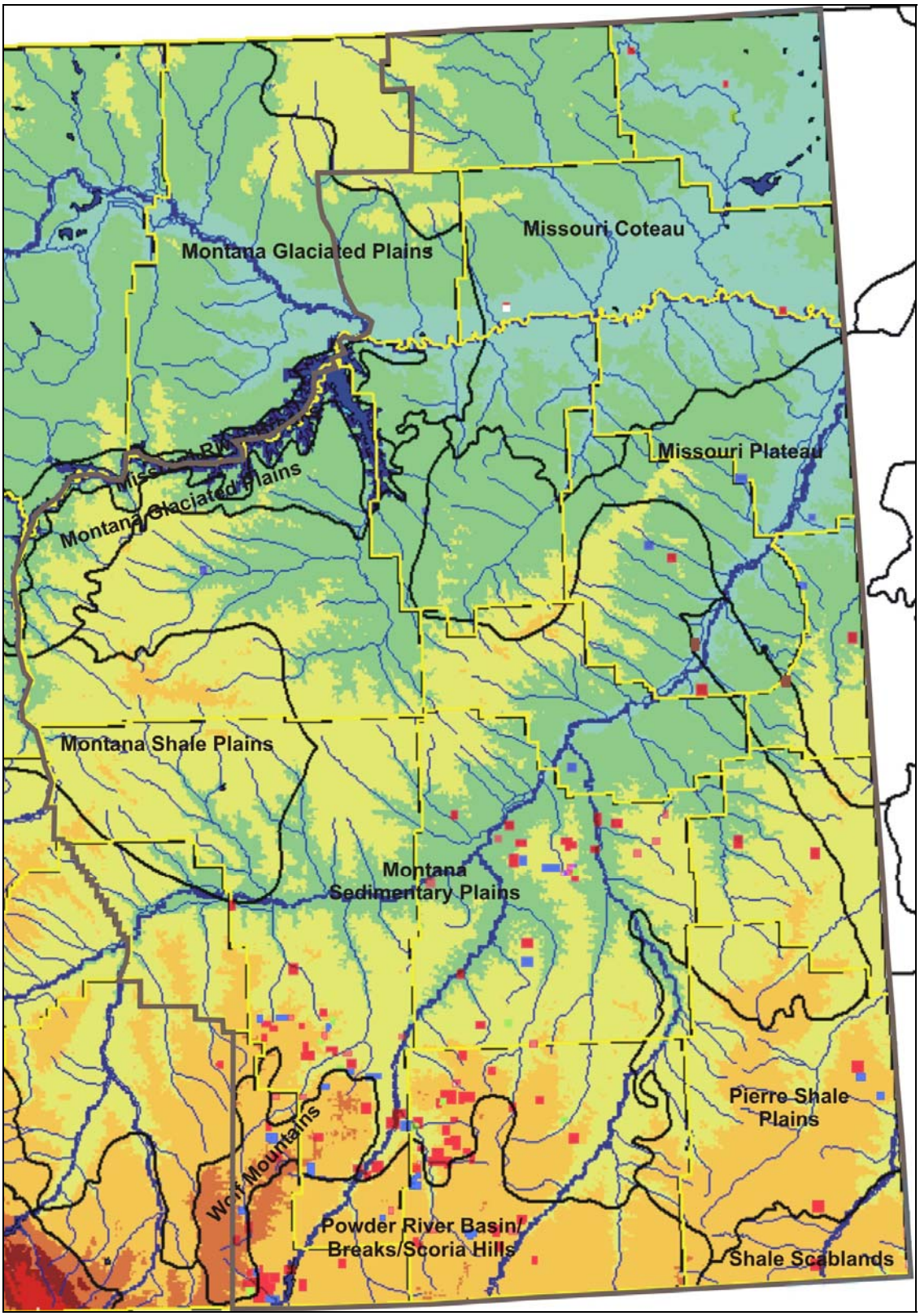

Figure 71: Sections with sites containing lithic procurement components (bedrock sources = blue, surface sources = red/pink/brown, both = green) overlain on ecological subsections, drainages, and counties.

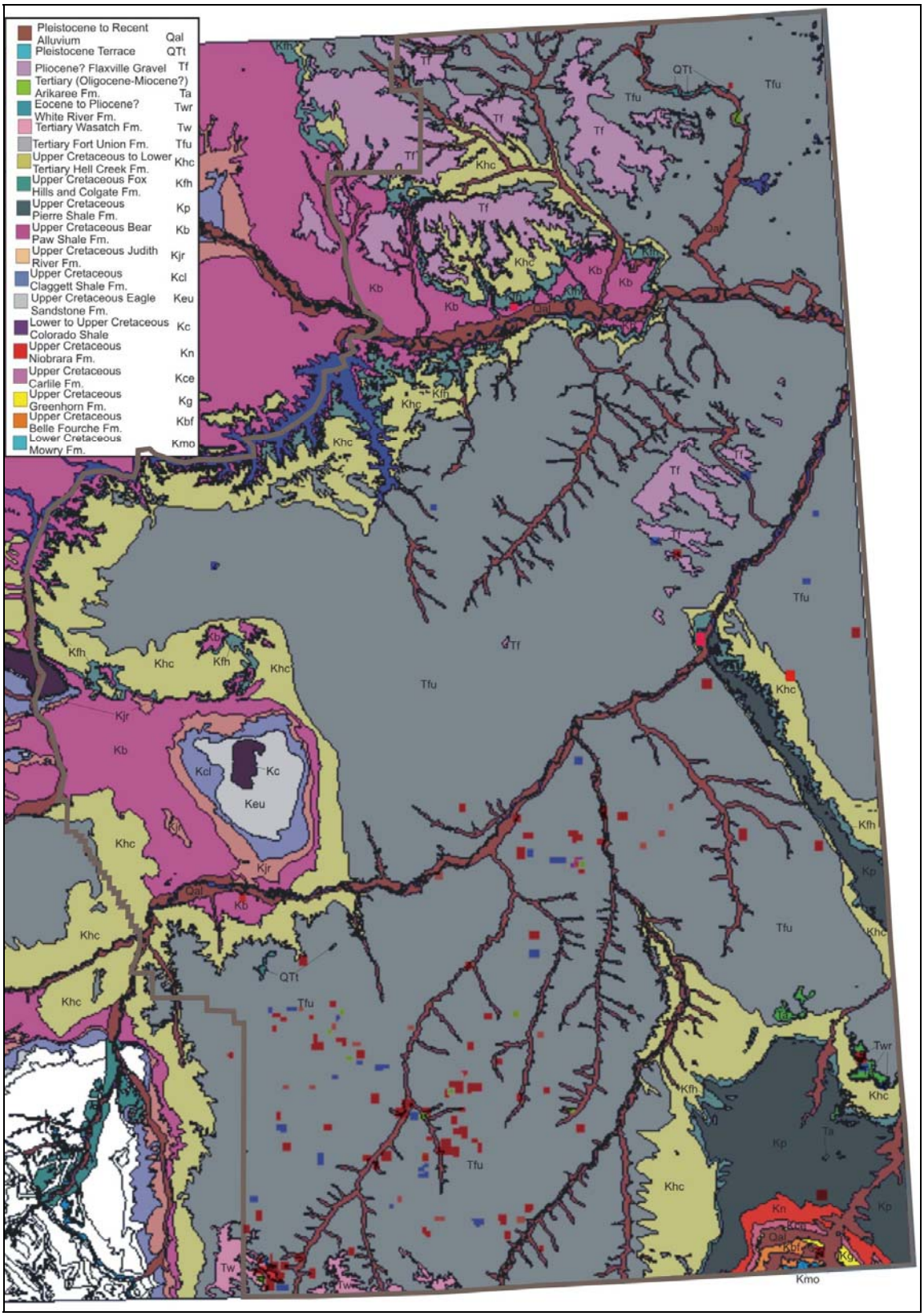

Figure 72: Sections with sites containing lithic procurement components (bedrock sources = blue, surface sources = red/pink, both = green) overlain on project area geological map.

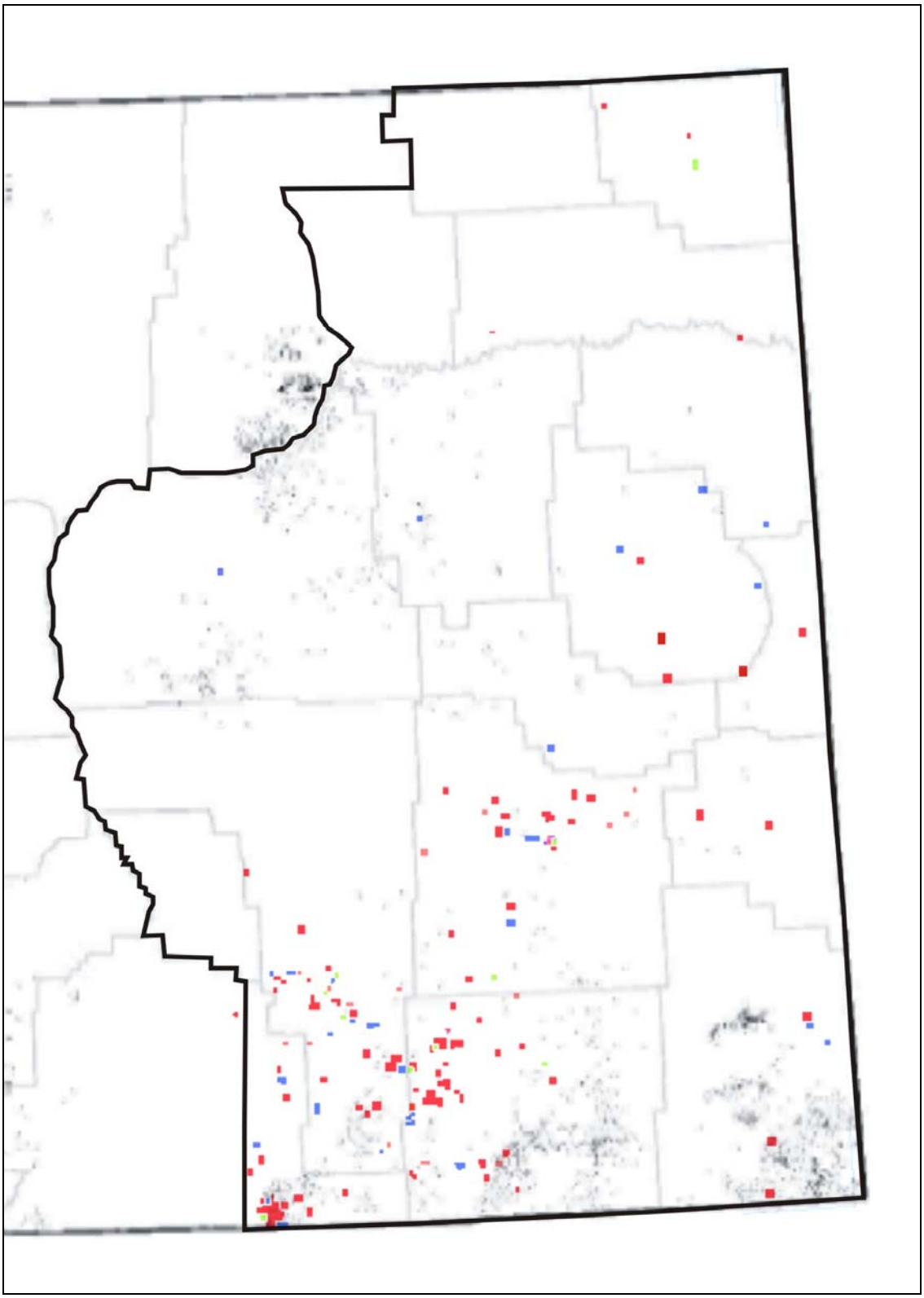

Figure 73: Sections with sites containing lithic procurement components (bedrock sources = blue, surface sources = red/pink/brown, both = green) overlain on project area map of rock exposures (in black/grey).

controlled and systematic sample of debitage would likely provide far more information on procurement, reduction, and tool-making processes than is currently available from most documented quarry sites.

Rockshelters and Caves

Sites listed as rockshelters or caves in the state data base include those that have buried occupations, petroglyphs or pictographs, and others that have associated cultural components (e.g. quarries, cribbed log structure). The data base of 7065 sites lists 79 (1.1%) as having rock shelter or cave components. The state data base has not been updated to include another 5 excavated rock shelter sites in Rosebud County that were initially recorded as lithic scatters or rock art sites so the adjusted total is 84 sites. Including those 5 sites, counties with recorded rockshelters or caves include Bighorn (n=10/11.9%), Custer (n=2/2.4%), Carter (n=8/9.5%), Garfield (n=2/2.4%), McCone (n=1/1.2%), Powder River (n=24/28.6%), Rosebud (n=32/38.1%), Richland (n=3/3.6%), Roosevelt (n=1/1.2%), and Treasure (n=1/1.2%). Counties with no recorded rockshelters include Daniels, Dawson, Fallon, Prairie, Sheridan, Valley (project area portion), and Wibaux. The seven counties encompassing the southern zone of the project area include Bighorn, Treasure, Rosebud, Custer, Powder River, Fallon, and Carter, all of which have a combined total of 77 rockshelters/caves or 91.7% of all such sites (Figure 74). The six counties that form the central zone include Garfield, McCone, Prairie, Dawson, Richland, and Wibaux with a combined total of 6 rockshelters or 7.1% of all of such sites. The four northern zone counties include Daniels, Valley, Roosevelt, and Sheridan with a combined total of just 1 (1.2%) of project area rockshelters/caves.

It is obvious that the overwhelming majority of rockshelters and caves occur in the sandstone members of the Fort Union Formation (Figure 75). Although Fort Union sandstones are extensively exposed in the southern part of the project area, limited exposures are present in some areas of the northern part of the project area. One rock shelter in the central part of the project area on the south side of the Missouri River occurs in the Cretaceous age Hell Creek sandstone. A few shelters in the southern part of the project area appear to associate with the Tertiary age White River and Wasatch Formations.

A number of rockshelters have been excavated or tested in the southwestern part of the project area and in areas immediately west of the project area. A number of radiocarbon dates have been obtained from many of these investigated occupied rockshelters. Very few radiocarbon dates are earlier than about 1700 years BP. Based on excavated rock shelter data as well as data from excavated open air occupations, Munson (1993a, 2003, 2004, 2005) suggests that southeastern Montana rock shelter use was most intense during the Late Prehistoric Period. Munson subdivides the Late Prehistoric Period into he calls the Late Prehistoric I/LPI (A.D. 350 – A.D. 1200) and Late Prehistoric Period II/LPII (A.D. 1200 – A.D. 1750) and suggests that there were changes in the way rockshelters were used during these sub-periods. He notes an overall shift in local shelter use from LPI to LPII with use emphasis as base camps (large and varied material culture indicating long period of use-possibly occupied in winter or early spring) in LPI and use emphasis as task camps (small and less varied material culture indicating

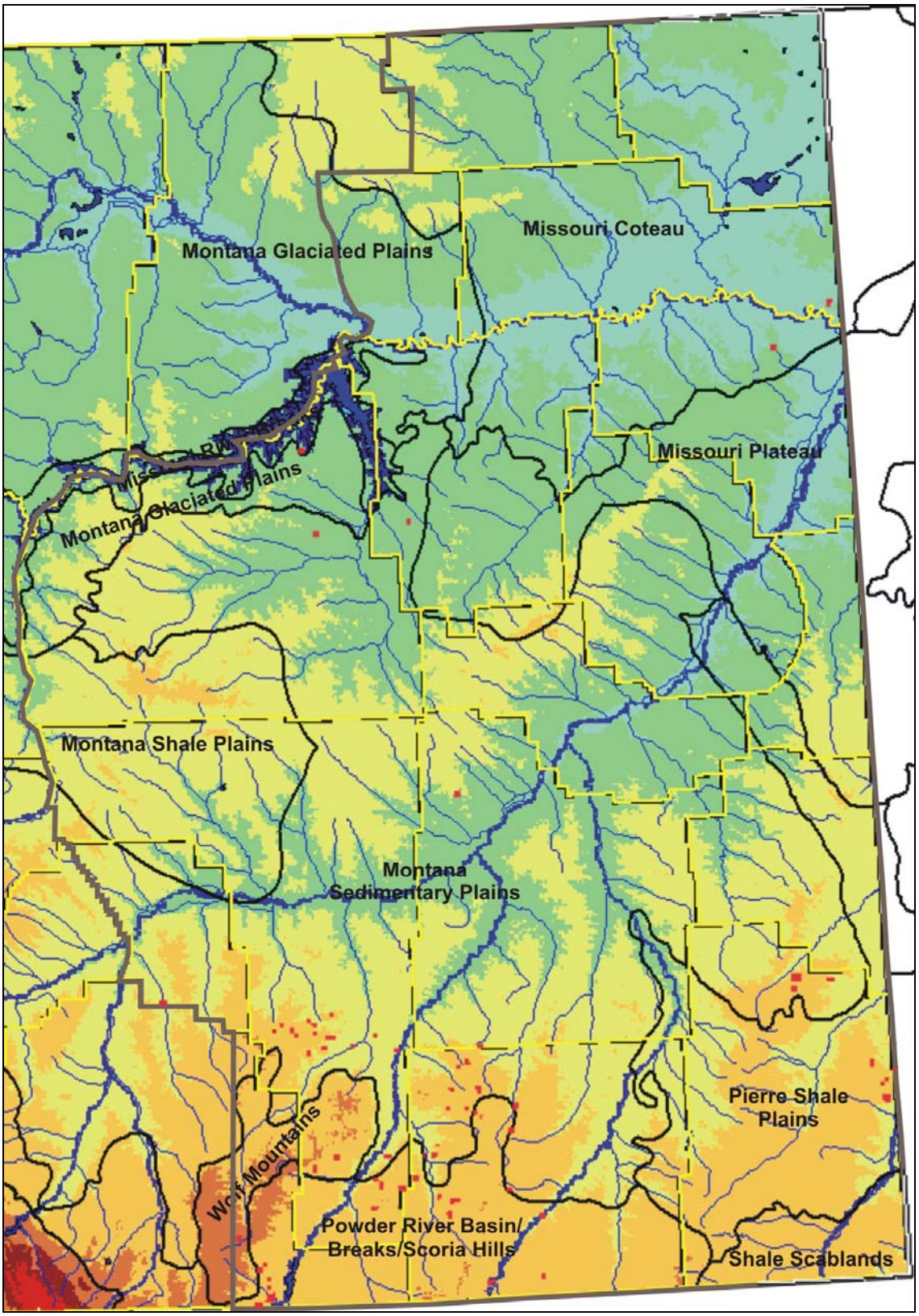

Figure 74: Sections (in red) with sites containing rockshelters or caves overlain on project area color relief map with ecological sub-sections and drainages.

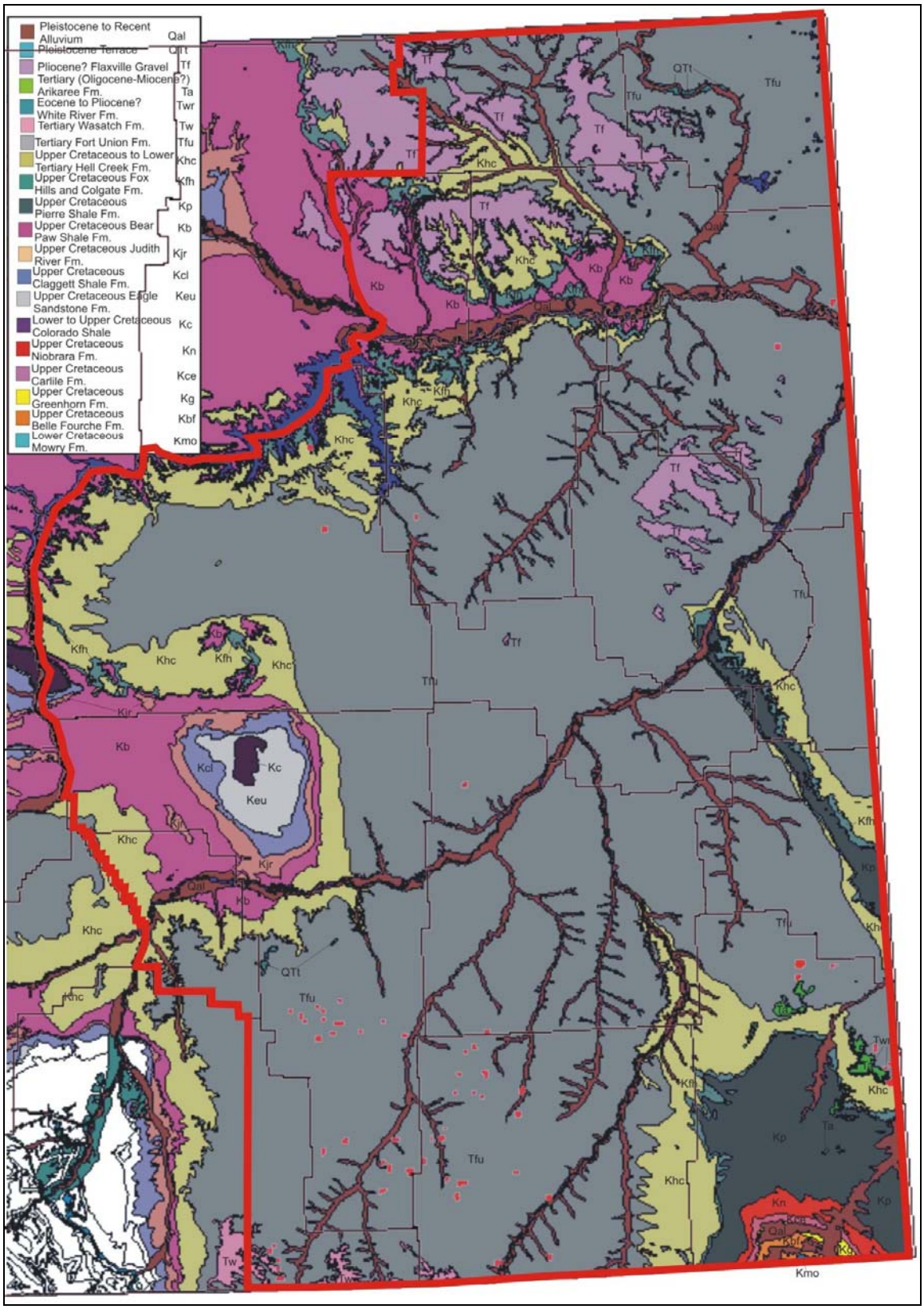

Figure 75: Sections (in red) with sites containing rockshelters or caves overlain on project area geological map.

shorter period of use) in LPII. According to Munson point styles are also more varied in LPI and suggests that two prehistoric economies existed in southeast Montana during Late Prehistoric Period: 1) focus on pursuit and exploitation of bison, 2) hunting wide variety of animals and wide variety of plant foods.

One of the earliest best documented rock shelter occurs just outside the project area in Big Horn County where the Janney Rockshelter (24BH1117) yielded a radiocarbon date of 4040 BP (Beta 114755) from an occupation that also yielded "Mallory" points (Munson and Ferguson 1998). The Janney shelter also yielded a date of 2640 BP (Beta 114751) from an occupation associated with Yonkee projectile points (Munson and Ferguson 1998). Aaberg et al. (2005) tested a small rock shelter in western Powder River County and found that it was relatively intensely occupied, yielding bone, lithic artifacts and two thermal cooking features. Although diagnostic projectile points were not found, a conventional radiocarbon date of 1210 BP (Beta 194518) was obtained from a hearth. Horseshoe Cave (24RB1073), on the edge of the Custer Forest Ashland District, was tested and yielded radiocarbon dates of 580±100 BP and 2100±80 BP (McLean 1976). A possible Scottsbluff point was also recovered from Horseshoe Cave suggesting occupations of rockshelters in the project area could extend to Paleoindian times.

Rock Art Sites

Aboriginal rock art of the project area includes petroglyphs (incised or pecked images) and pictographs (painted images). Rock art in the central and southern part of the project area is typically found on bedrock exposures that form cliffs, outcrops, and rockshelters or caves. Large, prominent freestone boulders, cliff spalls, or detached blocks also occasionally exhibit rock art. In the northern glaciated part of the project area rock art is found on the occasional rock outcrop, cliff or rock shelter but is also found on glacier boulders that range from about the size of a basketball to the size of a small car. Although just one project area glacial boulder petroglyph is listed on the state data base, numerous examples are present in the glaciated prairie just to the west of the project area. Petroglyphs dominate project area rock art with less than 5% of the total of such sites represented by pictographs. In fact after reviewing site forms where images were classified as pictographs, we are not sure how many legitimate aboriginal pictographic images actually occur in the project area. Generally, site forms describing pictographs in the project area are poorly executed with no description of color, and in some cases, no description of images. A number of errors were found in the state data base wherein petroglyph sites were categorized as pictograph sites. Some sites listed as containing both petroglyphs and pictographs were found to contain only prehistoric petroglyphs with historic graffiti classified as pictographs. After inspecting all site forms that were listed as containing pictographs and those that were listed as containing both pictographs and petroglyphs we refined the statistics for rock art sites in the project area. Our statistics indicate rock art components at 103 sites or 1.5% of the overall site total. Counties with rock art sites include the project area part of Bighorn (petroglyphs=15; pictographs=1), Carter (petroglyphs=14), Fallon (petroglyphs=1), Garfield (petroglyphs=1), McCone (petroglyphs=1), Powder River (petroglyphs=12; both=1), Rosebud (petroglyphs=51; pictographs=3; both=1), and Roosevelt (petroglyphs=2). Counties with no listed

aboriginal (some have historic rock art) rock art sites include Custer, Daniels, Dawson, Prairie, Richland, Sheridan, Treasure, Valley (portion in project area) and Wibaux (Figures 76 - 78).

A general classificatory scheme for rock art of the Plains has been developed by Keyser and Klassen (2001) who describe a number of traditions and associated chronologies. Those traditions include the *Early Hunting Tradition, Columbia Plateau Tradition, Dinwoody Tradition, En Toto Pecked Tradition, Pecked Abstract Tradition, Foothills Abstract Tradition, Hoofprint Tradition, Ceremonial Tradition, Biographic Tradition, Robe and Ledger Art Tradition*, and *Vertical Series Tradition*. Not all of these traditions could be expected to occur in the project area. However, those that occur or could occur are discussed below.

Generally the earliest rock art forms are associated with pecked stone images. The Keyser and Klassen (pp. 74-91) *Early Hunting Tradition* may date to the Paleoindian Period but they state with some certainty that it dates to the Middle or Archaic Period beginning about 5800 B.C. and extends to about 500 B.C. This tradition consists entirely of pecked stone images that were created through direct percussion and indirect percussion (for smaller/finer image details). This tradition is dominated by animal figures with human figures amounting to less than 20% of all images in this tradition. Keyser and Klassen do not map any sites of this tradition in the project area but they are known from Wyoming and South Dakota.

The *Dinwoody Tradition* includes anthropomorphic forms that have strange or "bizarre" elements that area believed to associate with spirit beings (Keyser and Klassen 2001: 107). As presently known these glyphs are pecked or abraded into sandstone. Presently the Dinwoody is thought to be restricted to parts of Wyoming in the Wind River Valley area and the southern Bighorn Basin area (Keyser and Klassen 107-126). Associated dates range from about 750 B.C. to about A.D. 1700.

The *En Toto Pecked Tradition* generally is characterized by mostly human images (a few animal figures are known) that have been "completely (*en toto*) pecked out rather than just outlined" (Keyser and Klassen 2001: 127). The human figures are often grouped and often have "exaggerated sexual characteristics". The images were created by both direct and indirect percussion. Keyser and Klassen do not list any sites of this tradition in the project area but note that some occur in south-central Montana just west of the project area (see Loendorf 1992). Keyser and Klassen (133-134) suggest that the *En Toto Pecked Tradition*, may have begun in the Middle or Archaic Period about 650 B.C. and extended to about A.D. 1150 whereupon incised forms began to replace pecked forms.

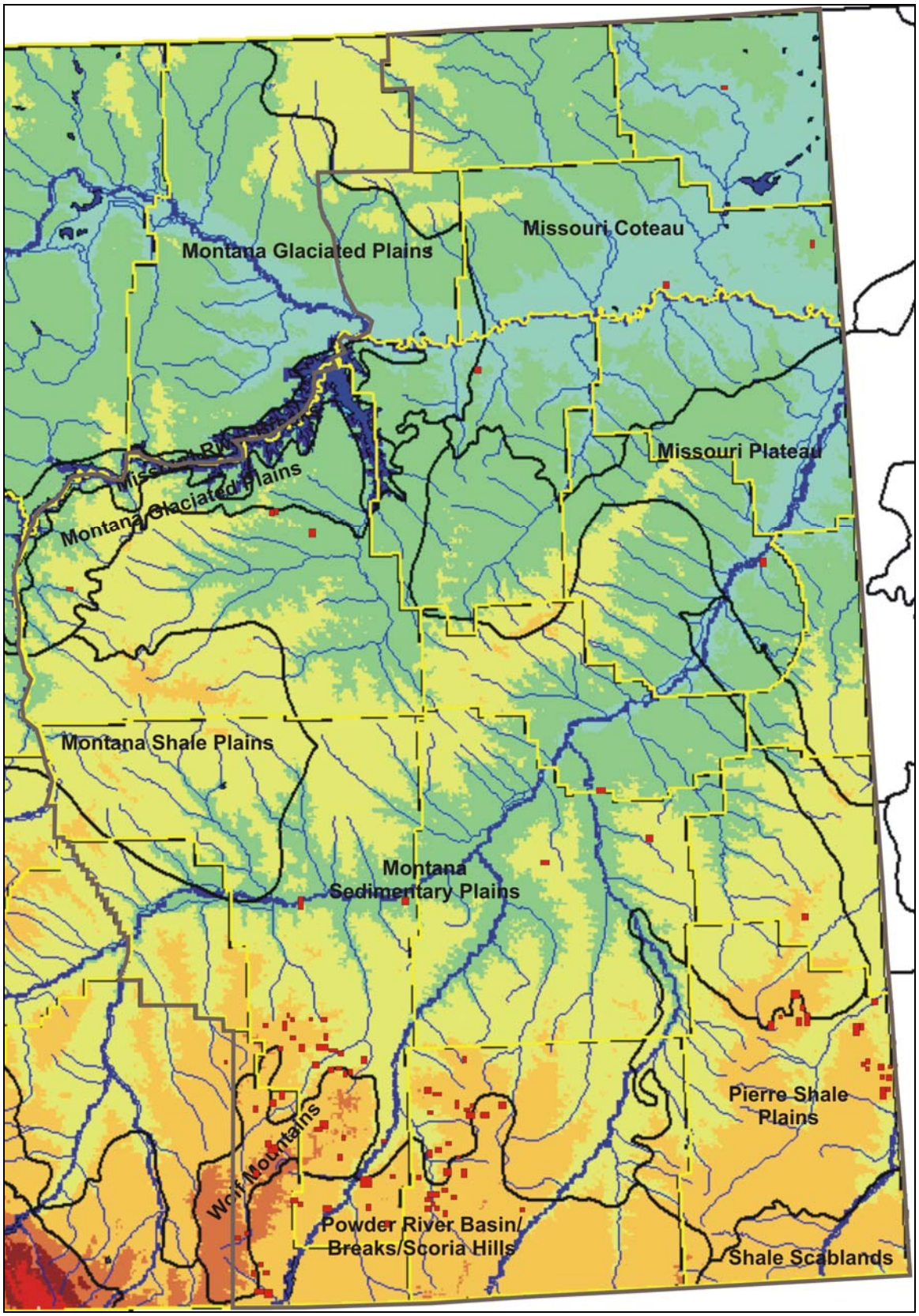

Figure 76: Sections with aboriginal rock art sites (in red) overlain on color relief map with ecological subsections, streams, and counties (some historic rock art sites also shown).

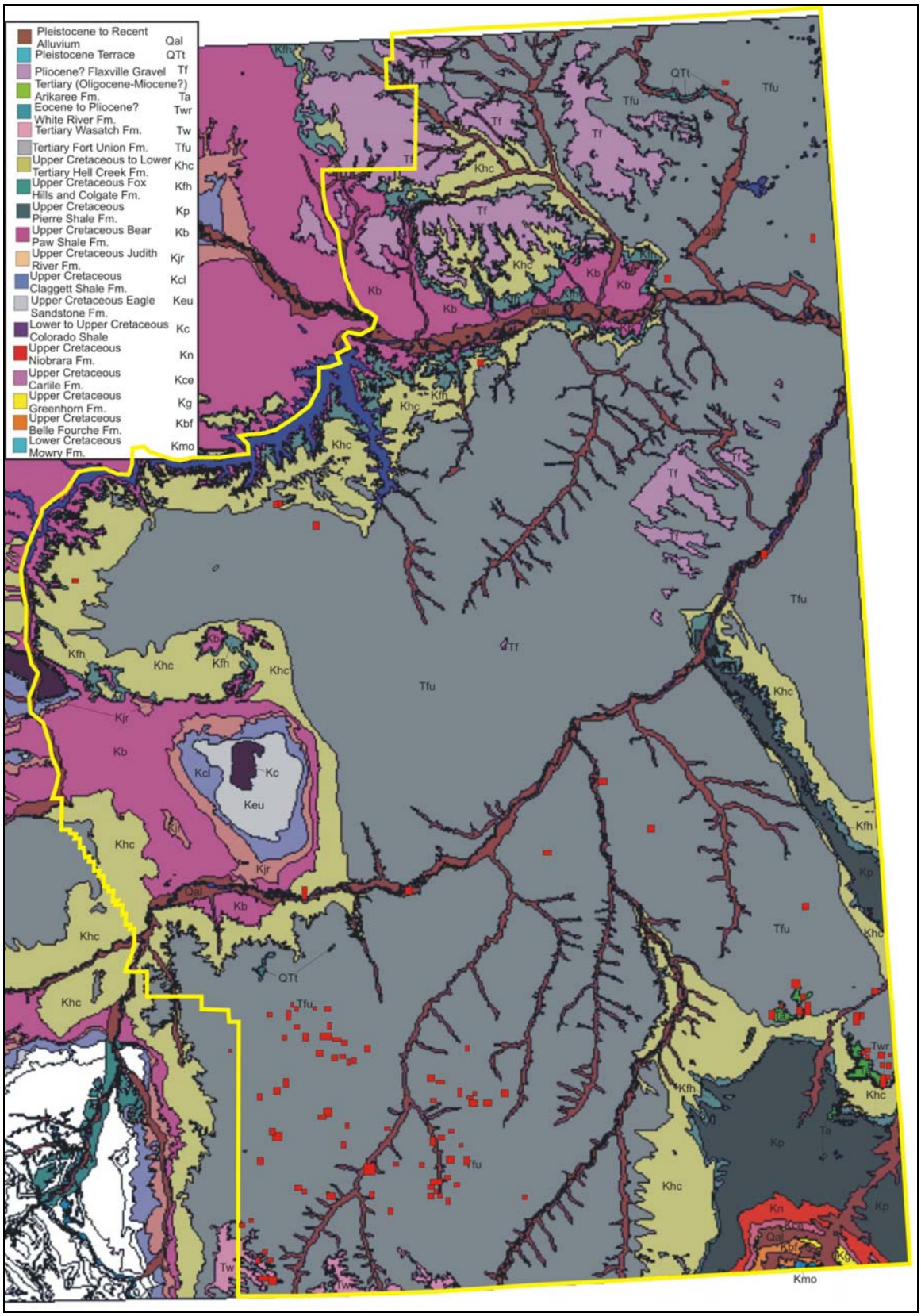

Figure 77: Sections with aboriginal rock art sites (in red) overlain on project area geological map (some historic rock art sites also shown).

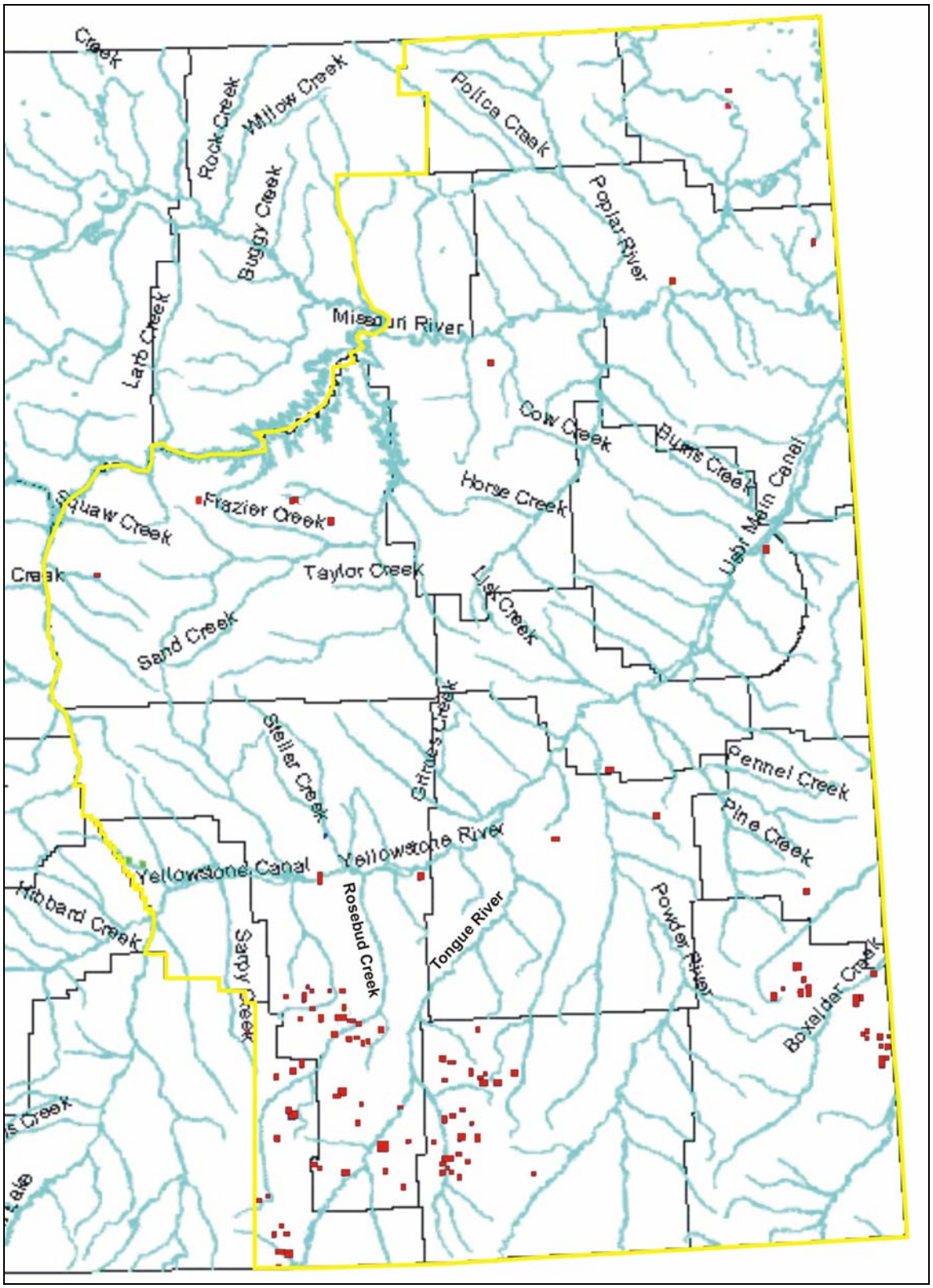

Figure 78: Sections with aboriginal rock art sites (in red) overlain on project area drainages map (some historic rock art sites also shown).

The *Pecked Abstract Tradition* images are "complex, asymmetrical, mazelike compositions that almost defy description" (Keyser and Klassen 2001: 139). The glyphs are often geometric and abstract in style and were made through freehand percussion. Although most common in the Black Hills "hogback" area of Wyoming and South Dakota, one example occurs in the Musselshell River valley of central Montana (Keyser and Klassen 2001: 139-140). This tradition is perceived as having begun about the time the *Early Hunting Tradition* ended about 500 B.C. and continued to about A.D. 1000 (Keyser and Klassen 2001: 143-145).

The *Hoofprint Tradition* consists of images created by pecking, incising, and abrading into outcrops, cliffs, and glacial boulders (Keyser and Klassen 2001: 178). Glyphs are dominated by hoofprints of bison, deer, elk, moose, horses and mules but include bird tracks, and other zoomorphic and anthropomorphic forms like "bison, elk, humans, faces and female genitalia" (Keyser and Klassen 2001: 177). Handprints, footprints, bearpaw prints, paw prints and penisforms are also described for this tradition (177-189). One site in the *Hoofprint Tradition* is known from the north part of the project area and several are reported from just within or just outside the southwestern part of the project area. Keyser and Klassen state that a reliable beginning date for this tradition has not been determined but suggest it likely associates with the Late Prehistoric Period from about A.D. 500 and continues through to the Protohistoric and early Post-contact Periods to about A.D. 1800.

The *Ceremonial Tradition* includes both petroglyphs and pictographs and according to Keyser and Klassen (191) "the images of this tradition are pictorial manifestations of the medicine powers that protected warriors in battle, gave them strength against enemies and status among peers". Common glyphs in this tradition include "shield-bearing warriors, elaborate humans, conventionalized animals, ritual objects, and weapons". Glyphs of this tradition are among the most common on the Plains and several are known from the southern and southwestern part of the project area. Keyser and Klassen (206) suggest that this tradition began as early as A.D. 250 and continued through the 1800s and "was the dominant Northwestern Plains rock art tradition from approximately A.D. 1000 until the early contact period".

The *Biographic Tradition* is dominated by petroglyphs but includes pictographs. Keyser and Klassen (2001: 224-253) suggest that the *Biographic* and *Ceremonial* traditions are similar in subject matter but differ in that the *Biographic Tradition* is largely narrative, "depicting everyday occurrences and recording historical events". *Biographic* images often depict action and are interpreted as telling a story about particular events and activities. Images include human figures (e.g. warriors, dancers, fighters, decedents, Euro-Americans) horses (and riders), tipis, weapons, wagons, boats, other vehicles, and shield-bearing warriors (from the earliest phase of this tradition). In appearance *Biographic* glyphs often consist of lightly scratched or incised lines. Although pictographs are uncommon they sometimes occur as red, orange, or black images that were applied with fingers, or more commonly, by direct application of the pigment material (Keyser and Klassen 2001: 225). Glyphs of this tradition are often found on cliffs, outcrops, or prominent blocks or boulders. Several sites in this tradition

have been recorded in the southwestern, central, and east-central part of the project area. Glyphs from this tradition have not been directly dated but chronology inferred from the images themselves indicates origins in the Late Prehistoric Period perhaps around A.D. 1700. Keyser and Klassen (239) state that this tradition flourished and reached its "greatest development and expression" in the Protohistoric and Historic Periods. The tradition includes many glyphs from the 1800s and Keyser and Klassen (238) even document one glyph dating to 1924.

The *Vertical Series Tradition* is described by Keyser and Klassen (2001: 281) as "among the most enigmatic and intriguing on the Northwestern Plains". They go on to describe this tradition as consisting "mostly of repeated nonrepresentational symbols arranged in multiple vertical columns or series" (281). They also suggest the possibility that this tradition is "an incipient ideographic notation system – an early precursor to true writing". This tradition is expressed more commonly as pictographs but includes some petroglyphs. Keyser and Klassen state that all pictographs in this tradition are red or reddish purple with the exception of two yellow dots associated with a particular site in South Dakota. Pigment is believed to be mostly derived from natural earth sources (e.g. ochre). Keyser and Klassen describe sites with glyphs of this tradition as uncommon and do not show any occurrences in the project area. Some sites are known from central and south-central Montana just west of the project area and some are known from northcentral Wyoming not far to the southwest of the project area. A firm chronology for this tradition has not been presented but Keyser and Klassen (290) suggest that it may have evolved from the Biographic tradition in the 1700s or possibly as late as the early 1800s.

Workshops

Site components described as workshops generally seem to be rather subjectively classified on the basis of lithic debitage content observed on the surface. Of 135 sites listed as having workshop components only 20 are not associated with any other site type. Included in properties with workshop components are 4 tipi ring sites, 1 "Ambush Game Drive", 3 bedrock quarries, 2 sites classified as "Fire hearths or Roasting Pits, FCR", 91 lithic scatters, 3 "Lookouts", 1 petroglyph site, 1 "Rock Cairn" site, 1 rock shelter or cave, 9 sites with "Rock Pile" components, and 9 surface quarries. Counties with sites that include workshop components include Bighorn (33/24.4%), Custer (22/16.3%), Carter (3/2.2%), Dawson (4/3%), Fallon (2/1.5%), Powder River (25/18.5%), Rosebud (38/28.1%), Richland (1/0.7%), Roosevelt (1/0.7%), Sheridan (1/0.7%), Treasure (1/0.7%), Valley (3/2.2%), and Wibaux (1/0.7%). Counties with no documented workshop site components include Daniels, Garfield, McCone, and Prairie. The southern zone of the project area (Bighorn, Treasure, Rosebud, Custer, Powder River, Fallon and Carter Counties) contains 124, or 91.9%, of all workshop site components. The central zone (Garfield, McCone, Prairie, Dawson, Richland and Wibaux Counties) contains 6(4.4%) workshop component sites. The northern zone (Daniels, Valley, Roosevelt, and Sheridan) contains 5(3.7%) workshop components.

Other Rock Structures, Circular Walls, and Rock Piles

Piled, stacked, or placed stone features that are described as unusual or unlike known feature types are included in this category. Features described as possible rings, or possible circles, or possible vision quests, and so on, are also included in this category. The state data base originally listed 67 archaeological sites as containing rock structure components, but upon examination of site forms it was found that 4 sites did not contain any mention of rock structures and 9 sites were described as historic features. Therefore the actual number of other rock structures in the prehistoric data base should be 54.

The southern zone of the project area, which encompasses seven counties, contains 48 sites (88.9%) with other rock structures and includes Bighorn County (n=9), Treasure County (n=1), Rosebud County (n=15), Custer County (n=3), Powder River County (n=7), Fallon County (n=0), and Carter County (n=13). The six central zone counties contain a combined total of 4 sites (7.4%) with other rock structures. Those central county rock structure sites include Garfield (n=0), McCone (n=1), Prairie (n=1), Dawson (n=0), Richland (n=2), and Wibaux (n=0). Other rock structure sites in the north zone include Daniels County (n=0), Valley County (n=0), Roosevelt County (n=2), and Sheridan County (n=0). Their combined total of 2 other rock structure sites amounts to 3.7% of all such sites. The high frequency of unusual or other rock structures in the southern zone, and the occurrence of these features in prominent settings may indicate ceremonial or some other specialized use of many of these features.

Four sites on the state data base were listed as circular walls (either site type 1 or site type 2). Those sites include one with a stone arc and cairn, one with a possible tipi ring, one with a circular stone pile, and one with a stone arc. It appears that this site type does not involve presence of a discrete or unusual feature type but involves site form feature descriptions that for some reason failed to allow data entry personnel from entering the feature descriptions into “standard” observational categories. The four sites that include circular wall components occur in Carter (n=1), Rosebud (n=1), Richland (n=1), and Valley (n=1) counties.

Thirty-two (n=32) sites are listed as rock pile(s) in the Site Type 1 heading of the state data base with no (null) associated Site Type 2. A sample of the site forms for these 32 sites were investigated and based on that sample, sites described as rock piles are sites that consist entirely of piles or cairns that are not in an apparent alignment. These sites are often restricted to under five features and in many instances age and/or function are unknown. Counties containing data-base-listed rock pile sites include Bighorn (n=16), Custer (n=1), Fallon (n=3), Prairie (n=2), Powder River (n=4), Rosebud (n=2), Richland (n=1) and Sheridan (n=1).

Trails

The state data base for prehistoric sites lists six trails. Site forms for five of these sites were investigated. The site form for the sixth site (24CT9) was not accessible. However, Doug Melton (personal communication) reports that it is not likely a trail but a campsite at a creek crossing. Only two of the other five sites contained physical evidence of a trail (24RB1386 and 24SH0654) and suggestion of use during prehistoric times was

simply speculation. One site (24SH0654) consists of a couple of segments of old two track ruts that were associated with use of a trail (used up to the 1920s) between Moose Mountain, Canada and the Fort Peck Reservation. Site 24RB1386 consists of ruts worn into sandstone between Rosebud and Greenleaf Creeks. Historic use of this route was not documented and it was only suggested that the ruts could represent a trail used in prehistoric times.

Documentation of actual use of a trail or trail system during prehistory is difficult and evidence used to support such use is often circumstantial. Documented use of a trail during the historic period is often used to argue use during the prehistoric period. Some researchers suggest that some linear arrangements of cairns may mark trail systems (various authors - Trails, Trails and More Trails: Another Historic Preservation Challenge *in AIM* 1980 L.B. Davis - editor). In one case in the Pryor Mountains area of Montana a series of cairns extend for about 19km and are interpreted as marking the "Bad Pass Trail", which based on a radiocarbon date obtained from one cairn dates to about 1620 BP (Loendorf and Brownell 1980). Others suggest that linear clusters or concentrations of archaeological sites along prominent landforms (e.g. high ridges or ridge systems, river valleys, drainage divides) may indicate prehistoric trail use (Walker-Kuntz and Aaberg 2001; Wettstaed 1989; Blakeslee and Blasing 1988).