

United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-MT-C020-2011-0160-EA
~~May 9, 2011~~ July 20, 2011

Project Title: Oil and Gas Lease Parcel, October 18, 2011 Sale

Location: Miles City Field Office (see Appendix A for list of lease parcels by number and legal description and Maps 1-12)





In Reply Refer To:

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Miles City Field Office
111 Garryowen Road
Miles City, Montana 59301-7000
www.blm.gov/mt



July 20, 2011

Dear Reader:

The Bureau of Land Management (BLM) Miles City Field Office prepared an environmental assessment (EA) to analyze the potential effects from offering 48 nominated lease parcels for competitive oil and gas leasing in a sale tentatively scheduled to occur on October 18, 2011. The EA was available for a 30-day public comment period that ended on June 14, 2011.

Based on our analysis and review of comments received, the EA has been updated (refer to Chapter 5 of the EA for a summary of public comments). A competitive oil and gas lease sale is scheduled to be held on October 18, 2011. It will be my recommendation to offer 37 lease parcels (36 whole, 1 partial) for the competitive oil and gas lease sale, along with stipulations identified in the BLM preferred alternative in the updated EA, see Appendix A. I will also recommend deferring 12 parcels (11 whole, 1 partial) pending additional study and analysis, see Appendix A.

We anticipate preparing and finalizing our Decision Record after the October oil and gas lease sale, but prior to lease issuance. Upon finalization, the decision record and accompanying finding of no significant impact (FONSI) will be posted at the website listed below.

Please refer to the Montana/Dakotas BLM website at www.blm.gov/mt. From this home page, go to the heading titled "Frequently Requested," where you will find a number of links to information about our oil and gas program. Current and updated information about our EAs can be found on the link titled "Oil and Gas Lease Sale Information" listed under the heading "Frequently Requested". Once there, click on "2011", where you will find the MCFO EA and associated documents for the October 18, 2011 lease sale for your review.

If you have any questions or would like more information about lease sale notices or the issuance of the EA, Decision Record and FONSI, please contact me at 406-233-2892.

Sincerely,

Deborah K. Johnson
Field Manager

**Miles City Oil and Gas Lease Sale EA
DOI-BLM-MT-C020-2011-0160-EA**

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1.0 PURPOSE AND NEED

1.1 Introduction

It is the policy of the Bureau of Land Management (BLM) to make mineral resources available for use and to encourage development of mineral resources to meet national, regional, and local needs. This policy is based on various laws, including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 Sec. 5102(a)(b)(1)(A) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing. The Montana State Office conducts mineral estate lease auctions for lands managed by the federal government, whether the surface is managed by the Department of the Interior (BLM or Bureau of Reclamation), United States Forest Service, or other departments and agencies. In some cases the BLM holds subsurface mineral rights on split estate lands where the surface estate is owned by another party, other than the federal government. Federal mineral leases can be sold on such lands as well. The Montana State Office has historically conducted five lease sales per year.

Members of the public file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. From these EOIs, the Montana State Office provides draft parcel lists to the appropriate field offices for review. BLM field offices then review legal descriptions of nominated parcels to determine: if they are in areas open to leasing; if new information has come to light which might change previous analyses conducted during the land use planning process; if there are special resource conditions of which potential bidders should be made aware; and which stipulations should be identified and included as part of a lease. Ultimately, all of the lands in proposed lease sales are nominated by private individuals, companies, or the BLM, and therefore represent areas of high interest.

This environmental assessment (EA) has been prepared to disclose and analyze the potential environmental consequences from leasing all 48 nominated lease parcels located in the Miles City Field Office (MCFO), to be included as part of a competitive oil and gas lease sale tentatively scheduled to occur October 18, 2011.

The analysis area includes the 48 nominated parcels in Carter, Wibaux, Daniels, Rosebud, Garfield, Richland, Roosevelt, and Sheridan counties (Map 1).

1.2 Purpose and Need for the Proposed Action

The purpose of offering parcels for competitive oil and gas leasing is to provide opportunities for private individuals or companies to explore for and develop federal oil and gas resources after receipt of necessary approvals and to sell the oil and gas in public markets.

This action is needed to help meet the energy needs of the people of the United States. By conducting lease sales, the BLM provides for the potential increase of energy reserves for the U.S., a steady source of income, and at the same time meets the requirement identified in the

Energy Policy Act, Sec. 362(2), Federal Oil and Gas Leasing Reform Act of 1987, and the Mineral Leasing Act of 1920, Sec. 17.

The decision to be made is whether to sell oil and gas leases on the lease parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

1.3 Conformance with Land Use Plan(s)

This EA is tiered to the information and analysis and conforms to the decisions contained in the Big Dry Resource Management Plan (RMP/EIS) of April 1996 and the Powder River RMP/EIS of March 1985, as amended (1994 Oil and Gas RMP/EIS Amendment, 2003 Final Statewide Oil and Gas Environmental Impact Statement and proposed Amendment of the Powder River and Billings RMPs, and the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings RMPs). The Big Dry and Powder River RMPs are the governing land use plans for the MCFO. The lease parcels to potentially be offered for sale are within areas determined to be open to oil and gas leasing in the Big Dry and Powder River RMPs. An electronic copy of the Big Dry RMP/EIS and the Powder River RMP/EIS, as amended, can be located via the internet on the BLM home page, www.blm.gov/mt. On the home page, locate the heading titled “*Montana/Dakotas*,” then select “*What We Do*”, then click on the “*Planning*” link.

A more complete description of activities and impacts, related to oil and gas leasing, development, production, etc. can be found at pages 111 to 156 of the Big Dry RMP and pages 55 to 77 of the 1994 Oil and Gas Amendment of the Powder River RMP (for leasing decisions), and pages 4-1 to 4-310 of the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings RMPs (for development, production, etc).

Analysis of the 48 parcels is documented in this EA, and was conducted by MCFO resource specialists who relied on professional knowledge of the areas involved, review of current databases, and file information to ensure that appropriate stipulations were recommended for a specific parcel or recommended deferring the leasing decision for all or parts of certain lease parcels.

At the time of this review it is unknown whether a particular parcel will be sold and a lease issued. It is unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of potential activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed for this environmental assessment (Appendix B), which is based on information contained in the MCFO RFD developed in 2005 and revised in 2009; it is an unpublished report that is available by contacting the MCFO. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the MCFO area and used to analyze projected wells for the 48 nominated lease parcels. Detailed site-specific analysis and mitigation of activities associated with any particular lease would occur when a lease holder submits an application for permit to drill (APD). A more complete description of mitigation, BMPs, and conditions of approval related to oil and gas lease activities can be found at pages 302-326 of the Big Dry

RMP, pages 130-137 of the 1994 Oil and Gas Amendment of the Powder River RMP, pages 3-6 of the 2008 Record of Decision for the Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings RMPs, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development-The Gold Book, and online at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html. Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

1.4 Public Scoping and Identification of Issues

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posted on the MCFO website National Environmental Policy Act (NEPA) notification log. Scoping was initiated March 28, 2011. Some scoping comments pertained to overall issues/concerns from oil and gas leasing within the MCFO while other scoping comments were specific to split estate mineral ownership and development. Refer to Section 5.2 of this EA for a more complete summary of the scoping comments received.

The BLM coordinates with Montana Fish, Wildlife, and Parks (MFWP), and the United States Fish and Wildlife Service (USFWS) to manage wildlife habitat because BLM management decisions can affect wildlife populations which depend on the habitat. The BLM manages habitat on BLM lands, while MFWP is responsible for managing wildlife species populations. The USFWS also manages some wildlife populations but only those federal trust species managed under mandates such as the Endangered Species Act, Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act. Managing wildlife is factored into project planning at multiple scales and is to be implemented early in the planning process.

Coordination with USFWS was conducted for the 48 lease parcels being reviewed and in the completion of this EA in order to prepare the analysis, identify protective measures, and apply stipulations and lease notices associated with these parcels being analyzed. A letter was sent to the MFWP during the 15-day scoping and 30-day comment periods requesting comments on the 48 parcels being reviewed.

The BLM consults with Native Americans under Section 106 of the National Historic Preservation Act. BLM sent letters to tribes in Montana, North and South Dakota and Wyoming at the beginning of the 15-day scoping period informing them of the potential for the 48 parcels to be leased and inviting them to submit issues and concerns BLM should consider in the environmental analysis. Letters were sent to the Tribal Presidents and the Tribal Historical Preservation Officer (THPO) or other cultural contacts for the Cheyenne River Sioux Tribe, Crow Tribe of Montana, Crow Creek Sioux Tribe, Eastern Shoshone Tribe, Ft. Peck Tribes, Lower Brule Sioux Tribe, the Mandan, Hidasta, and Arkira Nation, Northern Arapaho Nation, Northern Cheyenne Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe of Indians, Standing Rock Sioux Tribe, and Turtle Mountain Band of Chippewa. In addition to scoping letters, THPOs also received file search results from the preliminary review of parcels conducted by BLM. BLM ~~will send~~ sent a second letter to the tribes informing them about the 30 day public comment period for the EA and solicit any information BLM should consider before making a decision whether to offer any or all of the 48 parcels for sale.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Alternative A - No Action

Under the No Action alternative, the 48 lease parcels, ~~7,230.66~~ 7,173.57 surveyed federal mineral acres, (~~1,763.01~~ 1,705.92 surveyed BLM administered surface and 5,467.65 surveyed private/state surface) would not be offered for the October 18, 2011 competitive oil and gas lease sale (Maps 1-12). Under this alternative, the state and private minerals could still be leased in surrounding areas.

2.2 Alternative B – Proposed Action

Under the Proposed Action alternative, the 48 lease parcels, ~~7,230.66~~ 7,173.57 surveyed federal mineral acres (~~1,763.01~~ 1,705.92 surveyed BLM administered surface and 5,467.65 surveyed private/state surface), would be offered in whole with lease stipulations and/or lease notices from the Big Dry and Powder River RMPs as necessary (Appendix A) for competitive oil and gas lease sale and lease issuance, (Maps 1-12). No lease parcels would be deferred.

2.3 Alternative C -BLM Preferred Alternative

Under the BLM Preferred alternative, 37 of the 48 lease parcels (36 whole, 1 partial), ~~4,353.54~~ 4,296.45 surveyed federal mineral acres (~~785.90~~ 728.81 surveyed BLM administered surface and 3,567.64 surveyed private and/or state surface), would be offered in whole or part with RMP lease stipulations and/or lease notices as necessary for competitive oil and gas lease sale and lease issuance. Twelve lease parcels (11 whole, 1 partial), 2,877.12 surveyed federal mineral acres, in whole or part have been found to contain priority sage-grouse habitat and important cultural resource values (Appendix A) (Map 13).

Greater sage-grouse conservation areas are being considered in the alternatives as part of the ongoing MCFO RMP planning effort; therefore, eleven lease parcels in whole would be deferred at this time pending further review and analysis in the current RMP revision process. This would provide for consideration of alternatives in the future MCFO RMP planning effort utilizing recent research and updated BLM policies. In addition, BLM has determined that a portion of a lease parcel contains or is near a previously recorded site that has several types of archaeological features that are identified as being of concern to Native American groups. This would require further analysis and consultation/coordination with Native American Tribes to adhere to BLM policy; therefore, one partial lease parcel would be deferred pending further review and analysis for Native American concerns. The twelve deferred lease parcels (11 whole, 1 partial) would not be analyzed at this time.

2.4 Additional Considerations for Alternatives B and C

For the split-estate lease parcels, the BLM provided courtesy notification to private landowners that the federal oil and gas estate under their surface would be included in this lease sale. In the event of activity on such split estate lease parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

The terms and conditions of the standard federal lease and federal regulations would apply to each parcel offered for sale in each of the two Alternatives. Stipulations shown in Appendix A

would be included with identified parcels offered for sale. Standard operating procedures for oil and gas operations on federal leases include measures to protect the environment and resources such as groundwater, air, wildlife, historical and prehistorical concerns, and others as mentioned in the Big Dry and Powder River RMPs at pages 9 to 40 and 302 to 330 of the Minerals Appendix (Big Dry) and 2-1 to 2-28 and the Minerals Appendix Min-36 to Min-42 (2008 Final Supplement to the Montana Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings RMPs). Lease stipulations (as required by 43 CFR 3131.3) would be attached to the parcels to address site-specific concerns or new information not previously identified in the land use planning process. Standard operating procedures, best management practices (BMPs), conditions of approval (COAs) and lease stipulations can change over time to meet RMP objectives, resource needs or land use compatibility.

Federal oil and gas leases would be issued for a 10-year period and would remain valid for as long thereafter as oil or gas is produced in paying quantities, required payments are made and lease operations are conducted in compliance with regulations and approved permits. If a lessee fails to produce oil and gas by the end of the initial 10 year period, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, ownership of the minerals leased would revert back to the federal government and the lease could be resold. Drilling of wells on a lease would not be permitted until the lessee or operator secures approval of a drilling permit and a surface use plan as specified in 43 CFR 3162.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing environment (i.e., the physical, biological, social, and economic values and resources) within the analysis area, which includes the 48 nominated parcels in Carter, Wibaux, Daniels, Rosebud, Garfield, Richland, Roosevelt, and Sheridan counties (Map 1), that could be affected by implementation of the alternatives described in Chapter 2.

The existing environment is described by the different resources found throughout the eight counties listed above. Within each resource description, lease parcels containing the resource will be listed and analyzed further in Chapter 4. If the lease parcel does not contain the resource, then the lease parcel will be omitted from the description of that specific resource.

Unless otherwise stated, resource analysis in this chapter and Chapter 4 will be described in approximate acres due to the scaling and precision parameters associated with the Geographic Information System (GIS), in addition to being referenced to a different land survey.

Most of the analysis area consists of open expanses characteristic of the Northern Great Plains. This area is largely comprised of herbaceous vegetation (e.g., grasses) with interspersed shrubs (e.g., sagebrush). Lands with greater moisture or slopes exhibit ponderosa pine, limber pine, limited Douglas fir, and juniper species. Some hardwood trees grow along riparian areas and are common along the Missouri, Yellowstone, and Powder Rivers. The analysis area experiences extreme weather variations on a yearly basis due to its semiarid continental climate. Most of the public lands are scattered throughout the analysis area. The public lands are rich in natural resources, such as wildlife and livestock forage, minerals, cultural resources, paleontological resources, recreation opportunities, and watershed values.

Only those aspects of the existing environment that are potentially impacted by this project are described in detail. The following aspects of the existing environment were determined to not be present or not potentially impacted by this project include: lands with wilderness characteristics, cave and karst resources, wild and scenic rivers; wilderness study areas (WSAs); areas of critical environmental concern (ACECs); hazardous wastes or solids; and the Theodore Roosevelt Conservation Partnership Sportsmen Area in Phillips, Valley, Fergus, Petroleum, Garfield and McCone counties recently identified as having high quality hunting and fishing opportunities. These resources and resource uses will not be discussed further in this EA.

3.2 Air Resources

Air quality and climate are the components of air resources, which include applications, activities, and management of the air resource. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states. Air quality is determined by atmospheric pollutants and

chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years.

3.2.1 Air Quality

Analysis area air quality is very good. The EPA air quality index (AQI) is an index used for reporting daily air quality (<http://www.epa.gov/oar/data/geosel.html>). It tells how clean or polluted an area's air is and whether associated health effects might be a concern. The AQI focuses on the potential health effects a person may experience within a few hours or days after breathing polluted air. The EPA calculates the AQI for the five major criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level the EPA has set to protect public health. The following terms help interpret the AQI information:

- **Good** - The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate** - The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups** - When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.

In the context of ozone, all areas throughout Montana and the Dakotas (including near the Billings FO) are currently meeting federal standards in all locations. Light and dark blue circles in Figure A indicate standards being met in 2008. Open circles in Figure B indicate static trends.

For haze, trends appear to be improving for the clearest days (Figure C), while there are no apparent trends for the haziest days (Figure D).

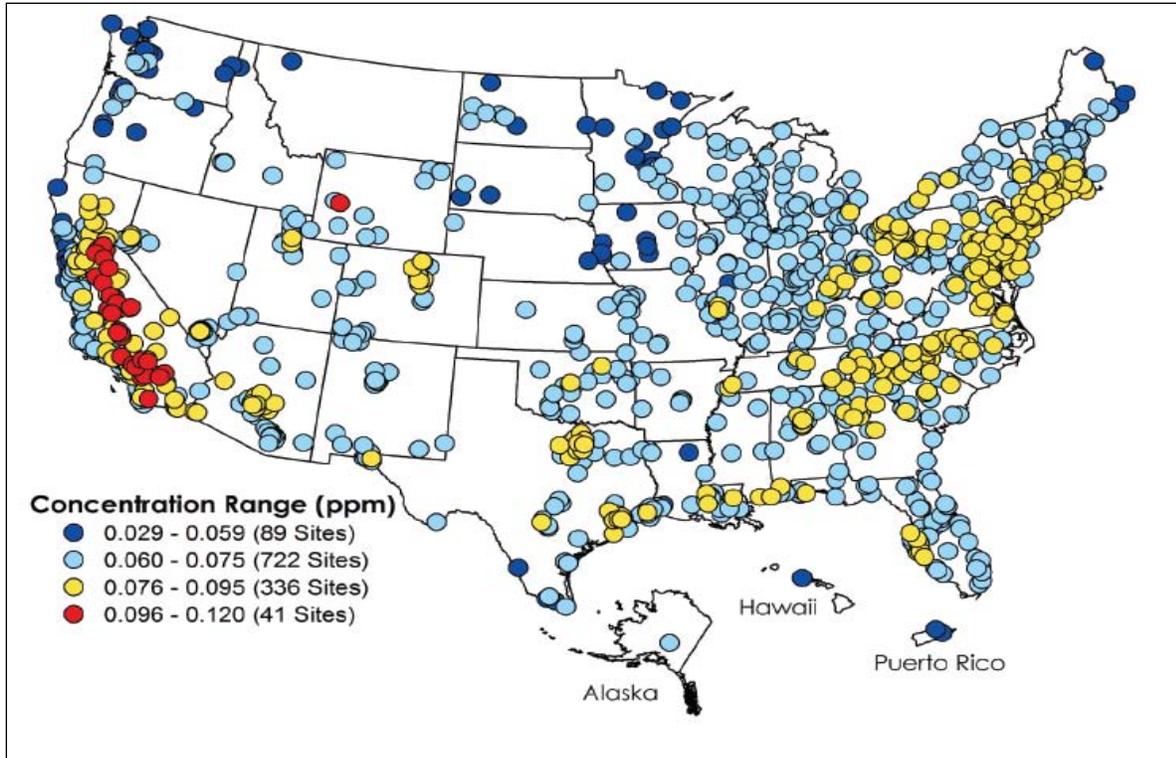


Figure A. Ozone concentrations in ppm, 2008 (fourth highest daily maximum 8-hour concentration).

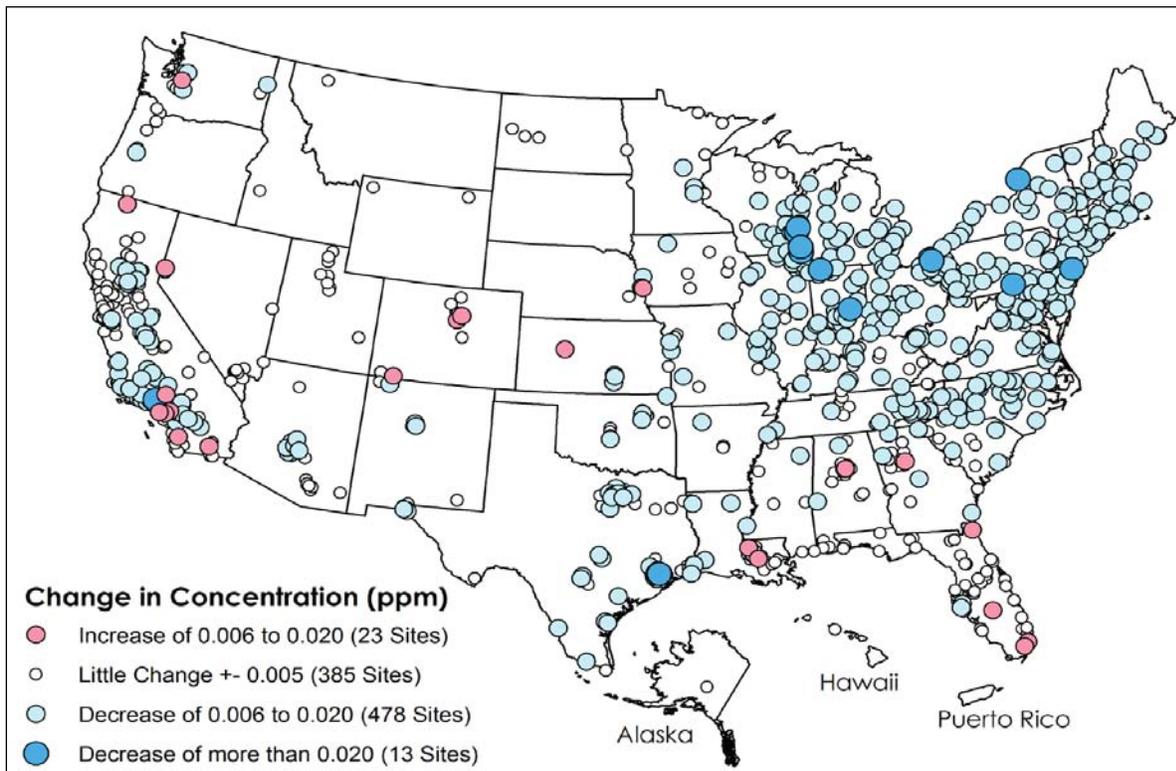


Figure B. Change in ozone concentrations in ppm, 2001-2003 vs. 2006-2008 (three-year average of the annual fourth highest daily maximum 8-hour concentrations).

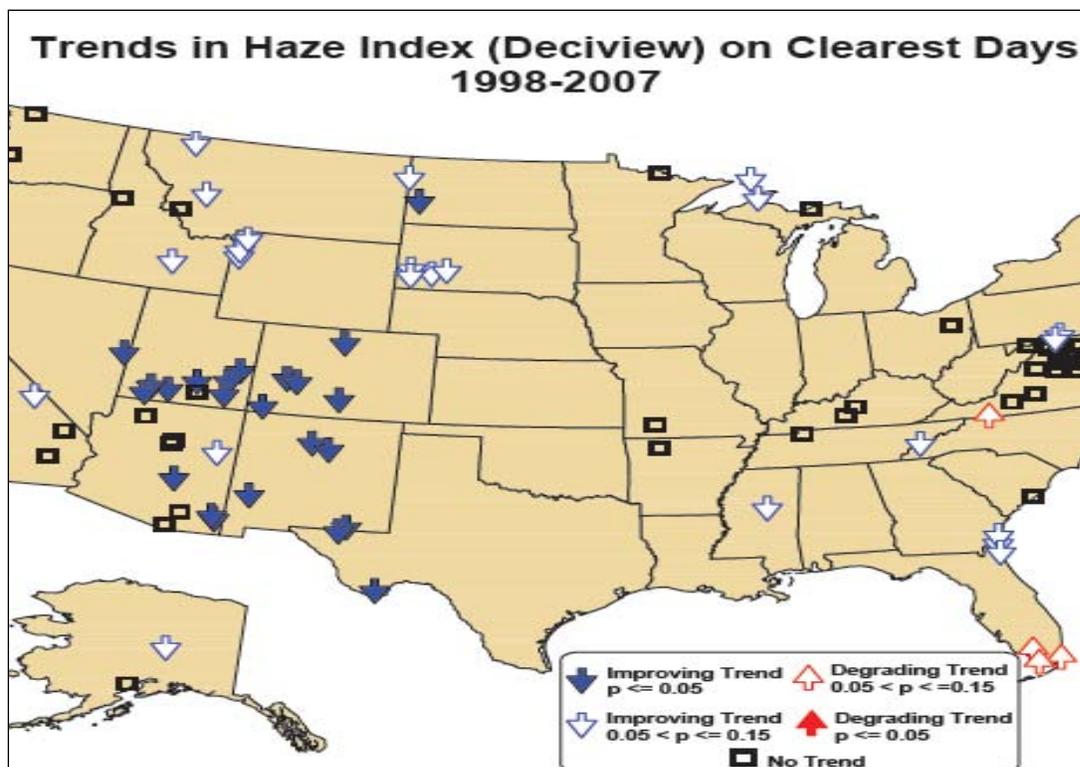


Figure C. Trends in haze index (deciview) on clearest days, 1998-2007.

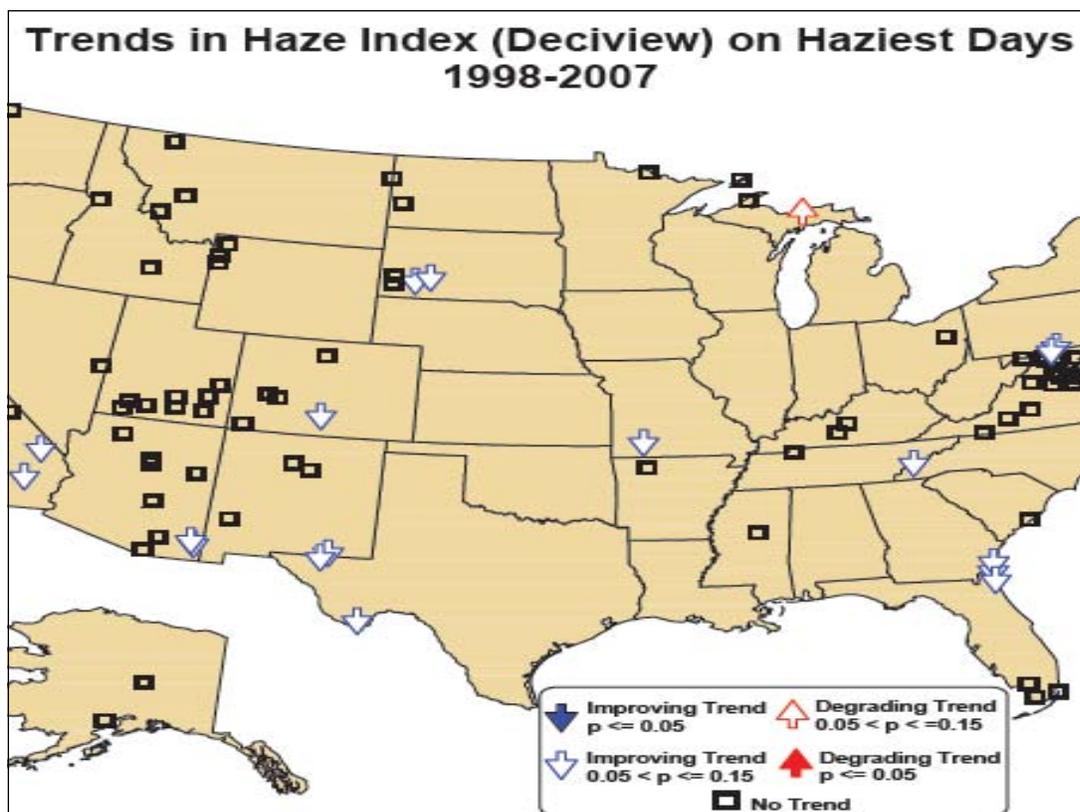


Figure D. Trends in haze index (deciview) on haziest days, 1998-2007.

The AQI data show that there is little risk to the general public from air quality in the MCFO (Table 1). Between 1999 and 2008, 95 percent of the days rated “good” with 5 percent being “moderate.” While there have been days that posed a health risk in Rosebud County, the occurrence is very rare (0.1 percent of all records) and short term (<1 day/year). The last occurrence was in 2003. The pollutants that caused these elevated risks were PM_{2.5} and PM₁₀. The primary air quality pollutants within the MCFO boundaries are sulfur dioxide and particulate matter.

Table 1. US EPA - AirData Air Quality Index Report – Field Office Summary (1999-2008)

County	State	# Days with Data	# Days rated Good	Percent of Days Rated Good	# Days Rated Mod	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy
Rosebud	MT	3,422	3,173	93	245	4	0
Roosevelt	MT	684	677	99	7	0	0
Sheridan	MT	779	775	99	4	0	0
McCone	MT	140	140	100	0	0	0
Field Office		5,025	4,765	95	256	4	0

Between 2004-2008, the area managed by the MCFO was in compliance with all air quality standards. Sulfur dioxide reached 6.7 percent of the standard (2004); nitrogen dioxide reached 5.6 percent (2005); PM_{2.5} reached 74 percent (24 hour---n 2005), and PM₁₀ reached 42 percent (2008) of the standard. This indicates that current air quality is very good, falling well below applicable standards. The difference in years is due to discontinuing monitoring at various stations.

Monitoring data show that the primary pollutants for this analysis area are sulfur dioxide (SO₂) and particulate matter (PM_{2.5} and PM₁₀). A review of emissions from Carter, Custer, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Rosebud, and Wibaux counties (where most BLM lands are located) show that coal mining activities are the primary sources of SO₂ resulting in 92 percent of all emissions. Particulate matter sources typically vary by the size of the particles. PM_{2.5} is primarily produced by combustion in Carter County (58 percent), agriculture (11 percent), coal production (10 percent), fugitive dust (7 percent), and mineral products (7 percent), while PM₁₀ is primarily from fugitive dust (29 percent), agriculture and forestry (27 percent), combustion (25 percent), mineral products (12 percent), and coal production (4 percent). It is important to note that the presence of a source does not automatically mean that air quality is impaired. As shown above, these emissions do not necessarily lead to impaired air quality. The emissions information is simply intended to identify those sectors which have the greatest likelihood to influence current and future air quality for this analysis area.

The PM₁₀ non-attainment area of Lame Deer is located in Rosebud County. While only a part of this county is in non-attainment, the entire county was considered because this entire area contributes to conditions in Lame Deer. The primary sources of PM₁₀ are fugitive dust (43

percent), coal production (24 percent), agriculture and forestry (15 percent), and mineral production (12 percent).

3.2.2 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.” (IPCC 2007a). Climate change and climate science are discussed in detail in the Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management (Climate Change SIR, 2010). This document is incorporated by reference into this EA.

The Intergovernmental Panel on Climate Change (Climate Change SIR, 2010) states, “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.” Global average temperature has increased approximately 1.4°F since the early 20th century (Climate Change SIR 2010). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth’s atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by IPCC 2007b (Climate Change SIR 2010) include:

- Rates of surface warming increased in the mid-1970s and the global land surface has been warming at about double the rate of ocean surface warming since then;
- Eleven of the last 12 years rank among the 12 warmest years on record since 1850;
- Lower-tropospheric temperatures have slightly greater warming rates than the earth’s surface from 1958-2005.

As discussed and summarized in the Climate Change SIR, earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO₂, methane, and N₂O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (Climate Change SIR 2010). Current ongoing global climate change is ~~believed by scientists to be linked to~~ **caused, in part, by** the atmospheric buildup of GHGs, which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG’s heat trapping effect and its longevity in the atmosphere (Climate Change SIR 2010). The buildup of GHGs such as CO₂, methane, N₂O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth’s surface and re-emit a larger portion of the earth’s heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained

climatic impact over different temporal scales due to their differences in global warming potential (described above) and lifespans in the atmosphere. For example, CO₂ proper may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR, 2010).

North Dakota, Montana, and South Dakota are all in the lower third of GHG-emitting states (by volume). North Dakota ranks 37, Montana ranks 42, and South Dakota ranks 43. Only Hawaii and Idaho have lower emissions than Montana and South Dakota among western states (http://assets.opencrs.com/rpts/RL34272_20071205.pdf, Ramseur 2007). Montana, North Dakota, and South Dakota combine for 1.8 percent of the U.S.'s GHG emissions.

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the Climate Change SIR describes impacts of climate change in detail at various scales, including the state scale when appropriate. The following bullet points summarize potential changes identified by the EPA (EPA, 2008) that are expected to occur at the regional scale, where the Proposed Action and its alternatives are to take place. The EPA identifies this area as part of the Mountain West and Great Plains region (<http://www.epa.gov/Region8/climatechange/pdf/ClimateChange101FINAL.pdf>):

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patters could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions would reduce the range and health of ponderosa and lodgepole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife such as the mountain lion, black bear, long-nose sucker, marten, and bald eagle could be further stressed.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR. Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue (USGCRP 2009, as cited by Climate Change SIR 2010). Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to two weeks earlier

through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.

- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increases insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

More specific to Montana, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (2010) include:

- Temperature increases in Montana are predicted to be between 3 to 5°F at mid-21st century and between 5 to 9°F at the end of the 21st century. As the mean temperature rises, more heat waves are predicted to occur. In the late 21st century, the number of days per year with temperatures above 100°F is predicted to be between 10 and 45, depending on the level of GHG emissions, with the largest increase in the number days over 100°F occurring in the eastern portion of the state.
- Precipitation increases in winter and spring in Montana may be up to 25 percent in some areas. Precipitation decreases of up to 20 percent may occur during summer, with potential increases or decreases in the fall. In the fall western Montana may see little change in precipitation while the northwestern portion of the state may experience 5 to 10 percent increases.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent, but northwestern Montana may see little change in annual runoff. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Glaciers are already known to be melting, and all glaciers in Glacier National Park are expected to be completely melted by 2030 or sooner.
- Wind power production potential is predicted to decline in Montana based on modeling focused on the Great Falls area.
- Conditions in Montana wetlands across much of the northern part of the state are predicted to remain relatively stable, although some wetland habitat near Cut Bank is predicted to degrade to less favorable conditions.
- Water temperatures are expected to increase in lakes, reservoirs, rivers, and streams. Fish populations are expected to decline due to warmer temperatures, which could also lead to more fishing closures.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in Montana based on a 1°C global average temperature increase to be 241 to 515 percent.

While long-range regional changes might occur within this analysis area, it is impossible to predict precisely when they could occur. The following example summarizing climate data for

the West North Central Region (MT, ND, SD, and WY) illustrates this point at the regional scale. A potential regional effect of climate change is earlier snowmelt and associated runoff. This is directly related to spring-time temperatures. Over a 112-year record, overall warming is clearly evident with temperatures increasing 0.21 degrees per decade (Figure E). This would suggest that runoff may be occurring earlier than in the past. However, data from 1991-2005 indicates a 0.45 degree per decade cooling trend (Figure F). This example is not an anomaly, as several other 15-year windows can be selected to show either warming or cooling

, and the eruption of large volcanoes (Climate Change SIR 2010). This information illustrates the difficulty of predicting actual regional or site-specific changes or conditions which may be due to climate change during any specific time frame.

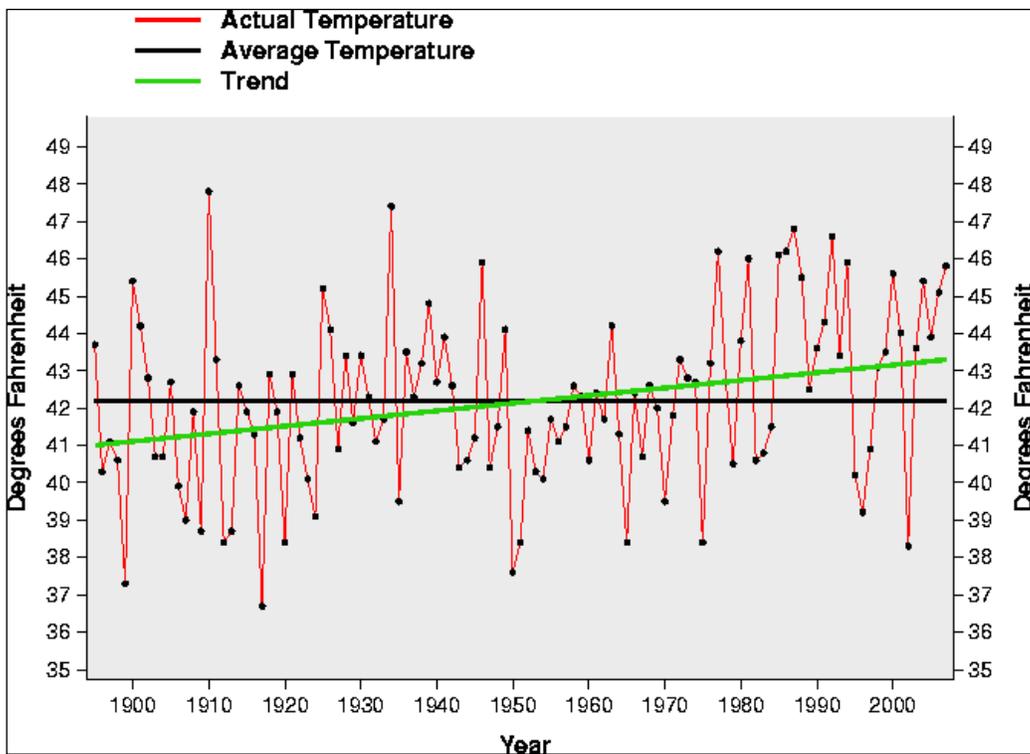


Figure E. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1895-2007. (Source: NOAA website – <http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html>)

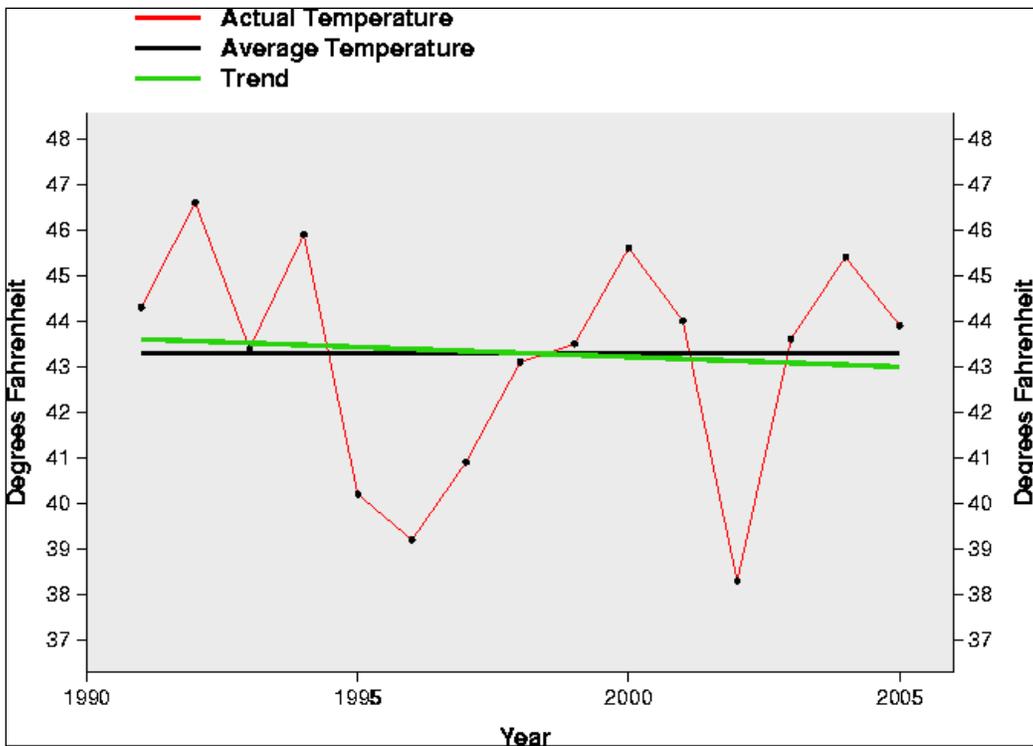


Figure F. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1991-2005. (Source: NOAA website – <http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html>)

3.3 Soil Resources

The soil-forming factors (i.e., climate, parent material, topography, biota, and age) are variable across the MCFO, which results in soils with diverse physical, chemical, and biotic properties. Important properties of naturally functioning soil systems include biotic activity, diversity, and productivity; water capture, storage, and release; nutrient storage and cycling; contaminant filtration, buffering, degradation, immobilization, and detoxification; and biotic system habitat.

Reclamation suitability describes the ability of the soil resource to restore functional and structural integrity following disturbance. The rate and degree of recovery is dependent on the action, time of year, and various site characteristics. Soils poorly suited to successful reclamation contain characteristics that include high salt content, poor water-holding capacity, inadequate rooting depth, or highly erosive qualities. Sites poorly suited to reclamation, would require unconventional and/or site-specific reclamation measures.

The lease parcels are located within 10 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Big Dry (HUC 10040105), Brush Lake Closed Basin (HUC 10060007), Charlie-Little Muddy (HUC 10060005), Lower Musselshell (HUC 10040205), Lower Yellowstone (HUC 10100004), Lower Yellowstone-Sunday (HUC 10100001), Middle Musselshell (HUC 10040202), Poplar (HUC 10060003), Upper Little Missouri (HUC 10110201), and West Fork Poplar (HUC 10060004). The acreage of lease parcels comprise between 0.01 and 0.41% of each watershed (USGS 2009). Soils considered prime farmlands, if irrigated, occur within the Brush Lake Closed Basin, Lower Yellowstone, Middle Musselshell, and West Fork Poplar watershed parcels. However, since dependable water is unavailable on these lands, they are not

considered prime farmland. The following describes the common soil properties of lease parcels within each watershed:

The Big Dry watershed contains proposed lease parcel MTM 97300 M2 located in Garfield County. Parcel soils generally developed from alluvium and residuum from the Tullock Member of the Fort Union Formation. Ecological sites are typically silty (Si, MLRA58AE, 10-14). Surface textures are typically silt loams. Terrain within the parcel is gentle, with slopes ranging around 10 percent; however, slopes reach about 30 percent. Elevation is approximately 3,000 feet. Approximately 20 percent (55 ac.) of the parcel is considered poorly suited to reclamation.

The Brush Lake Closed Basin watershed contains proposed lease parcels MTM 97300 LX, LY, LZ, and MP located in Sheridan County. Parcel soils generally developed from glacial till. Ecological sites are typically clayey-steep (CyStp, MLRA 53A, 10-14). Surface textures are typically clay loams. Terrain within the parcels is gentle, with slopes ranging around 5 percent; however, slopes reach about 25 percent. Elevation is approximately 2,000 feet. Approximately 67 percent (219 ac.) of the parcels are considered poorly suited to reclamation.

The Charlie-Little Muddy watershed contains proposed lease parcel MTM 97300 LD located in Roosevelt County. Parcel soils generally developed from residuum from the Tongue River Member of the Fort Union Formation. Ecological sites are typically shallow (Sw) or silty (Si, MLRA 53A, 10-14). Surface textures are typically silt loams. Terrain within the parcel is gentle, with slopes ranging around 10 percent; however, slopes reach about 30 percent. Elevation is approximately 2,000 feet. Approximately 42 percent (24 ac.) of the parcel is considered poorly suited to reclamation.

Lower Musselshell watershed contains proposed lease parcels MTM 97300 L0, N7, N8, NU, and NY located in Garfield County. Parcel soils generally developed from alluvium from the Hell Creek Formation. Ecological sites are typically silty (Si, MLRA 58AE, 10-14). Surface textures are typically silt loams. Terrain within the parcels is gentle, with slopes ranging around 5 percent; however, slopes reach about 80 percent. Elevation is approximately 2,700 feet. Approximately 6 percent (36 ac.) of the parcels are considered poorly suited to reclamation.

The Lower Yellowstone watershed contains proposed lease parcels MTM 97300 OY, P9, PT, PU, PV, PW, PX, PY, and PZ located in Richland and Wibaux counties. Parcel soils generally developed from the Tongue River Member of the Fort Union Formation. Ecological sites are typically silty-steep (SiStp, MLRA 58AE, 10-14). Surface textures are typically loams. Terrain within the parcels is rough, with slopes ranging around 25 percent; with slopes reaching about 180 percent. Elevation is approximately 1,900 feet. Approximately 74 80 percent (581 ac.) of the parcels are considered poorly suited to reclamation.

Lower Yellowstone-Sunday contains proposed lease parcels MTM 97300 M4, MX, MY, and MZ located in Rosebud County. Parcel soils generally developed from alluvium and residuum from the Bearpaw Shale Formation. Ecological sites are typically silty-steep (SiStp) or clayey (Cy, MLRA 58AE or 60BE, 10-14). Surface textures are typically silty clays. Terrain within the parcels is rolling hills, with slopes ranging around 5 percent; however, slopes reach about 70

percent. Elevation is approximately 2,700 feet. Approximately 60 percent (331 ac.) of the parcels are considered poorly suited to reclamation.

Middle Musselshell contains proposed lease parcels MTM 97300 L4, M1, M3, and MX located in Rosebud County. Parcel soils generally developed from residuum from the Lance Formation. Ecological sites are typically silty-steep (SiStp, MLRA 58AE, 10-14). Surface textures are typically loams. Terrain within the parcels is rolling hills, with slopes ranging around 15 percent; however, slopes reach about 55 percent. Elevation is approximately 3,000 feet. Approximately 74 percent (345 ac.) of the parcels are considered poorly suited to reclamation.

Poplar contains proposed lease parcels MTM 97300 OF, OG, OH, OI, OL, OM, ON, OP, and OS located in Daniels County. Parcel soils generally developed from glacial till from the Flaxville and Fort Union Formations. Ecological sites are typically silty (Si) or silty-steep (SiStp, MLRA 53A, 10-14). Surface textures are typically loams. Terrain within the parcels is rolling hills, with slopes ranging around 10 percent; however, slopes reach about 40 percent. Elevation is approximately 2,400 feet. Approximately 50 percent (305 ac.) of the parcels are considered poorly suited to reclamation.

The Upper Little Missouri contains proposed lease parcel MTM 97300 MW located in Carter County. Parcel soils generally developed from residuum from the Belle Fourche Shale Formation. Ecological sites are typically shallow clay (SwC, MLRA 60B, 10-14). Surface textures are typically clay. Terrain within the parcel is gentle, with slopes ranging around 10 percent; however, slopes reach about 40 percent. Elevation is approximately 3,300 feet. Approximately 96 percent (1,260 ac.) of the parcel is considered poorly suited to reclamation.

West Fork Poplar watershed contains proposed lease parcels MTM 97300 N0, N9, OB, OC, OD, OE, OJ, OK, OO, OQ, and OR located in Daniels County. Parcel soils generally developed from gravelly outwash from the Fort Union Formation. Ecological sites are typically silty (Si) or gravel (Gr, MLRA 53A, 10-14). Surface textures are typically sandy loams. Terrain within the parcels is rolling hills, with slopes ranging around 15 percent; however, slopes reach about 60 percent. Elevation is approximately 2,400 feet. Approximately 50 percent (1,115 ac.) of the parcels are considered poorly suited to reclamation.

3.4 Water Resources

3.4.1 Surface Hydrology

Surface water resources across the MCFO are present as lakes, reservoirs, rivers, streams, wetlands, and springs. Water resources are essential to the residents of eastern Montana to support agriculture, public water supplies, industry, and recreation. Water resources and riparian areas are crucial to the survival of many BLM-sensitive fish, reptiles, birds, and amphibians.

Perennial streams retain water year-round and have variable flow regimes. Intermittent streams flow during the part of the year when they receive sufficient water from springs, groundwater, or surface sources such as snowmelt or storm events. Ephemeral streams flow only in direct response to precipitation. Intermittent and ephemeral streams play an important role in the hydrologic function of the ecosystems within the lease parcels by transporting water, sediment, nutrients, and debris and providing connectivity within a watershed. They filter sediment,

dissipate energy from snowmelt and storm water runoff, facilitate infiltration, and recharge groundwater (Levick et al. 2008). The pools of intermittent streams retain water in the summer months, supporting riparian vegetation and providing water resources for wildlife and livestock.

Stream morphology is influenced by a number of factors including: stream flow regime, geology, soils, vegetation type, climate, and land use history. Stream conditions reflect a number of historic and current impacts, ranging from agriculture to mining. Surficial geology is generally represented by Tertiary sandstones, siltstones, and shales, with some alluvium and glacial till which tends to form fine grain soils (loams to clays), that are highly erosive. Streambeds consist typically of sand and silt, with few bedrock channels. Stream morphology is highly influenced by the presence and type of riparian vegetation because streambeds and stream banks generally lack control features (e.g., rocks, cobbles, bedrock).

The analysis area is located within the Upper Missouri River basin of the Missouri River Hydrologic region. The lease parcels are located within 10 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Big Dry (HUC 10040105), Brush Lake Closed Basin (HUC 10060007), Charlie-Little Muddy (HUC 10060005), Lower Musselshell (HUC 10040205), Lower Yellowstone (HUC 10100004), Lower Yellowstone-Sunday (HUC 10100001), Middle Musselshell (HUC 10040202), Poplar (HUC 10060003), Upper Little Missouri (HUC 10110201), and West Fork Poplar (HUC 10060004). The acreage of the lease parcels comprise between 0.01 and 0.41% of each watershed (USGS 2009).

The lease parcels cumulatively contain 49 acres of known potholes, lakes, reservoirs, and ponds, supporting beneficial uses including irrigation, livestock water, recreation, fisheries, and wildlife (NHD 2009). Many of these impoundments have been built across intermittent or ephemeral streams in order to capture spring runoff for livestock use. Additionally, there are numerous undocumented livestock ponds, dugouts, and small impoundments across the analysis area. These impoundments have altered natural hydrologic regimes on streams, limiting the ability of streams to transport sediment, reducing long term average flow rates, and contributing to changes in stream morphology.

The Big Dry (HUC 10040105) watershed contains proposed lease parcel MTM 97300 M2 located in Garfield County. The lease parcel comprises 0.03% of the watershed. Within this watershed, the lease parcel contains approximately 0.7 miles of Big Dry Creek and 0.6 miles of unnamed intermittent and ephemeral streams (USGS 2009). Within this watershed, the lease parcel contains 36 acres of 100-year floodplains.

The Brush Lake Closed Basin (HUC 10060007) watershed contains proposed lease parcels MTM 97300 LX, LY, LZ, and MP located in Sheridan County. The lease parcels comprise 0.08% of the watershed. Within this watershed, the lease parcels contain 0.3 miles of unnamed intermittent and ephemeral streams, 10.2 acres of the perennial Flat Lake, 3.8 acres of the perennial Park Lake, and 16.9 acres of perennial, unnamed lake/ponds, 4.6 acres of intermittent, unnamed lake/ponds (USGS 2009). Within this watershed, the lease parcels contains 41.3 acres of 100-year floodplains.

The Charlie-Little Muddy (HUC 10060005) watershed contains proposed lease parcel MTM 97300 LD located in Roosevelt County. The lease parcel comprises 0.01% of the watershed. Within this watershed, the lease parcel contains approximately 0.3 miles of unnamed intermittent and ephemeral streams and 5.8 acres of perennial, unnamed lake/ponds (USGS 2009).

Lower Musselshell (HUC 10040205) watershed contains proposed lease parcels MTM 97300 L0, N7, N8, NU, and NY located in Garfield County. The lease parcels comprise 0.06% of the watershed. Within this watershed, the lease parcels contain approximately 0.7 miles of Calf Creek, 0.2 miles of Musselshell River, 3.1 miles of unnamed intermittent and ephemeral streams; 1.5 acres of perennial, unnamed lake/ponds; and 0.6 acres of intermittent, unnamed lake/ponds (USGS 2009). Within this watershed, the lease parcels contain 52.8 acres of 100-year floodplains.

The Musselshell River (MT40C003_010; Flatwillow Creek to Fort Peck Reservoir) is identified as impaired on the 2010 303 (d)/305(b) Integrated Report (Impaired Streams List) by the MDEQ. It is listed as fully supporting primary contact recreation and partially supporting aquatic life and warm water fishery beneficial uses. The probable causes are alteration in stream-side or littoral vegetative covers and low flow alterations. The sources for the probable causes are agriculture, grazing in riparian or shoreline zones, streambank modifications/destabilization, flow alterations from water diversions, impacts from hydrostructure flow regulation/modification, and impacts from resort areas (winter and non-winter resorts). A Total Maximum Daily Load (TMDL) is not required because the causes of impairment are not classified as "pollutants" and do not require a TMDL. MDEQ developed a restoration plan called the Lower Musselshell TMDL Planning Area Decision Document was submitted to EPA on December 28, 2001. (http://cwaic.mt.gov/det_rep.aspx?segId=MT40C003_010&qryId=81221 accessed 3/29/11).

The Lower Yellowstone (HUC 10100004) watershed contains proposed lease parcels MTM 97300 OY, P9, PT, PU, PV, PW, PX, PY, and PZ located in Richland and Wibaux counties. The lease parcels comprise 0.02% of the watershed. Within this watershed, the lease parcels cumulatively contain approximately 0.2 miles of Alkali Creek, 0.3 miles of Smith Creek, 0.2 miles of the Yellowstone River, and 5.3 miles of intermittent and ephemeral streams (USGS 2009). Within this watershed, the lease parcels contain ~~174.9~~ 117.5 acres of 100-year floodplains.

Smith Creek (MT42M002_080; headwaters to mouth (Yellowstone River)) is identified as impaired on the 2010 303 (d)/305(b) Integrated Report (Impaired Streams List) by the MDEQ. It is listed as fully supporting primary contact recreation and aquatic life and partially supporting and warm water fishery beneficial uses. A TMDL is not required; no pollutant-related use impairment has been identified. The probable cause is fish-passage barrier and the source is low water crossing (http://cwaic.mt.gov/det_rep.aspx?segId=MT42M002_080&qryId=81245 accessed 3/29/11).

Yellowstone River (MT42M001_011; Lower Yellowstone Diversion Dam to North Dakota) is listed as category 5 (one or more uses are impaired and a TMDL is required) with agricultural, drinking water, industrial, and primary contact recreation uses fully supporting and aquatic life and warm water fishery uses partially supporting. The probable causes are nitrogen (Total),

chromium (total), pH, copper, sedimentation/siltation, lead, phosphorus (Total), total dissolved solids, alteration in stream-side or littoral vegetative covers, and fish-passage barrier and sources are impacts from hydrostructure flow regulation/modification, natural sources, source unknown, rangeland grazing, streambank modifications/20anadensis20tion, and irrigated crop production (http://cwaic.mt.gov/det_rep.aspx?segId=MT42M001_011&qryId=74139 accessed 3/29/11).

Lower Yellowstone-Sunday (HUC 10100001) contains proposed lease parcels MTM 97300 M4, MX, MY, and MZ located in Rosebud County. The lease parcels comprise 0.02% of the watershed. Within this watershed, the lease parcels cumulatively contain approximately 2.6 miles of intermittent and ephemeral streams and 2.9 acres of intermittent, unnamed lake/ponds (USGS 2009).

Middle Musselshell (HUC 10040202) contains proposed lease parcels MTM 97300 L4, M1, M3, and MX located in Rosebud County. The lease parcels comprise 0.04% of the watershed. Within this watershed, the lease parcels cumulatively contain approximately 0.1 miles of the Musselshell River and 2 miles of intermittent and ephemeral streams. Parcel MTM 97300 MX contains a spring (USGS 2009). Within this watershed, the lease parcels contain 2 acres of 100-year floodplains.

The Musselshell River (MT40C001_010; HUC boundary near Roundup to Flatwillow Creek) is identified as impaired on the 2010 303 (d)/305(b) Integrated Report (Impaired Streams List) by the MDEQ. It is listed as fully supporting primary contact recreation and partially supporting aquatic life and warm water fishery beneficial uses. The probable causes are alteration in stream-side or littoral vegetative covers, low flow alterations, and physical substrate alterations and sources are agriculture, channelization, streambank modifications/20anadensis20tion, impacts from hydrostructure flow regulation/modification, and impacts from resort areas (winter and non-winter resorts). A Total Maximum Daily Load (TMDL) is not required because no pollutant-related use impairment has been identified (http://cwaic.mt.gov/det_rep.aspx?segId=MT40C001_010&qryId=81248 accessed 3/29/11).

Poplar (HUC 10060003) contains proposed lease parcels MTM 97300 OF, OG, OH, OI, OL, OM, ON, OP, and OS located in Daniels County. The lease parcels comprise 0.07% of the watershed. Within this watershed, the lease parcels cumulatively contain approximately 0.2 miles of Butte Creek, 0.4 miles of Poplar River, 2.5 miles of intermittent and ephemeral streams, 1.5 acres of intermittent, unnamed lake/ponds, and 3.6 acres of perennial, unnamed lake/ponds (USGS 2009). Within this watershed, the lease parcels contain 18.5 acres of 100-year floodplains.

Butte Creek (MT40C001_010; headwaters to mouth (Poplar River)) is identified as impaired on the 2010 303 (d)/305(b) Integrated Report (Impaired Streams List) by the MDEQ. It is listed as fully supporting drinking water, industrial, and primary contact recreation beneficial uses; partially supporting agricultural and aquatic life beneficial uses; and cold water fishery beneficial uses had insufficient information. The probable causes are specific conductance, Total Kjeldahl Nitrogen (TKN), iron, phosphorus (Total), nitrate/nitrite (Nitrite + Nitrate as N), sodium, and sources are natural sources, crop production (crop land or dry land), and source unknown. A TMDL is required but has not been developed (http://cwaic.mt.gov/det_rep.aspx?segId=

MT40Q002_010&qryId=81249 accessed 3/29/11).

Poplar River (MT40C001_010; T35N R48E S17 to the mouth (Fort Peck Reservation), T33N R48E S12) is identified as impaired on the 2010 303 (d)/305(b) Integrated Report (Impaired Streams List) by the MDEQ. It is listed as fully supporting agricultural, drinking water, and industrial; partially supporting aquatic life; not supporting primary contact recreation; and insufficient information to assess cold water fishery beneficial uses. The probable causes are Escherichia coli, sedimentation/siltation, temperature, water, and sources are rangeland grazing, source unknown, and natural sources. A TMDL is required but has not been developed (http://cwaic.mt.gov/det_rep.aspx?segId=MT40Q001_011&qryId=81250 accessed 3/29/11).

The Upper Little Missouri (HUC 10110201) contains proposed lease parcel MTM 97300 MW located in Carter County. The lease parcel comprises 0.06% of the watershed. Within this watershed, the lease parcel contains approximately 4.1 miles of intermittent and ephemeral streams, 0.3 acres of intermittent, unnamed lake/ponds, and 0.8 acres of perennial, unnamed lake/ponds (USGS 2009). Within this watershed, the lease parcel contains 1 acre of 100-year floodplains.

West Fork Poplar (HUC 10060004) watershed contains proposed parcels MTM 97300 N0, N9, OB, OC, OD, OE, OJ, OK, OO, OQ, and OR located in Daniels County. The lease parcels comprise 0.41% of the watershed. Within these watersheds, the lease parcels cumulatively contain approximately 0.8 miles of Hell Creek, 0.1 miles of West Fork of Poplar River, 12.3 miles of intermittent and ephemeral streams, 1.5 acres of intermittent, unnamed lake/ponds, and 0.7 acres of perennial, unnamed lake/ponds. Parcel MTM 97300 OQ contains a spring (USGS 2009). Within this watershed, the lease parcels contain 35.3 acres of 100-year floodplains.

Fidelity Exploration is currently discharging treated, coal bed natural gas (CBNG) water authorized by one MDEQ permits (MT-0030724) into the Tongue River (BLM 2008). This permit has specific water quality and quantity standards.

Any beneficial use of produced water requires water rights to be issued by Montana Department of Natural Resources and Conservation (MDNRC) as established by law. This water has been used for watering livestock, irrigation, drilling operations, and industrial applications. Most of the CBNG-produced water is pumped into temporary ponds, where the water evaporates or could potentially infiltrate the soil or shallow aquifers.

3.4.2 Groundwater

The quality and availability of groundwater varies greatly across the region. Residents in eastern Montana commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations and some coal beds.

Alluvial aquifers within the area and generally consist of Quaternary alluvium and undifferentiated Quaternary/Tertiary sediments, which include sand and gravel deposits. Alluvial aquifers occur in terrace deposits and within the floodplains, and along the channels of larger streams, tributaries, and rivers, and are among the most productive sources of

groundwater. They are typically 0-40 feet thick. The quality of groundwater from alluvial aquifers is generally good, but can be highly variable [approximately 100 mg/l to 2,800 mg/l TDS, specific conductance (SC) of 500 to 125,000 microsiemens/centimeter (uS/cm), and sodium adsorption ratio (SAR) of 5.0 to 10]. Wells completed in coarse sand and gravel alluvial aquifers can yield as much as 100 gallons per minute (gpm), although the average yield is 15 gpm. Alluvial deposits associated with abandoned river channels or detached terraces are topographically isolated and have limited saturation and yield as much as 20 gpm (Zelt et al. 1999).

Within the analysis area, the primary bedrock aquifers occur in sandstones and coal beds of the Tertiary Fort Union Formation (Cenozoic rocks) and the sandstones of the Cretaceous Hell Creek and Fox Hills formations (Mesozoic rocks). Wells within the Fort Union formation aquifers are typically 100 to 200 feet deep, but can be up to 1500 feet in depth. These wells may produce as much as 40 gpm, but yields of 15 gpm are typical. Where aquifers are confined and artesian conditions exist, wells in the Fort Union Formation will generally flow less than 10 gpm. Well depths to the Hells Creek and Fox Hills formation aquifers are highly variable, but typically range from 200 to 1,000 feet in depth. Groundwater yields from these aquifers may be as much as 200 gpm, but are generally less than 100 gpm. Artesian wells within these aquifers may flow as high as 20 gpm (Zelt et al. 1999). Groundwater yields from the deeper Paleozoic Madison formation aquifer can range from 20 to 6,000 gpm, or can be higher, in karst areas. The depth to the Madison formation aquifer in the planning area can exceed 6,000 feet. Due to the extreme depth of this aquifer, it is rarely accessed for water use. Water quality of this aquifer is highly variable and is dependent on depth, bedrock type, recharge rate, and other factors.

If a lease parcel is developed for CBNG, the natural gas must be desorbed from the coal so that it can flow to production wells. This is typically achieved by pumping groundwater from the coal bed aquifer to reduce the hydrostatic pressure within the coal, creating a pressure gradient within the aquifer which enables methane to flow towards the well. The amount of water produced varies from well to well and annually for each well. As wells operate over time, hydrostatic pressure drawdown occurs within the coal aquifer. For example, in the Canyon coal bed, the hydrostatic pressure has been lowered more than 600 feet, and in the Dietz and Canyon beds, a 20-foot groundwater drawdown extended about 1.0 to 1.5 miles beyond the boundary of the CX field. The quality of CBNG-produced water varies, but is generally characterized by elevated levels of salinity, SAR (36.8 to 66.3), and TDS (up to 2,029 mg/L) (Wheaton et al. 2008).

The Montana Department of Natural Resources and Conservation (MDNRC) established the Controlled Groundwater Area in anticipation of the withdrawal of groundwater associated with CBNG development. Within the CBNG Controlled Groundwater Area, CBNG operators must offer water mitigation agreements to owners of water wells and natural springs located within 0.5 mile of a CBNG field, or within the area that the operator reasonably believes may be affected by a CBNG production operation, whichever is greater.

3.5 Vegetation Resources

The vegetation within the analysis area is characteristic of the Eastern Sedimentary Plains of Montana in the 10 to 14-inch precipitation zone, which lies within the Northern Great Plains. The Northern Great Plains is known for its diverse vegetation types, soil types, and topography.

Vegetation is comprised of both tall and short grasses as well as both warm and cool season grasses. A variety of grass-like plants, forbs, and shrubs also add to the vegetation diversity of this rangeland type. Plant species diversity increases in woody draws and riparian/wetland zones.

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, management boundary fence lines, and soil salinity. Vegetation communities have been affected by human activities for over a century. Some of these activities include: infrastructure developments (roads, powerlines, pipelines, etc.), chemical applications, logging, livestock grazing, farming, and wildfire rehabilitation, prevention, manipulation, and suppression.

The BLM Standards of Rangeland Health (Standards) for BLM administered lands address upland health, riparian health, air quality, water quality, and habitat for native plants and animals. Meeting these Standards ensures healthy, productive, and diverse vegetative resources on public lands. The BLM's policy for implementing the Standards for Rangeland Health (43 CFR §4180.2) provides that all uses of public lands are to complement the established rangeland standards. Application of 43 CFR §4180.2 provides the mechanism to adjust livestock grazing to meet or progress towards meeting Standards for Rangeland Health. Effects of other uses such as oil and gas development or off-highway vehicle use are evaluated against the Standards to provide rationale directing management of these uses.

Six vegetation communities have been identified within the analysis area: native mixed grass prairie, sagebrush/mixed grasslands, ponderosa pine-mixed grassland, agricultural lands, improved or restored pastures, and riparian-wetlands.

There are numerous ecological sites identified within the analysis area, but the primary ones include the following; Claypan (Cy), Sands (Sa), Sandy (Sy), Sandy-Steep (SyStp), Shallow (Sw), Shallow Clay (SwC), Silty (Si), and Silty- Steep (SiStp). The total dry-weight production expected to be found on these sites during a normal growing season ranges from approximately 800 to 1,500 lbs. /acre.

The native mixed grassland community is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses. These perennial grasses can also be both tall and short grasses. Some of the more common grasses include western wheatgrass (*Pascopyrum smithii*), needle-and-thread (*Hesperostipa 23anade*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and prairie junegrass (*Koeleria macrantha*). Various forbs and shrubs are present but, occur as a minor species composition component throughout the community.

The sagebrush/ mixed grassland community occurs on lower valley slopes near drainages, especially where soils are deeper. This community can include a combination of silver sagebrush (*Artemisia cana*) and Wyoming big sagebrush (*Artemisia 23anadensis ssp. Wyomingensis*). This setting is common throughout the analysis area. The sagebrush/grassland vegetation community has a perennial grass and forb understory, similar to the species found in a

mixed native grassland community. The expected species composition on this community consists of 70-75% native grass species, 10-15% forbs, and 5-10% shrubs and half-shrubs.

The ponderosa pine-mixed grassland community generally occurs on moderate-to-steep upland slopes on shallow soils. Ponderosa pine is a minor component of the community canopy cover but is characteristic of the type. Fifty-two percent of canopy cover is provided by grasses, including bluebunch wheatgrass (*Pseudoroegneria spicata*), western wheatgrass, and prairie junegrass, with forbs comprising about 41 percent of cover and 50 percent of herbaceous production. This community type is very limited within the analysis area.

Improved or restored pastures consists of cultivated areas planted with introduced grasses (crested wheatgrass, smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), and alfalfa (*Medicago sativa*), specifically for the improved vegetation production for livestock consumption. This setting is limited in the analysis area.

The cultivated plant community is comprised of monocultures of crops which may include small grains, alfalfa, or other crops grown primarily as supplemental feed sources for livestock production operations. These areas have been completely disturbed from the native vegetation potentials. This setting is absent or very limited in the analysis area.

Wetland areas are defined as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient, and which, under normal circumstances, do support, a prevalence of vegetation adapted for life in saturated soil conditions.” Riparian areas are defined as “a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil” (Prichard et. al 1995).

Within the analysis area, riparian and wetland areas would be associated with lakes, reservoirs, potholes, springs, bogs, and wet meadows as well as ephemeral, intermittent, or perennial streams. Riparian and wetland areas are among the most productive and important ecosystems (Prichard et. al. 1995). Characteristically, riparian and wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Adequate, healthy riparian and wetland vegetative buffers protect associated waterbodies from accelerated erosion and sedimentation and reduce or eliminate non-point source pollution from upland areas (MDEQ 2007). Healthy riparian and wetland systems filter and purify water as it moves through the riparian-wetland zone, reduce sediment loads and enhance soil stability, provide micro-climate moderation when contrasted to temperature extremes in adjacent areas, and contribute to groundwater recharge and base flow (Eubanks, 2004).

Riparian areas are considered to be some of the most biologically diverse habitats (FSEIS 2008). Some of the more common vegetative species that occur in riparian-wetland areas include prairie

cordgrass (*Spartina pectinata*), switchgrass (*Panicum virgatum*), Canada wildrye (*Elymus 25anadensis*), American licorice (*Glycyrrhiza lepidota*), sedges (*Carex spp.*), rushes (*Juncus spp.*), willow (*Salix spp.*), chokecherry (*Prunus virginiana*), buffaloberry (*Shepherdia argentea*), cottonwood (*Populus spp.*), and green ash (*Fraxinus pennsylvanica*).

Wetlands provide watering points for wildlife and livestock and provide habitat diversity. Species include several sedges (*Carex spp.*), rushes (*Juncus spp.*), bulrush (*Schoenoplectus spp.*), cattail (*Typha spp.*), wild rose (*Rosa spp.*), and snowberry (*Symphoricarpos spp.*). At higher elevations they are associated primarily with springs, seeps, and intermittent streams. Precipitation-dependent wetland sites fluctuate annually, in a range from dry to wet, in direct response to seasonal moisture, temperature, and wind.

From the Montana Natural Heritage Program (MTNHP) provisional mapping GIS data and the USFWS National Wetland Inventory (NWI) GIS data, 21 proposed lease parcels contain approximately 50 acres of delineated riparian or wetland areas (Table 2). This list is not comprehensive because 11 of the lease parcels (MTM 97300 L0, L4, M1, M2, M3, M4, MX, MY, MZ, N7, and N8) have not been mapped and GIS data for was not available for 1 of the lease parcel (MTM 97300 PT).

Table 2: MTNHP and USFWS Riparian and Wetland Areas by Lease Parcel*

Lease Parcel	Riparian/Wetland Type	Classification	Acres
MTM 97300-LX ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	6.9
		Palustrine, Emergent, Semipermanently Flooded	0.7
		Palustrine, Emergent, Temporarily Flooded	0.5
	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	0.2
	Lake		4.8
MTM 97300-LY ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	4.9
		Palustrine, Emergent, Semipermanently Flooded	2.1
		Palustrine, Emergent, Temporarily Flooded	4.9
MTM 97300-LZ ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	2.6
		Palustrine, Emergent, Semipermanently Flooded	7.8

	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded	9.0	
MTM 97300-MP ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	5.6	
		Palustrine, Emergent, Temporarily Flooded	7.4	
	Lake	Lacustrine, Littoral, Unconsolidated Shore, Seasonally Flooded	10.7	
	Other	Palustrine, Unconsolidated Shore, Seasonally Flooded	1.8	
MTM 97300-MW ¹	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded, Diked/Impounded	0.3	
		Palustrine, Emergent, Seasonally Flooded, Excavated	0.6	
		Palustrine, Emergent, Semipermanently Flooded, Diked/Impounded	0.1	
		Palustrine, Emergent, Temporarily Flooded	3.9	
	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	0.1	
		Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	0.4	
		Palustrine, Unconsolidated Shore, Temporarily Flooded	1.5	
	Lacustrine	Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded	0.1	
	MTM 97300-NO ²	Freshwater Emergent Wetland	Palustrine, Emergent, Temporarily Flooded, Diked/Impounded	< 0.1
	MTM 97300-NU ¹	Riparian Emergent	Riparian, Emergent	1.4
Riparian Forested		Riparian, Forested	2.1	
Riverine		Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	2.3	
		Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	0.6	

MTM 97300-NY ¹	Freshwater Emergent Wetland	Palustrine, Emergent, Temporarily Flooded	0.1
	Riparian Emergent	Riparian, Emergent	0.8
	Riparian Forested	Riparian, Forested	0.7
	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	1.9
		Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	0.8
MTM 97300-OB ²	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded	0.2
MTM 97300-OC ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded, Diked/Impounded	0.2
MTM 97300-OF ²	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded	0.4
	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Semipermanently Flooded	4.2
MTM 97300-OI ²	Freshwater Emergent Wetland	Palustrine, Emergent, Saturated	0.2
MTM 97300-OK ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	0.1
		Palustrine, Emergent, Seasonally Flooded, Diked/Impounded	0.1
MTM 97300-OK ²	Freshwater Emergent Wetland	Palustrine, Emergent, Temporarily Flooded, Diked/Impounded	0.3
MTM 97300-ON ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded, Diked/Impounded	0.4
MTM 97300-OQ ²	Freshwater Emergent Wetland	Palustrine, Emergent, Temporarily Flooded	0.4
	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded	0.2
MTM 97300-P9 ²	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Intermittently Exposed	1.9

MTM 97300-PU ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	0.8
		Palustrine, Emergent, Temporarily Flooded	1.9
	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	9.2
		Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	0.9
		Riverine, Lower Perennial, Unconsolidated Shore, Temporarily Flooded	0.8
MTM 97300-PV ²	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	0.3
	Freshwater Forested/Shrub Wetland	Palustrine, Scrub-Shrub, Temporarily Flooded	0.6
	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	9.5
		Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	0.7
		Riverine, Lower Perennial, Unconsolidated Shore, Temporarily Flooded	1.2
MTM 97300-PW ²	Freshwater Forested/Shrub Wetland	Palustrine, Scrub-Shrub, Temporarily Flooded	2.3
	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	1.2
		Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	0.4
		Riverine, Lower Perennial, Unconsolidated Shore, Temporarily Flooded	0.2
MTM 97300-PY ²	Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	0.0 0.1
		Riverine, Lower Perennial, Unconsolidated Shore, Temporarily Flooded	0.1

¹(Cymore 2011) ²(USFWS 2010) * This list is not comprehensive because 11 of the lease parcels: MTM 97300-L0, L4, M1, M2, M3, M4, MX, MY, MZ, N7, and N8 have not been mapped and GIS data for was not available for lease parcel MTM 97300 PT.

Proper Functioning Condition (PFC) is a qualitative method for assessing the conditions of riparian and wetland areas. It involves a consistent approach for assessing hydrology, riparian vegetation, soils, physical state, and processes to determine the overall condition or health of riparian and wetland areas. Riparian areas within MTM 97300 PV have been surveyed for PFC.

MTM 97300 PV contains 0.15 miles of the Yellowstone River which was rated as proper functioning condition with an upward trend in 2006. Riparian species present were cottonwood (*Populus deltoides*), reed canary grass (*Phalaris arundinacea*), sandbar willow (*Salix exigua*), green ash (*Fraxinus pennsylvanica*), snowberry (*Symphoricarpos spp.*), dogwood (*Cornus sp.*), wild rose (*Rosa spp.*), golden currant (*Ribes aureum*), peachleaf willow (*Salix amygdaloides*), common three-square (*Schoenoplectus pungens*), spikerush (*Eleocharis spp.*), buffaloberry (*Shepherdia spp.*), box elder (*Acer negundo*), cattail (*Typha spp.*), American licorice (*Glycyrrhiza lepidota*), and unknown sedge (*Carex spp.*). Weedy and invasive species were knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), Russian olive (*Elaeagnus angustifolia*), and saltcedar (*Tamarisk ramosissima*), kochia (*Bassia prostrata*), thistle (*Cirsium arvense*), sweet clover (*Melilotus officinalis*), cocklebur (*Xanthium strumarium*), and gumweed (*Grindelia squarrosa*). The presence of weedy and invasive species presented a concern.

Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the analysis area. Several invasive, non-native plant species are found in the analysis area including: crested wheatgrass (*Agropyron cristatum*), Japanese brome (*Bromus japonicas*), cheatgrass (*Bromus tectorum*), and foxtail barley (*Hordeum jubatum*). Crested wheatgrass occurs in areas as a result of being planted to increase forage production or to stabilize soils by reducing erosion. Cheatgrass, Japanese brome, and foxtail barley are all aggressive invasive species that out-compete desirable vegetation for water and soil nutrients.

Noxious weeds are invasive species and occur in scattered isolated populations throughout the analysis area. The most common species of noxious weeds are leafy spurge, Russian knapweed, spotted knapweed, field bindweed and Canada thistle. Noxious weed control is the responsibility of the land owner or land managing agency. Chemical and biological control methods are utilized, with chemical control being the more predominant.

3.6 Special Status Species

3.6.1 Special Status Animal Species

3.6.1.1 Aquatic Wildlife

For aquatic wildlife in the analysis area there are 9 fish, 2 amphibian, and 2 reptile species that are special status or are sensitive species (Table 3). All of these species depend on perennial and intermittent streams or rivers with intact floodplains, wetlands, and riparian areas that are properly functioning. One fish species, the pallid sturgeon (*Scaphirhyncus albus*), was federally listed as endangered by the U.S. Fish and Wildlife Service in 1990. Threats to the pallid sturgeon are habitat modification, small population size, limited natural reproduction, hybridization, pollution and contaminants, and commercial harvest. The pallid sturgeon inhabits the large river systems of the analysis area. In the analysis area the Yellowstone River (from the MT/ND border upstream to near Forsyth, MT) and Missouri River (from the MT/ND border upstream to near Fort Benton) are considered pallid sturgeon habitat. Additionally, these large

rivers are classified as having the highest concern for fish species (particularly ESA species and species of concern) habitat under the MFWP Crucial Area Planning System (CAPS 2010). The USFWS recently took further action by listing the shovelnose sturgeon (*Scaphirhynchus platyrhynchus*), which closely resembles the pallid sturgeon, as a threatened species where its range overlaps with the Pallid sturgeon (FWS 2010). In Table 4, endangered or sensitive aquatic wildlife species that occur within each of the lease parcels are listed.

Table 3. Aquatic sensitive or special status wildlife species in the analysis area. Shortnose gar and Sicklefin chub are listed sensitive species by the Montana Fish, Wildlife, and Parks.

Species	USFWS Status	BLM Sensitive	In Range	Suitable Habitat Present
Pallid sturgeon	Endangered	Special Status	Yes	Yes
Blue sucker	none	Sensitive	Yes	Yes
Northern redbelly X finescale dace	none	Sensitive	Yes	Yes
Paddlefish	none	Sensitive	Yes	Yes
Pearl dace	none	Sensitive	Yes	Yes
Sauger	none	Sensitive	Yes	Yes
Shortnose gar	none	none	Yes	Yes
Sicklefin chub	none	none	Yes	Yes
Sturgeon chub	none	Sensitive	Yes	Yes
Snapping turtle	none	Sensitive	Yes	Yes
Spiny softshell turtle	none	Sensitive	Yes	Yes
Northern leopard frog	none	Sensitive	Yes	Yes
Plains spadefoot	none	Sensitive	Yes	Yes

Table 4. Endangered or sensitive aquatic wildlife species that occur in, or their ranges overlap with, the lease parcels.

Lease Parcel	Endangered or Sensitive Species
MTM 97300 PU	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 PV	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 PW	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 PX	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 PY	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 PZ	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 P9	Pallid sturgeon, Paddlefish, Sauger, Blue Sucker, Sturgeon Chub, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 NU	Sauger, Northern redbelly X Finescale dace, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 NY	Sauger, Northern redbelly X Finescale dace, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 L4	Sauger, Northern redbelly X Finescale dace, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad

MTM 97300 OC	Sauger, Pearl dace, Softshelled Turtle, Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 OF	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 OI	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 ND	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 MZ	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 M4	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 M3	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 M2	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad
MTM 97300 N8	Snapping Turtle, Northern Leopard Frog, Plains Spadefoot Toad

3.6.1.2 Terrestrial Wildlife

Evaluating wildlife values at the landscape scale as a first step is key to understanding potential impacts of a project. Wildlife values, including terrestrial conservation species, richness, game quality, and aquatic conservation connectivity, conservation species, and game species, have been mapped at the landscape level for Montana by MFWP through their Crucial Areas Planning System (CAPS) 2010.

The lease parcels were reviewed in the CAPS GIS website as an overlay to potential aquatic, terrestrial, and habitat values. This course-scale landscape analysis of wildlife resources provides one tool for understanding the context of the wildlife values at a large scale. Fine-scaled tools, data, and resource information based on inventory and monitoring data, as well as local knowledge from BLM and MFWP employees, are used to further examine resource issues at the site-specific level for the specific resources contained in the lease parcels considered in this EA.

The analysis area covers a wide variety of habitat consistent with the Northern Great Plains. Lease parcels are located within sagebrush grasslands, short and mixed grass prairies, riparian and hardwood draw habitats, and others. See Section 3.5 for a detailed description of vegetation.

Some of these analysis areas provide habitat for species considered as BLM “special status species”. Special status species (SSS), collectively, are USFWS federally listed or proposed species, and the BLM sensitive species from the 2009 Montana/Dakota’s sensitive species list. BLM sensitive species also include both federal candidate species and delisted species within 5 years of delisting. Table 5 presents the following: a list of species; whether the analysis area is within the current range of the species; and if so, whether suitable habitat is present within the lease parcels.

Table 5: Analysis area occurrence of BLM terrestrial sensitive species and USFWS threatened, endangered, candidate or proposed terrestrial species

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
Mammals				
Gray Wolf*	Endangered/Experimental Nonessential (XN)	Special Status Species (SSS)	No	Not applicable (N/A)
Grizzly Bear**	Threatened	Sensitive	No	N/A
Black-footed ferret	Endangered	SSS	Unlikely	No
Black-tailed prairie dog	None	Sensitive	Yes	Yes
Swift fox	None	Sensitive	Yes	Yes
Fisher	None	Sensitive	No	NA
Meadow Jumping Mouse	None	Sensitive	Yes	Yes
Great Basin Pocket Mouse	None	Sensitive	No	N/A
North American Wolverine	None	Sensitive	No	N/A
Pygmy rabbit	None	Sensitive	No	N/A
Long-legged Myotis	None	Sensitive	Yes	Yes
Long-eared Myotis	None	Sensitive	Yes	Yes
Fringed Myotis	None	Sensitive	No	N/A
Fringe-tailed Myotis	None	Sensitive	No	N/A
Pallid bat	None	Sensitive	No	N/A
Northern Myotis	None	Sensitive	No	N/A
Townsend's big-eared bat	None	Sensitive	Yes	Yes
White-tailed prairie dog	None	Sensitive	No	N/A
Birds				
Common loon	None	Sensitive	Yes	Yes
Franklin's gull	None	Sensitive	Yes	Yes
Interior least tern	Endangered	SSS	Yes	Yes
Black tern	None	Sensitive	Yes	Yes
White-faced ibis	None	Sensitive	Yes	Yes
Whooping crane	Endangered	SSS	Yes	Yes
Yellow rail	None	Sensitive	Yes	Yes
Piping plover	Threatened, with critical habitat	SSS	Yes	Yes
Mountain plover	Proposed	Sensitive	Yes	Yes
Marbled godwit	Bird of Conservation Concern (BCC)	Sensitive	Yes	Yes
Long-billed curlew	BCC	Sensitive	Yes	Yes
Black-crowned night heron	None	Sensitive	Yes	Yes
Bobolink	None	Sensitive	Yes	Yes
Greater sage-grouse	Candidate	Sensitive	Yes	Yes
Burrowing owl	BCC	Sensitive	Yes	Yes
Great gray owl	None	Sensitive	No	NA
Three-toed woodpecker	None	Sensitive	No	NA
Trumpeter swan	None	Sensitive	unlikely	NA

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
Flammulated owl	None	Sensitive	No	NA
Bald eagle***	BCC	Sensitive	Yes	Yes
Golden eagle	None	Sensitive	Yes	Yes
Ferruginous hawk	None	Sensitive	Yes	Yes
Swainson's hawk	None	Sensitive	Yes	Yes
Peregrine falcon	None	Sensitive	Yes	unlikely
Northern goshawk	None	Sensitive	Yes	possible
Sage thrasher	BCC	Sensitive	Yes	possible
Sprague's pipit	Candidate	Sensitive	Yes	Yes
Sedge wren	None	Sensitive	Yes	Yes
Loggerhead shrike	BCC	Sensitive	Yes	Yes
Chestnut-collared longspur	BCC	Sensitive	Yes	Yes
McCown's longspur	BCC	Sensitive	Yes	Yes
Baird's sparrow	BCC	Sensitive	Yes	Yes
Brewer's sparrow	BCC	Sensitive	Yes	Yes
LeConte's sparrow	None	Sensitive	Yes	Yes
Nelson's Sharp-tailed sparrow	None	Sensitive	Yes	Yes
Horned grebe	BCC	None	Yes	Yes
American bittern	BCC	None	Yes	Yes
Prairie falcon	BCC	None	Yes	Yes
Upland sandpiper	BCC	None	Yes	Yes
Yellow-billed Cuckoo	BCC	Sensitive	Yes	Yes
Short-eared owl	BCC	None	Yes	Yes
Lewis's woodpecker	BCC	None	Yes	Yes
Red-headed woodpecker	BCC	Sensitive	Yes	Yes
Black-backed woodpecker	None	Sensitive	Yes	yes
Sage sparrow	BCC	Sensitive	Yes	Yes
Grasshopper sparrow	BCC	None	Yes	Yes
Dickcissel	BCC	Sensitive	Yes	Yes
Blue-gray naticatcher	None	Sensitive	No	N/A
Harlequin duck	None	Sensitive	No	N/A
Amphibians				
Great Plains toad	None	Sensitive	Yes	Yes
Northern leopard frog	None	Sensitive	Yes	Yes
Plains spadefoot toad	None	Sensitive	Yes	Yes
Boreal/Western Toad	None	Sensitive	No	N/A
Coeur d'Alene salamander	None	Sensitive	No	N/A
Reptiles				
Snapping turtle	None	Sensitive	Yes	Yes
Spiny softshell	None	Sensitive	Yes	Yes
Greater short-horned lizard	None	Sensitive	Yes	Yes
Milk snake	None	Sensitive	Yes	Yes
Western hog-nosed snake	None	Sensitive	Yes	Yes

Table 5 sources: Skarr 2003; Werner, Maxell, Hendricks, and Flath. 2004; Foresman 2001; MTNHP, 2010; BLM, 2009; USDA – NRCS Plants Database, 2010

*Gray wolf will be moved to the bureau sensitive list if delisted by the USFWS.

**Grizzly bear has been delisted for the Greater Yellowstone ecosystem. In that area it is a Bureau sensitive species.

***Bald eagle has been delisted so has been moved to the sensitive list.

3.6.1.2.1 Threatened, Endangered, Candidate, and Proposed Species

Threatened, endangered, candidate, or proposed bird species may occupy habitat infrequently or seasonally within the analysis area. These species include the whooping crane, interior least tern, piping plover, greater sage-grouse, hereafter referred to as sage grouse, and Sprague’s pipit.

The USFWS has identified a primary migration corridor for the Aransas-Wood Buffalo population of whooping cranes (http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf). Several lease parcels in Sheridan, Roosevelt, and Richland counties are located within this primary migration corridor. These parcels include MTM 97300 LD, LX, LY, LZ, MP, PT, PV, PW, PX, PY, PZ, OF, and OM. Nesting by whooping cranes has not been documented in the analysis area.

Interior least terns migrate up both the Missouri and Yellowstone rivers and utilize gravel bars along these rivers for nesting. All or portions of lease parcels MTM 97300 P9, PU, PV, PW, PX, PY, and PZ are located along the Yellowstone River. One nest site documented in 1994 is located approximately 3.6 miles upstream from the nearest parcel (MTM 97300 PU). No lease parcels are located within or adjacent to the Missouri River corridor.

Piping Plover nest along the Missouri River, as well as select nesting locations on wetland habitats in the northeast Montana pothole region. The USFWS has designated 3 separate “units” as critical habitat for piping plover in Montana. (<http://www.fws.gov/mountain-prairie/species/birds/pipingplover/>) Unit 1 designates wetlands across approximately 12 townships located in the northeast corner of the state. Lease parcels MTM 97300 LX, LY, LZ, and MP are located within Unit 1. Several documented piping plover nesting locations occur within proposed lease parcel MP.

The USFWS designated Unit 2 as the portion of the Missouri River from river mile 1,712 (south of Wolf Point, MT) to river mile 1,586.6 (North Dakota border) as critical habitat for the piping plover. No lease parcels are located within or immediately adjacent to the Unit 2 critical habitat designation for piping plover. However, one parcel (MTM 97300 LD) is located approximately 2 miles north of the unit 2 designation and would be considered to be within piping plover flyways to and from known nesting territories.

Black-footed ferrets are classified as endangered by the USFWS. No black-footed ferret reintroduction sites are located within the field office. A black-footed ferret re-introduction site exists on the Northern Cheyenne Reservation. This site is approximately 85 miles south of the nearest lease parcel that supports prairie dog towns in the analysis area. In addition, re-introduction sites exist north of Fort Peck Lake on Charles M. Russell National Wildlife Refuge (CMR) lands and on lands administered by the BLM- Malta Field Office.

Black-footed ferrets require prairie dog colonies for survival. According to USFWS guidelines for determining suitable black-footed ferret habitat (USFWS, 1989), a black-tailed prairie dog

complex suitable to support ferrets is defined as an aggregation of two or more neighboring prairie dog towns separated by a distance of less than 4.34 miles and totaling 80 acres or more. Recently, the separation distance has been reduced to 1.5 km (.93 miles) (Hanebury, pers. com 2010) to be considered within the range of habitat use by black-footed ferrets. A portion of one prairie dog colony approximately 10 acres in size is located within lease parcel MTM 97300 M4 in Rosebud County. The next nearest prairie dog colony is located approximately 2.77 km to the east. This separation distance does not meet the criteria as potential black-footed ferret habitat.

The potential for any native viable population of black-footed ferrets to exist anywhere outside of re-introduction sites is extremely unlikely (<http://www.fws.gov/mountain-prairie/species/mammals/blackfootedferret/>). Based on the lack of existing native populations, and lack of connective habitats from the re-introduction sites, black-footed ferrets would not be expected to occupy any lands within the analysis area.

The mountain plover is proposed for listing as threatened or endangered by the USFWS. Mountain plover breeding habitat includes short-grass prairie and shrub-steppe landscapes, dryland cultivated farm lands, and prairie dog towns. Vegetation in short-grass prairie types is sparse and typically less than 4 inches tall. Commonly, nest sites within shrub-steppe areas are on active prairie dog towns (Wildlife Survey Protocol, Powder River Basin Wildlife Taskforce, 2005). The majority of lease parcels do not provide suitable mountain plover habitat, because vegetation heights and densities in the parcels would be considered greater than what is normally preferred. However, potential suitable habitat for mountain plovers exists on portions of lease parcels MTM 97300 M1, M2, M3, M4, and MW (<http://apps.fwp.mt.gov/gis/maps/caps/>) but surveys for plovers have not occurred at these locations.

Two species recently classified as USFWS candidate species occur within the analysis area. These are the Sprague's pipit and the greater sage grouse. Candidate species are those that warrant protection under the Endangered Species Act, but listing the candidate species is precluded by the need to address other listing actions of a higher priority. The USFWS will review the need for listing these species annually and will propose the species for protection when funding and workload for other listing actions allow.

Sprague's pipits were found warranted, but precluded as a threatened or endangered species on September 15, 2010. Sprague's pipits are strongly tied to native prairie (land which has never been plowed) throughout their life cycle (Owens and Myres 1973, pp. 705, 708; Davis 2004, pp. 1138-1139; Dechant et al. 1998, pp. 1-2; Dieni et al. 2003, p. 31; McMaster et al. 2005, p. 219). They are rarely observed in cropland (Koper et al. 2009, p. 1987; Owens and Myres 1973, pp. 697, 707; Igl et al. 2008, pp. 280, 284) or land in the Conservation Reserve Program (a program whereby marginal farmland is planted primarily with grasses) (Higgins et al. 2002, pp. 46-47). Sprague's pipits will use nonnative planted grassland (Higgins et al. 2002, pp. 46-47; Dechant et al. 1998, p. 3; Dohms 2009, pp. 77-78, 88). Vegetation structure may be a better predictor of occurrence than vegetation composition (Davis 2004, pp. 1135, 1137). Montana Natural Heritage Tracker has documented observations of Sprague's pipits in Daniels, Sheridan, Roosevelt, McCone, Richland, Dawson, Prairie, Custer, and Fallon Counties within the Miles City Field Office. Additionally, BLM biologists have documented Sprague's pipits in Carter County. A total of 36 lease parcels: MTM 97300 LD, LX, LY, LZ, M1, M2, MP, N9, N0, OB,

OC, OJ, OK, OD, OE, OF, OG, OH, OI, OL, OM, ON, OO, OP, OQ, OR, OS, OY, P9, PT, PV, PU, PW, PX, PY, and PZ have been identified as providing potential suitable habitat for Sprague's pipits (<http://apps.fwp.mt.gov/gis/maps/caps/>).

On March 5, 2010, USFWS concluded sage grouse warrants protection under the Endangered Species Act. However, USFWS determined the listing of the species is precluded by the need to take action on higher priority species. Sage grouse was placed on the list of species that are candidates under the Endangered Species Act.

Sage grouse are a native prairie grouse species that are considered sagebrush obligates and depend on sagebrush for survival. Sage grouse habitat includes nesting habitat, brood rearing habitat, winter habitat, and connectivity to those habitats. The habitat either exists in 1) such quality without anthropogenic disturbances, which provides for highly intact and functional habitat with stable sage grouse populations, or 2) in limited habitat quality surrounded by a high degree of anthropogenic disturbances, which provides for areas highly important to maintain sage grouse on a landscape level with genetic connectivity.

Sage grouse habitat delineations have been developed for the sage grouse conservation alternatives being considered in the future MCFO RMP planning effort. This delineation effort resulted in the identification of large areas exhibiting these habitat characteristics which will be important to the future conservation of the species. Those lease parcels, or portions of, that are located within these delineated areas include MTM 97300 L4, MY, N7, LO, N8, MZ, M1, M3, M4, M2, and MW. In addition, sage grouse may utilize habitat outside of the delineated polygon conservation alternatives being considered in the future RMP planning effort. No sage grouse leks are located on lease parcels with this proposal.

3.6.1.2.2 Other Sensitive Species

As noted in Table 5 above, up to fifty six wildlife species considered as BLM "sensitive" have the potential to occur within the analysis area. These include 42 birds six mammals, three amphibians, and five reptiles. This list is a combination of recent and historic observations. In some instances, historic observations are the only known record. If a species is noted as in range, it signifies that habitat within the field office would be considered within the documented range of occupation of habitat by a particular species during some phase of its life cycle. This might be only for a short time frame, during migrations, seasonally, or possibly year-round. Documentation and coverage of occupation of habitat by specific wildlife species is considered good across this area for some species, (e.g., sage grouse) and lacking for other species (small mammals, herptiles, raptors, etc.). However, the table documents the potential for wildlife species occurrence if at least one lease parcel is located within a particular sensitive species' known range of habitat occupation based on available science and research.

The black-tailed prairie dog is a designated BLM sensitive species. Black-tailed prairie dog towns may also provide potential habitat for several raptor species; Bureau-sensitive species such as mountain plovers, burrowing owls, black-footed ferrets, and numerous other non-sensitive wildlife species. One black-tailed prairie dog colony approximately 10 acres in size is partially located within lease parcel MTM 97300 M4 in Rosebud County. This parcel may also be

considered as potential mountain plover habitat or burrowing owl habitat; however, surveys for these species have not been conducted in this area.

Various bird surveys throughout different years have been conducted across the MCFO, which may have included some of the lease parcel areas or at least similar habitats. Surveys have been conducted by the United States Geological Survey, University of Montana Avian Science Center, Rocky Mountain Bird Observatory, MTNHP, and other interested “birders.”

Specific surveys in the Powder River Basin area identified 104 species of birds as inhabitants of this portion of southeast Montana and another 55 species as probable/possible inhabitants (Carlsen and Cooper, 2003). Additionally, the University of Montana surveyed migratory birds within the Cedar Creek anticline and the Powder River Basin in selected habitats in 2007 and 2008. This survey documented 70 different migratory birds. Migratory bird species diversity varies across the MCFO area. According to P.D. Skaar’s Montana Bird Distribution, 6th edition (Lenard et al., 2003) species diversity ranges from less than 40 species per “latilong” (~3,200 square miles) to more than 200 across the analysis area.

The analysis area provides potential nesting, foraging, and migratory habitat for various species of raptors. Species fairly common to eastern Montana that could be found within the analysis area include northern harriers, red-tailed hawks, great horned owls, and American kestrels. Other species that may utilize these areas in less abundance are bald and golden eagles, sharp-shinned hawks, cooper’s hawks, Swainson’s hawks, burrowing owls, prairie falcons, and merlins. Peregrine falcons are also known to migrate through eastern Montana. No raptor nests have been documented within or adjacent (within ½ mile) to the proposed lease parcels.

3.6.2 Special Status Plant Species

According to the MTNHP, there are no known threatened or endangered plant species located on the lease parcels. Twelve plant species on the Montana Plant Species of Concern list have been identified as having suitable habitat in areas near these parcels (MTNHP, 2011). These species are listed in the Table 6 and have the potential to exist on the lease parcels. Five of these species are also identified as BLM “Sensitive” plants.

According to the Montana field guide, (USDA – NRCS Plants Database, 2011) these plants are typically found in very specific habitats and do not occur predictably across the landscape. Following is a list of Montana’s species of concern that may have existing populations and/or suitable habitat on or near the lease parcels by county:

Table 6. MT Species of Concern and BLM Sensitive Plants on or near lease parcels

Plant Name	Counties it occurs in	Habitat description
Dwarf woollyhead *	across river from Rosebud Co.	Drying mud ponds and other vernal wet soil in valleys and on the plains
Barr’s milkvetch *	Carter, Rosebud	Sparsely vegetated knobs and buttes, usually with dry, fine-textured, often calcareous soils.
Poison suckleya *	Dawson, Roosevelt	Drying mud along ponds and streams, and in disturbed, often alkaline soil on the plains
Nine anther prairie	Richland	Gravelly soiled grasslands and slopes on the

clover		plains
Silky prairie clover	Richland, Sheridan, Carter	Sandy soils of prairies and open woodlands often near sandstone outcrops or on dunes and roadsides
Prairie goldenrod	Carter, Richland	Open, dry grasslands, often on sandy soil or limestone on the plains
Nannyberry *	Richland, Roosevelt	Openings in riparian forests on the plains
Chaffweed	Sheridan	Vernally wet, sparsely vegetated soil around ponds and along rivers and streams in the valleys and on the plains
Ovalleaf milkweed	Sheridan, Carter	Open pine woodland, prairies and dry riparian terraces
Pale-spiked lobelia *	Sheridan, Richland	Moist meadows on the plains
Northern blue-eyed grass	Sheridan	Low prairie zone of prairie wetland margins
Many headed sedge	Sheridan	Moist soil of meadows along streams and ponds in the valleys and on the plains

*BLM Sensitive

3.7 Fish and Wildlife

3.7.1 Aquatic Wildlife

The aquatic resources in the analysis area include aquatic wildlife and habitat for fish, aquatic arthropods (insects and crustaceans), amphibians, reptiles, and bivalves. The habitat consists of rivers, streams, lakes, and reservoirs that provide habitat for a variety of aquatic wildlife and riparian communities (and their varying lifecycle stages).

Based on known fish presence (MFWP 2010), there are approximately 253 miles of fish-bearing streams within the analysis area, but due to ongoing inventory efforts, the discovery of more prairie streams that support native fish and other aquatic wildlife would occur. Additionally, prairie fish are constantly moving through a landscape that balances, at the local and landscape scale, between drying and flooding stages. Consequently, the ability to migrate during high flows is a crucial life history strategy.

Aquatic resource conditions of streams are strongly related to riparian vegetation, upland range conditions, land use impacts, and quality and quantity of in-stream water. Habitat conditions throughout the analysis area vary between and within water bodies; the upper and middle reaches of smaller streams may be intermittent, while the lower reaches may receive perennial flows, resulting in different habitat conditions and different aquatic communities within the same stream. Prairie fish are adapted to these cycles of drying and flooding and thrive in these intermittent pools, provided land-use impacts are not severe (Bramblett et al. 2005). However, prairie streams are highly sensitive to disturbance, and due to this factor many prairie stream ecosystems are already imperiled due to anthropogenic activities (Dodds et al. 2004).

Riparian vegetation is a critical component in maintaining aquatic wildlife habitat and is a source of organic nutrients and food items for the prairie stream ecosystem, provides in-stream habitat for fish, amphibians, reptiles, and invertebrates, adds structure to the banks, and reduces erosion; when riparian vegetation senesces and falls into the stream, it adds cover, habitat complexity, and moderates water temperatures. In some cases throughout the analysis area, riparian habitats

have been degraded, and the results include increases in erosion and sedimentation, shallower and wider streams (which increases evaporation and thus decreases water quality and quantity), increases in temperature fluctuations, and critically low oxygen content levels; these effects collectively reduce or degrade available aquatic wildlife habitat.

Existing factors limiting or affecting aquatic resources in the analysis area include the lack of a normative flow regime primarily through extensive reservoir development; loss or degradation of riparian habitat; habitat fragmentation; livestock grazing damage; past and current oil and gas development; non-fish & aquatic wildlife passable culverts, oil skimmers, and other stream crossings; and excess siltation due to the various land use activities.

3.7.2 General Wildlife

A diversity of wildlife habitat, topography, and vegetation types exists across the analysis area. This diversity across eastern Montana and the analysis area provides habitat for many wildlife species in addition to those previously mentioned.

Current and historic land uses across the lease parcels include grazing, farming, hunting, energy development, and others. Consequently, some areas contain large contiguous blocks of well-functioning habitats, while other areas composed of small, fragmented patches of native habitats. In some areas, existing anthropogenic disturbance at some frequency has been expected to reduce habitat suitability for some species of wildlife intolerant to human activities.

Wildlife species and habitat surveys have been conducted throughout the analysis area at various times and for various species. The entire area has not been comprehensively surveyed for all wildlife resources; however, a combination of past surveys provides insight into what species have been documented, and what other species are expected within those habitat types.

Mule deer are the most abundant big game species and use the greatest variety of habitats, generally preferring sagebrush, grassland, and conifer types (BLM 1984). Habitat diversity appears to be a good indicator of intensity of deer use. In mule deer habitats, diversity of vegetation usually followed topographic diversity; thus, rugged topography may be the ultimate factor influencing mule deer use of an area (Mackie et. al. 1998). Habitat such as riparian bottoms, agricultural areas, and forests are used as well, either yearlong or seasonally. Habitat to support mule deer likely exists within all of the lease parcels.

Winter range is often part of year-round habitat in eastern Montana. Winter ranges are typically in areas of rougher topography and are often dominated by shrub species that provide crucial browse during winter months. Escape and thermal cover are also important for maintenance and survival. “Doghair” stands of ponderosa pine and juniper are examples of important escapes and thermal cover used by mule deer in the analysis area. Those lease parcels that are located within winter range habitat for mule deer include MTM 97300 MX, MY, MZ, OP, OQ, OR, OS, OY, PU, PV, P9, and PX.

Although less abundant than mule deer, white-tailed deer are also common in the analysis area. White-tailed deer prefer riparian drainage bottoms and conifer areas, but they will also use a variety of other habitats including farmlands. During the winter, white-tailed deer using forested

areas prefer dense canopy classes, moist habitat types, uncut areas, and low snow depths. Suitable winter range is a key habitat factor for white-tailed deer, and winter concentration areas occur almost exclusively in riparian and wetland habitats and dense pine (Youmans and Swenson 1982). Although white-tailed deer move on and off winter range, as dictated by seasonal habitat requirements, the animals do not migrate for long distances (Hamlin 1978). Those lease parcels that are located within white-tailed deer winter range habitat include MTM 97300 NU, NY, L4, PU, PV, P9, PW, PX, PY, and PZ.

Pronghorn antelope are widely distributed across the analysis area. They are generally associated with grasslands and shrublands, but they will also use agricultural fields. Winter ranges for pronghorn antelope generally occur within sagebrush grasslands with at least greater densities of big sagebrush than the surrounding areas. Those lease parcels that are located within pronghorn antelope winter range habitat include MTM 97300 MX, N7, N8, MZ, M1, M2, M3, and M4.

The potential exists for other big game species to occupy these areas infrequently. These may include elk, moose, and black bear although most likely this would occur in transition to preferred habitats elsewhere. Some of these areas also provide habitat for mountain lion. The potential for big game movements or migrations through eastern Montana are not fully understood. At a local level, it is reasonable to assume big game movements occur at least seasonally. Migration corridors have not been identified through any of the lease parcels.

In addition to sage grouse, sharp-tailed grouse are the other native prairie grouse species in the analysis area. Sharp-tailed grouse generally prefer hardwood draws, riparian areas, and prairie grasslands intermixed with shrubs such as chokecherry and buffaloberry. Two sharp-tailed grouse leks are located on or very near two lease parcels MTM 97300 LY and LZ. Parcels MTM 97300 OB, OC, OJ, OK, OF, OG, OH, OI, OM, PY, PZ, LY, LZ and MP are located within two miles of sharp-tailed grouse leks, and most, if not all, of these parcels would be expected to provide at least seasonal habitat for sharp-tailed grouse.

Wild turkeys, pheasants, and Hungarian partridge are all species that have been introduced to eastern Montana and would be expected to utilize available habitats within some of the lease parcels.

3.8 Cultural Resources

BLM is responsible for identifying, protecting, managing, and enhancing cultural resources located on public lands or those that may be affected by BLM management actions on non-federal lands. Cultural resources include archaeological, historic, architectural properties, and traditional lifeway values important to Native Americans. Sites can vary with regard to their intrinsic value as well as their significance to scientific study; therefore, management practices employed are commensurate with their designation. Significant cultural resources values include; their use to gather scientific information on human culture, history, interpretive and educational value, values associated with important people and events of significance in history, and often aesthetic value, as in a prehistoric rock art panel or an historic landscape.

A generalized prehistory of eastern Montana can be categorized in a chronological framework, and time periods are distinguished on the basis of differences in material culture traits or artifacts and subsistence patterns: the PaleoIndian period (ca. 12,500 BP-7800 BP), Archaic period (ca. 7800 BP-1500 BP), Prehistoric period (ca. 1500 BP-200 BP), Protohistoric period (ca. 250 BP-100 BP), and Historic Periods (A.D. 1805-A.D. 1960) (Aaberg et al. 2006).

Cultural properties are evaluated with reference to the National Register criteria for the purposes of assessing their historical values and public significance; such evaluations are carefully considered when cultural properties are allocated to use categories, although preservation and nomination properties must be weighted on a case-by-case basis.

A recent Class I overview of cultural resources was prepared for the analysis area (Aaberg et al. 2006). The cultural environment of the MCFO as of May 2005 contained 7,065 prehistoric and 2,869 historic archeological sites as well as 1,929 paleontological localities. Archeological properties (historic and prehistoric sites) occur in all counties encompassed by the field office. The eight counties that have lease parcels within their boundaries contain 44.9% percent of all prehistoric and 61% of all historic resources. Each county contains the following percentages of resource site types within its boundaries, Carter 7% prehistoric 15% historic, Daniels .6% prehistoric 1.7% historic, Garfield 2.2% prehistoric 5.1% historic, Richland 2% prehistoric, 6.1% historic, Roosevelt 3.7% prehistoric, 6.2% historic, Rosebud 18.4% prehistoric, 11.2% historic, Sheridan 4.5% prehistoric, 13.9% historic and Wibaux prehistoric 1.1%, historic 1.8%.

The overall archeological site density of the MCFO (historic and prehistoric) is estimated at one site per 93 acres (Aaberg et al. 2006). Prehistoric sites are estimated to be distributed at one site per 130.8 acres (4.9 per square mile) and historic sites at one site per 322 acres (two per square mile) for all surveyed acres within the MCFO. Approximately one site in 10 to 15 (10% to 15%) of all sites are found to be eligible for the National Register of Historic Places.

A review of the Montana State Historical Preservation Office (SHPO) Cultural Resource Information System (CRIS) and Cultural Resource Annotated Bibliography System (CRABS), as well as BLM Cultural Resource databases and GIS data, indicates no lease parcels contain recorded cultural sites within their boundaries and three parcels have sites within the same section. Inventory data is not available for a majority of individual lease parcels, but some parcels have partial coverage of cultural resource inventory. Review of lease parcel MTM 97300 LX contains a previously recorded cultural site that has several types of archaeological features that are identified as being of concern to Native American groups.

3.9 Native American Religious Concerns

BLM's management of Native American Religious concerns is guided through its 8120 Manual: *Tribal Consultation Under Cultural Resources Authorities* and 8120 Handbook: *Guidelines for Conducting Tribal Consultation*. Further guidance for consideration of fluid minerals leasing is contained in BLM Washington Office Instruction Memorandum 2005-003: Cultural Resources, Tribal Consultation, and Fluid Mineral Leasing. The 2005 memo notes leasing is considered an undertaking as defined in the National Historic Preservation Act. Generally areas of concern to Native Americans are referred to as "Traditional Cultural Properties" (TCPs) which are defined as cultural properties eligible for the National Register because of its association with cultural

practices or beliefs that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community.

Areas of tribal concern in southeast Montana are listed in Appendices B-E of the Ethnographic Overview of Southeast Montana (Peterson and Deaver 2002). Based on input from various tribes, the 2002 Ethnographic Overview also identified 12 sensitive site types. These include battlefield and raiding sites, burials, cairns, communal kills, fasting beds (vision quests), homesteads, medicine lodges, rock art, settlements (campsites), stone rings, spirit homes, and environmental places (plant gathering areas, mineral and fossil collection areas).

The Crow Tribe's 2002 document noted that rock art, fasting sites, siege sites, camp sites, mourning sites, final resting places (burials), buffalo jumps, and environmental areas, including animal habitats and natural areas of concern such as springs. The Northern Cheyenne Tribe in its 2002 document noted large ring sites (both in terms of ring diameters and ring numbers), isolated fasting beds, rock art sites, and large diameter fasting structure as having religious significance to the tribe.

A portion of lease parcel MTM 97300 LX contains a previously recorded site that has several types of archaeological features that are identified as being of concern to Native American groups. It is unknown if the site extends into the lease parcel. An updated site form lists an unrecorded cultural site in the lease parcel. These sites have not been evaluated for listing on the National Register of Historic Places, but may meet historic context requirements for National Register listing in Sheridan County (Hufdtetler et al. 1992).

3.10 Paleontology

According to Section 6301 of the Paleontological Resource Protection Act of 2009 Omnibus Public Lands Bill, Subtitle D, SEC. 6301, paleontological resources are defined as "any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth" (Paleontological Resource Protection Act of 2009 Omnibus Lands Bill, Subtitle D, SEC. 6301-3612 (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 431-433). All vertebrate fossils, be they fossilized remains, traces, or imprints of vertebrate organisms, are considered significant. Paleontological resources do not include archaeological and cultural (typically human graves) resources.

Paleontological localities are generally not considered eligible for the National Register of Historic Places as individual fossil localities; however, they may be eligible under National Register criteria A, B, and D for other reasons (e.g., the development of paleontology in Montana, association with important events such as exploration surveys, association with paleontologists, for their contribution to understanding of the paleohistory of an area).

Within the MCFO paleontological resources are strongly associated with the Upper Cretaceous Hell Creek formation and the Tertiary Tullock Member of the Fort Union formation.

BLM classified geologic formations that have a high Potential Fossil Yield Classification (PFYC) of 4 or 5. The MCFO has the following geologic formation classifications:

Arikaree	Class 4
Ft Union-Tullock	Class 4
Hell Creek	Class 5
Lance	Class 5
Judith River	Class 4b

A review of BLM's Paleontological Resource database and GIS-mapped PFYC formations indicates all or part of 16 lease parcels are located within PFYC formations rated 4 or 5. The parcels were identified within three of the five geologic formations that are considered significant PFYC formations to the field office; Hell Creek Formation 5, Tullock Member Ft Union 4 and the Lance Formation 4.

The 16 lease parcels within a PFYC 4 or 5 classified geologic formations are within three counties: Daniels County, MTM 97300 N9, N0, OB, OC, OK, OE, OG, OH, and OI; Garfield County, MTM 97300 MX, N7, L0, N8 and M2; Rosebud County, MTM 97300 MY and MZ; while the parcels in Carter, Richland, Roosevelt, Sheridan and Wibaux Counties are not within PFYC 4 or 5 formations.

Results of the MCFO RMP Paleontological Resources Database search indicate that no lease parcels contain recorded paleontological localities.

3.11 Visual Resources

BLM Visual Resource classifications are only applied to BLM surface, as such, the affected environment for visual resources only consists of approximately ~~4,737~~ 1,680 acres of BLM - administered surface in the analysis area (Table 7).

A Class II VRM area classification means that the character of the landscape has unique combinations of visual features such as land, vegetation, and water. The existing character of the landscape should be retained. Activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes caused by management activities must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

A Class III VRM area classification means the level of change to the character of the landscape should be moderate. Changes caused by management activities should not dominate the view of the casual observer and should not detract from the existing landscape features. Any changes made should repeat the basic elements found in the natural landscape such as form, line, color and texture.

A Class IV VRM area classification means that the characteristic landscape can provide for major modification of the landscape. The level of change in the basic landscape elements can be high. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Table 7: VRM Classes for the analysis area by lease parcel

Leasing Areas	VRM Class II Acres	VRM Class III Acres	VRM Class IV Acres
CARTER COUNTY	<i>0 total acres</i>	<i>181 total acres</i>	<i>357 total acres</i>
MTM 97300-MW	0	181	357
GARFIELD COUNTY	<i>19 total acres</i>	<i>313 total acres</i>	<i>139 total acres</i>
MTM 97300-NU	19	0	0
MTM 97300-NY	0	0	7
MTM 97300-L0	0	98	66
MTM 97300-M2	0	215	66
RICHLAND COUNTY	<i>656 599 total acres</i>	<i>0 total acres</i>	<i>72 total acres</i>
MTM 97300-PT	0	0	72
MTM 97300-PU	159	0	0
MTM 97300-P9	23	0	0
MTM 97300-PW	31	0	0
MTM 97300-PX	23	0	0
MTM 97300-PY	76 19	0	0
MTM 97300-PZ	16	0	0
MTM 97300-PV	328	0	0

3.12 Forest and Woodland Resources

Evergreen forest habitat types occurring in the analysis area include ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), and Rocky Mountain juniper (*Juniperus scopulorum*). Deciduous forest habitat types include green ash (*Fraxinus pennsylvanica*) and boxelder (*Acer negundo*) (Hansen et al. 2008). Ponderosa pine and Rocky Mountain juniper forest types occur on the majority of analysis area forestlands. Green ash forest types occur along woody draws, streams, rivers, lakes, reservoirs, ponds, and other wet areas. Moisture (along with soil type, nutrient availability, plant density, topography, and climate) is one of the most important factors affecting plant growth; lack of moisture can have a pronounced influence on overall productivity (Hansen et al. 2008). In Table 8, forest and woodland acres in the analysis area are summarized by forest type and individual lease parcel.

Table 8. Forestland Acreage and Forest Type by Lease Parcel

Lease Parcel	Evergreen Forest (acres)	Deciduous Forest (acres)	Mixed Evergreen-Deciduous Forest (acres)	Total Acres
MTM 97300 L4		0.22		0.22
MTM 97300 LX			0.22	0.22
MTM 97300 M2		7.89		7.89
MTM 97300 M4		1.33		1.33
MTM 97300 MW		14.29		14.29
MTM 97300 MX	114.00	34.43		148.43
MTM 97300 MY	0.67	4.00		4.67
MTM 97300 MZ	2.00	1.77		3.77
MTM 97300 N0		1.11	0.22	1.33
MTM 97300 N7		.44		.44
MTM 97300 N8		2.89		2.89
MTM 97300 NU		2.47		2.47
MTM 97300 NY	0.44	2.03		2.47
MTM 97300 OB		8.50	0.22	8.72
MTM 97300 OC		9.05	0.13	9.18

MTM 97300 OE		1.19		1.19
MTM 97300 OF		3.81		3.81
MTM 97300 OH		0.15		0.15
MTM 97300 OI		2.22	0.44	2.66
MTM 97300 OJ			0.67	0.67
MTM 97300 OK		0.63		0.63
MTM 97300 OO		3.71	2.00	5.71
MTM 97300 OP		.85		.85
MTM 97300 OQ		12.23	7.70	19.93
MTM 97300 OR		1.11		1.11
MTM 97300 OS			0.62	0.62
MTM 97300 OY		0.22		0.22
MTM 97300 P9		9.78	1.21	10.99
MTM 97300 PT		0.67	1.33	2.00
MTM 97300 PU	0.22	2.12	11.42	13.76
MTM 97300 PV		10.98	7.06	18.04
MTM 97300 PW		24.37	0.67	25.04
MTM 97300 PX		16.33		16.33
MTM 97300 PY		71.86 14.77	2.00	73.86 16.77
MTM 97300 PZ		0.44	0.81	1.25
Total	117.33	253.09 196	36.72	407.14 350.05

Source: LANDFIRE Vegetation Cover Types, 30-meter resolution, Veg Codes 2054 or 2179 for Conifer Forest, 162 for Hardwoods (Bur Oak)

Historically, many forests in the analysis area consisted of open and park-like stands of ponderosa pine and juniper intermixed with hardwood draws. Mature stands were dominated by large ponderosa pine trees with an understory of native bunchgrasses and low shrubs. Prior to European settlement, fires ignited by lightning and Native Americans frequently burned throughout the analysis area, with fire return intervals of 35 to 40 years (Arno and Gruell 1983). High-frequency low-intensity fires kept forests open and removed understory vegetation, down material, and tree regeneration; results in irregularly shaped patches and groups of trees varying in age, size, and density across the landscape.

In the early 1900s, implementation of aggressive fire suppression tactics dramatically interrupted the historic role of fire in ponderosa pine ecosystems; resulting in species composition and structural changes and increased stand density levels. Subsequently, vegetative communities shifted towards late successional stage forests and woodlands. Forests and woodlands have declined in overall health and productivity and are less resilient to disturbances. Overstocked forests and woodlands experience increased stress due to competition for growing space (e.g., water, sunlight, and nutrients). Consequently, these conditions have increased the susceptibility of forested areas to insect attacks, disease, and the risk of stand-replacing fires.

Since the late 1800s, intensive grazing in eastern Montana has removed fine grass fuels that historically carried low-intensity fires over large areas each year (Clark and Sampson 1995). As a result of both fire suppression and livestock grazing, juniper became established on sites that were previously grass-covered and maintained by periodic wildfires (Smeins and Fuhlendorf 1997). Trees are now growing on sites where natural disturbance historically limited their presence.

Forest and woodland health within the analysis area will continue to deteriorate without implementation of management treatments to reduce fuel accumulations and restore existing stands to desired conditions by improving the overall vigor, productivity, and resiliency of forested vegetation. Selective thinning and removal of vegetative resources through hand and mechanical methods, or low intensity prescribed burns, would be important management tools for ponderosa pine forests.

3.13 Livestock Grazing

The majority of the lease parcels (35 of 48) involve only private and/or state surface ownership. Thirteen of the lease parcels, in whole or part, have BLM surface ownership. Of the 13 lease parcels, ten have a BLM grazing authorization and three are not leased for livestock grazing. The ten lease parcels involve 11 different grazing allotments. Of the 11 grazing allotments, nine are authorized for cattle grazing only and the other two are authorized for cattle and sheep grazing. Approximately half of the grazing authorizations restrict the season of use. The other half do not restrict the grazing season of use due to the small percentage of public land within the allotment. One allotment does graze according to a developed allotment management plan (AMP). Most allotments have several range improvements such as fences, stock ponds, pipelines, springs, windmills, seedings, wells, and access roads for livestock management purposes.

3.14 Recreation and Travel Management

BLM only manages recreational opportunities and experiences on BLM-administered surface. The affected environment consists of approximately ~~1,737~~ 1,705 acres of BLM-administered surface. Recreational activities enjoyed by the public on BLM lands within the analysis area include hunting, hiking, camping, fishing, photography, picnicking, and winter activities such as snowmobiling. Benefits and experiences enjoyed by recreational users include opportunities for solitude, spending time with families, enhancing leisure time, improving sports skills, enjoying nature and enjoying physical exercise.

Of the ~~1,737~~ 1,705 BLM-administered acres proposed for lease, approximately ~~667~~ 610 acres (MTM 97300- PU, PV, Lot 9 of P9, PW, PX, PY, and PZ) are located within the Lewis and Clark Trail Special Recreation Management Area (SRMA). The Lewis and Clark National Historic Trail (NHT) lies within the SRMA boundary. Management objectives within the Lewis and Clark Trail SRMA are to enhance water-based recreation resources while meeting public demand for river access. Recreational activities in the Lewis and Clark Trail SRMA include floating, rafting, fishing, picnicking, day hiking, wildlife viewing, and camping.

Much of the approximately ~~1,737~~ 1,705 BLM-administered acres proposed for lease consist of small, isolated, and scattered tracts with limited legal public access (i.e., no public easements or rights-of-way across private property). The lack of public access limits use of the BLM parcels for recreational use by the general public. The types of limited public use on these lease parcels can be characterized as casual dispersed recreational activities including hiking, hunting (including outfitters), camping, and wildlife viewing.

3.15 Lands and Realty

The analysis area consists of 48 parcels that include ~~7,230.66~~ 7,173.57 surveyed acres of which ~~1,763.04~~ 1,705.92 surveyed acres are BLM administered surface and 5,467.65 acres are private or state surface. Twelve parcels (MTM 97300 NU, NY, L0, M2, PT, PU, PV, P9, PW, PX, PY, PZ) are BLM administered surface and all minerals. These twelve parcels consist of ~~1,226.35~~ 1,169.26 surveyed acres. Parcel MTM 97300 MW is a mixture of private surface (770.00 surveyed acres) and BLM administered surface (536.66 surveyed acres) with BLM administered oil and gas minerals. Thirty-five of the parcels (MTM 97300 L4, MX, MY, N7, N8, MZ, MI, M4, M3, OO, OP, OQ, OR, N9, N0, OS, OB, OC, OJ, OK, OD, OE, OF, OG, OH, OI, OL, OM, ON, LD, LX, LY, LZ, MP, OY) are private surface and BLM administered oil and gas. These parcels consist of 4,697.65 surveyed acres.

Three of the parcels with BLM administered surface have the following existing BLM Rights-of-Way (ROWs) on them: (Source: BLM LR2000, March 29, 2011, Authorized Rights-of-Way and Montana Master Title Plats (MTPs), March 16, 2011):

- Parcel MTM-97300-P9 – T20N, R58E, Sec. 34, Lot 10, P.M.M., Richland County, Montana - ROW MTM97636 issued to Bill Davis for a water pipeline, 245 feet long and 20 feet wide consisting of 0.11 acre, more or less
- Parcel MTM-97300-MW – T9S, R57E, Sec. 2, N½NE¼, P.M.M., Carter County, Montana - ROW MTM-014079 issued to Frank Cochran for a reservoir and canal and T9S, R57E, Sec. 12, N½NW¼SW¼, E½SE¼SW¼, P.M.M., Carter County, Montana - ROW MTM-46030 held by Remuda Energy Dev. LLC for a 4” high pressure gas line. This gas pipeline ROW also crosses private land in the N½NE¼, NE¼SE¼NE¼, Sec. 11 and SW¼NW¼, NE¼SW¼, W½SE¼SW¼, Sec. 12, T9S, R57E. The patent for these lands was issued subject to the gas pipeline.
- Also Parcel MTM-97300-OH – T33N, R48E, Sec. 4, NE¼SE¼, P.M.M., Daniels County, Montana - ROW MTM-002368 was issued to the Montana Department of Transportation for a Federal Highway project from Wolf Point to Scobey; this ROW was reserved when the patent was issued for the subject land.

3.16 Minerals

3.16.1 Fluid Minerals

It is the policy of the BLM to make mineral resources available for disposal and to encourage development of these resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable prices. At the same time, the BLM strives to assure that mineral development occurs in a manner which minimizes environmental damage and provides for the reclamation of the lands affected.

Currently there are 1,234 federal oil and gas leases covering approximately 949,371 acres in the MCFO. The number of acres leased and the number of leases can vary on daily basis as leases are relinquished, expired, or are terminated. Existing production activity occurs on approximately 18 percent of this lease acreage. Information on numbers and status of wells on these leases and well status and numbers of private and state wells within the external boundary

of the field office is displayed in Table 9. Numbers of townships, leases acres within those townships, and development activity for all jurisdictions are summarized in Table 10.

Exploration and development activities would only occur after a lease is issued and the appropriate permit is approved. Exploration and development proposals would require completion of a separate environmental document to analyze specific proposals and site-specific resource concerns before BLM approved the appropriate permit.

Table 9. Existing Development Activity

	FEDERAL WELLS	PRIVATE AND STATE WELLS
Drilling Well(s)	1	59
Producing Gas Well(s)(including CBNG)	493	1176
Producing Oil Well(s)	251	1662
Water Injection Well(s)	135	472
Shut-in Well(s)	119	1067
Temporarily Abandoned Well(s)	87	231

Table 10. Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels

	Carter County	Daniels County	Garfield County	Richland County	Roosevelt County	Rosebud County	Sheridan County	Wibaux County
Number of Townships Containing Lease Parcels	1	9	3	4	1	5	2	1
Total Acres Within Applicable Township(s)	24,323	207,191	57,285	92,285	22,712	112,838	38,206	15,096
Acres of Federal Oil and Gas Minerals	22,815	4,657	8,287	5,356	2,927	6,854	818	360
Percent of Township(s)	93.8	2.2	15.4	5.8	12.9	6.1	2.1	2.3
Acres of Leased Federal Oil and Gas Minerals	11,477	870	4,727	667	2,211	2,261	209	320
Percent of Township(s)	47.2	0.4	8.2	0.7	9.7	2	0.5	2.1
Acres of Leased Federal Oil and Gas Minerals Suspended	0	0	0	0	0	0	0	0
Percent of Township(s)	0	0	0	0	0	0	0	0
Federal Wells	No Drilling, producing, shut in, or TA wells.	No Drilling, producing, shut in, or TA wells.	1 shut in, and 34 P&A wells.	1 producing, well.	3 P&A wells.	No Drilling, producing, shut in, or TA wells.	No Drilling, producing, shut in, or TA wells.	No Drilling, producing, shut in, or TA wells.
Private and State Wells	No Drilling, producing,	1 POW, 5 OSI, 1 Service	1 producing, 1 Shut in	22, producing, 2 shut in, 1	3 Producing Oil Wells,	1 drilling well, 3 OSI wells,	22 Producing Oil	No Drilling, producing,

	Carter County	Daniels County	Garfield County	Richland County	Roosevelt County	Rosebud County	Sheridan County	Wibaux County
	shut in, or TA wells.	and 26 P&A wells	and 29 P&A wells.	WIW and 16 P&A wells.	9 P&A Wells	2 GSI wells, 1 WIW well and 62 P&A wells.	Well(s) 10 Water Injection Well(s) 26 Shut-in Well(s) 2 WSW wells, 4 TA wells, 32 P&A wells	shut in, or TA wells.

3.16.2. Solid Minerals

3.16.2.1. Coal

The MCFO area, including the analysis area, contains large coal deposits, most of which are administered by the federal government. In the southern-third of the MCFO the coal is sub-bituminous in rank. Throughout the remaining northern two-thirds of the MCFO coals are lignitic and low rank sub-bituminous. Some of the coal mined in the MCFO area is exported out of state, and the remainder is burned at the power plants in Richland and Rosebud counties. In addition, a small amount of coal is railed or trucked in-state to power plants and other manufacturing facilities.

Coal is usually made available by competitive lease sales and noncompetitive lease modifications. Currently, five surface mines (Absaloka, Decker, Rosebud, Savage, and Spring Creek) produce coal within the MCFO. The inactive Big Sky Mine is also located in the field office area and is currently undergoing final reclamation. A new mine in the Otter Creek drainage located in northeastern Powder River County currently in the initial planning phase; with initial production anticipated within the next 5 to 10 years. All of the mines extract coal from beds within the Tongue River Member of the Fort Union Formation.

Only the Savage Mine in southeastern Richland County is located in the analysis area. The remaining mines are located outside of the analysis area.

None of the parcels proposed to be leased for oil and gas in the analysis area conflict with permitted coal mines and existing federal coal leases. Therefore, this subject will not be discussed further in this document.

3.16.2.2. Locatable Minerals

Locatable minerals are subject to provisions of the 1872 Mining Law. Minerals such as vanadium, uranium, gold, silver, gypsum and uncommon varieties of bentonite are found in various areas throughout the MCFO.

Bentonite clay is the predominate locatable mineral in the MCFO, occurring in the Cretaceous Belle Fourche and Mowry formations in the southeast corner of the field office within the Powder River Basin. Bentonite also occurs in other Cretaceous rocks, such as the Hell Creek

Formation and the Bearpaw shale. Bentonite is exposed along the Missouri River as far downstream (east) as Brockton on the Fort Peck Indian Reservation and along the axis of the Cedar Creek Anticline from Baker to Glendive. Within the MCFO, only those deposits, located in southern Carter County near the town of Alzada, are currently being extensively mined.

Uranium deposits within the MCFO, are located in the southeastern corner of Montana in Carter County. Uranium is associated with the Miocene age Arikaree Formation, which is present in the Ekalaka Hills, Long Pines, Finger Buttes and other isolated plateaus. In some areas the uranium has been leached by natural groundwater flows and re-deposited in underlying lignite coalbeds contained in the upper Fort Union Formation. Uranium is also associated with the lower Cretaceous age Fall River and Lakota sandstones. These deposits are of the roll-front type occurring at depths of 1,700 to 2,200 feet deep. All uranium mining claims are located in south-central Carter County, to the west of Alzada and south of U.S. Highway 212. No production of uranium has been performed since 1983 (US BLM, 1984) and activities in general have discontinued since about 2007.

Potash deposits have received some recently renewed exploratory interest in northwestern North Dakota and may have similar interest and potential in contiguous portions of northeastern Montana. These evaporates are deposited in the lower Devonian age Prairie Evaporite Formation. The deposit extends from the Canadian Northwest Territories to northeastern Montana and northwestern North Dakota. The salt-bearing interval occurs at depths from 6,000 to 9,000 feet. Production of potash would utilize solution mining in which water would be injected and the potash dissolved and recovered at the surface. After mining the void in the subsurface may have uses for natural gas storage or carbon sequestration. To date, the MCFO has not received APDs nor awarded claims for potash exploration or mining.

One lease parcel (MTM 97300 MW) in Carter County conflicts and encompasses lands with active locatable mineral activity (bentonite and uranium) and staked claims or patents on both federal and fee lands.

3.16.2.3. Salable Minerals

Salable minerals (mineral materials) are those common varieties of sand, stone, gravel, cinders, pumice, pumicite, and clay that may be acquired under the Materials Act of 1947. Mineral materials are disposed of by free-use and community/common-use permits granted to municipalities or non-profit entities, respectively. Contracts for sale of mineral materials are offered to private entities on both a competitive and non-competitive basis. Disposal of salable minerals is a discretionary decision of the BLM authorized officer. Potential resource development conflicts may be avoided by not issuing sales contracts or permits in oil and gas development locations or conditioning the APDs and/or contracts and permits to avoid conflicts in development of resources.

None of the lease parcels in the analysis area conflict with existing sales contracts or permits granted for saleable minerals. Therefore, this subject will not be discussed further in this document.

3.17 Special Designations

3.17.1 National Historic/Scenic Trails

Lease parcels MTM 97300 PU, PV, Lot 9 of P9, PW, PX, PY, and PZ (approximately 667 610 acres) are adjacent to the Lewis and Clark National Historic Trail. The Lewis and Clark NHT will continue to be managed in accordance with the act that established the trail in 1978. The trail will be managed for public use and enjoyment, while preserving the historic and cultural resources that are related to the events that occurred during the Lewis and Clark Expedition. Any changes in the landscape within view of the Lewis and Clark NHT will be guided by Class II visual resource management objectives.

3.18 Social and Economic Conditions

3.18.1 Social and Environmental Justice

The social section focuses on the areas in the immediate vicinity of the parcels being examined, which are located in eight counties in eastern Montana and concentrated in the area along the border with North Dakota and northern South Dakota. These counties include: Carter, Daniels, Garfield, Rosebud, Richland, Roosevelt, Sheridan and Wibaux, with the majority of the parcels available being located in Daniel, Carter and Rosebud Counties. The county seats in the counties where leasing could occur include Ekalaka in Carter County (2010 population 332), Scobey in Daniels County (1,017), Jordan in Garfield County (343), Forsyth in Rosebud County (1,777), Sidney in Richland County (5,191), Wolf Point in Roosevelt County (2,621), Plentywood in Sheridan County (1,734), and Wibaux in Wibaux County (589). In addition, there are other smaller communities in the vicinity of the parcels. All of these counties, except Richland where oil and gas development is occurring, lost population between 2000 and 2010. The losses ranged from 2 percent in Rosebud and Roosevelt Counties to 18 percent in Sheridan County while the gain in Richland County was 1 percent. Population density (persons per square mile) is generally very low ranging from less than 1 person per square mile in Carter and Garfield Counties to nearly 5 in Richland County. These figures compare to a statewide figure of 6.8. The areas in the vicinity of the parcels are home mostly to large cattle ranches. Approximately 75 percent of the land being considered is split estate (private or state surface with federal mineral estate).

Oil and gas leasing and production are already occurring in all of the counties included in this analysis. In the years 2005-2010, Richland and Wibaux Counties had the highest oil and gas production of any of the eight counties that include these parcels. Most of the oil and gas industry support services for eastern Montana occur in Glendive, Sidney, Baker and Miles City, Montana, and Williston and Dickinson, North Dakota. An area of high oil and gas drilling and production activity is currently occurring in the Bakken formation in western North Dakota near Stanley which is east of Roosevelt County, Montana.

In 2010, the American Indian population was 2% or less in all counties except for Roosevelt and Rosebud Counties whose populations were 60 percent and 35 percent American Indian, respectively. The percent of the population living below the poverty level in 2008 ranged from 11 percent in Richland County to over 20 percent in Rosebud and Roosevelt Counties. Three of the counties, Rosebud, Roosevelt and Garfield have percentages higher than the state figure of 14 percent. One American Indian Reservation, Fort Peck, is located north of the Missouri River, in

Roosevelt, Daniels and Sheridan Counties. The Northern Cheyenne Reservation is located mostly in Rosebud County.

The social environment of these counties is described in detail in the Socioeconomic Baseline Report for the Miles City Field Office RMP and EIS (prepared for the DOI, BLM, MCFO, June, 2005).

3.18.2 Economics

Certain existing demographic and economic features influence and define the nature of local economic and social activity. Among these features are the local population, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and unique area amenities. While this lease sale considers parcels in eight counties in eastern Montana, the affected local economy is made up of 16 counties in Montana within the BLM MCFO boundaries (Big Horn, Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Treasure, and Wibaux). Big Horn County is included in this analysis because federal minerals in Big Horn County are managed by the MCFO. Oil and gas leasing and production levels in Valley County are not included in this analysis because the federal mineral estate in Valley County is managed by the BLM HiLine District.

The 16-county local economy had an estimated 2009 population of 77,587 people. Total employment was estimated to be 49,061 jobs; there were an estimated 29,230 households; there were 168 NAIC industrial sectors represented in the local economy; average income per household was \$84,256; and total personal income was \$2,462.8million (IMPLAN, 2009). Miles City (population 8,410) is the largest population and business center in Eastern Montana (US Census Bureau, 2010). There were 1.58 people per job within the local economy and 0.60 households per job.

In the 10-year period between 2000 and 2009, oil and gas drilling and production occurred in every county except Treasure. During this 10-year period, an annual average of 98 oil wells, 81 natural gas wells, 95 Coal Bed Methane (CBM) wells, and 13 dry holes were drilled (MT DNR, Oil and Gas Conservation Commission, 2010). Statewide average wellhead prices in 2008 were \$91.79 per bbl. for crude oil and \$7.65 per MCF for natural gas (IPAA, 2010). Statewide average output per producing well was 6,255 bbls of crude oil and 12,458 MCF for natural gas (IPAA, 2010). The statewide average cost of drilling and equipping each well was \$5,360,703 for oil wells, \$808,477 for gas wells, and 2,799,436 for dry holes (IPAA, 2010).

Local economic effects of leasing federal minerals for oil and gas exploration, development, and production are influenced by the number of acres leased and estimated levels of production. The acres leased, number of wells drilled, and level of production all influence local employment, income, and public revenues (indicators of economic impacts).

In April, 2011, there were 949,371 acres of BLM federal minerals leased for oil and gas in the MCFO. Annual lease rental is paid on 760,739 acres that are not held by production. Total annual lease bonus and rental revenues to the federal government from leasing federal minerals

averaged \$2.35 million between FY2005 and FY2010. Lease rents are not paid on acres that are held by production. Instead, royalties are paid on oil and gas production from these leases.

Federal oil and gas leases generate a one-time lease bonus bid as well as annual rents. The minimum competitive lease bid is \$2.00 per acre. If parcels do not receive the minimum bid they may be leased later as noncompetitive leases that don't generate bonus bids. Within the MCFO area, bonus bids averaged \$15.43 per acre on federal leases issued between 2005 and 2010. Average bonus per leased acre ranged from \$0.96 for Carter County to \$86.48 for Richland County.

Lease rental is \$1.50 per acre per year for the first five years and \$2.00 per acre per year thereafter. Typically, oil and gas leases expire after 10 years unless held by production. During the lease period annual lease rents continue until one or more wells are drilled that result in production and associated royalties. Within the MCFO, about 20 percent of the leased acres are held by production.

Forty-nine percent of these federal leasing revenues from public domain minerals are distributed to the state and the state distributes 25 percent of the revenue it receives back to the counties where the leases exist. About 98 percent of the leased federal minerals within the MCFO area are leased on public domain minerals. With federally acquired minerals (acquired under Bankhead Jones authority), 25 percent of federal revenues are distributed directly to the appropriate counties. The federal government collects an estimated annual average of about \$2.35 million in lease bonus bids and rent, of which an estimated \$1.2 million is distributed to the state/local governments.

Between 2005 and 2010, annual production from federal minerals in the MCFO averaged 3.27 million barrels of oil and 12,825,602 MCF of natural gas (ONRR, 2011). Over the past six years, 15 percent of total oil production and 32 percent of total natural gas production came from federal minerals administered by the BLM. The amounts of federal minerals and the contributions of that production to local economies vary among the counties. Table 11 displays the average annual (2005-2010) federal oil and gas production, sales, and royalties by county. Fallon County has the largest amount of federal oil and gas production.

Table 11. Average Annual (2005-2010) Federal Oil and Gas Production, Sales, and Royalties by County

Counties	Production		Sales		Royalties	
	Oil (bbl)	Gas (MCF)	Oil	Gas	Oil	Gas
Big Horn	15,866	4,251,127	\$673,597	\$22,275,027	\$5,778	\$2,443,683
Carter	26,162	40,613	\$1,775,781	\$132,667	\$205,992	\$15,026
Custer	0	31,944	0	\$126,271	0	\$15,778
Dawson	282,147	77	\$17,068,357	\$655	\$2,133,511	\$82
Fallon	1,891,322	8,040,360	\$113,742,752	\$40,266,109	\$12,614,927	\$3,908,119
Garfield	4,171	0	\$194,309	0	\$6,639	0
Powder R.	103,480	5,234	\$6,653,968	\$30,642	\$664,762	\$3,819
Prairie	94,467	2,903	\$5,597,308	\$18,859	\$699,663	\$2,357
Richland	428,147	286,089	\$28,174,367	\$1,994,378	\$2,250,647	\$160,253

Roosevelt	11,582	4,620	\$730,841	\$34,376	\$98,866	\$4,190
Rosebud	35,338	0	\$1,994,964	0	\$162,863	0
Sheridan	32,329	8,066	\$2,001,960	\$52,002	\$237,785	\$5,976
Wibaux	346,466	154,570	\$21,014,091	\$781,842	\$2,473,138	\$88,128
Total	3,271,477	12,825,602	\$199,622,295	\$65,712,827	\$21,554,571	\$6,647,410
Source: Office of Natural Resource Revenues, February 2011						

Federal oil and gas production in Montana is subject to production taxes or royalties. The federal oil and gas royalties on production from public domain minerals equal 12.5 percent of the value of production (43 CFR 3103.3.1). Forty-nine percent of these royalties from public domain minerals are distributed to the state, of which 25 percent is distributed back to the county of production (Title 17-3-240, MCA). If production comes from acquired federal minerals under the Bankhead Jones authority, 25 percent of the federal revenues are distributed directly to the counties of production. Average annual federal royalty revenues between 2005 and 2010 were about \$28.2million; of which about \$13.8 million were disbursed to the state and counties.

Local economic contributions of leasing, exploring, and developing federal minerals: The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) local royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors. Extraction of oil and natural gas (NAICS sector 20), drilling oil and gas wells (NAICS sector 28), and support activities for oil and gas operations (NAICS sector 29) supported an estimated 1,200 total direct jobs and \$84.6 million in total direct employee compensation and proprietor income in the local economy (IMPLAN, 2009).

Total federal revenues from federal oil and gas leasing, rents, and royalty payments averaged an estimated \$30.6 million between 2005 and 2010. Federal revenues disbursed to the state of Montana averaged an estimated \$14.9 million per year. The local counties of production received an estimated combined average \$3.7 million per year. These revenues help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and/or keeping records. Other county functions that may be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

The estimated annual local economic contribution associated with BLM-managed federal leases, rents, drilling, production, and royalty payments combined to support about 4,060 ~~110~~ total local jobs (full and part-time) and \$247.4 ~~\$5.1~~ million in local labor income, respectively. This amounts to about eight less than one percent of the local employment and about 14 percent of the local income. ~~The NAICS aggregated sectors that experience the most influence from oil and gas related leasing, exploration, development, and production are mining, retail trade, construction, health care and social assistance, accommodations and food service.~~ Table 12 shows the current contributions of leasing federal oil and gas minerals and the associated

exploration, development, and production of federal oil and gas minerals to the 16 counties that make up the local economy.

Table 12. Current Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the 16-County Local Economy

Industry	Employment (jobs)			Labor Income (Thousands of 2009 dollars)		
	Area Totals	Federal O&G - Related		Area Totals	Federal O&G- Related	
Agriculture	8,702	3	0	\$122,258	\$48	\$1
Mining	2,386	2,316	32	\$181,862	\$187,545	\$2,390
Utilities	698	22	0	\$94,048	\$2,915	\$63
Construction	2,070	37	0	\$80,180	\$1,550	\$9
Manufacturing	546	2	0	\$22,524	\$94	\$2
Wholesale Trade	1,024	181	5	\$46,256	\$8,160	\$241
Transportation & Warehousing	1,701	135	4	\$108,227	\$8,114	\$251
Retail Trade	4,073	241	5	\$101,066	\$5,794	\$117
Information	645	38	1	\$27,734	\$1,613	\$49
Finance & Insurance	1,490	116	3	\$47,290	\$3,625	\$98
Real Estate & Rental & Leasing	881	101	3	\$15,236	\$2,892	\$77
Prof, Scientific, & Tech Services	1,029	216	6	\$36,416	\$9,028	\$253
Mngt of Companies	36	20	1	\$2,986	\$1,675	\$43
Admin, Waste Mngt & Rem Serv	652	49	1	\$11,783	\$792	\$21
Educational Services	527	11	0	\$13,875	\$278	\$5
Health Care & Social Assistance	4,747	200	4	\$176,735	\$7,070	\$143
Arts, Entertainment, and Rec	1,269	40	1	\$18,090	\$526	\$11
Accommodation & Food Services	2,916	143	3	\$44,769	\$2,157	\$46
Other Services	2,909	130	3	\$62,071	\$2,853	\$68
Government	10,761	61	31	\$509,256	\$2,644	\$1,221
Total	49,061	4,063	105	\$1,722,663	\$249,375	\$5,109
Federal O&G as Percent of Total	---	8.28	0.21%	---	14.48	0.30%

IMPLAN, 2009 database

4.0 ENVIRONMENTAL IMPACTS

4.1 Assumptions and Reasonably Foreseeable Development Scenario Summary

At this stage of the leasing process, the act of leasing parcels would not result in any activity that might affect various resources. Even if lease parcels are leased, it remains unknown whether development would actually occur, and if so, where specific wells would be drilled and where facilities would be placed. This would not be determined until the BLM receives an APD in which detailed information about proposed wells and facilities would be provided for particular leases. Therefore, this EA discusses potential effects that could occur in the event of development.

Upon receipt of an APD, the BLM would initiate a more site-specific NEPA analysis to more fully analyze and disclose site-specific effects of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of BMPs documented in “Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development” (USDI and USDA 2007), also known as the “Gold Book.” The BLM could also identify APD COAs, based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

For split-estate leases, the BLM would notify the private landowners that oil and gas exploration or development activities are proposed on their lands and they are encouraged to attend the onsite inspection to discuss the proposed activities. In the event of activity on such split estate leases, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

This chapter presents the potential environmental, social, and economic effects from the actions described in each alternative in Chapter 2, as well as potential effects from lease exploration and development activities. In addition to describing potential effects, this chapter presents mitigation measures designed to reduce, minimize or avoid potential impacts as per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts of the action alternatives are identified by resource below. The duration of the possible effects is analyzed and described as either short-term or long-term. Short-term effects generally last less than five years; long-term effects generally last more than five years.

4.1.1 Reasonably Foreseeable Development Scenario Summary

The RFD scenario (Appendix B) is based on information contained in the MCFO RFD developed in 2005 and revised in 2009; it is an unpublished report that is available by contacting the MCFO. The RFD scenario (Appendix B) contains projections of the number of possible oil and gas wells that could be drilled and produced in the MCFO area and used to analyze projected wells for the 48 nominated lease parcels. The 48 lease parcels are not identified within high potential development for coal bed methane. For the RFD scenario, the parcels have been analyzed under the following oil and gas potential development areas; the Williston Basin,

Williston Basin Other, Cedar Creek Anticline, Powder River Basin, and the MCFO Other. These areas are on Map 14. A detailed description of the RFD forecast in the analysis area is found in Appendix B.

4.1.2 Alternative B and C Assumptions

No surface disturbance would occur as a result of issuing leases. The potential number of acres disturbed by exploration and development activities is shown in Tables C-1 and C-2 in Appendix C. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the MCFO. Typical exploration and development activities and associated acres of disturbance were used as assumptions for analysis purposes in this EA. (Note: The assumptions were not applied to Alternative A because the lease parcels would not be recommended for lease; therefore, no wells would be drilled or produced on the lease parcel, and no surface disturbance would occur on those lands from exploration and development activities).

4.2 Alternative A (No Action Alternative)

4.2.1 Direct Effects Common to All Resources, not including Economics

Under Alternative A, the 48 parcels, ~~7,230.66~~ 7,173.57 surveyed federal mineral acres (~~1,763.01~~ 1,705.92 surveyed acres BLM administered surface and 5,467.65 surveyed acres of private and/or state surface), would not be offered for competitive oil and gas lease sale. Under this alternative, the state and private minerals could still be leased in surrounding areas.

There would not be new impacts from oil and gas exploration or production activities on the federal lease parcel lands. Additional natural gas or crude oil could not enter the public markets, and royalties could not accrue to the federal or state treasuries from the parcel lands. The No Action Alternative would result in the continuation of the current land and resource uses on the lease parcels.

Except for Economic resources, described below, no further analysis of the No Action Alternative is presented for resources on parcel lands.

4.2.2 Economics

4.2.2.1 Direct and Indirect Effects:

The basis for economic impacts is the number of acres leased, rents paid, and level of production by alternative. The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors.

Economic effects are summarized and displayed in comparative form in Table 13 and Table 14. Under Alternative A, none of the parcels would be leased. Consequently, no federal, state, or local revenues could be generated from leasing, rents, or royalties associated with production. No employment or income could be generated if none of the parcels are leased.

Table 13 Summary of Anticipated Average Annual Oil and Gas Activity by Alternative

Activity	Alternative			
	A	B		C
Acres that would be leased based on this EA	0	7,231	7,174	4,354 4,297
Lease rental first 5 years (\$1.50/acre)	0	\$5,423	5,381	\$3,266 3,223
Lease rental second 5 years (\$2.00/acre)	0	\$7,231	7,174	\$4,354 4,297
Bonus bids (avg. \$15.43/acre)	0	\$11,157 11,069		\$6,718 6,630
Total annual federal lease and rental revenue	0	\$23,812 23,624		\$14,338 14,150
Distribution to State/local government	0	\$11,553 11,462		\$6,957 6,866
Average annual oil production (bbl)	0	24,918	24,721	15,004 14,807
Average annual gas production (MCF)	0	97,688	96,918	58,821 58,051
Average annual Federal Oil Royalty (bblx\$91.76x0.125)	0	\$285,898 283,645		\$172,148 169,894
Average annual Federal gas Royalty (MCFx\$7.65x0.125)	0	\$93,414 92,678		\$56,247 55,511
Total average annual Federal O&G royalties	0	\$379,312 376,322		\$228,395 225,405
Average annual distribution to state/local government	0	\$184,042 182,592		\$110,817 109,367
Total average annual federal revenues	0	\$403,124 399,946		\$242,733 239,555
Total average annual state/local revenues	0	\$195,596 194,054		\$117,774 116,232
Total average annual revenue distributed to counties	0	\$50,411 50,013		\$30,354 29,956
Average annual total local employment (jobs)	0	17	0	10 0
Average annual total local income (\$1,000)	0	1,115	\$29	669 \$17

Table 14 Summary Comparison of Estimated Average Annual Economic Impacts

Alternative	Acres Leased	Local Revenue to Counties (\$1,000)	Total Employment (full and part-time jobs)	Total Labor Income (\$1,000)	Change in Population	Change in Number of Households
A	0	0	0	0	0	0
B	7,231 7,174	\$50,411 50,013	17 0	\$1,115 \$29	27 0	10 0
C	4,354 4,297	\$30,354 29,956	10 0	\$669 \$17	16 0	6 0

4.2.2.2 Cumulative Effects:

Cumulative economic impacts associated with Alternative A would be similar to those described in the economic section of the Affected Environment. The cumulative effects of federal mineral leasing, exploration, development and production within the local economy are summarized in Table 15 and Table 16. The cumulative demographic and economic characteristics of the local economy could not change if the 48 parcels are not leased.

Table 15 Summary Comparison of Cumulative Annual Economic Impacts by Alternative

Activity	Alternative		
	A	B	C
Existing Acres leased*	949,371	949,371	949,371
Acres that would be leased based on this EA **	0	7,231-7,174	4,354 4,297
Total acres leased	949,371	956,602 956,545	953,725 953,668
Acres held by production*	188,632	188,632 188,632	188,632 188,632
Total acres leased for which lease rents would be paid	760,739	767,970 767,913	765,093 765,036
Lease rental first 5 years (\$1.50/acre)	\$570,554	\$575,978 575,935	\$573,820 573,777
Lease rental second 5 years (\$2.00/acre)	\$760,739	\$767,970 767,913	\$765,093 765,036
Bonus bids (average \$15.43/acre)	\$1,173,820	\$1,184,978 1,184,890	\$1,180,538 1,180,451
Total average annual federal lease and rental revenue	\$2,505,114	\$2,528,925 2,528,738	\$2,519,451 2,519,264
Average annual distribution to State/local government	\$1,215,481	\$1,227,035 1,226,943	\$1,222,438 1,222,347
Average annual oil production (bbl)***	3,271,477	3,296,395 3,296,198	3,286,481 3,286,284
Average annual gas production (MCF)***	12,825,602	12,923,290 12,922,520	12,884,423 12,883,653
Federal Oil Royalty (bblx\$91.79x0.125)	\$37,536,109	\$37,822,008 37,819,754	\$37,708,257 37,706,003
Federal gas Royalty (MCFx\$7.65x0.125)	\$12,264,482	\$12,357,896 12,357,159	\$12,320,729 12,319,993
Total Average annual Federal O&G royalties	\$49,800,591	\$50,179,903 50,176,913	\$50,028,986 50,025,996
Average annual distribution to State/local government	\$24,163,247	\$24,347,289 24,345,838	\$24,274,064 24,272,613
Total average annual Federal Revenues	\$52,305,705	\$52,708,829 52,705,651	\$52,548,438 52,545,260
Total average annual State/Local Revenues	\$25,378,728	\$25,574,324 25,572,782	\$25,496,502 25,494,960

Total average annual revenue distributed to counties	\$6,540,828	\$6,591,239 6,590,842	\$6,571,182 6,570,785
*LR2000, BLM, April 4, 2011			
**RFD, BLM, March 29, 2011			
***Based on average annual production 2005-2010, Office of Natural Resource Revenue, 2011			

Table 16 Summary Comparison of Employment and Income by Major Industry by Alternative

Industry	Total Jobs Contributed			Total Income Contributed (\$1000)		
	Alt. A	Alt. B	Alt. C	Alt. A	Alt. B	Alt. C
Total Federal Contribution	4,063 105	4,080 105	4,073 105	\$249,375 \$5,109	\$250,490 \$5,138	\$250,044 \$5,126
Percent Change from Current	0.0%	0.4% 0.6%	0.2% 0.3%	0.0%	0.4% 0.6%	0.3%

IMPLAN, 2009 database

4.3 Alternative B (Proposed Action)

Under Alternative B, 48 parcels, 7,230.66 7,173.57 surveyed federal mineral acres (1,763.01 1,705.92 surveyed acres of federal surface and 5,467.65 surveyed acres of private and/or state surface), would be offered for competitive oil and gas lease sale. No parcels would be deferred.

4.3.1 Direct Effects Common to All Resources

The action of leasing the parcels in Alternative B would, in and of itself, have no direct impact on resources. Any potential effects on resources from the sale of leases could occur during lease exploration and development activities. At the time of this review it is unknown whether a particular lease parcel would be sold and a lease issued.

4.3.2 Indirect Effects Common to All Resources

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation are indirect effects from leasing the lease parcels in Alternative B. It is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Thus, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. The potential impacts from exploration and development activities would be analyzed after receipt of an APD or sundry notice.

Typical impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the Miles City Oil & Gas Amendment/EIS (1994), the Big Dry RMP (1996), the Montana Statewide Oil & Gas Amendment/EIS (2003) and the Supplement (2008) to that document.

4.3.3 Air Resources

4.3.3.1 Direct and Indirect Effects

4.3.3.1.1 Air Quality

Leasing the parcels would have no direct impacts on air quality. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads; exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHGs and volatile organic compounds during drilling or production activities. The amount of increased emissions cannot be precisely quantified at this time since it is not known for certain how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g., compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact would also vary according to the characteristics of the geologic formations from which production occurs, as well as the scope of specific activities proposed in an APD.

Current monitoring data show that the criteria pollutants fall well below applicable air quality standards indicating very good air quality. The potential level of development and mitigation described below is expected to maintain this level of air quality by limiting emissions. In addition, pollutants would be regulated through the use of state-issued air quality permits or air quality registration processes developed to maintain air quality below applicable standards.

4.3.3.1.2 Greenhouse Gas Emissions at the MCFO and Project Scales

Sources of GHGs associated with development of lease parcels could include construction activities, operations, and facility maintenance in the course of oil and gas exploration, development, and production. Estimated GHG emissions are discussed for these specific aspects of oil and gas activity because the BLM has direct involvement in these steps. However, the current proposed activity is to offer parcels for lease. No specific development activities are currently proposed or potentially being decided upon for any parcels being considered in this EA. Potential development activities would be analyzed in a separate NEPA analysis effort if the BLM receives an APD on any of the parcels considered here.

Anticipated GHG emissions presented in this section are taken from the Climate Change SIR, 2010. Data are derived from emissions calculators developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, based on methods described in the Climate Change SIR (2010). Based on the assumptions summarized above for the MCFO RFD, Table 17 discloses projected annual GHG source emissions from BLM-permitted activities associated with the RFD (note: the source year selected to disclose the estimated GHG emissions was the year with the highest expected combined construction and production emissions for oil and gas sources in the planning area).

Table 17. BLM projected annual emissions of greenhouse gases associated with oil and gas exploration and development activity in the MCFO.

Source	BLM Long-Term Greenhouse Gas Emissions in tons/year				Emissions (metric tons/yr)
	CO ₂	CH ₄	N ₂ O	Co ₂ e	CO ₂ e

Conventional Natural Gas	158,154.7	1,572.8	1.2	190,984.1	173,817.6
Coal Bed Natural Gas	268,477.4	5,194.6	0.9	377,826.5	342,855.24
Oil	91,689.0	562.6	0.5	103,663.3	94,068.3
Total	518,321.1	7,330	2.6	672,473.9	610,741.1

To estimate GHG emissions associated with the action alternatives, the following approach was used:

1. The proportion of each project level action alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing relative to the total acreage of federal mineral acreage available for leasing in the RFD.
2. This ratio was then used as a multiplier with the total estimated GHG emissions for the entire RFD (with the highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately ~~7,230~~ 7,173.57 acres of lease parcels with federal minerals would be leased. These acres constitute approximately 0.12 percent of the total federal mineral estate of approximately 5,798,000 acres identified in the MCFO RFD. Therefore, based on the approach described above to estimate GHG emissions, 0.12 percent of the RFD for this EA total estimated BLM emissions of approximately 610,741.1 metric tons/year would be approximately 761.65 metric tons/year of CO₂e if the parcels within Alternative B were to be developed.

4.3.3.1.3 Climate Change

The assessment of GHG emissions and climate change is in its formative phase. As summarized in the Climate Change SIR, climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (Climate Change SIR 2010).

It is currently not possible to know with certainty the net impacts from developing lease parcels on climate. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. It is therefore beyond the scope of existing science to relate a specific source of greenhouse gas emission or sequestration with the creation or mitigation of any specific climate-related environmental effects. Although the effects of greenhouse gas emissions in the global aggregate are well-documented, it is currently impossible to determine what specific effect GHG emissions resulting from a particular activity might have on the environment. For additional information on environmental effects typically attributed to climate change, please refer to the cumulative effects discussion below.

While it is not possible to predict effects on climate change of potential GHG emissions discussed above in the event of lease parcel development for alternatives considered in this EA, the act of leasing does not produce any GHG emissions in and of itself. Releases of GHGs could occur at the exploration/development stage.

4.3.3.2 Mitigation

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Measures would also be required as COAs on permits by either the BLM or the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Some of the following measures could be imposed at the development stage:

- flare or incinerate hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- install emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- install emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- vapor recovery systems where petroleum liquids are stored;
- tier II or greater, natural gas or electric drill rig engines;
- secondary controls on drill rig engines;
- no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing volatile organic compounds (VOCs));
- gas or electric turbines rather than internal combustion engines for compressors;
- nitrogen oxides (NO_x) emission controls for all new and replaced internal combustion oil and gas field engines;
- water dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.
- co-locate wells and production facilities to reduce new surface disturbance;
- directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- gas-fired or electrified pump jack engines;
- install velocity tubing strings;
- cleaner technologies on completion activities (i.e. green completions), and other ancillary sources;
- centralized tank batteries and multi-phase gathering systems to reduce truck traffic;
- forward looking infrared (FLIR) technology to detect fugitive emissions; and
- air monitoring for NO_x and ozone (O₃).

More specific to reducing GHG emissions, Section 6 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR and as summarized below in Table 18 (reproduced from Table 6-2 in Climate Change SIR), display common methane emission technologies reported under the USEPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 18. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program ¹

Source Type / Technology	Annual Methane Emission Reduction ¹ (Mcf/yr)	Capital Cost Including Installation (\$)	Annual Operating and Maintenance Cost (\$)	Payback (Years or Months)	Payback Gas Price Basis (\$/Mcf)
Wells					
Reduced emission (green) completion	7,000 ²	\$1K – \$10K	>\$1,000	1 – 3 yr	\$3
Plunger lift systems	630	\$2.6K – \$10K	NR	2 – 14 mo	\$7
Gas well smart automation system	1,000	\$1.2K	\$0.1K – \$1K	1 – 3 yr	\$3
Gas well foaming	2,520	>\$10K	\$0.1K – \$1K	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	\$35K – \$104K	\$7K – \$17K	3 – 19 mo	\$7
Consolidate crude oil production and water storage tanks	4,200	>\$10K	<\$0.1K	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	\$5K – \$9.8K	Negligible	4 – 51 mo	\$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	\$7
Zero-emission dehydrators	31,400	>\$10K	>\$1K	0 – 1 yr	NR
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	\$0.2K – \$0.3K	Negligible	3 – 8 mo	\$7
Early replacement	260	\$1.9K	Negligible	13 mo	\$7
Retrofit	230	\$0.7K	Negligible	6 mo	\$7
Maintenance	45 – 260	Negl. to \$0.5K	Negligible	0 – 4 mo	\$7
Convert to instrument air	20,000 (per facility)	\$60K	Negligible	6 mo	\$7
Convert to mechanical control systems	500	<\$1K	<\$0.1K	0 – 1 yr	NR
Valves					
Test and repair pressure safety valves	170	NR	\$0.1K – \$1K	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<\$1K	\$0.1K – \$1K	0 – 1 yr	NR

Table 18. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program ¹

Source Type / Technology	Annual Methane Emission Reduction ¹ (Mcf/yr)	Capital Cost Including Installation (\$)	Annual Operating and Maintenance Cost (\$)	Payback (Years or Months)	Payback Gas Price Basis (\$/Mcf)
Compressors					
Install electric compressors	40 – 16,000	>\$10K	>\$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	\$324K	Negligible	10 mo	\$7
Flare Installation					
	2,000	>\$10K	>\$1K	None	NR

Source: Multiple USEPA Natural Gas STAR Program documents. Individual documents are referenced in Climate Change SIR (2010).

¹ Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc).

² Emission reduction is per completion, rather than per year.

K = 1,000

mo = months

Mcf = thousand cubic feet of methane

NR = not reported

yr = year

In the context of the oil sector, additional mitigation measures to reduce GHG emissions include methane reinjection and CO₂ injection. These measures are discussed in more detail in Section 6.0 of the Climate Change SIR (2010).

In an effort to disclose potential future GHG emissions reductions that might be feasible, the BLM estimated GHG emissions reductions based on the RFD for the MCFO. For emissions sources subject to BLM (federal) jurisdiction, the estimated emissions reduction represent approximately 51 percent reduction in total GHG emissions compared to the estimated MCFO federal GHG emissions inventory (Climate Change SIR, as updated October 2010, Section 6.5 and Table 6-3). The emissions reductions technologies and practices are identified as mitigation measures that could be imposed during development. (Note: except for the light-duty vehicle GHG emission standards, no federal or state regulations mandate these GHG emissions reductions).

4.3.4 Soil Resources

4.3.4.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on soil resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Land uses associated with oil and gas exploration and development could cause surface disturbances. Such acts result in reduced ground cover, soil mixing, compaction, or removal, exposing soils to accelerated erosion by wind and water, resulting in the irretrievable loss of topsoil and nutrients and potentially resulting in mass movement or sedimentation. Surface disturbances also change soil structure, heterogeneity (variable characteristics), temperature regimes, nutrient cycling, biotic richness, and diversity. Along with this, mixed soils have decreased bulk density, and altered porosity, infiltration, air-water relationships, salt content, and pH (Perrow and Davy, 2003; Bainbridge 2007). Soil compaction results in increased bulk

density, and reduced porosity, infiltration, moisture, air, nutrient cycling, productivity, and biotic activity (Logan 2001; 2003; 2007). Altering such characteristics reduces the soil system's ability to withstand future disturbances (e.g., wildfire, drought, high precipitation events, etc.).

The probability and magnitude of these effects are dependent upon local site characteristics, climatic events, and the specific mitigation applied to the project. Within 2-5 years following reclamation, vegetative cover and rates of erosion would return to pre-disturbance conditions (FSEIS 2008). Exceptions would be sites poorly suited to reclamation (apx. 4,271 ac., 60 percent of the parcels), which could require unconventional and/or site-specific reclamation measures.

4.3.4.2 Mitigation

Measures would be taken to reduce, avoid, or minimize potential impacts to soil resources from exploration and development activities. Prior to authorization, proposed actions would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Mitigation would include avoiding areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, decompaction, revegetation, weed control, slope stabilization, surface roughening, and fencing. Conducting oil and gas development with BMPs would enhance soil resilience or reduce soil system fragmentation, accelerated wind and water erosion.

4.3.5 Water Resources

4.3.5.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on water resources. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

The magnitude of the impacts to water resources would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. Surface disturbance effects typically are localized, short-term, and occur from implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on water resources.

Oil and gas exploration and development of a lease parcel could cause the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed, 100-year floodplains of non-major streams, and non-riparian, ephemeral waterbodies. The potential effects from these activities could be accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential can be further increased in the long term by soil compaction and low permeability surfacing (e.g. roads and well pads) which increases the energy and amount of overland flow and decreases infiltration, which in turn changes flow characteristics, reduces groundwater recharge, and increases sedimentation and erosion (DEQ 2007).

Spills or produced fluids could potentially impact surface and ground water resources in the long term. Oil and gas exploration/development could contaminate aquifers with salts, drilling fluids,

fluids and gases from other formations, detergents, solvents, hydrocarbons, metals, and nutrients; change vertical and horizontal aquifer permeability; and increase hydrologic communication with adjacent aquifers (EPA 2004). Groundwater removal could result in a depletion of flow in nearby streams and springs if the aquifer is hydraulically connected to such features. Typically produced water from conventional oil and gas wells is from a depth below useable aquifers or coal seams (FSEIS 2008).

4.3.5.2 Mitigation

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, measures would be taken to reduce, avoid, or minimize potential impacts to water resources including application of appropriate mitigation. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, and expedite rapid reclamation (including interim reclamation) would maintain water resources.

Methods to reduce erosion and sedimentation could include: reducing surface disturbance acres; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around waterbodies and floodplains could reduce sedimentation and maintain water quality. Appropriate well completion, the use of Spill Prevention Plans, and Underground Injection Control regulations would mitigate groundwater impacts. Site-specific mitigation and reclamation measures would be described in the COAs.

4.3.6 Vegetation Resources

4.3.6.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on vegetation resources. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

Impacts to vegetation depend on the vegetation type/community, soil community and the topography of the lease parcels. Disturbance to vegetation is of concern because protection of soil resources, maintenance of water quality, conservation of wildlife habitat, and livestock production capabilities could be diminished or lost over the long-term through direct loss of vegetation (including direct loss of both plant communities and specific plant species).

Other direct impacts, such as invasive species invasion, could result in loss of desirable vegetation. Invasive species and noxious weeds could also reduce livestock grazing forage, wildlife habitat quality, and native species diversity. In addition, invasive species are well known for changing fire regimes.

Additionally, surface disturbing activities directly affect vegetation by destroying habitat, churning soils, impacting biological crusts, disrupting seedbanks, burying individual plants, and generating sites for competitive species. In addition, other vegetation impacts could also be

caused from soil erosion and result in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Fugitive dust generated by construction activities and travel along dirt roads could affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil, fuel, wastewater or other chemical spills could contaminate soils as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term vegetation damage could be expected.

Oil and gas development activity could reduce BLM's ability to manage livestock grazing while meeting or progressing towards meeting the Standards of Rangeland Health. Development and associated disturbances could reduce available forage or alter livestock distribution leading to overgrazing or other localized excess grazing impacts. Construction of roads, especially in areas of rough topography could cause significant changes in livestock movement and fragment suitable habitat for some plant communities.

If development activity is reducing vegetative resources for livestock grazing and the grazing activity is resulting in the allotment not meeting the standards for rangeland health, then the authorized officer would have to take action prior to the next grazing season to ensure the BLM lands are progressing towards meeting the standards. This could result in the change of livestock grazing activities in order to improve vegetative conditions.

4.3.6.2 Mitigation

Mitigation would be addressed at the site specific APD stage of exploration and development. If needed, COAs would potentially include revegetation with desirable plant species, soil enhancement practices, direct live haul of soil material for seed bank revegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs.

4.3.7 Riparian-Wetland Habitats

4.3.7.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on riparian-wetland habitats. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

The exploration and development of oil and gas within uplands or adjacent to riparian-wetland areas could reduce riparian/wetland functionality by changing native plant productivity, composition, richness, and diversity; accelerating erosion; increasing sedimentation; and changing hydrologic characteristics. Impacts that reduce the functioning condition of riparian and wetland areas could impair the ability of riparian/wetland areas to reduce nonpoint source pollution (MDEQ 2007) and provide other ecosystem benefits. The magnitude of these effects would be dependent on the specific activity, season, proximity to riparian-wetland areas, location in the watershed, upland and riparian-wetland vegetation condition, mitigation applied, and the time until reclamation success. Erosion increases typically are localized, short term, and occur

from implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on riparian-wetland resources.

4.3.7.2 Mitigation

Stipulations addressing steep slopes, waterbodies, streams, 100-year floodplains of major rivers, and riparian areas would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, site-specific mitigation measures would be identified which would avoid or minimize potential impacts to riparian-wetland areas at the APD stage. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, maintain biodiversity, maintain vegetated buffer zones, and expedite rapid reclamation (including interim reclamation) would maintain riparian/wetland resources.

4.3.8 Wildlife

4.3.8.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on wildlife. Any potential effects from the sale of lease parcels could occur at the time the leases are developed.

The use of standard lease terms and stipulations on these lands (Appendix A) would minimize, but not preclude impacts to wildlife. Oil and gas development which results in surface disturbance could directly and indirectly impact aquatic and terrestrial wildlife species. These impacts could include loss or reduction in suitability of habitat, improved habitat for undesirable (non-native) competitors, species or community shift to species or communities more tolerant of disturbances, nest abandonment, mortalities resulting from collisions with vehicles and power lines, electrocutions from power lines, barriers to species migration, habitat fragmentation, increased predation, habitat avoidance, and displacement of wildlife species resulting from human presence. The scale, location, and pace of development, combined with implementation of mitigation measures and the specific tolerance of the species to human disturbance all influence the severity of impacts to wildlife species and habitats, including threatened, endangered, candidate, proposed, and other special status species.

4.3.8.1.1 Threatened, Endangered Proposed, and Candidate Species

Habitat within the lease parcels exists to support USFWS threatened, endangered, proposed, or candidate species including the whooping crane, interior least tern, piping plover, black-footed ferret, pallid sturgeon, mountain plover, Sprague's pipit, and sage grouse.

BLM has determined that the act of issuing leases within the whooping crane migration corridor will not affect the whooping crane. However, impacts to whooping cranes are possible from subsequent oil and gas development activities permitted at the APD stage. At this time, stipulations do not currently exist to protect any known whooping crane migration staging areas. Line strikes, collisions with vehicles, habitat fragmentation, and other anthropogenic activities could disturb, displace, or cause direct mortality of whooping cranes.

Therefore, if development on any of the 13 leases proposed within the whooping crane migration corridor is proposed, BLM would consult with the USFWS pursuant to section 7(a)(2) of ESA.

An outcome of the consultation process could be that conditions of approval are attached to the permit or the permit could not be approved. Other BMP's could also be developed through consultation, including minimizing disturbance, adherence to Avian Powerline Interaction Committee (APLIC) guidelines, and others as deemed appropriate.

The seven lease parcels located within Interior least tern and the four within piping plover nesting habitat are along the Yellowstone River corridor for least terns, and within the Unit 1 critical habitat designation for piping plovers. Existing stipulations from the Big Dry RMP (1995) requires a NSO stipulation within 0.25 miles of wetlands identified as interior least tern and/or piping plover habitat. As a result of these stipulations, development would not impact nesting habitat, and issuing the proposed lease parcels would have no affect on interior least terns and piping plovers.

Because of the lack of suitable black-footed ferret habitat within the proposed lease parcels, and the low likelihood that black-footed ferrets exist outside of the reintroduction areas BLM has determined that the project would not affect the black-footed ferret.

Pallid sturgeon individuals and their habitat would occur in or near lease parcels MTM 97300 PU, PV, PW, PX, PY, PZ, and P9 have the potential to be affected by the development of oil wells. The RFD scenario (Appendix B) describes parcels MTM 97300 PU, PV, PZ, and P9 (Williston Basin Other) as having medium development potential while parcels MTM 97300 PX, and PY (Williston Basin) are described as having high development potential. Potential impacts from development could include: overland oil spills, underground spills from activities associated with horizontal drilling or other practices, spills from drilling mud or other extraction and processing chemicals, and surface disturbance activities that create a localized erosion zone. Oil spills and other pollutants from the oil extraction process could harm the endangered pallid sturgeon in two different ways. First, toxicological impacts from direct contact could have immediate lethal effects to eggs, juveniles, and adults. Second, toxic effects to lower food web levels (e.g. aquatic macro-invertebrates) could indirectly affect the pallid sturgeon species by degrading water quality and degrading or eliminating food resources. Additionally, surface disturbing activities that decrease the availability or input of organic material, large woody debris, and trees could decrease cover, food-web compartments and fluxes, and holding areas for pallid sturgeon. Other aquatic species could experience the same type of direct and indirect impacts.

Currently, in the Big Dry and Powder River RMPs there are no stipulations specific to Pallid sturgeon habitat. However, a floodplain stipulation (NSO 11-2) would not allow surface occupancy in the 100-year floodplain boundary of the Yellowstone River. Additionally, least tern stipulations (NSO 11-10) protects pallid sturgeon habitat by providing a one-quarter mile buffer along the Yellowstone River. The stipulations apply to wetlands habitat and the BLM considers the Yellowstone River wetlands habitat for this bird species. No lease parcels are located along the Missouri River.

BLM has determined that issuing leases for the seven parcels along the Yellowstone River will have no affect on the pallid sturgeon. If development were to occur, additional mitigation would be included as conditions of approval at the APD stage. These conditions include the placement

of earthen berms and oil skimmers (a culvert device placed in drainages which is intended to block oil from entering streams) to help protect pallid sturgeon habitat in case of oil spills by greatly reducing the potential for spills to reach pallid sturgeon habitat. If oil and gas development is proposed for these seven lease parcels, BLM would consult with the USFWS pursuant to section 7(a)(2) of ESA.

BLM has determined that the proposed action would not jeopardize the mountain plover. Impacts to mountain plovers from development would be similar to what was described above for other species, but stipulations do not exist for mountain plover. In the event oil and gas development is proposed within mountain plover habitat, BLM would conference with the USFWS pursuant to section 7(a)(4) of ESA. Conference could determine the need for terms and conditions that would be applied to the project for the conservation of mountain plovers. Terms and conditions in a conference opinion are not binding, but through the process of “confirmation” may be converted to binding terms and conditions in a subsequent biological opinion (BO) if the mountain plover is later listed as threatened or endangered.

Energy development (oil, gas, and wind) and associated roads and facilities increase the fragmentation of grassland habitat. A number of studies have found that Sprague's pipits appear to avoid non-grassland features in the landscape, including roads, trails, oil wells, croplands, woody vegetation, and wetlands (Dale et al. 2009, pp. 194, 200; Koper et al. 2009, pp. 1287, 1293, 1294, 1296; Greer 2009, p. 65; Linnen 2008, pp. 1, 9-11, 15; Sutter et al. 2000, pp. 112-114). Sprague's pipits avoid oil wells, staying up to 350 meters (m) (1148 feet (ft)) away (Linnen 2008, pp. 1, 9-11), magnifying the effect of the well feature itself. Oil and gas wells, especially at high densities, decrease the amount of habitat available for breeding territories. (Federal Register: September 15, 2010 (Volume 75, Number 178))

Potential suitable habitat exists for the Sprague's pipit across those lease parcels mentioned previously; however, inventories have not been conducted within the parcels. Therefore, wildlife inventories would be conducted at the APD stage of development to determine the presence or absence of Sprague's pipits. The Sprague's pipit lease notice, LN 14-15, is issued with those leases and would be applied if Sprague's pipits are found in the area. If Sprague's pipits are found, protective measures would be applied as conditions of approval to minimize impacts to Sprague's pipits and their habitat. In the event oil and gas development is proposed within Sprague's pipit habitat, at the APD stage BLM would conference with the USFWS pursuant to section 7(a)(4) of ESA, or if the Sprague's pipit has been listed as threatened or endangered, BLM would consult with the USFWS pursuant to section 7(a)(2).

Sage grouse are offered species specific protections through a stipulation. Under Alternative B, ¼ mile NSO buffers and 2 mile timing buffers would apply where relevant. Based on research, these stipulations for sage grouse are considered ineffective to ensure that sage grouse can persist within fully developed areas. With regard to existing restrictive stipulations applied by the BLM, (Walker et al. 2007a) research has demonstrated that the 0.4-km (0.25 miles) NSO lease stipulation is insufficient to conserve breeding sage-grouse populations in fully developed gas fields because this buffer distance leaves 98 percent of the landscape within 3.2 km (2 miles) open to full-scale development. Full-field development of 98 percent of the landscape within 3.2

km (2 miles) of leks in a typical landscape in the Powder River Basin reduced the average probability of lek persistence from 87 percent to 5 percent (Walker et al. 2007a).

Other studies also have assessed the efficacy of existing BLM stipulations for sage grouse. Impacts to leks from energy development are most severe near the lek, and remained discernable out to distances more than 6 km (3.6 miles) (Holloran 2005, Walker et al. 2007a), and have resulted in the extirpation of leks within gas fields (Holloran 2005, Walker et al. 2007a). Holloran (2005) shows that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road, and that development influence counts of displaying males to a distance of between 4.7 and 6.2 km (2.9 and 3.9 miles). All well-supported models in Walker et al. (2007a) indicate a strong effect of energy development, estimated as proportion of development within either 0.8 km (0.5 miles) or 3.2 km (2 miles), on lek persistence. Buffer sizes of 0.25 mi., 0.5 mi., 0.6 mi. and 1.0 mi. result in an estimated lek persistence of 5 percent, 11 percent, 14 percent, and 30 percent. Lek persistence in the absence of CBNG development averages approximately 85 percent. Models with development at 6.4 km (4 miles) had considerably less support, but the regression coefficient indicated that impacts were still apparent out to 6.4 km (4 miles) (Walker et al. 2007a). Tack (2009) found impacts of energy development on lek abundances (numbers of males per lek) out to 7.6 miles.

The 2 mile timing stipulation attached to the respective parcels in this proposal only applies between March 1 to June 15, and development can occur within the 2 miles outside of those dates. Not all lease parcels would be expected to see full field development as noted in the range of RFD, although effects would most likely mirror these studies to some degree proportionate to the amount of development that occurs outside of the stipulated timeframe.

Noise has been shown to affect sage-grouse and associated sagebrush obligates. Sage-grouse are known to select highly visible leks with good acoustic properties. Effects to sage-grouse would be a decrease in numbers of males on leks and activity levels and lower nest initiation near oil and gas development. Sage-grouse numbers on leks within 1.6 km (1 mile) of coal bed natural gas compressor stations in Campbell County, Wyoming were shown to be consistently lower than on leks not affected by this disturbance (Braun et al. 2002). Holloran (2005), Holloran et al. (2005a, 2005b), and Anderson (2005) reported that lek activity by sage-grouse decreased downwind of drilling activities, suggesting that noise had measurable negative impacts on sage-grouse. The actual level of noise (measured in decibels) that would not affect greater sage-grouse breeding and nesting activities is presently unknown.

The 50 decibel limit (10 dBA above background noise level) at the lek site for CBNG production facilities within the Powder River RMP area of the FSEIS provides mitigation for noise levels in that RMP area but not for conventional oil and gas development throughout the entire RMP area. In addition, timing restriction (TL 13-3) is applied within 2 miles of leks within the MCFO, which also provide mitigation for noise level effects to sage-grouse.

This alternative also includes the attachment of a sage grouse lease notice (LN 14-11) when the lease parcel is located in sage grouse habitat. The lease notice would require an operator to implement specific measures to reduce impacts of oil and gas operations on sage grouse

populations and habitat quality. The application of this lease notice would be expected to reduce, but not eliminate, impacts to sage grouse and habitats.

4.3.8.1.2 Other Special Status Species

As noted, up to 46 wildlife species that BLM has designated as “sensitive” have the potential to occur within the parcel areas. Stipulations are not provided for all BLM sensitive species in the current RMPs. Stipulations are provided for 10 out of the 46 “non-TE&P” sensitive species. For those species afforded some protections through existing stipulations, impacts could be minimized, but not eliminated. Impacts to BLM sensitive species would be similar to those described above, unless they are afforded protective measures from other regulations such as the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703.) or the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c). BLM does not consult with the USFWS on “sensitive” species and likewise would not receive terms and conditions from USFWS requiring additional protections of those species.

Numerous species of birds were identified as potential inhabitants across the analysis area. With the impacts associated with development, it is reasonable to assume there would be impacts to nesting and migrating bird species. The primary impacts to these species would include disturbance of preferred nesting habitats, improved habitat for undesirable competitors and/or a species shift to disturbance associated species, and increased vehicle collisions.

Research in Sublette County, Wyoming on the effects of natural gas development on sagebrush steppe passerines documented negative impacts to sagebrush obligates such as Brewer’s sparrows, sage sparrows, and sage thrashers (Ingelfinger 2001). The impacts were reported greatest along roads where traffic volumes are high and within 100 meters of these roads. Sagebrush obligates were reduced within these areas by as much as 60%. Sagebrush obligate density was reduced by 50% within 100 meters of a road even when traffic volumes were less than 12 vehicles /day. It would be expected that similar population declines would occur to this guild of species from similar development proposals within sagebrush habitats.

Stipulations do not exist specifically for the protection of BLM sensitive songbirds. The MBTA prohibits the take, capture or kill of any migratory bird, any part, nest or eggs of any such bird (16 U.S.C 703 (a)). NEPA analysis pursuant to Executive Order 13186 (January 2001) requires BLM to ensure that MBTA compliance and the effects of Bureau actions and agency plans on migratory birds are evaluated, should reduce take of migratory birds and contribute to their conservation.

Effects to migratory birds from oil and gas development at the APD stage could include direct loss of habitat from roads, well pads and other infrastructure, disturbance, powerline strikes and unintended direct mortality, fragmentation of habitat, change in use of habitats, and potential threats and competition from edge species. Field surveys for nesting birds at proposed development sites would be conducted for activities planned between May 1 and August 15. Mitigation measures would be assigned at the APD stage to minimize negative effect on migratory bird populations, in compliance with Executive Order 13186 and MBTA. These mitigation measures would be required as COAs. An NSO stipulation for oil and gas surface disturbing activities in riparian and wetland areas would prohibit any potential oil and gas development in those habitats unless approval was granted through the Waivers, Exceptions, and

Modifications (WEM) process. BLM would coordinate WEMs with USFWS to assure MBTA compliance.

Take of bald and golden eagles and any other migratory raptors is not anticipated through this action; however, unintended take may occur indirectly as a result of vehicle collisions and other related actions associated with development. Field surveys for raptors at proposed development sites would be conducted for activities planned between April 15 and August 15. Mitigation measures would be assigned at the APD stage to minimize negative effect on raptor populations, including bald and golden eagles. These mitigation measures would be required as COAs. The application of stipulations and COAs at the project level would comply with MBTA and BGEPA.

Only one known black-tailed prairie dog colony exists within any of the proposed lease parcel boundaries. Stipulations do not exist specific to prairie dog colonies. If development were to occur within this area, potential impacts to prairie dogs could be mortalities from vehicles and construction activities, and improved access to these areas where prairie dog shooting could occur. Disturbances on the periphery of a colony from pipelines could increase the ability of prairie dogs to occupy habitat within the disturbed areas, and possibly expand or re-distribute the colony into these areas.

Many other species have been documented to utilize prairie dog colonies. Impacts to associated species include disturbance from vehicle traffic, human presence, and potential mortalities from vehicles. Where potential suitable habitat exists for these species, oil and gas development activities would be expected to reduce habitat suitability in the area.

4.3.8.1.3 Other Fish and Wildlife

The types and extent of impacts to other wildlife species and habitats from development are similar to those described above for other species. Based on the RFD scenarios, direct habitat loss is possible. Initial disturbance could change the occupation of those areas to disturbance-oriented species (e.g., horned larks), or species with more tolerance for disturbances. These changes could also be expected to decrease the diversity of wildlife. Although bladed corridors would be reclaimed after the facilities are constructed, some changes in vegetation could occur along the reclaimed areas. The goal of reclamation is to restore disturbed areas to pre-disturbed conditions. The outcome of reclamation, unlike site restoration, will therefore not always mimic pre-disturbance conditions and offer the same habitat values to wildlife species. Sagebrush obligates, including some species of songbirds and sage grouse, could be most affected by this change.

It is anticipated that some development could occur adjacent to existing disturbances of some type. Depending on proximity and species tolerance, wildlife species within these areas could either have acclimated to the surrounding conditions, previously been displaced by construction activities, or could be caused to be displaced to other areas with or without preferred habitat.

Potential impacts to aquatic wildlife from development could include: overland oil spills, underground spills from activities associated with horizontal drilling or other practices, spills from drilling mud or other extraction and processing chemicals, and surface disturbance

activities that create a localized erosion zone. Oil spills and other pollutants from the oil extraction process could harm the aquatic wildlife species in two different ways if the spill substances enter the habitat. First, toxicological impacts from direct contact could have immediate lethal effects to eggs, larvae, juveniles, and adults. Second, toxic effects to lower food web levels (e.g. aquatic macro-invertebrates) could indirectly affect fish, amphibian, and reptile species by degrading water quality and degrading or eliminating food resources.

Additional mitigation could occur as COAs at the APD stage. These conditions could include the placement of earthen berms and oil skimmers (in ephemeral drainages where fish passage will not be blocked) to help protect aquatic wildlife habitat in case of oil spills.

Oil and gas development is allowed within big game crucial winter range with a timing restriction from December 1 to March 31. This stipulation does not apply to operation and maintenance of production facilities. The goal of this stipulation is to protect crucial big game habitats from disturbance during the winter use season. This stipulation provides protection to big game winter habitats and species only during that timeframe, and does not provide protection during the long-term operation and maintenance periods. Development can occur outside of those dates and will exist thereafter until reclamation, thus only delaying impacts until after that year of construction.

Mule deer could be impacted by this project from habitat fragmentation and disturbance. Mule deer winter range habitat has been identified within 12 lease parcels. Development could affect mule deer use of winter range habitat in those areas. Studies conducted in the Pinedale anticline of Wyoming found that mule deer avoided areas in close proximity to well pads with no evidence of well-pad acclimation during 3 out of 4 years. During year 4 of development habitat selection patterns were influenced more by road density, and not proximity of well pads. The authors attributed this to an unusually severe winter, where movement options and available habitat was limited. Densities of mule deer decreased by an estimated 46% within the developed area over the four years, and indirect impacts were observed out to 2.7-3.7 km of well sites. Mule deer distribution shifted toward less preferred and presumably less suitable habitat. (Sawyer et al. 2005) Similar impacts could be expected from development with this proposal.

White-tailed deer could also be expected to be impacted by this project from habitat fragmentation and disturbance. Winter range for white-tailed deer exists across the analysis area, but covers much less area than other big game ranges. White-tailed deer winter range has been identified within 10 lease parcels.

Pronghorn could be impacted by this project from habitat fragmentation and disturbance. Pronghorn winter range habitat has been identified within 8 lease parcels. Preliminary studies in the upper green river basin in Wyoming report that some pronghorn exhibit movement patterns that suggest almost complete avoidance of gas field areas of intensive development in the Jonah field during the winter, whereas pronghorn in the Pinedale Anticline Project Area (PAPA) apparently have not been avoiding human activities. It is speculated that the difference may exist due to different levels in well densities, as the Jonah field was reported as 1 well/57 acres, and the PAPA at 1 well/124 acres (Berger et al. 2007). Effects to winter range within existing and

future oil and gas development and exploration would be similar to those referenced above and could depend on rate and location of development.

Two sharp-tailed grouse leks exist within the two proposed lease parcels. An NSO buffer within 1/4 mile of leks applies to the affected portions of the parcels. In addition, 14 lease parcels are located within 2 miles of sharp-tailed grouse leks where timing stipulations from March 1 to June 15 were applied. This timing does not apply to operation and maintenance of production facilities. Although limited research exists that documents impacts to sharp-tailed grouse from development activities, it is expected that sharp-tailed grouse could be impacted similarly to sage grouse. Sharp-tailed grouse could be impacted by this project from habitat fragmentation and disturbance. Vehicles and human activity during breeding and nesting seasons could reduce breeding activity, displace nesting hens and reduce the suitability of habitat for brood-rearing. Mortality could increase as a result of collisions with vehicles.

Wild turkeys, pheasants, and hungarian partridge could also be affected by disturbance and direct mortality through nest destruction and vehicle collisions during the development stages.

4.3.8.2 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to fish and wildlife animal species from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could include rapid revegetation, project relocation, or pre-disturbance wildlife species surveying. In the event that CBNG development is proposed within the area previously analyzed in the FSEIS (2008) a Wildlife Monitoring and Protection Plan (WMPP) would be required with the development application. If oil and gas development is proposed in suitable habitat for threatened or endangered species, consultation with the USFWS would occur to determine if additional terms and conditions would need to be applied.

4.3.9 Special Status Plant Species

4.3.9.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on special status plant species. Any potential effects from the sale of leases could occur at the time the leases are developed.

4.3.9.2 Mitigation

Stipulations applied to wildlife resources, steep slopes, waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would likely also provide protections for special status plant species. Proposed development would be analyzed on a site-specific basis prior to approval of oil and gas exploration or development activities at the APD stage. Mitigation would also be addressed at the site-specific APD stage. Surveys to determine the existence of federally listed species could occur on BLM-administered surface or minerals prior to approval of exploration and development activities at the APD stage.

4.3.10 Cultural Resources

4.3.10.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on cultural resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Indirect effects from surface disturbances associated with exploration and development activities post leasing have the potential to alter the characteristics of a significant cultural or historic property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Other effects to cultural resources from proposed surface disturbance activities include the destruction, damage, or alteration to all or part of the cultural resource and diminishing the property's significant historic features as a result of the introduction of visual, atmospheric, or audible elements. This could include altering or diminishing the elements of a National Register eligible property and diminish an eligible property's eligibility status. Cultural resource investigations associated with development potentially adds to our understanding of the prehistory/history of the area under investigation and discovery of sites that could otherwise remain undiscovered due to burial or omission during review inventories. Indirect effects to cultural resources within the analysis area by county are as follows:

Lease parcel MTM 97300 MW, located in Carter County, is approximately 1,307 acres. Based on modeling results for the MCFO area, the parcel could contain up to 15 cultural sites with 2 to 3 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 2 conventional oil or gas wells could be drilled on the parcel. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcels MTM 97300 N0, N9, OB, OE, OJ, OK, OO, OP, OQ, OR, OS, OD, OF, OG, OH, OI, OL, OM and ON, located in Daniels County, are approximately 2,866 acres. Based on modeling, the parcels could contain up to 31 cultural sites with 4 to 5 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcels. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcels MTM 97300 L0, M2, N7, N8, NU and NY, in Garfield County, are approximately 885 acres. Based on modeling, the parcels could contain up to 10 cultural sites with 1 to 2 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcels. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcels MTM 97300 L4, M4, MY, MZ, M1, M3 and MX, located in Rosebud County, are approximately 1,012 acres. Based on modeling, the parcels could contain up to 11 cultural sites with 2 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcels. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcels MTM 97300 P9, PU, PV, PY, PZ, PT, PW and PX, located in Richland County, are approximately 748 acres. Based on modeling, the parcels could contain up to 9 cultural sites with 1 to 2 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcels. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcel MTM 97300 LD, located in Roosevelt County, is approximately 57 acres. Based on modeling, the parcel could contain up to 1 cultural site having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts no conventional oil or gas wells be drilled on the parcels; thus, no cultural resource affects.

Lease parcels MTM 97300 LX, LY, LZ, and MP, located in Sheridan County, are approximately 347 acres. Based on modeling, the parcel could contain up to 4 cultural sites with 1 site having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcel. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

A portion of lease parcel MTM 93700 LX is adjacent to a previously recorded sensitive archaeological site. Based on the present information, it cannot be determined if the site extends into the parcel. The site form also lists unrecorded cultural sites in the lease parcel. BLM requires additional information to determine if the adjacent site extends into the lease parcel and record and evaluate cultural resources in the lease parcel.

Lease parcel MTM 97300 OY, located in Wibaux County, is approximately 40 acres. Based on modeling, the parcel could contain 1 cultural site which could have the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcels. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Leasing approximately ~~7,262~~ 7,173 acres of federal minerals within the above described counties could indirectly affect 79 cultural sites with 8 to 12 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. Taking the RFD scenario into account, development of 8 wells could affect 7 cultural sites, 7 sites that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

4.3.10.2 Mitigation

The use of lease terms, the cultural no surface occupancy stipulation (NSO 11-11), and the cultural lease notice (LN 16-1) provide protection to cultural values or at least notification to the

lessee that potentially valuable cultural resource values are or are likely to be present on the lease parcels.

Specific mitigation measures, including but not limited to, possible site avoidance, excavation or data recovery would be determined when site-specific development proposals are received. However, in most surface-disturbing situations cultural resources would be avoided by project redesign or relocation. ~~Should a cultural property be unavoidable, significant properties would be site specifically mitigated prior to implementation of a project.~~ If significant properties cannot be avoided, appropriate strategies would be implemented to mitigate potential impacts in accordance with existing federal regulations.

4.3.11 Native American Religious Concerns

4.3.11.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on Native American religious concerns. Any potential effects from the sale of leases could occur at the time the leases are developed.

A review of the lease parcels indicates that no previously reported TCPs would be directly or indirectly impacted; however, some of the lease parcels are located adjacent or near the Fort Peck Reservation in Richland, and Roosevelt Counties. Section 3.8 summarizes the results of cultural resource data reviews for lease parcels analyzed in this EA. A portion of lease parcel MTM 93700 LX is adjacent to a previously recorded sensitive archaeological site, which until additional information is obtained, cannot be evaluated or determined to extend into the parcel.

4.3.11.2 Mitigation

Mitigation would be the same as section 4.3.10.2 above. For those parcels where no inventory data is available or where no information is available for TCPs, BLM would apply the cultural lease notice (LN 16-1).

4.3.12 Paleontology

4.3.12.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on paleontological resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

The surface disturbances associated with oil and gas exploration and development activities could have indirect effects to paleontological resources primarily in areas classified as Potential Fossil Yield Classification (PFYC) 4 or 5 areas. Surface-disturbing activities could potentially alter the characteristics of paleontological resources through damage, fossil destruction, or disturbance of the stratigraphic context in which paleontological resources are located, resulting in the loss of important scientific data. However, in most surface-disturbing situations, paleontological resources could be avoided by project redesign or relocation before project approval which would negate the need for the implementation of mitigation measures.

Conversely, surface-disturbing activities could potentially lead to the discovery of paleontological localities that would otherwise remain undiscovered due to burial or omission during review inventories. The scientific study to retrieve and interpret important paleontological resource information provides a better understanding of the nature and

distribution of those resources. However, the retrieval and interpretation of information is most successful and meaningful when a site is left intact.

4.3.12.2 Mitigation

The application of lease terms, the cultural no surface occupancy stipulation (NSO 11-11), and the paleontological lease notice (LN 14-12) at leasing provides protection to paleontological values during development. The paleontological lease notice would be applied to those lease parcels that fall within the PFYC 4 or 5 areas, requiring a field survey prior to surface disturbance. These inventory requirements would result in the identification of paleontological resources and avoidance or mitigation of significant localities before permit approval and prior to surface disturbance. However, the application of lease terms only allows the relocation of activities up to 200 meters, unless documented in the NEPA document, and cannot result in moving the activity off lease.

Specific mitigation measures could include, but are not limited to, site avoidance or excavation. Avoidance of paleontological properties would be a best management practice. However, should a paleontological locality be unavoidable, significant properties would be mitigated prior to implementation of a project. These measures would be determined when site specific development proposals are received.

In order to protect potential paleontological values the following leases are recommended to have the Paleontological lease notice 14-12 applied per guidance identified in IM 2009-011 and 2008-009: MTM 97300 N9, N0, OB, OC, OK, OE, OG, OH, & OI in Daniels County; MTM 97300 MX, N7, L0, N8, and M2 in Garfield County; and MTM 97300 MY and MZ in Rosebud County (Appendix A).

4.3.13 Visual Resources

4.3.13.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on visual resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

The lease parcels fall into VRM classes II, III and IV. While the act of leasing federal minerals produces no visual impacts, development of a lease parcel could result in some level of modification to the existing landscape.

4.3.13.2 Mitigation

All new oil and gas development would implement, as appropriate for the site, BLM BMPs for VRM, regardless of the VRM class. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance, selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. Wherever practical, no new development would be allowed on ridges or mountain tops. Overall, the goal would be to not reduce the visual qualities or scenic value that currently exists.

Specifically, visual impacts would be minimized in the Class II areas by the use of the lease stipulation. The stipulation states “all surface-disturbing activities, semi-permanent and permanent facilities in VRM Class II, areas may require special design, including location, painting, and camouflage, to blend with the natural surroundings and meet the visual quality objectives for the area.” In addition those modifications would follow the existing form, line, color and texture of the current landscape. Measure would be taken to mitigate the visual impacts within a Class III and Class IV area to protect the scenic value.

4.3.14 Forest and Woodland Resources

4.3.14.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on forest and woodland resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Potential impacts from oil and gas development could include the cutting and subsequent removal of forest and woodland vegetation from drill-site development areas, including roads, pads, reserve and earthen pits, surface facilities, pipelines, and powerlines. The degree of impact would vary according to the precise location of development activities in the parcel area and is directly related to topography, miles of road construction (including right-of-way), standing timber volume per acre, and total acres of surface facilities development. Greater numbers of miles/acres of surface disturbance and steeper slopes with larger cuts and fills within forested areas signify that a greater volume of forest and woodland vegetation would be removed. A total of ~~407~~ 350 forest and woodland acres could potentially be impacted under this alternative; 117 acres of evergreen, 253 196 acres of deciduous, and 37 acres of mixed evergreen-deciduous forest.

4.3.14.2 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to forest and woodland resources from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. The road construction and maintenance BMPs outlined in the Gold Book are consistent with the Water Quality BMPs for Montana Forests (Logan 2001) which are designed to protect water quality and forest soils. Other mitigation measures could include the artificial planting of bareroot or containerized nursery stock seedlings.

All severed forest and woodland vegetative material would need to be removed or reduced to acceptable standards meeting Montana’s Control of Timber Slash and Debris Law (Title 76, Chapter 13, Part 4), commonly referred to as the “Slash” Law; therefore, requiring burning, grinding, chipping, burying, or hauling residual debris off-site to a designated landfill or other location for disposal.

4.3.15 Livestock Grazing

4.3.15.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on livestock grazing. Any potential effects from the sale of leases could occur at the time the leases are developed.

Oil and gas development could result in a loss of vegetation for livestock grazing (e.g., direct removal, introduction of unpalatable plant species, etc.), decrease the palatability of vegetation due to fugitive dust, disrupt livestock management practices, involve vehicle collisions, and decrease grazing capacity. Direct losses of forage could also result from construction of roads, well pads and associated infrastructure and would vary depending on the extent of development. These impacts could vary from short-term impacts to long-term impacts depending on the type of exploration or development, the success of reclamation, and the type of vegetation removed for the oil and gas activities.

4.3.15.2 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to livestock grazing from oil and gas exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation could potentially include controlling livestock movement by maintaining fence line integrity, fencing of facilities, revegetation of disturbed sites, and fugitive dust control.

4.3.16 Recreation and Travel Management

4.3.16.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on recreation and travel management. Any potential effects from the sale of leases could occur at the time the leases are developed.

Recreation impacts could exist where oil and gas development and recreational user conflicts could occur. More specifically, in areas of high oil and gas development potential, there could be user conflicts between motorized recreationists (OHV activities), hunting, target shooting, camping, fishing, river use, picnicking, and winter activities (e.g., snowmobiling) and associated oil and gas activities. These impacts could exist in both the short-term (exploration and construction phases of oil and gas development) and in the long-term (producing wells, maintenance of facilities, etc.). Recreationists could lose some benefit outcomes such as loss of importance sense of place, solitude and possible increase of stress.

Areas frequented by recreationists, where there are other land use activities occurring, in addition to oil and gas development, the public could perceive these areas as inaccessible or unavailable because of the existing facilities. As oil and gas development occurs, new routes are created which often attract recreationists seeking additional or new areas to explore for motorized recreational opportunities. Motorized recreational opportunities could be enhanced through the additional opportunities to explore; however, user conflicts and public safety issues could result from the use of the new travel routes. The creation of routes from oil and gas activities could lead to a proliferation of user-created motorized routes, resulting in adverse impacts to the scenic qualities of the area and increased level of surface disturbance.

For those areas with isolated tracks of BLM public lands that generally do not have existing public access, recreation opportunities that occur in these areas are limited to use with adjacent land owner permission or hunting by an outfitter; therefore, oil and gas activities would have little or no impact on recreational experiences in these isolated tracks.

Foreseeable changes in recreation use levels include demand for recreational use of public land to increase. Increases could be expected in, but not limited to, hunting, fishing, hiking, camping, wildlife viewing, and dispersed recreational uses. This could increase the incidence of conflict between recreationists involved in motorized activities and non-motorized activities.

4.3.16.2 Mitigation

Measures would be taken to minimize, avoid, or mitigate impacts to recreation from oil and gas exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation measures could potentially include, but are not limited to, reclamation of industrial routes/areas when no longer needed, fencing of facilities, and installing signs along roads.

4.3.17 Lands and Realty

4.3.17.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on lands and realty. Any potential effects from the sale of leases could occur at the time the leases are developed.

Facilities associated with oil and gas development on the 48 parcels could cause disturbance to the existing rights-of-way on federal and private surface on three of the parcels (MTM 97300 OH, P9, and MW). The patents for the affected private surface were issued reserving or subject to the existing ROWs. Additional ROWs could be required across federal surface for “off-lease” or third party facilities required for potential development of the parcel.

4.3.17.2 Mitigation

Measures would need to be taken to avoid disturbance to or impacting the existing rights-of-way on federal and/or private surface on parcels MTM 97300 OH, P9, and MW in the event of any exploration and development activities. Any new “off-lease” or third party rights-of-way required across federal surface for future exploration and/or development of the 48 parcels would be subject to lands and realty stipulations to protect other resources as determined by environmental analyses which would be completed on a case-by-case basis.

4.3.18 Minerals

4.3.18.1 Fluid Minerals

4.3.18.1.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on fluid minerals. Any potential effects from the sale of leases could occur at the time the leases are developed.

Issuing a lease provides opportunities to explore for and develop oil and gas. Additional natural gas or crude oil produced from any or all of the 48 parcels could enter the public markets. There could be a reduction in the known amount of oil and gas resources. Royalties and taxes could accrue to the federal and state treasuries from the lease parcel lands.

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use could affect oil and gas exploration and development, both on and off the federal lease parcel. Leases issued with major constraints (NSO stipulations) could decrease some lease values, increase operating costs, and require relocation of well sites, and modification of field

development. Leases issued with moderate constraints (timing limitation and controlled surface Use (CSU) stipulations) could result in similar but reduced impacts, and delays in operations and uncertainty on the part of operators regarding restrictions.

Under Alternative B, all of the lease parcels would be offered for lease subject to major (NSO) or moderate (CSU) constraints and/or standard lease terms and conditions.

4.3.18.2 Solid Minerals

4.3.18.2.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on solid mineral resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Parcel MTM 97300 MW could have direct and indirect impacts with existing patented claims granted by the BLM for bentonite extraction. There are multiple active and inactive surface mining pits, reclaimed and unreclaimed lands located in T. 9 S., R. 57 E., Sections 11 and 12. A total of 1,086 acres (83.1 percent) of the parcel could directly conflict with existing patented claims and operations.

Parcel MTM 97300 MW could also have direct and indirect impacts with existing patented claims for uranium on lands with private mineral interests within the parcel. A total of 605 acres (46.3 percent) of the parcel could directly conflict with existing patented claims. There are no active uranium development, mining or recovery and processing operations on federal or non-federal lands in the parcel or other offered parcels in the analysis area.

Potential oil and gas development could present impacts to existing and future bentonite and uranium operations. Impacts from potential oil and gas development could restrict mining pit excavations/expansions, access, facility construction, infrastructure placement, reclamation of disturbed surface, and timeframe and progress of potential development. Some loss or restriction of otherwise recoverable resources could also be expected.

4.3.18.2.2 Mitigation

In the event of any exploration and development activities on the lease parcels, coordination between all facets of mining and oil and gas operations would be closely maintained by the respective operators and BLM to minimize impacts to solid mineral resources. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures.

4.3.19 Special Designations

4.3.19.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on special designations. Any potential effects from the sale of leases could occur at the time the leases are developed.

Seven lease parcels (MTM 97300 PU, PV, Lot 9 of P9, PW, PX, PY, and PZ) approximately 667 610 acres, are within the Lewis and Clark Trail Special Recreation Management Area (SRMA). For impacts please see the Recreation and Travel Management section.

4.3.19.2 Mitigation

Mitigation measures would be the same as those described in Alternative B, Visual Resources, Mitigation.

4.3.20 Social and Economic Conditions

4.3.20.1 Social

4.3.20.1.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on social resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

Exploration, drilling or production could create an inconvenience to people living adjacent to leases due to increased traffic and traffic delays, and light, noise and visual impacts. This could be especially noticeable in rural areas where oil and gas development has not occurred previously. The amount of inconvenience could depend on the activity affected, traffic patterns within the area, noise and light levels, length of time and season these activities occur, etc. In addition, competition for housing could occur in some communities. However, residents living in areas that have been experiencing ongoing population losses could support the increased employment and population related to oil and gas development. Their communities could also benefit from the additional revenues to counties due to oil and gas leasing and development.

There would be no disproportionate effects to low income or minority populations from leasing. However, there are some leases in the vicinity of the Fort Peck Indian Reservation. Consultation with potentially affected Tribes would occur at the APD stage.

4.3.20.2 Economics

4.3.20.2.1 Direct and Indirect Effects

The basis for economic impacts is the number of acres leased, rents paid, and level of production by alternative. The economic contribution to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in other sectors. Table 13 (see Section 4.2.2.1) displays the anticipated average annual employment and income generated by the oil and gas leasing, development, and production for each alternative. Table 14 (see Section 4.2.2.1) is a summary of local revenues, employment, income, population, and household impacts of each alternative.

Leasing approximately ~~7,231~~ 7,173 acres of federal minerals (Alternative B) would increase average annual oil and gas leasing and rent revenues to the federal government by an estimated \$24,000. Average annual leasing and rent revenues that could be distributed to state/local governments could increase by an estimated ~~\$12,000~~ \$11,000; average annual federal oil and gas royalties could increase by an estimated ~~\$379,000~~ \$376,000; and average annual royalties distributed to the state/counties could increase by an estimated ~~\$184,000~~ \$183,000 compared to current levels.

Total average annual federal revenues related to leasing approximately ~~7,231~~ 7,173 acres of federal minerals and associated annual rent and royalty revenues related to average annual production of federal minerals could amount to an estimated ~~\$403,000~~ \$400,000. Of this, an estimated ~~\$196,000~~ \$194,000 could be disbursed to the state. Total estimated revenues distributed to the counties could be about \$50,000.

The estimated combined total average annual employment ~~would likely not change from current levels~~ and income supported by federal oil and gas leasing, distributions of royalties to local governments, drilling wells, and production would ~~amount to about 20 total jobs (full and part-time) and \$1.1 million~~ increase by about \$29,000 within the local economy (IMPLAN, 2009). There would ~~also be a corresponding increase~~ not be a change in local population of ~~about 30 people and 10~~ or households.

Total federal contribution of Alternative B and anticipated related exploration, development, and production of oil and gas could ~~have very limited effects on~~ local population, total local employment, number of households, average income per household, and total personal income. The economic effects could be spread unevenly among the counties. Leasing approximately ~~7,231~~ 7,173 acres and anticipated exploration, development, and production under Alternative B could provide additional funds (\$50,000) for county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that could be funded include administering primary and secondary education and operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. Demand for these services could ~~also increase along with the increase~~ change very little since there would be no expected changes in total local employment and population. Leasing approximately ~~7,231~~ 7,173 acres and anticipated exploration, development, and production could not change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), or economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates) across the entire 16-county area.

4.3.21 Cumulative Impacts- Alternative B

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). This section describes cumulative impacts associated with this project on resources. The ability to assess the potential cumulative impacts at the leasing stage for this project is limited for many resources due to the lack of site-specific information for potential future activities. Upon receipt of an APD for any of the lease parcels addressed in this document, more site-specific planning would be conducted in which the ability to assess contributions to cumulative impacts in a more detailed manner would be greater due to the availability of more refined site-specific information about proposed activities.

4.3.21.1 Past, Present and Reasonably Foreseeable Future Actions

Past, present, or reasonably foreseeable future actions that affect the same components of the environment as the Proposed Action are: grazing, roads, wildfire and prescribed fire, range improvement projects, and utility right-of-ways.

4.3.21.2 Cumulative Impacts by Resource

Cumulative effects for all resources in the MCFO are described in the final Big Dry RMP/EIS (pgs. 111 to 156) and the 1992 Oil and Gas Amendment of the Billings, Powder River, and South Dakota Resource Management Plans and Final Environmental Impact Statement and the 1994 Record of Decision and the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact with a development alternative for coal bed natural gas production (4-1 to 4-310). Anticipated exploration and development activities associated with the lease parcels considered in this EA are within the range of assumptions used and effects described in this cumulative effects analysis for resources other than air, climate, and socio-economics resources. This previous analysis is hereby incorporated by reference for resources other than for air, climate, and economics resources.

4.3.21.2.1 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

The cumulative effects analysis area is the MCFO, with additional discussion at state-wide, national, and global scales for GHG emissions and climate change.

This section incorporates an analysis of the contributions of the Proposed Action to GHG emissions, followed by a general discussion of potential impacts to climate change. Potential emissions relate to those derived from potential exploration and development of fluid minerals. Additional emissions beyond the control of the BLM, and outside the scope of this analysis, would also occur during any needed refining processes, as well as end uses of final products.

Projected GHG emissions for this project and the MCFO RFD are compared below with recent, available inventory data at the state, national, and global scales. Greenhouse gas emissions inventories can vary greatly in their scope and comprehensiveness. State, national, and global inventories are not necessarily consistent in their methods or in the variety of GHG sources that are inventoried (Climate Change SIR 2010). However, comparisons of emissions projected by the BLM for its oil and gas production activities are made with those from inventories at other scales for the sake of providing context for the potential contributions of GHGs associated with this project.

As discussed in the Air Quality section of Chapter 4, total projected BLM GHG emissions from the RFD are 610,741.1 metric tons/year CO₂e. Potential emissions under Alternative B would be approximately 0.12 percent of this total. Table 19 displays projected GHG emissions from non-BLM activities included in the Miles City RFD. Total projected emissions of non-BLM activities in the RFD in Appendix B are 1,382,889.8 metric tons/year of CO₂e. When combined with projected annual BLM emissions, this totals 1,993,630.9 metric tons/year CO₂e. Potential GHG emissions under Alternative B would be 0.038 percent of the estimated emissions for the entire RFD. Potential incremental emissions of GHGs from exploration and development of fluid minerals on parcels within Alternative B, and Alternative C, would be minor in the context of projected GHG contributions from the entire RFD for the MCFO.

Table 19. Projected non-BLM GHG emissions associated with the MCFO Reasonably Foreseeable Development Scenario for fluid mineral exploration and development.

Source	Non-BLM Long-Term Greenhouse Gas Emissions in tons/year	Emissions (metric tons/yr)
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	CO₂	CH₄	N₂O	Co₂e	CO₂e
Conventional Natural Gas	545,689.1	5425.9	2.1	658,344.3	599,170.7
Coal Bed Natural Gas	274,925.2	5,330.5	0.9	387,135.7	351,302.8
Oil	422,033.9	2,576.2	1.2	476,522.7	432,416.3
Total	1,242,648.3	13,332.6	4.2	1,522,002.7	1,382,889.8

Montana's Contribution to U.S. and Global Greenhouse Gases (GHGs)

Montana's GHG inventory (<http://www.eia.doe.gov/oiaf/1605/archive/gg04rpt/emission.html>, Center for Climate Strategies 2007) shows that activities within the state contribute 0.6 percent of U.S and 0.076 percent of global GHG emissions (based on 2004 global GHG emission data from the IPCC, summarized in the Climate Change SIR 2010). Based on 2005 data in the state-wide inventory, the most pronounced source of Montana's emissions is combustion of fossil fuels to generate electricity, which accounts for about 27 percent of Montana's emissions. The next largest contributors are the agriculture and transportation sectors (each at approximately 22 percent) and fossil fuel production (13.6 percent).

Greenhouse gas emissions from all major sectors in Montana in 2005 added up to a total of approximately 36.8 million metric tons of CO₂e (Center for Climate Strategies (CCS) 2007). Potential emissions from development of lease parcels in Alternative B of this project represent approximately 0.002 percent of the state-wide total of GHG emissions based on the 2005 state-wide inventory (CCS 2007).

The EPA (USEPA 2010, as summarized by the Climate Change SIR 2010) published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,957 million metric tons, and net emissions of 6,016 million metric tons (when CO₂ sinks were considered) of CO₂e in 2008. Potential annual emissions under Alternative B of this project would amount to approximately 0.000013 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007, summarized by the Climate Change SIR 2010) indicated approximately 49 gigatonnes (10⁹ metric tons) of CO₂e emitted. Potential annual emissions under Alternative B would amount to approximately 0.0000015 percent of this global total.

As indicated above, although the effects of greenhouse gas emissions in the global aggregate are well-documented, it is currently not credibly possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative B, potential GHG emissions described above would incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

Mitigation measures identified in the Chapter 4 Air Quality section above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development on lease parcels under Alternative B. This is likely because many operators working in Montana, South Dakota, and North Dakota are currently USEPA Natural Gas STAR Program Partners and future regulations may require GHG emission controls for a variety of industries, including the oil and gas industry (Climate Change SIR 2010).

4.3.21.2.2 Cumulative Impacts of Climate Change

As previously discussed in the Air Quality section of Chapter 4, it is difficult to impossible to identify specific impacts of climate change on specific resources within the analysis area. As summarized in the Climate Change SIR (2010), climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (IPCC 2007b, as cited by the Climate Change SIR 2010). Effects of climate change on resources are described in Chapter 3 of this EA and in the Climate Change SIR (2010).

4.3.21.3 Cumulative Impacts to Wildlife

For wildlife species, past and presently on-going oil and gas development, fire, farming, livestock grazing, traffic, and any other form of human and natural disturbances result in cumulative impacts to wildlife.

Construction of roads, production well pads, and other facilities would result in long term (>5 years) loss of habitat and forage in the analysis area. This would be in addition to acres disturbed, or habitats fragmented from various other adjacent activities. As new development occurs, direct and indirect impacts could continue to stress wildlife populations, most likely displacing the larger, mobile animals into adjacent habitat, and increasing competition with existing local populations. Non-mobile animals could be affected by increased habitat fragmentation and interruptions to preferred habitats.

Certain species are localized to some areas and rely on very key habitats during critical times of the year. Disturbance or human activities that could occur in winter range for big game, nesting and brood-rearing habitat for grouse and raptors could displace some or all of the species using a particular area or disrupt the normal life cycles of species. Wildlife and habitat in and around the project could be influenced to different degrees by various human activities. Some species and/or a few individuals from a species group could be able to adapt to these human influences over time.

With the addition of various forms of stipulations, mitigation, and terms and conditions applied during the development stage, the assessed resources of concern are not expected to approach conditions where additional stresses associated with the proposed action and, past, present and future foreseeable actions will have consequential cumulative effects.

4.3.21.4 Cumulative Impacts to Economic Conditions

The cumulative effects of federal mineral leasing within the local economy as well as the specific effects of leasing approximately ~~7,231~~ 7,173 acres under Alternative B are summarized in Table 15 and 16. These tables also display in comparative form the cumulative effects of alternatives A, B, and C. The total demographic and economic impacts of Alternative B on the local economy could change a ~~relatively small amount~~ very little with the economic activity.

Local employment and income associated with federal mineral leasing could increase by an estimated 0.6 percent.

4.4 Alternative C (BLM Preferred)

4.4.1 Direct Effects Common to All Resources

Under Alternative C, 37 of the 48 lease parcels (36 whole, 1 partial), 4,353.54 surveyed federal mineral acres (728.81 surveyed BLM administered acres and 3,567.64 surveyed acres of private and/or state surface) in whole or part would be offered for competitive oil and gas lease sale. The remaining 12 parcels (11 whole, 1 partial), 2,877.12 surveyed federal mineral acres (977.11 surveyed acres of federal surface and 1,900.01 surveyed acres of private and/or state surface) in whole or part would be deferred pending further review.

The action of leasing the lease parcels in Alternative C would, in and of itself, have no direct impact on resources. Any potential effects on resources from the sale of leases could occur during lease exploration and development activities. At the time of this review it is unknown whether a particular lease parcel would be sold and a lease issued.

4.4.2 Indirect Effects Common to All Resources

Oil and gas exploration and development activities such as construction, drilling, production, infrastructure installation, vehicle traffic and reclamation are indirect effects from leasing the lease parcels in Alternative C. It is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Thus, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. The potential impacts from Alternative C would be analyzed after receipt of an APD or sundry notice.

Typical impacts to resources from oil and gas exploration and development activities such as well sites, roads, facilities, and associated infrastructure are described in the Miles City Oil & Gas Amendment/EIS (1994), the Big Dry RMP (1996), the Montana Statewide Oil & Gas Amendment/EIS (2003) and the Supplement (2008) to that document.

4.4.3 Air Resources

4.4.3.1 Air Quality

4.4.3.1.1 Direct and Indirect Effects

Effects to Air Quality would be the same as similar to those for Alternative B. Fewer leased acres would likely result in less future development and fewer emissions than Alternative B. Consequently, air quality under Alternative C would be less than those for Alternative B.

4.4.3.1.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.3.2 GHG Emissions

4.4.3.2.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of parcels proposed for deferral pending further review. Approximately ~~4,353~~ 4,296 acres of lease parcels with federal minerals would be leased, which constitute ~~0.08~~ 0.07 percent of the total federal mineral estate of approximately 5,798,000 acres identified in the RFD. Therefore, based on the approach described in Alternative B to estimate GHG emissions, ~~0.08~~ 0.07 percent of the RFD total estimated BLM emissions of 610,741.1 metric tons/year could be approximately ~~459~~ 453 metric tons/year of CO₂e if the parcels within Alternative C were to be developed.

4.4.3.2.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.3.3 Climate Change

4.4.3.3.1 Direct and Indirect Effects

Effects to Climate Change would be ~~the same as~~ similar to those for Alternative B. Fewer leased acres would likely result in less future development and fewer GHG emissions than Alternative B. Consequently, Climate Change impacts under Alternative C would be less than those for Alternative B.

4.4.3.3.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.4 Soil Resources

4.4.4.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of parcels proposed for deferral pending further review. Sites poorly suited to reclamation would be reduced to approximately 2,540 acres (60 percent of the parcels).

Impacts would not occur in the Big Dry watershed.

The potentially impacted acres within the Brush Lake Closed Basin watershed would be reduced by 12 percent as compared to Alternative B. Approximately 63 percent (180 ac.) of the parcels are considered poorly suited to reclamation.

The potentially impacted acres within the Lower Musselshell watershed would be reduced by 94 percent as compared to Alternative B. Parcel soils generally developed from residuum from the Bearpaw Shale and Carlile Formations. Ecological sites are typically shallow clay (SwC, MLRA 60BE, 10-14). Surface textures are typically silt clays. Terrain within the parcels is gentle with steeper slopes on terrace banks. Slopes range around 15 percent; however, slopes reach about 80 percent. Elevation is approximately 2,300 feet. Approximately 39 percent (15 ac.) of the parcels are considered poorly suited to reclamation.

The potentially impacted acres within the Lower Yellowstone-Sunday watershed would be reduced by 95 percent as compared to Alternative B. Parcel soils generally developed from residuum from the Lance Formation. Ecological sites are typically silty-steep (SiStp, MLRA

58AE, 10-14). Surface textures are typically loams. Terrain within the parcel is rolling hills, with slopes ranging around 15 percent; however slopes reach about 70 percent. Elevation is approximately 3,100 feet. Approximately 100 percent (30 ac.) of the parcel is considered poorly suited to reclamation.

The potentially impacted acres within the Middle Musselshell watershed would be reduced by 38 percent as compared to Alternative B. Approximately 100 percent (290 ac.) of the parcel is considered poorly suited to reclamation.

Impacts would not occur in the Upper Little Missouri watershed.

4.4.4.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.5 Water Resources

4.4.5.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of the lease parcels proposed for deferral pending further review. Any potential effects to water resources could occur from subsequent exploration/development of the remaining 37 lease parcels in whole or part.

Impacts would not occur in the Big Dry watershed (HUC 10040105), including 0.7 miles of Big Dry Creek, 0.6 miles of unnamed intermittent and ephemeral streams (USGS 2009), and 36 acres of 100-year floodplains.

The potentially impacted acres within the Brush Lake Closed Basin (HUC 10060007) would be reduced by 12% as compared to Alternative B. Additionally, impacts would not occur in 0.1 miles of Musselshell River and 0.3 miles of unnamed intermittent and ephemeral streams, 3.8 acres of the perennial Park Lake, and 1.8 acres of perennial, unnamed lake/ponds (USGS 2009), and 0.7 acres of 100-year floodplains.

The potentially impacted acres within the Lower Musselshell (HUC 10040205) watershed would be reduced by 94% as compared to Alternative B. Additionally, impacts would not occur in 0.7 miles of Calf Creek, 3.1 miles of unnamed intermittent and ephemeral streams; 1.5 acres of perennial, unnamed lake/ponds; (USGS 2009), and 43.8 acres of 100-year floodplains.

The potentially impacted acres within the Lower Yellowstone-Sunday (HUC 10100001) watershed would be reduced by 95% as compared to Alternative B. Additionally, impacts would not occur in 2.6 miles of intermittent and ephemeral streams and 2.9 acres of intermittent, unnamed lake/ponds (USGS 2009).

The potentially impacted acres within the Middle Musselshell (HUC 10040202) watershed would be reduced by 38% as compared to Alternative B. Additionally, impacts would not occur in 0.1 miles of the Musselshell River and 0.6 miles of intermittent and ephemeral streams (USGS 2009), and 2 acres of 100-year floodplains.

Impacts would not occur in the Upper Little Missouri (HUC 10110201), including 4.1 miles of intermittent and ephemeral streams, 0.3 acres of intermittent, unnamed lake/ponds, 0.8 acres of perennial, unnamed lake/ponds (USGS 2009), and 1 acre of 100-year floodplains.

4.4.5.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.6 Vegetation Resources

4.4.6.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.6.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.7 Riparian-Wetland Habitats

4.4.7.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Potential impacts would not occur in the deferred lease parcels therefore would not occur on:

Table 20: MTNHP and USFWS Riparian and Wetland Areas by Lease Parcel with No Potential Impacts under Alternative C*

Lease Parcel	Riparian/Wetland Type	Classification	Acres
MTM 97300-MW ¹	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded, Diked/Impounded	0.3
		Palustrine, Emergent, Seasonally Flooded, Excavated	0.6
		Palustrine, Emergent, Semipermanently Flooded, Diked/Impounded	0.1
		Palustrine, Emergent, Temporarily Flooded	3.9
	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	0.1
		Palustrine, Aquatic Bed, Semipermanently Flooded, Excavated	0.4
		Palustrine, Unconsolidated Shore, Temporarily Flooded	1.5
	Lacustrine	Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded	0.1

¹(Cymore 2011) ²(USFWS 2010) * This list is not comprehensive because 11 of the lease parcels: MTM 97300-L0, L4, M1, M2, M3, M4, MX, MY, MZ, N7, and N8 have not been mapped and GIS data for was not available for 1 of the lease parcels: MTM97300 PT.

4.4.7.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.8 Wildlife & Fisheries/Aquatics

4.4.8.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

As mentioned in Chapter 3, sage grouse habitat delineations have been developed for the sage grouse conservation alternatives being considered in the future MCFO RMP planning effort. Because of the delineated sage grouse areas, 11 parcels would be deferred (MTM 97300 L4, MY, N7, LO, N8, MZ, M1, M4, M3, M2, and MW) pending further review in the MCFO RMP planning effort. The sage grouse delineated areas and the proposed deferred parcels will not be analyzed or offered for lease under this Alternative. Therefore, no direct, indirect, or potential additional cumulative effects to sage grouse within the analysis area will occur as a result of this action.

4.4.8.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.9 Special Status Plant Species

4.4.9.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.9.2 Mitigation

Mitigation would be that same as Alternative B.

4.4.10 Cultural

4.4.10.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Direct and indirect effects would be the same on the following lease parcels as those described in Alternative B: MTM 97300 OO, OP, OQ, OR, N9, N0, OS, OB, OC, OJ, OK, OD, OE, OF, OG, OH, OI, OL, OM, and ON in Daniels County; MTM 97300 PT, PU, PV, P9, PW, PX, PY and PZ in Richland County; MTM 97300 LD in Roosevelt County; and MTM 97300 OY in Wibaux County.

Direct or indirect effects would not occur in the following lease parcels due to the deferral of 12 parcels (11 whole, 1 partial). These are lease parcels: MTM 97300 L4, MY, MZ, M1, M4, and

M3 in Rosebud County; MTM 97300 N7, L0, N8, and M2 in Garfield County; MTM 97300 MW in Carter County; and MTM 97300 LX in Sheridan County.

As a result of deferred parcels, potential impacts to the remaining lease parcels in Garfield, Sheridan, and Rosebud counties has changed. Two lease parcels MTM 97300 NU and NY, approximately 41 combined acres remaining in Garfield County, could contain 1 cultural site which could have the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcel. This development could affect 1 newly recorded cultural site that could have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcel MTM 97300 LX, approximately 307 acres remaining in Sheridan County, could contain up to 4 cultural sites, and 1 could have the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcel. This development could affect 1 newly recorded cultural site that may have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Lease parcel MTM 97300 MX, approximately 320 acres remaining in Rosebud County, could contain up to 4 cultural sites, and 1 could have the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario predicts 1 conventional oil or gas well could be drilled on the parcel. This development could affect 1 newly recorded cultural site that may have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

Leasing approximately ~~4,362~~ 4,296 acres of federal minerals under this alternative within the above described counties could indirectly affect 47 cultural sites with 5 to 8 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places. The RFD scenario could disturb 31.2 surface acres. This development could affect 1 cultural site which may have the cultural significance to be considered eligible for listing on the National Register of Historic Places.

4.4.10.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.11 Native American Religious Concerns

4.4.11.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

In addition, the BLM has determined that a portion of a lease parcel MTM 97300 LX contains or is near a previously recorded site that has several types of archaeological features that are identified as being of concern to Native American groups. This requires further analysis and potential consultation/coordination with Native American Tribes to adhere to BLM policy. The

partial lease parcel would be deferred pending further review and analysis for Native American concerns; thus, no potential direct or indirect impacts.

4.4.11.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.12 Paleontology

4.4.12.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Direct and indirect effects would be the same on the following lease parcels as those described in Alternative B: MTM 97300 N9, N0, OB, OC, OK, OE, OG, OH, OI, OO, OP, OQ, OR, OS, OJ, OD, OF, OL, OM, and ON in Daniels County; MTM 97300 NU and NY in Garfield County; MTM 97300 PT, PU, PV, P9, PW, PX, PY, and PZ in Richland County; MTM 97300 LD in Roosevelt County, MTM 97300 LY, MP, LX (remaining portion), and LZ in Sheridan County; and MTM 97300 OY Wibaux County; and MTM 97300 MX in Rosebud County

Direct or indirect effects would not occur on the following lease parcels due to the deferral of 12 parcels (11 whole, 1 partial): MTM 97300 L4, MY, MZ, M1, M4, and M3 in Rosebud County; MTM 97300 N7, L0, N8, and M2 in Garfield County; MTM 97300 MW in Carter County; and MTM 97300 LX (deferred portion) in Sheridan County.

4.4.12.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.13 Visual Resources

4.4.13.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.13.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.14 Forest and Woodland Resources

4.4.14.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review. Under this alternative, acreage potentially impacted would be approximately 115 acres of evergreen, 220 acres of deciduous, and 37 acres of mixed evergreen-deciduous forest.

4.4.14.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.15 Livestock Grazing

4.4.15.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.15.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.16 Recreation and Travel Management

4.4.16.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.16.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.17 Lands and Realty

4.4.17.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Under this alternative, ROWs MTM-014079 and MTM-46030 found within lease parcel MTM 97300 MW, proposed for deferral pending further review, would not be impacted.

4.4.17.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.18 Minerals

4.4.18.1 Fluid Minerals

4.4.18.1.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review. Approximately 60% of the lease parcels would be offered for lease subject to major (NSO) or moderate (CSU) constraints and/or standard lease terms and conditions.

Deferring lease parcels would result in delays of some development plans, relocation of development to state or private leases, or completely eliminate development plans because of the need to include federal acreage as part of a plan. In addition, less natural gas or crude oil would enter the public markets.

4.4.18.2 Solid Minerals

4.4.18.2.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Under this alternative, parcel MTM 97300 MW would be deferred pending further review; thus, there would be no direct or indirect impacts with existing patented claims granted by the BLM for bentonite and uranium extraction.

4.4.18.2.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.19 Special Designations

4.4.19.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.19.2 Mitigation

Mitigation would be the same as Alternative B.

4.4.20 Social and Economic Conditions

4.4.20.1 Social

4.4.20.1.1 Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

4.4.20.2 Economics

4.4.20.2.1 Direct and Indirect Impacts

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review (Tables 13 and 14).

Under this alternative, leasing approximately ~~4,354~~ 4,296 acres of federal minerals could increase average annual oil and gas leasing and rent revenues to the federal government by an estimated \$14,000. Average annual leasing and rent revenues that could be distributed to state/local governments could increase by an estimated \$7,000. Average annual federal oil and gas royalties would increase by an estimated ~~\$228,000~~ \$225,000. Average annual royalties distributed to the state/counties could increase by an estimated ~~\$111,000~~ \$109,000.

Total average annual federal revenues and associated annual rent and royalty revenues related to average annual production of federal minerals could amount to an estimated ~~\$243,000~~ \$240,000. Total average annual revenues from leasing, rent, and royalties distributed to the state and counties could be an estimated ~~\$118,000~~ \$116,000. Total estimated revenues distributed to the counties could be about \$30,000.

The estimated combined total average annual employment and income supported by federal oil and gas leasing, distributions of royalties to local governments, drilling wells, and production could amount to about ~~10 less than one~~ total jobs- (full and part-time) and ~~\$0.7 million~~ \$17,000 within the local economy (IMPLAN, 2009). There would ~~also be a corresponding increase~~ not be a change in local population ~~of about 20 people and about 10~~ or households.

Total federal contribution under Alternative C and anticipated related exploration, development, and production of oil and gas could ~~effects~~ **cause** local population, total local employment, number of households, average income per household, and total personal income to change very little if at all. The economic effects would continue to be spread unevenly among the counties. Leasing the additional 4,254 acres and anticipated exploration, development, and production under alternative C would provide a very small amount of additional funds for county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, or keeping records. Demand for these services would change very little if at all. Leasing additional acres and anticipated exploration, development, and production would not change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), or economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates) across the entire 16-county area.

4.4.21 Cumulative Impacts- Alternative C

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). This section describes cumulative impacts associated with this project on resources. The ability to assess the potential cumulative impacts at the leasing stage for this project is limited for many resources due to the lack of site-specific information for potential future activities. Upon receipt of an APD for any of the lease parcels addressed in this document, more site-specific planning would be conducted in which the ability to assess contributions to cumulative impacts in a more detailed manner would be greater due to the availability of more refined site-specific information about proposed activities.

4.4.21.1 Past, Present and Reasonably Foreseeable Future Actions

Past, present, or reasonably foreseeable future actions that affect the same components of the environment as the Proposed Action are: grazing, roads, wildfire and prescribed fire, range improvement projects, and utility right-of-ways.

4.4.21.2 Cumulative Impacts by Resource

Cumulative effects for all resources in the MCFO are described in the final Big Dry RMP/EIS (pgs. 111 to 156) and the 1992 Oil and Gas Amendment of the Billings, Powder River, and South Dakota Resource Management Plans and Final Environmental Impact Statement and the 1994 Record of Decision and the 2008 Final Supplement to the Montana Statewide Oil and Gas Environmental Impact with a development alternative for coal bed natural gas production (4-1 to 4-310). Anticipated exploration and development activity associated with the lease parcels

considered in this EA are within the range of assumptions used and effects described in this cumulative effects analysis for resources other than climate, wildlife, and economics resources.

4.4.21.3 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

Greenhouse Gas Emissions and Cumulative Impacts on Climate Change would be the same as Alternative B except for a minor decrease in emission percentage due to approximately 2,877 acres of lease parcels proposed for deferral pending further review. Greenhouse gas emissions from all major sectors in Montana in 2005 added up to a total of approximately 36.8 million metric tons of CO₂e (Center for Climate Strategies (CCS) 2007). Potential emissions from development of lease parcels in Alternative C of this project represent approximately 0.0012 percent of the state-wide total of GHG emissions based on the 2005 state-wide inventory (CCS 2007).

The EPA (USEPA 2010, as summarized by the Climate Change SIR 2010) published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,957 million metric tons, and net emissions of 6,016 million metric tons (when CO₂ sinks were considered) of CO₂e in 2008. Potential annual emissions under Alternative C of this project would amount to approximately 0.000001 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007, summarized by the Climate Change SIR 2010) indicated approximately 49 gigatonnes (10⁹ metric tons) of CO₂e emitted. Potential annual emissions under Alternative C would amount to approximately 0.0000009 percent of this global total.

As indicated above, although the effects of greenhouse gas emissions in the global aggregate are well-documented, it is currently not credibly possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative C, potential GHG emissions described above would incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

Mitigation measures identified in the Chapter 4 Air Quality section above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development on lease parcels under Alternative C. This is likely because many operators working in Montana, South Dakota, and North Dakota are currently USEPA Natural Gas STAR Program Partners and future regulations may require GHG emission controls for a variety of industries, including the oil and gas industry (Climate Change SIR 2010).

4.4.21.4 Cumulative Impacts of Climate Change

Cumulative impacts of climate change on resources would be the same as Alternative B.

4.4.21.5 Cumulative Impacts to Wildlife

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Eleven parcels in whole would be deferred within identified sage grouse habitat being analyzed in the current RMP effort and one partial parcel would be deferred near a site sensitive to Native American tribes, see Native American Religious Concerns above. Therefore, if the remaining lease parcels are developed, potential additional cumulative impacts to wildlife could occur over less area than what is described in Alternative B.

4.4.21.6 Cumulative Impacts to Economic Conditions:

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 40%, due to approximately 2,877 acres of lease parcels proposed for deferral pending further review.

Under this alternative, the cumulative effects of federal mineral leasing within the local economy as well as the specific effects of leasing approximately 4,354 ~~4,296~~ acres are summarized in Table 15 and 16. These tables also display in comparative form the cumulative effects of alternatives A, B, and C. The total demographic and economic impacts of Alternative C could change a relatively small amount. Local employment and income associated with federal mineral leasing could increase by an estimated ~~2 percent and 3 percent respectively~~ ~~0.3 percent~~.

5.0 CONSULTATION AND COORDINATION:

5.1 Persons, Agencies, and Organizations Consulted

Coordination with USFWS was conducted for the 48 lease parcels being reviewed and in the completion of this EA in order to prepare the analysis, identify protective measures, and apply stipulations and lease notices associated with these parcels being analyzed. A letter was sent to the MFWP during the 15-day scoping period requesting comments on the 48 parcels being reviewed.

The BLM consults with Native Americans under Section 106 of the National Historic Preservation Act. BLM sent letters to tribes in Montana, North and South Dakota and Wyoming at the beginning of the 15 day scoping period informing them of the potential for the 29 parcels to be leased and inviting them to submit issues and concerns BLM should consider in the environmental analysis. Letters were sent to the Tribal Presidents and THPO or other cultural contacts for the Cheyenne River Sioux Tribe, Crow Tribe of Montana, Crow Creek Sioux Tribe, Eastern Shoshone Tribe, Ft. Peck Tribes, Lower Brule Sioux Tribe, the Mandan, Hidasta, and Arkira Nation, Northern Arapaho Nation, Northern Cheyenne Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe of Indians, Standing Rock Sioux Tribe, and Turtle Mountain Band of Chippewa. BLM will send a second letter to the tribes informing them about the 30 day public comment period for the EA and solicit any information BLM should consider before making a decision whether to offer any or all of the 48 parcels for sale.

5.2 Summary of Public Participation

Scoping

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posting on the field office website NEPA notification log. Scoping was initiated March 28, 2011. Surface owner notification letters were also distributed briefly explaining the oil and gas leasing process and planning process. The surface owner notification letter requested written or oral comments regarding any issues or concerns that should be addressed in the environmental analysis.

A total of 28 surface owner notification letters were distributed for the oil and gas leasing analysis process in the MCFO. The written and verbal communication resulted in a total of seven individual verbal comments pertaining to this EA.

All seven comments, were comments/requests for additional information (e.g., split estate brochure) regarding the general process of oil and gas leasing, split estate, questions about the planning process, and questions regarding the verification of mineral ownership.

30-day Public Comment Period

On May 16, 2011, the EA, along with an unsigned FONSI, was made available for a 30-day public comment period. Notification letters were distributed to external entities, local agencies, and tribes to explain that an EA and the unsigned FONSI were available for review and comment.

No substantive comments were received after the 30-day comment period from the public; however, after an internal review of the EA, some modifications have been made to the EA. Changes made to the analysis are noted with gray-scale shading and/or strikeout so the modifications to the EA can easily be identified.

After the 30-day protest period, but before lease issuance, the BLM will issue the Decision Record and signed Finding of No Significant Impact for this EA. This information, along with other updates and Lease Sale Notice information can be found on the Montana/Dakotas BLM website at www.blm.gov/mt. From this home page, go to the heading titled “Frequently Requested,” where you will find a number of links to information about our oil and gas program. Current and updated information about our environmental assessments and lease sale notices can be found on the link titled “Oil and Gas Lease Sale Information.” Surface owner notification letters will be distributed to explain that an EA and the unsigned FONSI were available for review and comment.

Table 21. List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Bobby Baker	Wildlife Biologist	Wildlife
Jake Chaffin	Fisheries Biologist	Fisheries
Julie Cymore	Hydrologist	Water
CJ Trusedlae	Archaeologist Technician	Cultural/Paleontology/Special Designations
Mel Schroeder	Soil Scientist	Soils
Dena Lang	Outdoor Recreation Planner	Recreation/VRM/Travel Management
Scott Kichman	Natural Resource Specialist (GIS)	GIS
Tami Sabol	Forester	Forestry
Dawn Doran	Rangeland Management Specialist	Livestock Grazing/Vegetation/Invasive Species
Doug Melton	Archeologist	Native American Religious Concerns
Pam Wall	Realty Specialist	Lands/Realty
Jim Shaffer	Geologist	Solid Minerals
Charles Laakso	Petroleum Engineer	Fluid Minerals
Irma Nansel	Natural Resource Specialist	EA Lead
Kathy Bockness	Planning & Environmental Coordinator	NEPA
Joan Trent	Social Scientist	Social Analysis
John Thompson	Planning & Environmental Specialist	Economic Analysis
Merry Prestridge	Legal Land Examiner-Sale Lead	Expressions of Interest/Lease Sale

In addition to the primary preparers listed above, the following individuals provided document review:

Todd Yeager	Assistant Field Manager, Division of Renewable Resources
Shane Findlay	Supervisory Land Use Specialist, Division of Nonrenewable
Deborah Johnson	Field Manager, Miles City Field Office
Elaine Raper	District Manager, Montana/Dakotas
Charles L. Sullivan	Energy Biologist, U.S. Fish and Wildlife Service

6.0 REFERENCES

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7.0 DEFINITIONS

The North American Industry Classification System (NAICS) is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. NAICS was developed under the auspices of the Office of Management and Budget (OMB), and adopted in 1997 to replace the Standard Industrial Classification (SIC) system and to allow for a high level of comparability in business statistics among the North American countries.

IMPLAN: The IMPLAN Model is the most flexible, detailed and widely used input-output impact model system in the U.S. It provides users with the ability to define industries, economic relationships and projects to be analyzed. It can be customized for any county, region or state, and used to assess "multiplier effects" caused by increasing or decreasing spending in various parts of the economy. This can be used to assess the economic impacts of resource management decisions, facilities, industries, or changes in their level of activity in a given area. The current IMPLAN input-output database and model is maintained and sold by MIG, Inc. (Minnesota IMPLAN Group). The 2007 data set was used in this analysis is.

APPENDIX A

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-NU	T. 15 N, R. 30 E, PMM, MT SEC. 9 POR LOT 18; GARFIELD COUNTY 22.76 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-NY	T. 15 N, R. 30 E, PMM, MT SEC. 34 POR LOT 13 (1.98 AC); SEC. 34 POR LOT 14 (16.70 AC); GARFIELD COUNTY 18.68 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 34 POR LOT 14 (16.70 AC); NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 34 POR LOT 14 (16.70 AC); NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-L4	T. 12 N, R. 31 E, PMM, MT SEC. 20 SENE; ROSEBUD COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-3 (ALL LANDS) LN 14-11 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-MX	T. 9 N, R. 32 E, PMM, MT SEC. 10 N2; ROSEBUD COUNTY 320.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 10 NE,N2NW,SENW; LN 14-12 (ALL LANDS) NSO 11-2 SEC. 10 SWNE,NW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 10 NE,N2NW,SENW; LN 14-12 (ALL LANDS) NSO 11-2 SEC. 10 SWNE,NW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE

APPENDIX A

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-MY	T. 9 N, R. 32 E, PMM, MT SEC. 22 E2NE; ROSEBUD COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 22 SENE; LN 14-11 (ALL LANDS) LN 14-12 (ALL LANDS) NSO 11-2 SEC. 22 NENE; TL 13-1 (ALL LANDS) TES 16-2 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-N7	T. 15 N, R. 32 E, PMM, MT SEC. 6 LOTS 1,2,3; SEC. 6 SESW,E2SE; GARFIELD COUNTY 240.19 AC PD	CR 16-1 (ALL LANDS) LN 14-12 (ALL LANDS) NSO 11-2 SEC. 6 LOTS 1; SEC. 6 SESW,NESE; NSO 11-4 SEC. 6 LOT 3; SEC. 6 SESW,E2SE; LN 14-11 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-L0	T. 15 N, R. 32 E, PMM, MT SEC. 14 NE; GARFIELD COUNTY 160.00 AC PD	CR 16-1 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-12 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.

APPENDIX A

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-N8	T. 15 N, R. 32 E, PMM, MT SEC. 18 LOT 4; SEC. 18 NENW,SESW,NWSE; GARFIELD COUNTY 155.18 AC PD	CR 16-1 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-12 SEC. 18 LOT 4; SEC. 18 NENW,SESW, NSO 11-2 SEC. 18 NENW,NWSE; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-MZ	T. 9 N, R. 33 E, PMM, MT SEC. 28 SWSW; SEC. 32 W2SW; ROSEBUD COUNTY 120.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 32 W2SW; LN 14-11 (ALL LANDS) NSO 11-2 SEC. 28 SWSW; SEC. 32 NWSW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 SEC. 28 SWSW;	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-M1	T. 10 N, R. 33 E, PMM, MT SEC. 18 N2NE; ROSEBUD COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-M4	T. 9 N, R. 34 E, PMM, MT SEC. 22 S2; ROSEBUD COUNTY 320.00 AC PD	CR 16-1 (ALL LANDS) LN 14-11 (ALL LANDS) NSO 11-2 SEC. 22 NESE; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.

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PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-M3	T. 12 N, R. 34 E, PMM, MT SEC. 30 LOTS 1,2,3,4; ROSEBUD COUNTY 54.64 AC PD	CR 16-1 (ALL LANDS) LN 14-11 (ALL LANDS) NSO 11-2 SEC. 30 LOTS 1,4; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-M2	T. 15 N, R. 34 E, PMM, MT SEC. 2 LOTS 1,2,4; SEC. 2 N2SW,E2SE; GARFIELD COUNTY 280.45 AC PD	CR 16-1 (ALL LANDS) LN 14-11 (ALL LANDS) LN 14-12 SEC. 2 LOTS 1,2,4; SEC. 2 N2SW; LN 14-15 (ALL LANDS) NSO 11-2 SEC. 2 LOT 4; SEC. 2 E2SE; NSO 11-4 SEC. 2 N2SW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF PRIORITY SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.
MTM 97300-OO	T. 35 N, R. 44 E, PMM, MT SEC. 31 LOT 1; SEC. 31 NENW; DANIELS COUNTY 77.24 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE
MTM 97300-OP	T. 36 N, R. 44 E, PMM, MT SEC. 11 N2NW; SEC. 12 S2SW; DANIELS COUNTY 160.00 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 11 N2NW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 11 N2NW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE

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PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-OQ	T. 36 N, R. 44 E, PMM, MT SEC. 17 S2SW; SEC. 19 LOTS 3,4; SEC. 19 W2NE,E2SW,SE; SEC. 30 LOTS 1,2,3; SEC. 30 N2NE; DANIELS COUNTY 662.34 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 17 SESW; SEC. 19 LOT 4; SEC. 19 E2SW,SE; SEC. 30 LOTS 1,2,3; SEC. 30 N2NE; NSO 11-2 SEC. 17 S2SW; SEC. 19 W2NE,E2SW,SE; SEC. 30 LOTS 1,2,3; SEC. 30 N2NE; LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 SEC. 17 S2SW; SEC. 19 LOTS 3,4; SEC. 19 W2NE,E2SW,SE; SEC. 30 N2NE;	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 17 SESW; SEC. 19 LOT 4; SEC. 19 E2SW,SE; SEC. 30 LOTS 1,2,3; SEC. 30 N2NE; NSO 11-2 SEC. 17 S2SW; SEC. 19 W2NE,E2SW,SE; SEC. 30 LOTS 1,2,3; SEC. 30 N2NE; LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 SEC. 17 S2SW; SEC. 19 LOTS 3,4; SEC. 19 W2NE,E2SW,SE; SEC. 30 N2NE;	NONE
MTM 97300-OR	T. 36 N, R. 44 E, PMM, MT SEC. 22 SWNE,W2SE; SEC. 27 S2NW; DANIELS COUNTY 200.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 22 SWNE,W2SE; LN 14-15 (ALL LANDS) NSO 11-2 SEC. 22 SWNE; SEC. 27 S2NW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 22 SWNE,W2SE; LN 14-15 (ALL LANDS) NSO 11-2 SEC. 22 SWNE; SEC. 27 S2NW; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-N9	T. 33 N, R. 45 E, PMM, MT SEC. 1 LOT 1; DANIELS COUNTY 39.97 AC PD	CR 16-1 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE

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PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-N0	T. 33 N, R. 45 E, PMM, MT SEC. 4 LOTS 3,4; SEC. 4 SENE,SWNW,NESE; SEC. 9 LOT 6; DANIELS COUNTY 253.70 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 9 LOT 6; LN 14-12 SEC. 4 LOTS 3,4; SEC. 4 NESE; LN 14-15 (ALL LANDS) NSO 11-2 SEC. 4 LOTS 3,4; SEC. 4 SENE,SWNW; TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 9 LOT 6; LN 14-12 SEC. 4 LOTS 3,4; SEC. 4 NESE; LN 14-15 (ALL LANDS) NSO 11-2 SEC. 4 LOTS 3,4; SEC. 4 SENE,SWNW; TES 16-2 (ALL LANDS)	NONE
MTM 97300-OS	T. 36 N, R. 45 E, PMM, MT SEC. 29 NESW; DANIELS COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-OB	T. 33 N, R. 46 E, PMM, MT SEC. 1 LOTS 2,3; SEC. 1 SENE; SEC. 11 LOT 8; SEC. 12 LOT 5; DANIELS COUNTY 230.41 AC PD	CR 16-1 (ALL LANDS) LN 14-12, SEC. 1 LOT 3; SEC. 12 LOT 5; LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 SEC. 11 LOT 8;	CR 16-1 (ALL LANDS) LN 14-12, SEC. 1 LOT 3; SEC. 12 LOT 5; LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 SEC. 11 LOT 8;	NONE

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PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-OC	T. 33 N, R. 46 E, PMM, MT SEC. 3 LOT 1; SEC. 3 S2SW; SEC. 4 SESE; SEC. 8 LOT 5; SEC. 9 LOTS 5,6,7,8; SEC. 10 LOTS 7,8; DANIELS COUNTY 547.16 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 3 SESW; SEC. 8 LOT 5; SEC. 9 LOTS 6,7,8; LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 3 LOT 1; SEC. 8 LOT 5; SEC. 9 LOTS 6,7,8; TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 3 SESW; SEC. 8 LOT 5; SEC. 9 LOTS 6,7,8; LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 3 LOT 1; SEC. 8 LOT 5; SEC. 9 LOTS 6,7,8; TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OJ	T. 34 N, R. 46 E, PMM, MT SEC. 17 SWSE; DANIELS COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OK	T. 34 N, R. 46 E, PMM, MT SEC. 33 S2SW; DANIELS COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 33 SESW; LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 33 SESW; LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OD	T. 33 N, R. 47 E, PMM, MT SEC. 2 LOT 3; DANIELS COUNTY 41.69 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE

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MTM 97300-OE	T. 33 N, R. 47 E, PMM, MT SEC. 5 SWSW; SEC. 6 SESW; DANIELS COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) LN 14-12 SEC. 6 SESW; LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) LN 14-12 SEC. 6 SESW; LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE
MTM 97300-OF	T. 33 N, R. 48 E, PMM, MT SEC. 2 LOTS 1,2; DANIELS COUNTY 84.77 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OG	T. 33 N, R. 48 E, PMM, MT SEC. 3 LOT 2; DANIELS COUNTY 42.35 AC PD	CR 16-1 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OH	T. 33 N, R. 48 E, PMM, MT SEC. 4 NESE; DANIELS COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) LN 14-1 (ALL LANDS) LN 14-15 (ALL LANDS) LN 14-12 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-1 (ALL LANDS) LN 14-12 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OI	T. 33 N, R. 48 E, PMM, MT SEC. 11 LOT 8; DANIELS COUNTY 53.84 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OL	T. 34 N, R. 48 E, PMM, MT SEC. 7 LOT 3; DANIELS COUNTY 37.05 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE

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PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-OM	T. 34 N, R. 48 E, PMM, MT SEC. 13 SENE; DANIELS COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-ON	T. 34 N, R. 48 E, PMM, MT SEC. 31 LOTS 1,2,3; DANIELS COUNTY 114.78 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 31 LOTS 1,2; TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 31 LOTS 1,2; TES 16-2 (ALL LANDS)	NONE
MTM 97300-PT	T. 22 N, R. 57 E, PMM, MT SEC. 34 NWNW, NESE; RICHLAND COUNTY 80.00 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) LN 14-15 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-LD	T. 27 N, R. 57 E, PMM, MT SEC. 14 LOT 3; ROOSEVELT COUNTY 57.43 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS)	NONE
MTM 97300-LX	T. 36 N, R. 57 E, PMM, MT SEC. 5 N2SW; SEC. 7 NENW; SHERIDAN COUNTY 120.00 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 SEC. 5 N2SW;	T. 36 N, R. 57 E, PMM, MT SEC. 7 NENW; SHERIDAN COUNTY 40.00 AC PD CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS)	DEFER T. 36 N, R. 57 E, PMM, MT SEC. 5 N2SW; SHERIDAN COUNTY 80.00 AC PD DEFER PENDING FURTHER REVIEW OF SENSITIVE CULTURAL RESOURCES AND COMPLETION OF TRIBAL CONSULTATION.

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MTM 97300-PU	T. 19 N, R. 58 E, PMM, MT SEC. 20 LOTS 1,5,6,8,9,10; RICHLAND COUNTY 151.62 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-PV	T. 20 N, R. 58 E, PMM, MT SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,3,4; SEC. 24 E2E2,SWSE; RICHLAND COUNTY 331.93 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,4; SEC. 24 E2E2,NESE; NSO 11-10 SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,3,4; SEC. 24 NENE,SWSE; NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,3,4; SEC. 24 SWSE,SESE;	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,4; SEC. 24 E2E2 -E2NE,NESE; NSO 11-10 SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,3,4; SEC. 24 NENE,SWSE; NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 SEC. 24 POR LOT 5 NOT ERODED BY YELLOWSTONE RIV (14.84 AC); SEC. 24 LOTS 1,3,4; SEC. 24 SWSE,SESE;	NONE

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PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-P9	T. 20 N, R. 58 E, PMM, MT SEC. 34 LOTS 9,10; RICHLAND COUNTY 32.82 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 34 LOT 10; CSU 12-4 (ALL LANDS) LN 14-1 SEC. 34 LOT 10; LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 SEC 34 LOT 9; NSO 11-13 SEC. 34 LOT 9; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 34 LOT 10; CSU 12-4 (ALL LANDS) LN 14-1 SEC. 34 LOT 10; LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 SEC 34 LOT 9; NSO 11-13 SEC. 34 LOT 9; TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-PW	T. 21 N, R. 58 E, PMM, MT SEC. 12 LOT 9; RICHLAND COUNTY 29.99 AC PD	CR 16-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-PX	T. 21 N, R. 58 E, PMM, MT SEC. 24 LOT 4; RICHLAND COUNTY 23.66 AC PD	CR 16-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE

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MTM 97300-PY	T. 21 N, R. 58 E, PMM, MT SEC. 26 POR LOT 7 NOT ERODED BY YELLOWSTONE RIV (21.52 AC); SEC. 27 LOTS 7,8; RICHLAND COUNTY 78.61 21.52 AC PD	CR 16-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-PZ	T. 21 N, R. 58 E, PMM, MT SEC. 34 LOT 3; RICHLAND COUNTY 15.83 AC PD	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) CSU 12-1 (ALL LANDS) CSU 12-4 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-10 (ALL LANDS) NSO 11-13 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-LY	T. 37 N, R. 58 E, PMM, MT SEC. 9 NESE; SHERIDAN COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-4 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-4 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-LZ	T. 37 N, R. 58 E, PMM, MT SEC. 22 LOTS 3,4; SEC. 27 LOT 1; SHERIDAN COUNTY 71.07 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-4 SEC. 22 LOT 4; SEC. 27 LOT 1; TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-4 SEC. 22 LOT 4; SEC. 27 LOT 1; TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE

APPENDIX A

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING ALTERNATIVE C	PROPOSED FOR DEFERRAL/ NO LEASING ALTERNATIVE C
MTM 97300-MP	T. 37 N, R. 58 E, PMM, MT SEC. 33 LOTS 3,4; SEC. 33 SWSE; SHERIDAN COUNTY 93.84 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-9 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) NSO 11-9 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	NONE
MTM 97300-OY	T. 17 N, R. 60 E, PMM, MT SEC. 4 SWSW; WIBAUX COUNTY 40.00 AC PD	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	CR 16-1 (ALL LANDS) LN 14-15 (ALL LANDS) NSO 11-2 (ALL LANDS) TES 16-2 (ALL LANDS) TL 13-1 (ALL LANDS)	NONE
MTM 97300-MW	T. 9 S, R 57 E, PMM, MT SEC. 2 RSVR ROW MTM 014079 (26.66 AC); SEC. 11 ALL; SEC. 12 ALL; CARTER COUNTY 1306.66 AC PD THIS PARCEL IS DESCRIBED AS A PART OF TRACT NO. 12 OF THE DEADMAN UNIT. THESE LANDS WERE COMMITTED TO THE UNIT BY THE AUTHORIZED OFFICER AT THE TIME OF UNIT APPROVAL, JOINDER TO THE UNIT IS NOT REQUIRED.	CR 16-1 (ALL LANDS) CSU 12-1 SEC. 11 NESW; SEC. 12 NWSW,N2SE; LN 14-1 SEC. 2 RSVR ROW MTM 014079 (26.66 AC); SEC. 11, N2NE, NESESW SEC. 12, SWNW, NESW, W2SESW, N2NWSW, E2SESW LN 14-11 (ALL LANDS) NSO 11-2 SEC. 2 RSVR ROW MTM 014079 (26.66 AC); SEC. 11 NE,E2NW,NWSW,W2SE; SEC. 12 NE,NENW,W2W2,SWSE, E2SE; TES 16-2 (ALL LANDS) TL 13-3 (ALL LANDS)	DEFER ALL LANDS	DEFER ALL LANDS PENDING FURTHER REVIEW OF RESTORATION SAGE-GROUSE HABITAT IN FUTURE MCFO RMP PLANNING EFFORT.

Appendix B - RFD Scenario Forecast for Area of Analysis

The RFD is based on information contained in the MCFO RFD developed in 2005 and revised in 2009; it is an unpublished report that is available by contacting the MCFO. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the MCFO area and used to analyze projected wells for the 48 nominated lease parcels. These well numbers are only an estimate based on historical drilling and mineral resources present, and may change in the future if new technology is developed or new fields and formations are discovered. For the RFD scenario, the 48 lease parcels have been analyzed under the following development areas; the Williston Basin, Williston Basin Other, Porcupine Dome, Powder River Basin, and the MCFO Other; and then, described by county. Based on the development area boundaries some of the parcels may fall in more than one development area and have two different potential development scenarios. These areas are on Map 14.

One lease parcel is located in the Powder River Basin development area. That lease parcel is located in Carter County. The parcel is in a high potential area. This parcel contains 1,307 acres approximately. The RFD forecasts a total of between 192 and 844 oil wells in this area with a range of 46 to 191 producing federal oil wells. The RFD also projects a total of 29 to 126 gas wells with a range of seven to 29 producing federal gas wells in this area. The RFD also projects a range of 5,706 to 15,635 CBNG wells with a range of producing federal CBNG wells from 2,473 to 7,174 wells. However, the location of the parcel is numerous miles from the high development potential CBNG areas within the Powder River Basin development area because of this no CBNG wells are projected for the 48 lease parcels being analyzed. The Powder River Basin development area totals 8,337,012 acres. The lease parcel under consideration is located in 1 township. There are 4 active federal oil and gas leases in this township covering 11,477 acres or approximately 47.2 percent of this township. The lease parcel totals approximately 1,307 acres, approximately 5.4 percent of this township and 0.01 percent of the Powder River Basin development area identified in the RFD.

Parcel Number	GIS acres	County	Potential	Development Area
MTM 97300-MW	1307	CARTER	High	Powder River Basin

Twenty four lease parcels are located in Daniels, Garfield and Rosebud Counties in the Miles City Other development area. They are in an area of very low potential. The Miles City Other development area totals 10,082,887 acres. The RFD scenario forecast a range of 27 to 54 oil wells and zero to 854 gas wells in this development area. The range for producing federal wells is 7 to 14 oil wells and zero to 224 gas wells. The lease parcel under consideration, are located in whole or in part in 13 townships. There are 11 active federal oil and gas leases in these townships covering 9,110 acres or approximately 3.2 percent of these townships. The lease parcels total approximately 3800 acres, approximately 1.4 percent of these townships and 0.03 percent of the Miles City Other development area identified in the RFD.

Parcel Number	GIS acres	County	Potential	Development Area
MTM 97300-N0	254	DANIELS	Very Low	Miles City Other
MTM 97300-N9	40	DANIELS	Very Low	Miles City Other
MTM 97300-OB	231	DANIELS	Very Low	Miles City Other

MTM 97300-OC	547	DANIELS	Very Low	Miles City Other
MTM 97300-OE	80	DANIELS	Very Low	Miles City Other
MTM 97300-OJ	40	DANIELS	Very Low	Miles City Other
MTM 97300-OK	80	DANIELS	Very Low	Miles City Other
MTM 97300-OO	77	DANIELS	Very Low	Miles City Other
MTM 97300-OP	160	DANIELS	Very Low	Miles City Other
MTM 97300-OQ	662	DANIELS	Very Low	Miles City Other
MTM 97300-OR	200	DANIELS	Very Low	Miles City Other
MTM 97300-OS	40	DANIELS	Very Low	Miles City Other
MTM 97300-L0	165	GARFIELD	Very Low	Miles City Other
MTM 97300-M2	281	GARFIELD	Very Low	Miles City Other
MTM 97300-N7	253	GARFIELD	Very Low	Miles City Other
MTM 97300-N8	161	GARFIELD	Very Low	Miles City Other
MTM 97300-NU	19	GARFIELD	Very Low	Miles City Other
MTM 97300-NY	7	GARFIELD	Very Low	Miles City Other
MTM 97300-L4	39	ROSEBUD	Very Low	Miles City Other
MTM 97300-M4	321	ROSEBUD	Very Low	Miles City Other
MTM 97300-MY	23	ROSEBUD	Very Low	Miles City Other
MTM 97300-MZ	120	ROSEBUD	Very Low	Miles City Other

Fourteen lease parcels are located in the Williston Basin Other development area. These lease parcels are all in areas of medium potential in Daniels, Wibaux and Richland counties. The Williston Basin Other area totals 4,340,094 acres. The RFD scenario forecast a range of 15 to 28 oil wells and zero to 100 gas wells in this development area. The range for producing federal well is two to four oil wells and no gas wells. The lease parcels under consideration are located in 7 different townships. There are 7 active federal oil and gas leases in these townships covering 3,855 acres or approximately 2.5 percent of these townships. The lease parcels total approximately ~~1,040~~ 1,034 acres, approximately 0.7 percent of these townships and 0.02 percent of the Williston Basin Other development area identified in the RFD.

Parcel Number	GIS acres	County	Potential	Development Area
MTM 97300-OD	42	DANIELS	Medium	Williston Basin Other
MTM 97300-OF	85	DANIELS	Medium	Williston Basin Other
MTM 97300-OG	42	DANIELS	Medium	Williston Basin Other
MTM 97300-OH	40	DANIELS	Medium	Williston Basin Other
MTM 97300-OI	54	DANIELS	Medium	Williston Basin Other
MTM 97300-OL	37	DANIELS	Medium	Williston Basin Other
MTM 97300-OM	40	DANIELS	Medium	Williston Basin Other
MTM 97300-ON	115	DANIELS	Medium	Williston Basin Other
MTM 97300-OY	40	WIBAUX	Medium	Williston Basin Other
MTM 97300-P9	33	RICHLAND	Medium	Williston Basin Other
MTM 97300-PU	159	RICHLAND	Medium	Williston Basin Other

MTM 97300-PV	328	RICHLAND	Medium	Williston Basin Other
MTM 97300-PY	93	RICHLAND	Medium	Williston Basin Other
MTM 97300-PZ	16	RICHLAND	Medium	Williston Basin Other

Nine parcels are located in the Williston Basin development area. They are all in areas mapped as high development potential. The Williston Basin area totals 1,551,717 acres. Lease parcels are located in Richland, Roosevelt, and Sheridan Counties. The RFD scenario forecast a range of 624 to 1,246 oil wells and no gas wells in this development area. The range for producing federal well is 23 to 46 oil wells and no gas wells. The lease parcels under consideration are located in 5 different townships. There are 11 active federal oil and gas leases in these townships covering 3,074 acres or approximately 2.8 percent of these townships. The lease parcels total approximately 606 558 acres, approximately 0.6 0.5 percent of these townships and 0.03 percent of the Williston Basin development area identified in the RFD.

Parcel Number	GIS acres	County	Potential	Development Area
MTM 97300-PT	81	RICHLAND	High	Williston Basin
MTM 97300-PW	31	RICHLAND	High	Williston Basin
MTM 97300-PX	23	RICHLAND	High	Williston Basin
MTM 97300-PY	67 19	RICHLAND	High	Williston Basin
MTM 97300-LD	57	ROOSEVELT	High	Williston Basin
MTM 97300-LX	120	SHERIDAN	High	Williston Basin
MTM 97300-LY	60	SHERIDAN	High	Williston Basin
MTM 97300-LZ	71	SHERIDAN	High	Williston Basin
MTM 97300-MP	96	SHERIDAN	High	Williston Basin

Four parcels are located, either in whole or in part within the Porcupine Dome development area. They are all in areas mapped as high development potential. The Porcupine Dome development totals 250,336 acres. These lease parcels are located in Rosebud County. The RFD scenario forecast a range of 37 to 67 oil wells and zero to 501 gas wells in this development area. The range for producing federal well is 5 to 10 oil wells and zero to 75 gas wells. The lease parcels under consideration are located in 3 different townships. There are 4 active federal oil and gas leases in this township covering 2,661 acres or approximately 3.9 percent of these townships. The lease parcels total approximately 511 acres, approximately 0.7 percent of these townships and 0.2 percent of the Porcupine Dome development area identified in the RFD.

Parcel Number	GIS acres	County	Potential	Development Area
MTM 97300-M1	80	ROSEBUD	High	Porcupine Dome
MTM 97300-M3	54	ROSEBUD	High	Porcupine Dome
MTM 97300-MX	320	ROSEBUD	High	Porcupine Dome
MTM 97300-MY	57	ROSEBUD	High	Porcupine Dome

Appendix C - Potential Surface Disturbance Associated with Oil & Gas Exploration and Development

The potential number of acres disturbed by exploration and development activities is shown in Tables C-1 and C-2. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the MCFO. Typical exploration and development activities and associated acres of disturbance were used as assumptions for analysis purposes in this EA. The assumptions were not applied to Alternative A because the lease parcel would not be recommended for lease; therefore, no wells would be drilled or produced on the lease parcel and no surface disturbance would occur on those lands from exploration and development activities.

Table C-1. Total RFD Projected Disturbance for CBNG Wells and Associated Production

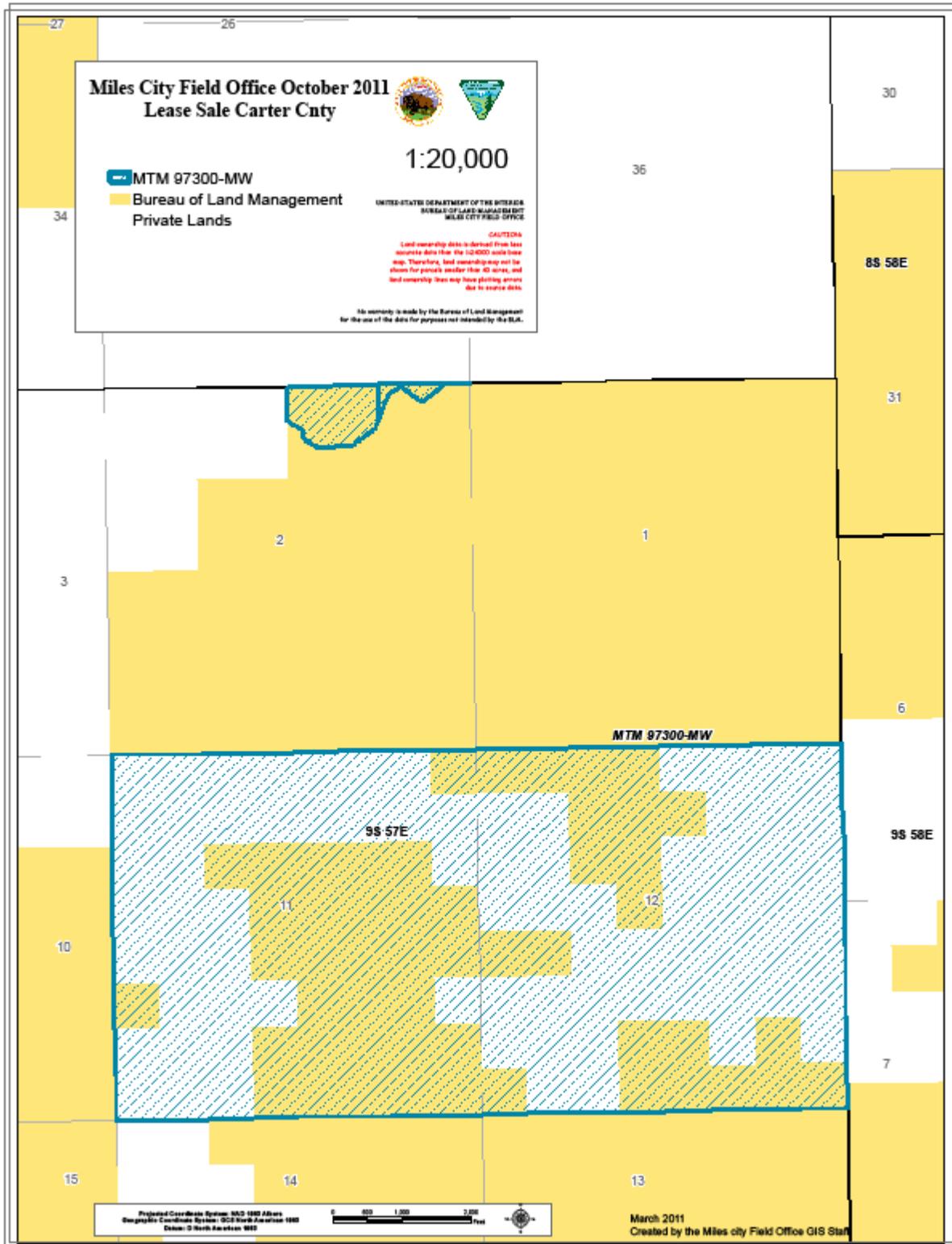
Facilities		Exploratory Well Disturbance (acres/well)	Construction Disturbance (acres/well)	Operation/Production Disturbance (acres/well)
		Short-Term – 2 Years		Long-Term
Well Sites		0.25	0.25	0.05
Access Roads and Routes to Well Sites	Two-track	N/A	0.30	0.30
	Graveled	N/A	0.10	0.10
	Bladed	0.75	0.075	0.10
Utility Lines	Water	N/A	0.35	....¹
	Overhead Electric	N/A	0.20	0.20
	Underground Electric	N/A	0.35	....
Transportation Lines	Low Pressure Gas	N/A	0.90	....
	Intermediate Pressure Gas	N/A	0.25	....
Processing Area	Battery Site	N/A	0.020	0.020
	Access Roads	N/A	0.15	0.15
	Field Compressor	N/A	....	0.02 (0.5 acres/24 producing wells)
	Sales Compressor	N/A	....	0.005 (1.0 acres/240 producing wells)
	Plastic Line	N/A	....	0.5 ²
	Gathering Line	N/A	....	0.25
	Sales Line	N/A	....	0.075
Produced Water Management	Discharge Point	N/A	0.01	0.002
	Storage Impoundment	N/A	0.3	0.25
Total Disturbance		1.0	3.25	2.0

1. The operation disturbance for utilities assumes most utilities would be underground, and reclamation would occur so that no disturbance should remain except for overhead electric lines.
2. Assumption for plastic lines within the processing area is an average corridor width of 25 feet.

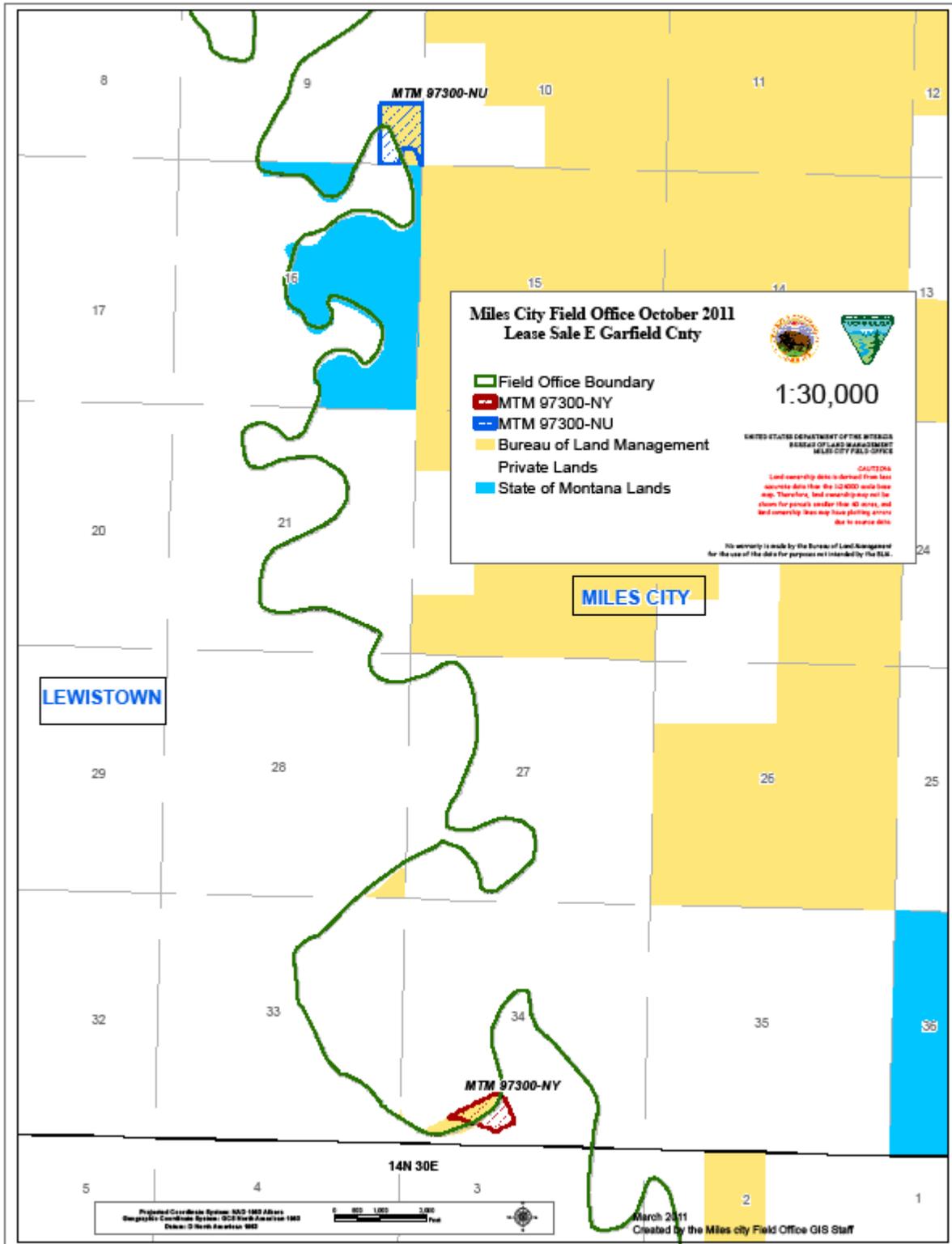
Table C-2. Total RFD Projected Disturbance for Oil and Gas Wells and Associated Production Facilities

Facilities		Exploratory Well Disturbance (acres/well)	Construction Disturbance (acres/well)	Operation/Production Disturbance (acres/well)
		Short-Term – 2 Years		Long-Term
Well Pad (360-foot by 360-foot pad during drilling and construction reduced to 200-foot by 200 foot pad during operation)		3	3	1
Access Roads and Routes to Well Sites	Two-track (12-foot wide by 0.21 miles long)	N/A	0.30	0.30
	Graveled (12-foot wide by 0.075 miles long)	0.5	0.10	0.10
	Bladed (12-foot wide by 0.05 miles)	0.5	0.075	0.075
Utility Lines	Water lines (15-foot by 0.20 miles)	N/A	0.35	1
	Overhead Electric (10-foot by 0.15 miles)	N/A	0.20	0.20
	Underground Electric (15-foot by 0.20 miles)	N/A	0.35	0
Transportation Lines	Intermediate Pressure Gas Line to and from field compressor (25-foot by 0.08 miles)	N/A	0.25	0.001
	High Pressure Gas or Crude Oil Gathering Line (25-foot by 0.3 miles)	N/A	0.9	0.2
Processing Area	Tank Battery (one 0.50-acre tank battery per 12.5 wells)	N/A	0.020	0.04
	Access Roads (25-foot by 0.05 miles)	N/A	0.15	0.15
	Field Compressor (0.5-acre pad per 12.5 wells)	N/A	0.2	0.04
	Sales Compressor (2-acre pad for 240 wells)	N/A	0.01	0.01
	Sales Line (25-foot by 6 miles per 240 wells)	N/A	0.075	0.075
Produced Water Management	Produced Water Pipeline (25-foot by 0.3 miles)	N/A	0.9	0.2
	Water Plant/Injection Well (6 acres site per 12.5 wells)	N/A	0.25	0.5
Total Disturbance per Conventional Oil or Gas Well (acres)		4	7.1	3

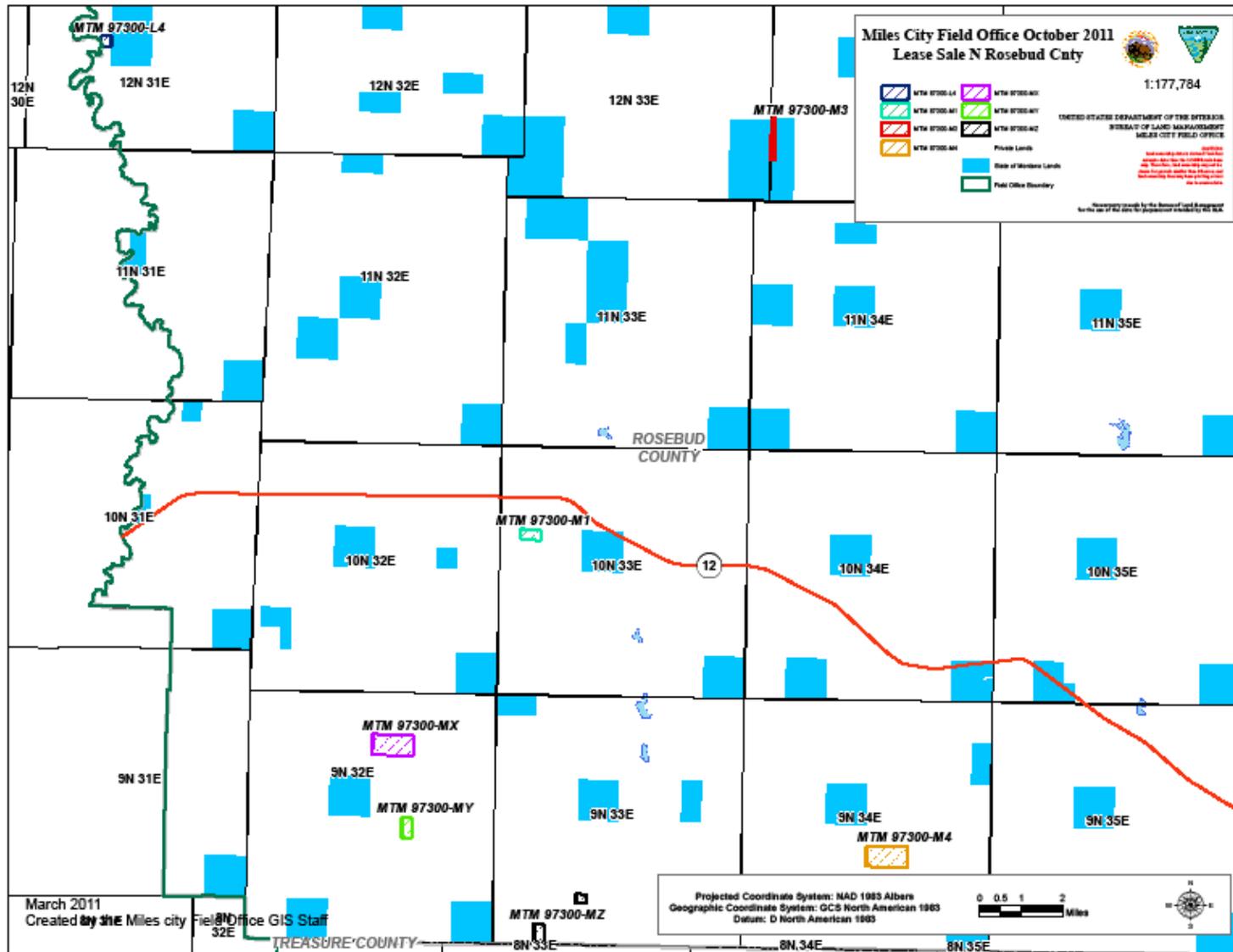
Map 2



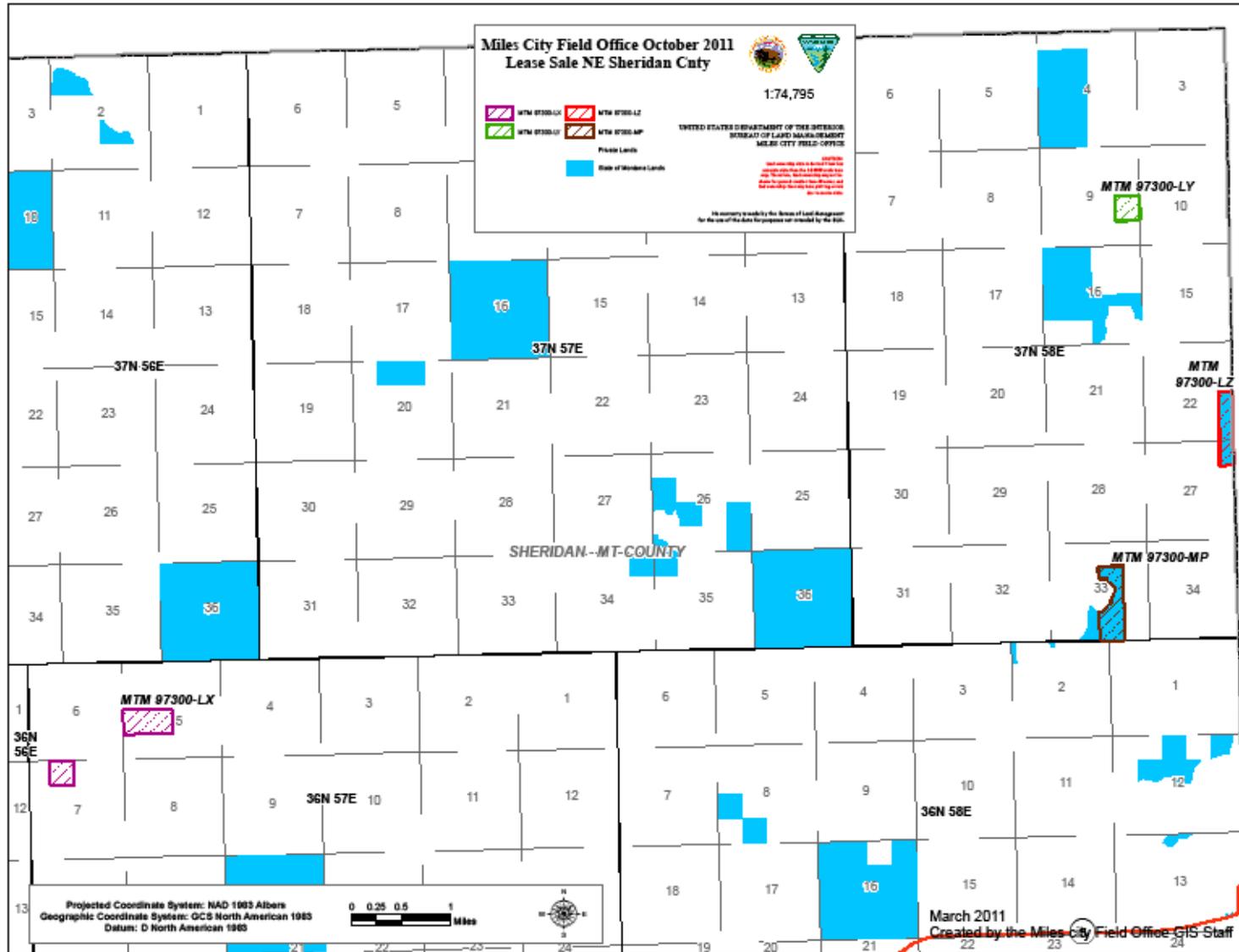
Map 3



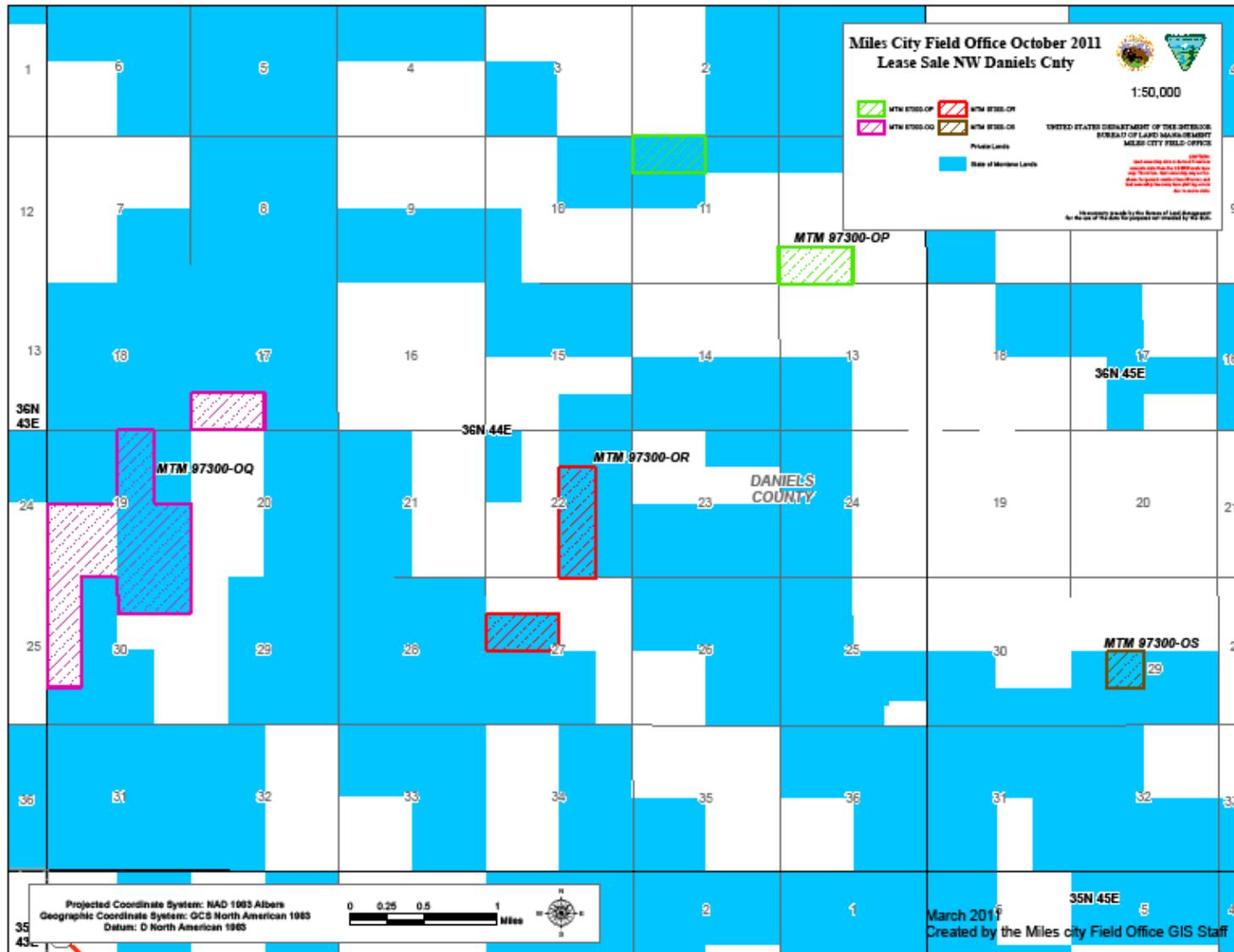
Map 4



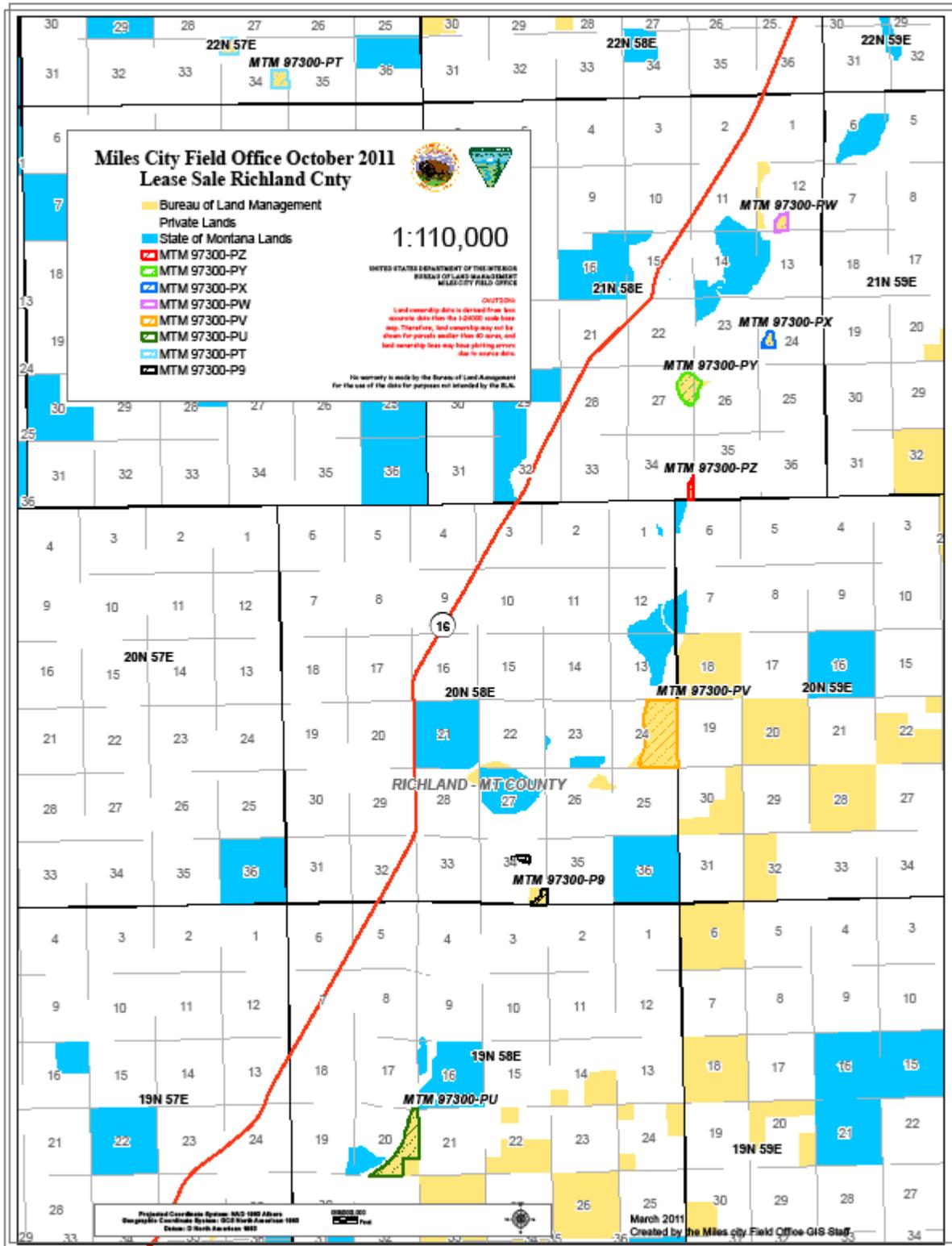
Map 5



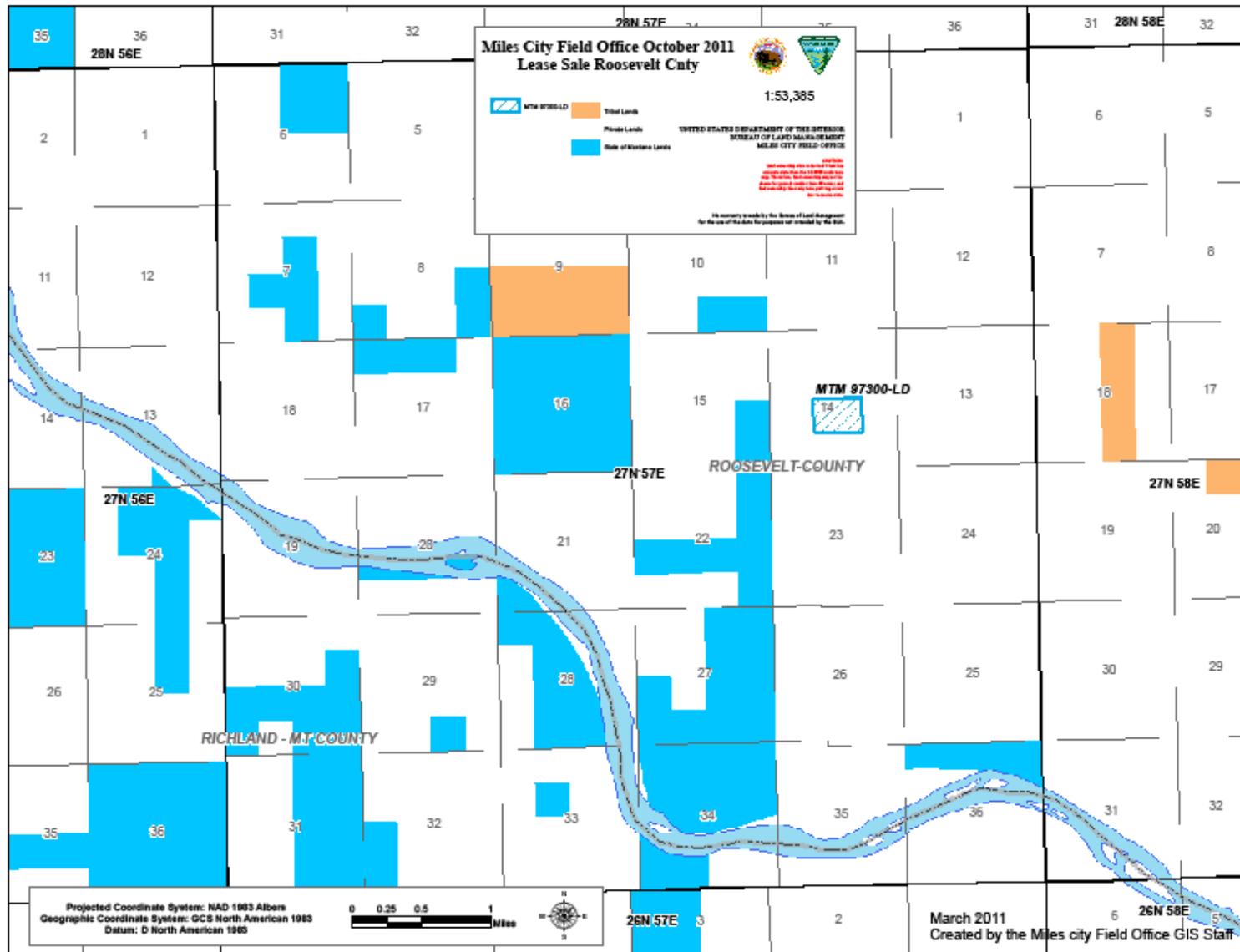
Map 6



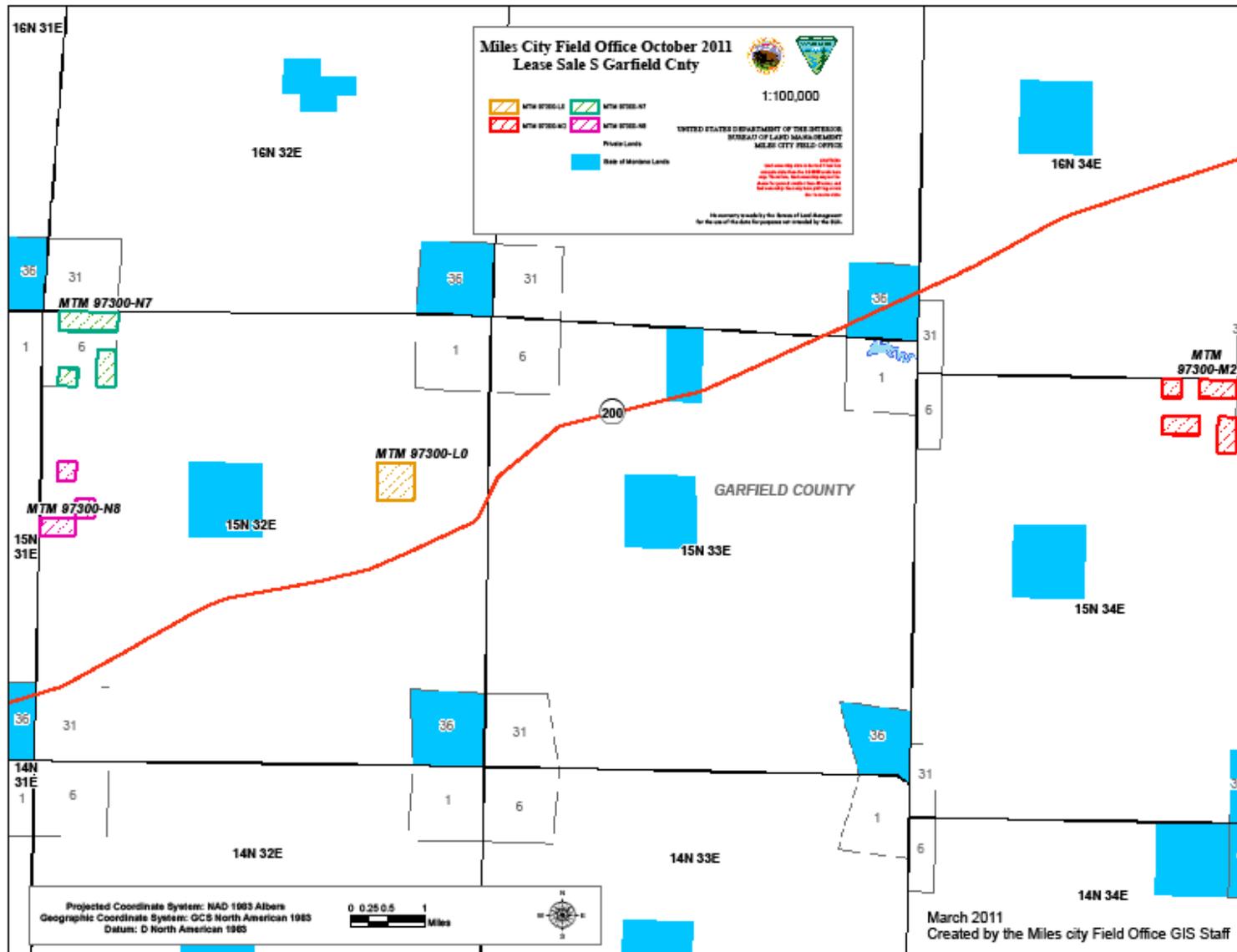
Map 7



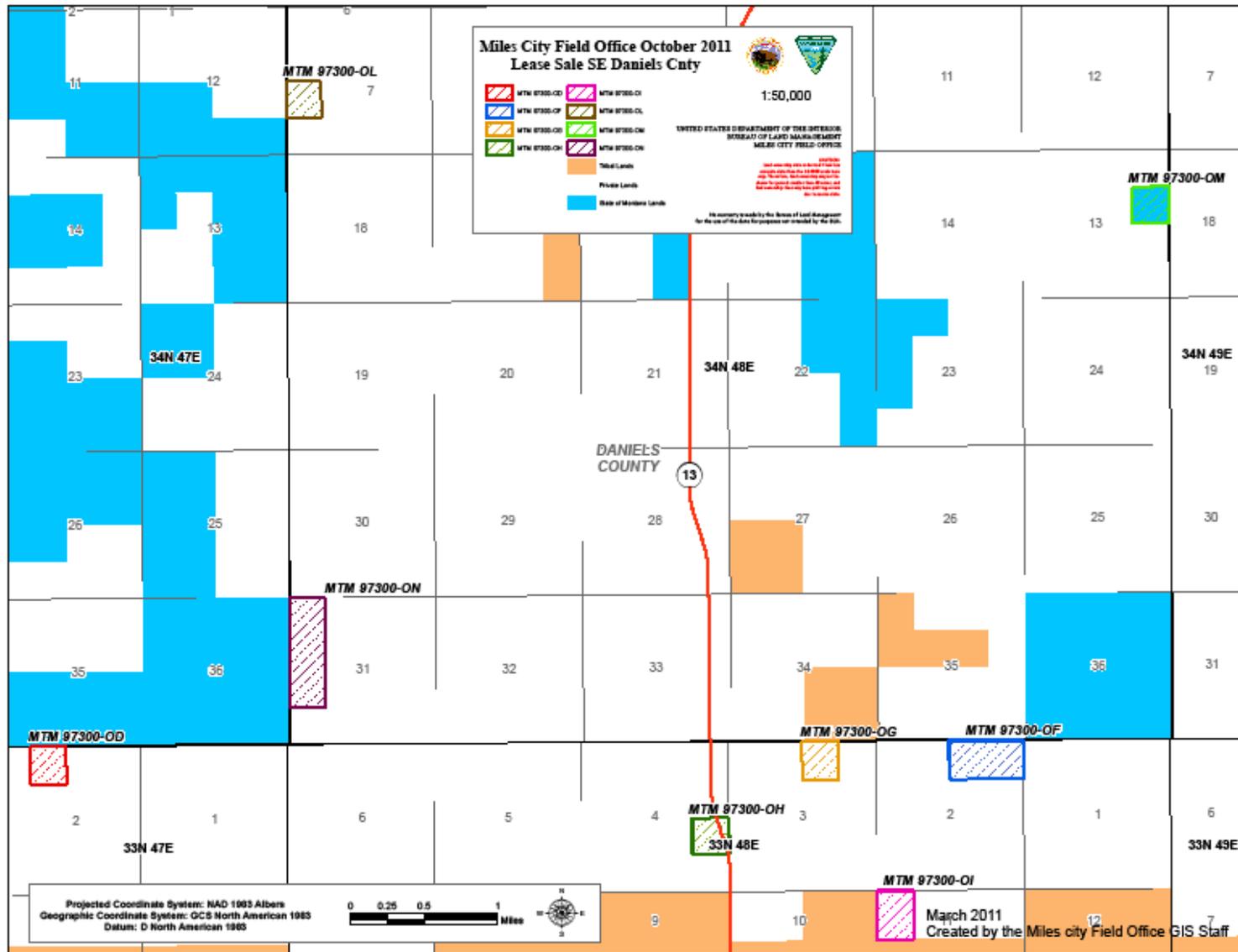
Map 8



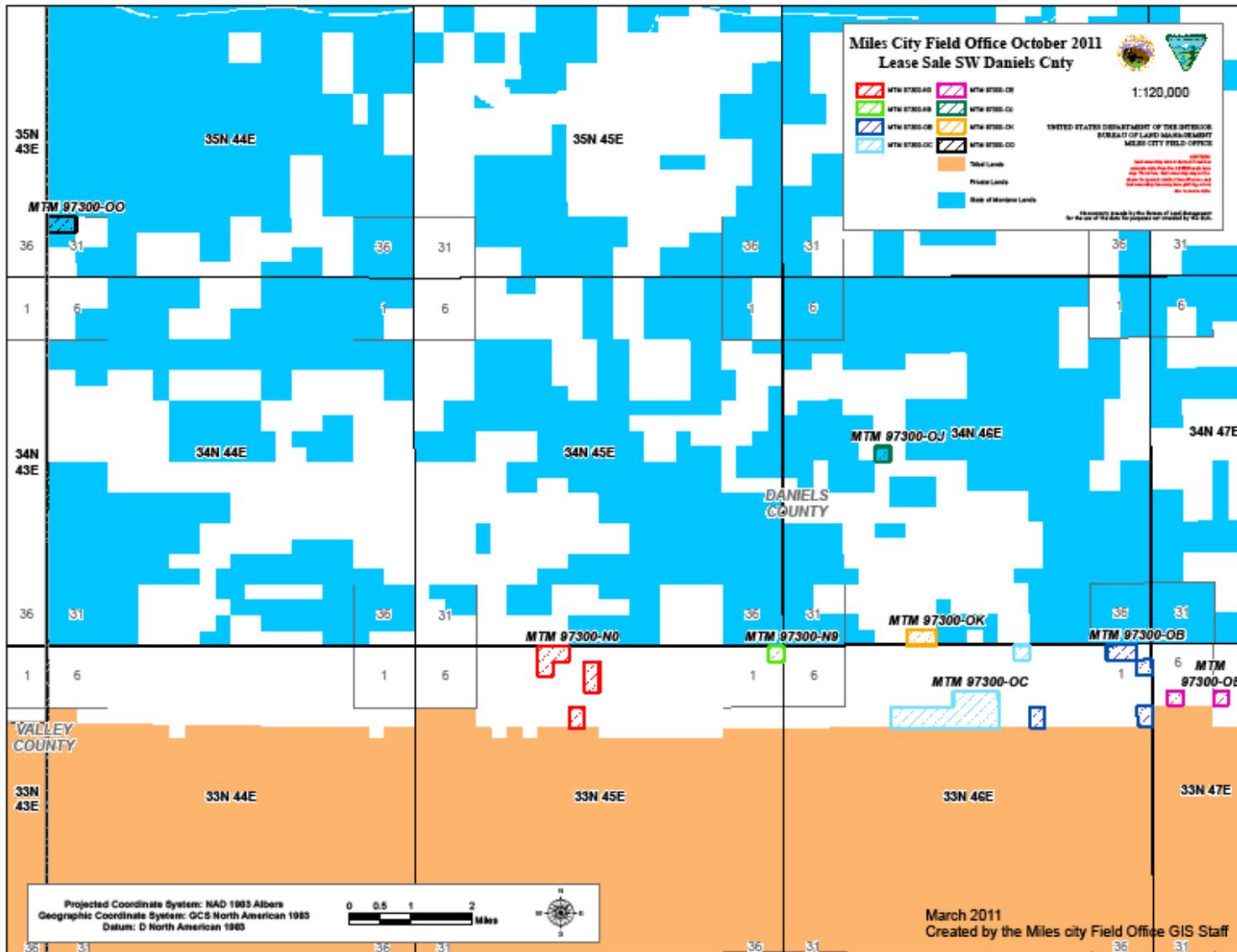
Map 9



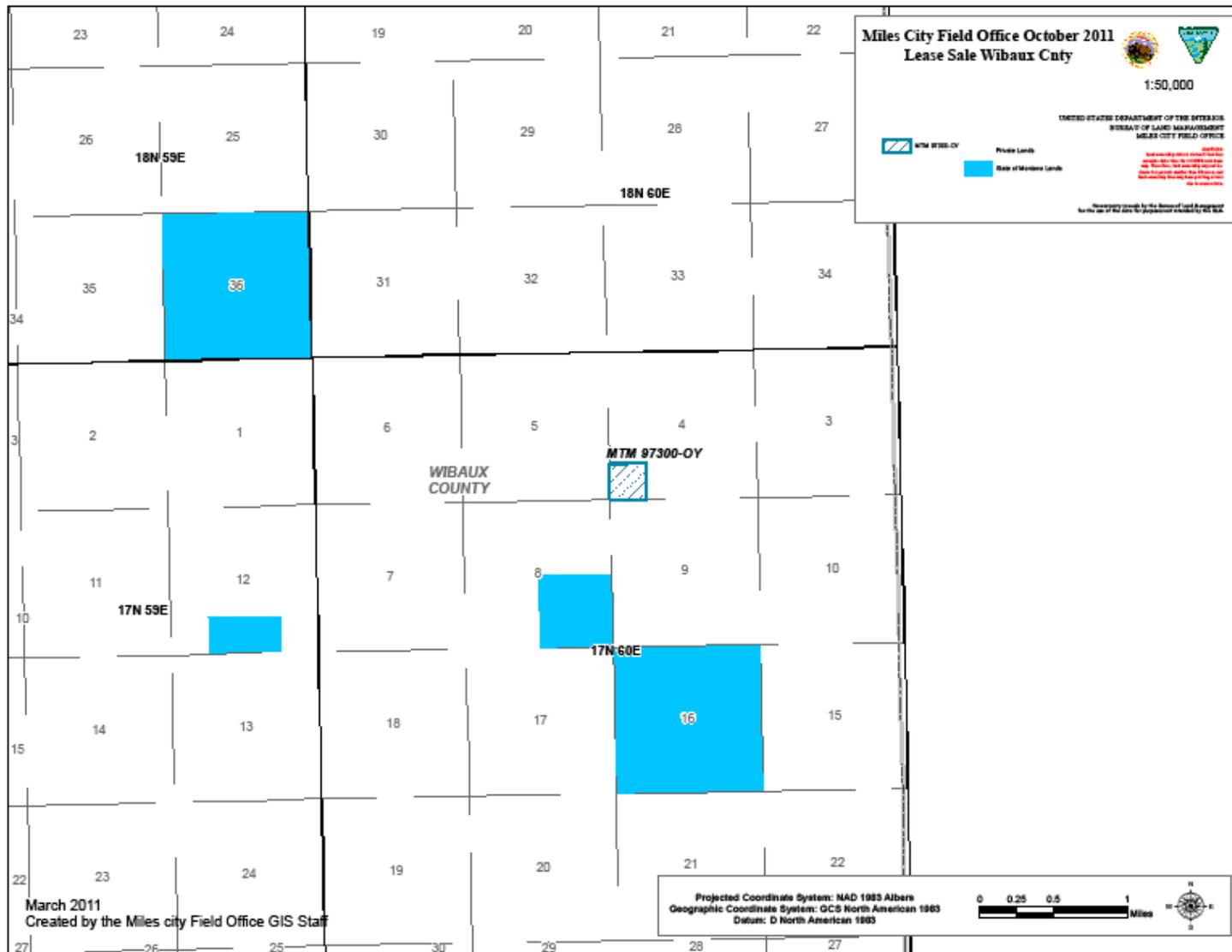
Map 10



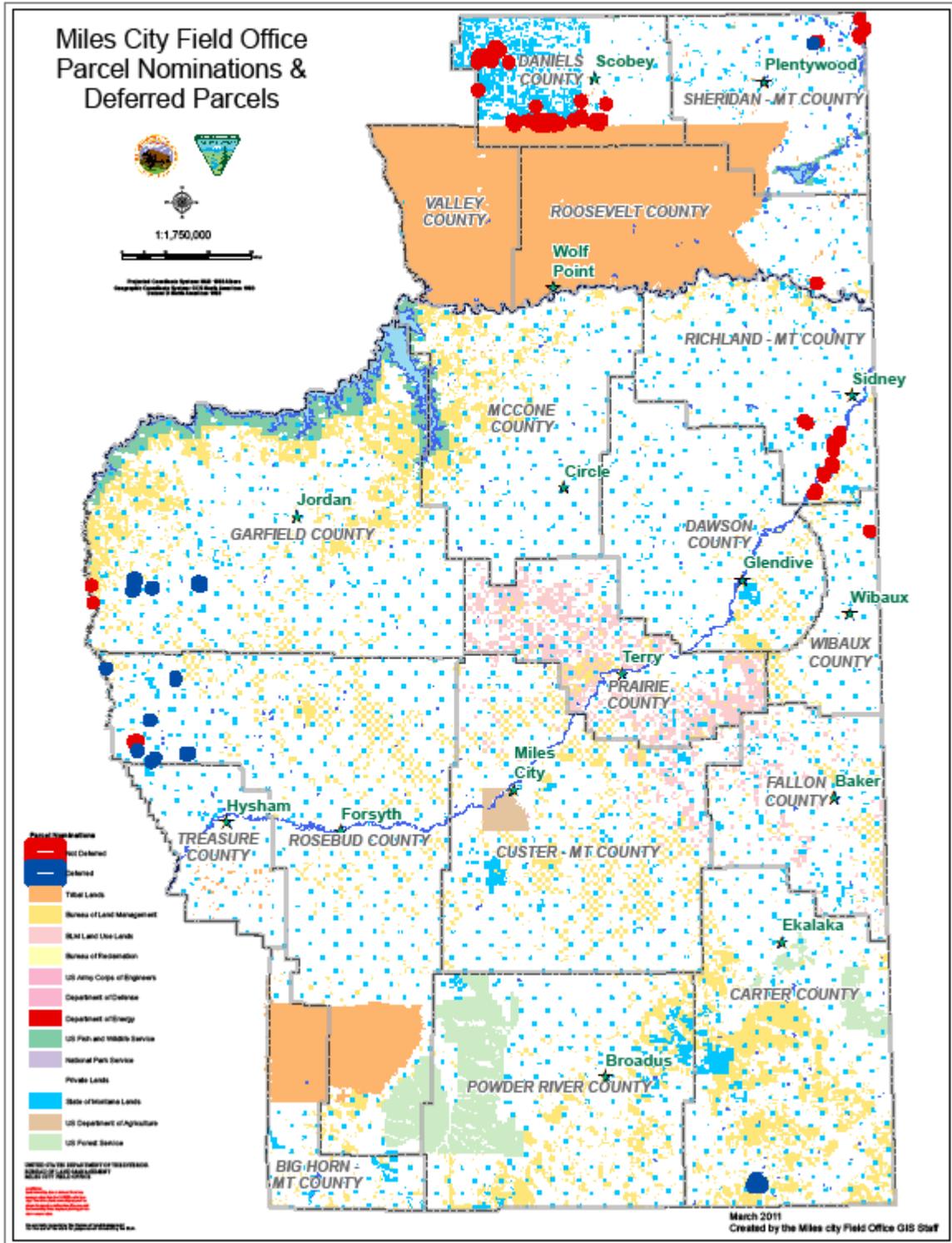
Map 11



Map 12



Map 13



Map 14

