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

In Reply Refer To:

Dear Reader:

The Bureau of Land Management (BLM) Miles City Field Office has prepared an environmental assessment (EA) to analyze the potential effects from offering 11 nominated lease parcels for competitive oil and gas leasing in a sale tentatively scheduled to occur on May 21, 2014.

The EA with an unsigned Finding of No Significant Impact (FONSI) is available for a 30-day public comment period. Written comments must be postmarked by January, 14, 2014, to be considered. Comments may be submitted using one of the following methods:

Email: BLM_MT_Miles_CityFO_Lease_EA@blm.gov

Mail: Miles City Field Office
Attn: Jon David
111 Garryowen Road
Miles City, Montana 59301-7000

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – will be available for public review. If you wish to withhold personal identifying information from public review or disclosure under the Freedom of Information Act (FOIA), you must clearly state, in the first line of your written comment, "CONFIDENTIALITY REQUESTED." While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations, from businesses, and from individuals identifying themselves as representatives of organizations or businesses, will be available for public review.

Upon review and consideration of public comments, the EA will be updated as needed. Based on our analysis, parcels recommended for leasing in our assessment would be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on May 21, 2014.

Prior to issuance of any leases, the Decision Record and FONSI will be finalized and posted for public review on our BLM website. Please refer to the Montana/Dakotas BLM website at http://blm.gov/jdld. Current and updated information about our EAs, Lease Sale Notices, and corresponding information pertaining to this sale can be found at the link referenced above.

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 406-233-2837.

Sincerely,

Todd D. Yeager
Field Manager

BLM

United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-MT-C020-2014-0017-EA
December 16, 2013

Project Title: Oil and Gas Lease Parcel, May 21, 2014 Sale

Location: Miles City Field Office (see Appendix A for list of lease parcels by number and legal description and Maps 1-8)

Miles City Oil and Gas Lease Sale EA
DOI-BLM-MT-C020-2014-0017-EA

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DOI-BLM-MT-C020-2014-0017-EA

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. The 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 11 nominated lease parcels encompassing a total of 2362.63 surveyed Federal mineral acres 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 in May 21, 2014.

The analysis area includes the 11 nominated parcels in Richland and Roosevelt 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. 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 RMP. An electronic copy of the Big Dry RMP/EIS 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 (for development, production, etc.).

Analysis of the 11 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, file information, and some site visits to ensure that appropriate stipulations were recommended for a specific parcel. Analysis may have also identified the need to defer entire or partial parcels from leasing pending further environmental review.

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 C), which is based on information contained in the MCFO RFD developed in 2005 and revised in 2012; 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 11 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 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 October 21, 2013. No external issues were identified by the public during the 15-day scoping period.

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 MFWP was conducted for the 11 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 USFWS and MFWP during the 15-day scoping and 30-day public comment periods requesting comments on the 11 parcels being reviewed.

The BLM consults with Native Americans under various statues, regulations, and executive orders, including the American Indian Religious Freedom Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, the National Environmental Policy Act, and Executive Order 13175-Consultation and Coordination with Indian Tribal Governments. The BLM sent letters to tribes in Montana, North and South Dakota and Wyoming for the 15-day scoping period informing them of the potential for the 11 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. The BLM sent a second letter with a copy of the EA 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 nominated parcels for sale.

No external issues were identified by the public during the 15-day scoping period. Site specific resource concerns were identified by the BLM through the preliminary review process conducted prior to a 15-day public scoping period. Lease stipulations (as required by Title 43 Code of Federal Regulations 3131.3) were added as necessary to each parcel as identified by the BLM to address site specific resource concerns.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Alternative A - No Action

For EAs on externally initiated Proposed Actions, the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would be denied or rejected.

The No Action Alternative would exclude all 11 lease parcels, covering 2,362.63 surveyed Federal mineral acres (1,035.79 surveyed BLM administered surface, 47.88 Bureau of Reclamation (BOR) surface, and 1,278.96 surveyed private/State surface), from the competitive oil and gas lease sale (Maps 1-12). Surface management would remain the same and ongoing oil and gas development would continue on surrounding Federal, private, and State leases.

2.2 Alternative B – Proposed Action

The Proposed Action Alternative would be to offer 11 lease parcels of Federal minerals for oil and gas leasing, covering 2,362.63 surveyed Federal mineral acres (1,035.79 surveyed BLM administered surface, 47.88 BOR surface, and 1,278.96 surveyed private surface), in conformance with the existing land use planning decisions. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Maps 1-12 indicate the detailed location of each parcel.

2.3 Alternative C -BLM Preferred

Under the BLM Preferred Alternative, 9 whole parcels of the 11 lease parcels, 2,211.48 surveyed Federal mineral acres (904.84 surveyed BLM administered surface, 1,278.96 surveyed private surface and 27.68 surveyed BOR surface) would be offered with RMP lease stipulations and/or lease notices as necessary (Appendix A) for competitive oil and gas lease sale and lease issuance.

A total of 2 lease parcels (MTM 102757-6T and MTM 97300-MN), in whole, 151.15 surveyed Federal mineral acres (130.95 surveyed BLM administered surface and 20.2 BOR surveyed surface), are recommended for deferral. The 2 lease parcels contain Source Water Protection Areas designated by Montana Department of Environmental Quality. Designated water protection areas are being analyzed in the current MCFO RMP effort; therefore, the 2 lease parcels, in whole, would be deferred at this time pending further review and analysis. This would provide for consideration of alternatives in the current MCFO RMP planning.

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 RMP at pages 9 to 40 and 302 to 330 of the Minerals Appendix. Conditions of Approval (COAs) would be attached to permits issued to explore and develop the parcels to address site-specific concerns or new information. Standard operating procedures, best management practices (BMPs), 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, or does not comply with the terms and conditions of the lease, the BLM would terminate the lease. The lessee can relinquish the lease. The oil and gas resources could be offered for sale at a future lease sale.

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 11 nominated parcels in Richland and Roosevelt 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 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 and Yellowstone 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: coal, locatable minerals, salable minerals, lands with wilderness characteristics, cave and karst resources, wild and scenic rivers; wilderness study areas (WSAs); Areas of Critical Environmental Concern (ACECs) and hazardous wastes or solids. These resources and resource uses will not be discussed further in this EA.

3.2 Air Resources

Air resources include air quality, air quality related values (AQRVs), and climate change. As part of the planning and decision making process, BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on air resources.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter with a diameter less than or equal to 10 microns (PM_{10}), particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). Two additional pollutants, nitrogen oxides (NO_x) and volatile organic compounds

(VOCs) are regulated because they form ozone in the atmosphere. Regulation of air quality is also delegated to some states. Air quality is determined by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

3.2.1 Air Quality

The EPA air quality index (AQI) is an index used for reporting daily air quality (http://www.epa.gov/oar/data/geosel.html) to the public. The index tells how clean or polluted an area's air is and whether associated health effects might be a concern. The EPA calculates the AQI for five 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 NAAQS to protect public health. An AQI value of 100 generally corresponds to the primary NAAQS for the pollutant. 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.
- **Unhealthy** – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- **Very Unhealthy** – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 1). Based on available aggregate data for Richland County (the nearest county with monitoring data) for years 2009–2011, 93 percent of the days were rated "good" and the three-year median daily AQI was 32 for monitors in the analysis area.

Table 1. US EPA – Air Data Air Quality Index Report (2009-2011)

County[1]	# Days in Period	# Days Rated Good or No Data	Percent of Days Rated Good or No Data	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Richland	1,095	1,013	93%	82	0	0	0

[1]The Richland County monitor is located near Sidney, MT. Source: EPA Air Data website (http://www.epa.gov/airdata/ad_rep_aqi.html, accessed March 18, 2013).

The area managed by the MCFO is in compliance with all NAAQS. Based on monitoring data available for 2009 through 2011, maximum concentrations as a percentage of the NAAQS are summarized in Table 2. Data are not provided for CO and lead which are not monitored within the analysis area.

Table 2. Monitored Concentrations Representative of the Study Area [a]

Pollutant	Averaging Time	Applicable Standardb	Concentrationc, d
NO2	1 hour	100 ppb	9 ppb (9%)
O3	8 hour	0.075 ppm	0.056 ppm (75%)
PM10	24 hour	150 μg/m^3	96 μg/m^3 (64%)
PM2.5	24 hour	35 μg/m^3	14 μg/m^3 (40%)
	Annual	12 μg/m^3	6 μg/m^3 (50%)
SO_2	1 hour	75 ppb	6 ppb (77%) [e]
	24 hour	140 ppb	3 ppb (2%)

[a] Representative concentrations are based on data from the Sidney monitoring station in Richland County.
[b] Most restrictive national or State standard.
[c] Monitored concentrations are the 2nd highest for 24-hour PM_{10} and 24-hour SO_2; three-year average of the annual 4th highest daily maximum for 8-hour O3; three-year average of the 98th percentile for 24-hour $PM_{2.5}$ and 1-hour NO_2; and three-year arithmetic mean for annual PM2.5.
[d] Values in parentheses are monitored concentrations as a percentage of the most restrictive applicable standard.
[e] Only two years of recent data were available for SO_2. The two-year average is based on calendar years 2010 and 2011.
Source: EPA Air Data website (http://www.epa.gov/airdata/ad_rep_con.html, accessed March 18, 2013).

Although ozone concentrations above the NAAQS have been monitored in some rural areas in other states with oil and gas activity, moderate ozone concentrations have been monitored in Montana oil and gas areas. Based on 2010-2012 data from monitors located near Sidney and Broadus, Montana, ozone concentrations are approximately 75 percent of the ozone NAAQS (MDEQ 2013).

Hazardous air pollutants (HAPs) would also be emitted from oil and gas operations, including well drilling, well completion, and gas and oil production. Recent air quality modeling performed for the MCFO indicates that concentrations of benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylene would be less than 14 percent of applicable health-based standards and that the additional risk of cancer would be less than 0.18 in one million (BLM 2013).

Air resources also include visibility, which can be degraded by regional haze due in part to sulfur, nitrogen, and particulate emissions. Based on trends identified during 2005-2009, visibility has degraded slightly at the Medicine Lake National Wildlife Refuge IMPROVE monitor in Sheridan County on the haziest days (20 percent worse days). On the 20 percent best (clearest) days, visibility at this monitor has been improving, as shown by decreasing haze in Figure A.

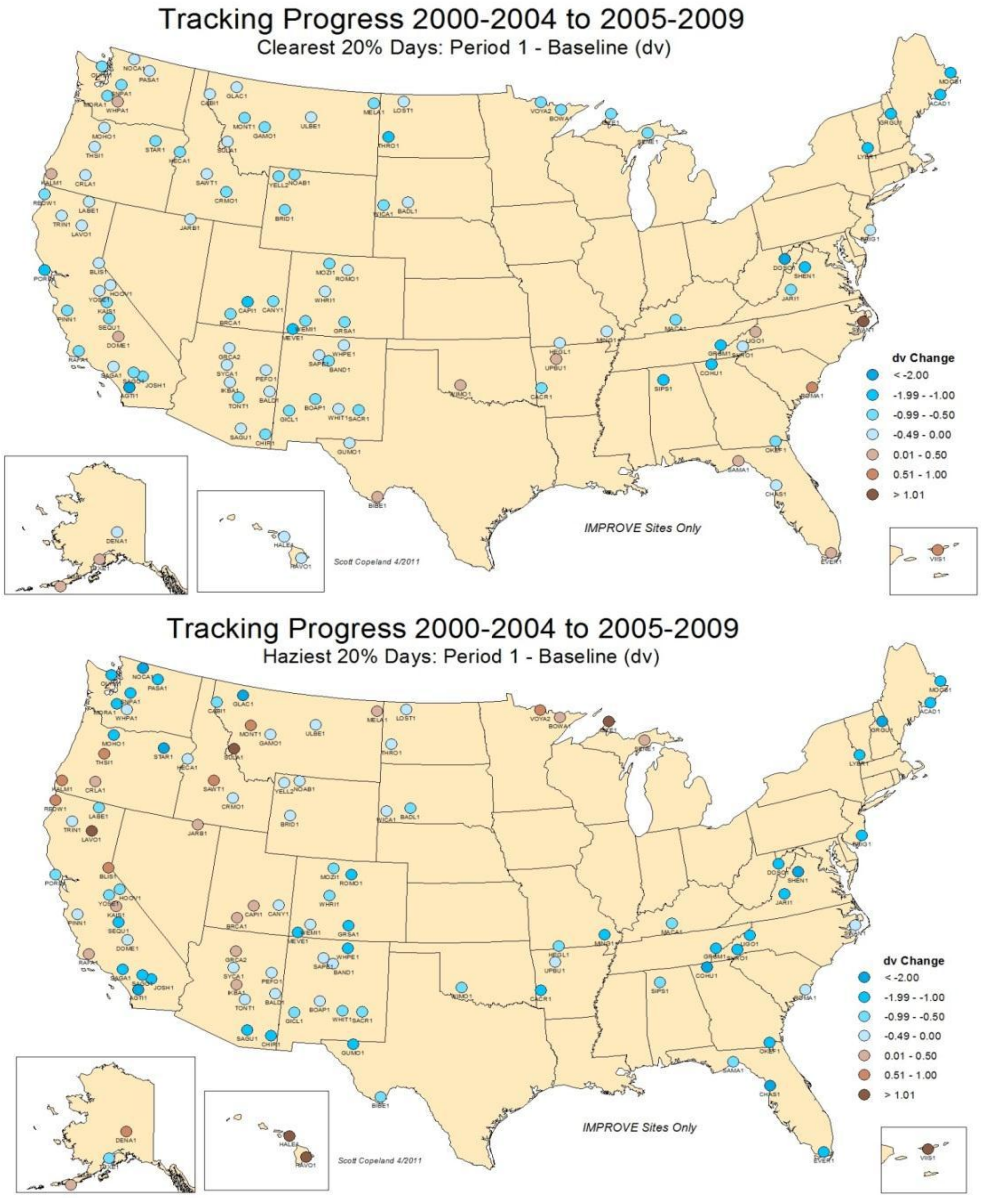

Figure A. Trends in haze index (deciview) on haziest and clearest days, 2005-2009. Source: IMPROVE 2011.

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 2007). 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 the IPCC (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 caused, in part, by the atmospheric buildup of greenhouse gases (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 CO2 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 may last 50 to 200 years in the

atmosphere while methane has an average atmospheric life time of 12 years (Climate Change SIR 2010).

With regard to statewide GHG emissions, Montana ranks in the lowest decile when compared to all the states (http://assets.opencrs.com/rpts/RL34272_20071205.pdf, Ramseur 2007). The estimate of Montana's 2005 GHG emissions of 37 million metric tons (MMt) of gross consumption-based carbon dioxide equivalent (CO2e) account for approximately 0.6 percent of the U.S. GHG emissions (CCS 2007).

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 EPA identifies eastern Montana as part of the Great Plains region. The following summary characterizes 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 occur.

- 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 patterns 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 2 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 would 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 the mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- 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.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Wind power production potential is predicted to decline in Montana based on modeling focused on the Great Falls area.
- 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 B). However, data from 1991-2005 indicate a 0.45 degree per decade cooling trend (Figure C). This example is not an anomaly, as several other 15-year windows can be selected to show either warming or cooling trends. Some of these year-to-year fluctuations in temperature are due to natural processes, such as the effects of El Niños, La Niñas, and the eruption of large volcanoes (Climate Change SIR 2010). This information illustrates the difficulty of predicting actual short-term regional or site-specific changes or conditions which may be due to climate change during any specific time frame.

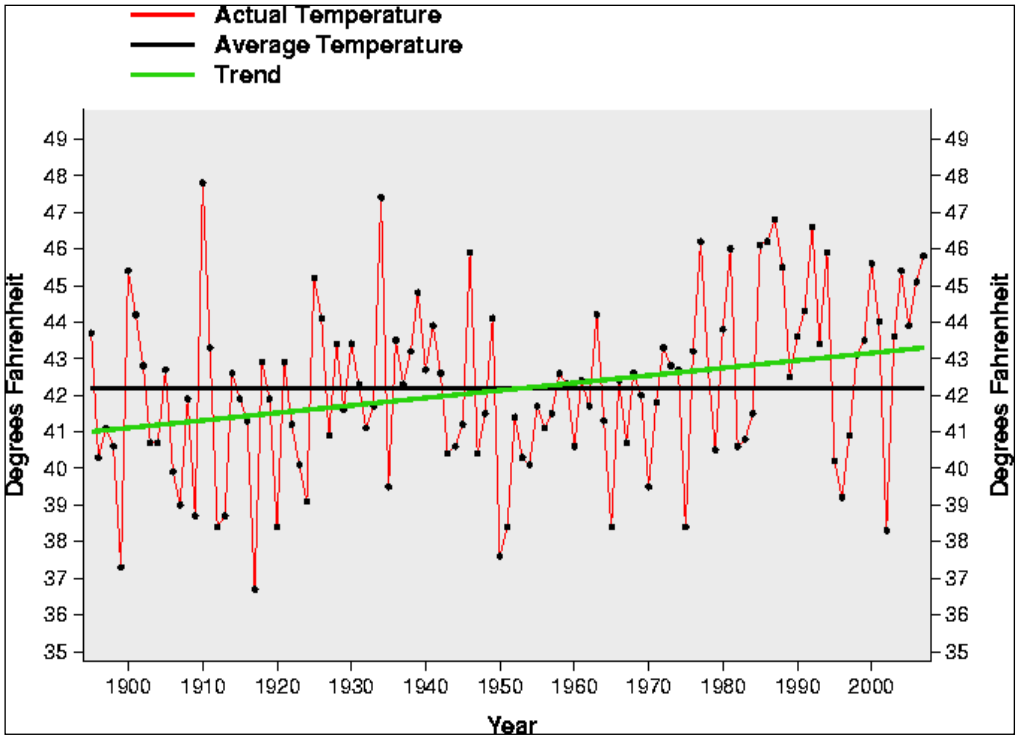

Figure B. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1895-2007. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)**

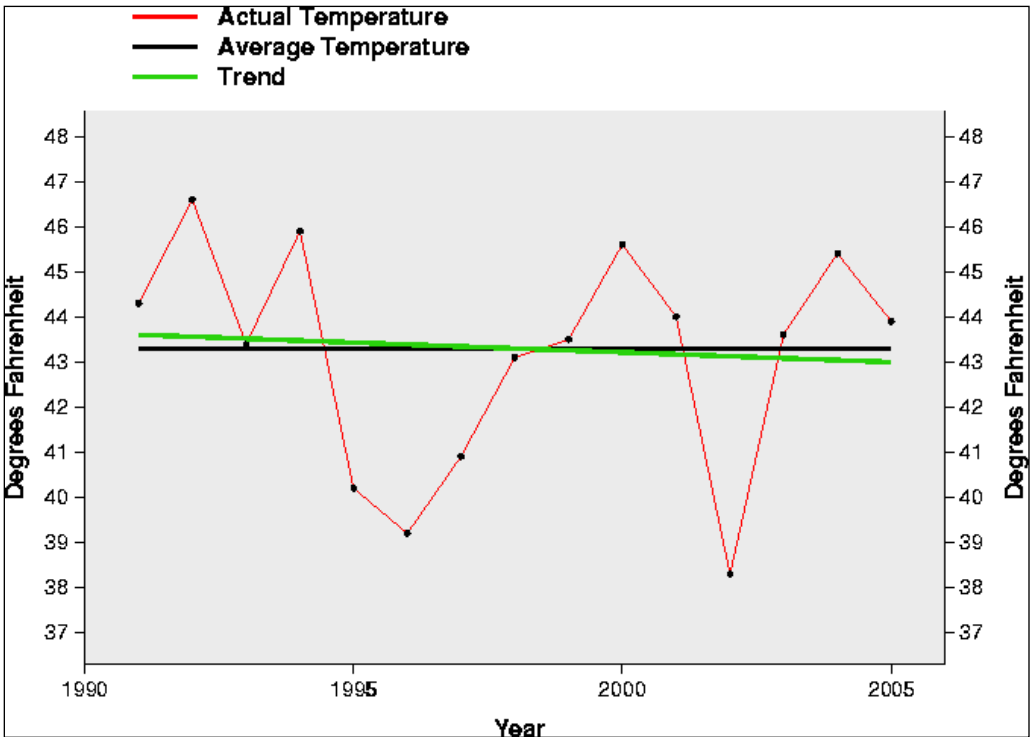

Figure C. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1991-2005. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html)

3.3 Soil Resources

The soil-forming factors (climate, parent material, topography, biota, and age) are variable across the planning area, 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.

Soil Restoration Potential 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 for soil restoration, would require unconventional and/or site-specific restoration measures.

The lease parcels are located within 3 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Charlie-Little Muddy (HUC 10060005), Lower Yellowstone (HUC 10100004), and Redwater (HUC 10060002). The following describes the common soil properties of lease parcels within each watershed:

The Charlie-Little Muddy watershed contains proposed parcels MTM 105431-FH, MTM 102757-6U, MTM 102757-6R, MTM 102757-6T and MTM 102757-6V. The lease parcels are located in Richland and Roosevelt County. Parcel soils generally developed from the Fox Hills Formation, Fort Union Formation or Alluvium. Ecological sites are typically silty-steep (MLRA 58A, 10-14 p. z.) or silty (MLRA 53A, 10-14 p.z.). There are several different kinds of terrain in these parcels such as Badlands, Moraines, and Flood plains. The majority of the terrain within the parcels is hills at 20 to 40 percent slope. Slopes can reach 65 percent or more. Approximately less than 1 percent of the soils within these parcels have a low potential for restoration and 4 percent of soils were not rated.

The Lower Yellowstone watershed contains proposed parcels MTM 97300-MN, MTM 97300-MO, MTM 97300-6C, MTM 97300-6E, and MTM 97300-6J. The lease parcels are located in Richland County. Parcel soils generally developed from Alluvium or the Fort Union Formation. Ecological sites are typically silty (MLRA 53A, 10-14 p. z.). Most of the terrain within the parcels is flood plains and stream terraces, with slopes ranging around 0 to 4 percent. Approximately 1 to 2 percent of the soils in these parcels have a low potential for soil restoration and 8 percent of soils were not rated.

The Redwater watershed contains proposed parcel MTM 102757-6Q. This lease parcel is located in Richland County. Parcel soils generally developed from the Fort Union Formation. Ecological sites are typically silty (MLRA 53A, 10-14 p. z.). Most of the terrain within the parcel is hills or morraines, with slopes ranging from 2-8 percent; however slopes can reach about 65 percent. Approximately 16 percent of the parcel is considered to have a low potential for soil restoration.

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, cobles, bedrock).

Approximately 420 acres of 100-year floodplains are present within 7 of the proposed lease parcels. These floodplains are generally associated with the Missouri and Yellowstone Rivers and their major tributaries.

The lease parcels are located within 3 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Charlie-Little Muddy Creeks (HUC 10060005), Lower Yellowstone River (HUC 10100004), and Redwater River (HUC 10060002). The acreage of the lease parcels comprises between less than 0.1 percent and 0.24 percent of each watershed (USGS 2009).

The Charlie-Little Muddy Creeks watershed contains proposed parcels MTM 102757-6R, 6T, 6U, 6V, and MTM 105431-FH; comprising 0.24 percent of the watershed. The lease parcels are located in Richland and Roosevelt Counties. The Lower Yellowstone River watershed contains proposed parcels MTM 97300-6J, MN, and MO, and102757-6C and 6E; comprising less than 0.1 percent of the watershed. The lease parcels are located in Richland County. The Redwater River watershed contains proposed parcel MTM 102757-6Q; comprising less than 0.1 percent of the watershed. The lease parcel is located in Richland County. 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. Water used for oil well development may come from several different sources. It may be purchased from municipalities under certain conditions,

appropriated from a surface water source under a new appropriation or by making changes to an existing water right, or by extracting groundwater from either a permitted or exempt well.

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 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 within 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.

3.4.3 Source Water Protection Areas

Two proposed lease parcels are located within portions of State-designated Source Water Protection Areas (SWPA). Proposed lease parcel MTM 102757-6T is located entirely within the SWPA for the Culbertson Public Water Supply (PWS). The Culbertson PWS is classified as a community system and services 796 residents via 379 active service connections. Source water is obtained through an intake on the Missouri River located near Culbertson, Montana (MDEQ 2002). Proposed lease parcel MTM 97300-MN is located entirely within the SWPA for the Montana Dakota Utility PWS. The Montana Dakota Utility PWS is classified as a community system and services 25 employees via 1 active service connection. Source water is obtained through an intake on the Yellowstone River located near Sidney, Montana (MDEQ 2003).

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 and the Northern Dark Brown Glaciated Plains in the 10 to 14-inch precipitation zone, which lie 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, shrubs and trees 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; Sandy (Sy), Shallow (Sw), Silty (Si), Clayey (Cy) and Overflow (Ov). 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 comata*), 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 tridentata 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 percent native grass species, 10-15 percent forbs, and 5-10 percent 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 2012). 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 canadensis*), American licorice (*Glycyrrhiza lepidota*), sedges (*Carex spp*.), rushes (*Juncus spp*.), willow (*Salix spp.*), chokecherry (*Prunus virginiana*), buffaloberry (*Shepherdia argentea*), cottonwood (*Populus spp.*), needleleaf sedge (*Carex duriuscula*), sandbar willow (*Salix exigua*), Nebraska sedge (*Carex nebrascensis*), softstem bulrush (*Schoenoplectus tabernaemontani*), beaked sedge (*Carex rostrata*), yellow willow (*Salix lutea*), common three-square (*Schoenoplectus pungens*), and green ash (*Fraxinus pennsylvanica*). Weedy and invasive species common to riparian areas are knapweed (*Centaurea stoebe*), leafy spurge (*Euphorbia esula*), Russian olive (*Elaeagnus augustifolia*), saltcedar (*Tamarisk ramosissima*), kochia (*Bassia prostrata)*, thistle (*Cirsium arvense)*, sweet clover (*Melilotus officinalis*), cocklebur (*Xanthium strumarium)*, and gumweed (*Grindelia squarrosa)*.

Wetlands provide watering points for wildlife and livestock and provide habitat diversity. Species include 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, 7 proposed lease parcels contain approximately 116 acres of delineated riparian or wetland areas (see Table 3). This list is not comprehensive because complete GIS data was not available for 6 of the lease parcels: MTM 102757-6Q, 6R, 6T, 6U, and 6V, and MTM 105431-FH.

Table 3: MTNHP and USFWS Riparian and Wetland Areas by Lease Parcel[1,2]

Lease Parcel	Riparian/Wetland Type	Classification	Acres
MTM 102757-6T	Freshwater Emergent Wetland	Palustrine, Emergent, Temporary Flooded	22.2
	Riverine	Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	5.8
		Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded	38.3
MTM 102757-6U	Freshwater Emergent Wetland	Palustrine, Emergent, Temporary Flooded	0.5
		Palustrine, Emergent, Seasonally Flooded	0.5
MTM 105431-FH	Freshwater Pond	Palustrine, Aquatic Bed, Semipermanently Flooded, Diked/Impounded	2.6
MTM 97300-6J	Freshwater Emergent Wetland	Palustrine, Emergent, Temporary Flooded, Excavated	3.2
	Riparian Forested	Riparian, Lotic, Forested	0.1
MTM 97300-MN	Freshwater Emergent Wetland	Palustrine, Emergent, Temporary Flooded	0.1
	Riparian Forested	Riparian, Lotic, Forested	16.1

Lease Parcel	Riparian/Wetland Type	Classification	Acres
	Riverine	Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	<0.1
MTM 97300-MO	Freshwater Emergent Wetland	Palustrine, Emergent, Seasonally Flooded	5.2
	Freshwater Scrub-Shrub Wetland	Palustrine, Scrub-Shrub, Temporary Flooded	1.8
	Riparian Emergent	Riparian, Lotic, Emergent	4.1
	Riparian Forested	Riparian, Lotic, Forested	12.2
	Riparian Scrub-Shrub	Riparian, Lotic, Scrub-Shrub	0.9
	Riverine	Riverine, Lower Perennial, Unconsolidated Shore, Seasonally Flooded	1.1
		Riverine, Intermittent, Streambed, Seasonally Flooded, Excavated	0.8

[1](USFWS 2009) [2] This list is not comprehensive because complete GIS data was not available for 6 of the lease parcels: MTM 102757-6Q, 6R, 6T, 6U, and 6V, and MTM 105431-FH.

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 Plant Species

According to the MTNHP, there are no known threatened or endangered plant species located within the lease parcels. Ten plant species on the Montana Plant Species of Concern list have been identified as having suitable habitat in areas near these parcels (MTNHP, 2012). These species are listed in the Table 4 and have the potential to exist on the lease parcels. Three of these species are also identified as BLM "Sensitive" plants.

According to the MTNHP field guide, 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 4. MT Species of Concern and BLM Sensitive Plants in or near lease parcels

Plant Name	Common Name	County	Habitat Description
Carex gravida	Pregnant sedge	Richland	wetland/riparian
Dalea enneandra	Nine-anther prairie clover	Richland	grasslands (plains)
Dalea villosa	Silky prairie clover	Richland	sandy sites
Dalea enneandra	Nine-anther prairie clover	Richland	grasslands (plains)
Dalea villosa	Silky prairie clover	Richland	sandy sites
Lobelia spicata *	Pale-spiked Lobelia	Richland	Moist meadow
Solidago ptarmicoides	Prairie Goldenrod	Richland	Moist meadow
Suckleya suckleya*	Suckleya suckleana	Richland, Roosevelt	wetland/riparian
Viburnum lentago*	Nannyberry	Richland	Riparian forests
Teucrium canadense	American Germander	Roosevelt	Moist meadow
* BLM Sensitive			

3.6.2 Special Status Animal 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. The BLM sensitive species also include both Federal candidate species and delisted species within 5 years of delisting.

3.6.2.1 Aquatic Wildlife

For aquatic wildlife in the analysis area there are 9 fish, 3 amphibians, and 2 reptile species that are special status or are sensitive species (Table 5). All of these species depend on perennial and intermittent streams or rivers with intact floodplains, wetlands, and riparian areas that have functional habitat. 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 platorynchus*), which closely resembles the pallid sturgeon, as a threatened species where its range overlaps with the Pallid sturgeon (FWS 2010). In Table 6, endangered or sensitive aquatic wildlife species that occur within each of the lease parcels are listed.

Table 5. Aquatic sensitive or special status wildlife species in the analysis area.

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 Dace *	None	None	Yes	Yes
Northern Redbelly X Finescale Dace	None	Sensitive	Yes	Yes
Paddlefish	None	Sensitive	Yes	Yes
Pearl Dace	None	Sensitive	No	N/A
Sauger	None	Sensitive	Yes	Yes
Iowa Darter *	None	None	Yes	Yes
Sicklefin Chub *	None	None	Yes	Yes
Sturgeon Chub	None	Sensitive	Yes	Yes
Snapping Turtle	None	Sensitive	Yes	Yes
Spiny Softshell	None	Sensitive	Yes	Yes
Plains Spadefoot	None	Sensitive	Yes	Yes
Great Plains Toad	None	Sensitive	Yes	Yes

***Iowa darter, northern redbelly dace, and sicklefin chub are listed as species of concern by the Montana Fish, Wildlife, and Parks.**

Table 6. Endangered or sensitive aquatic wildlife species that occur in, or their ranges overlap with, the lease parcels.

Lease Parcel	Endangered or Sensitive Species
MTM 102757-6Q	Iowa Darter, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 105431-FH	Iowa Darter, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 102757-6T	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Iowa Darter, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 102757-6U	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Iowa Darter, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 102757-6R	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Iowa Darter, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 97300-MN	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad, Spiny Softshell, Snapping Turtle
MTM 97300-MO	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad, Spiny Softshell, Snapping Turtle
MTM 102757-6V	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Iowa Darter, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad, Snapping Turtle

Lease Parcel	Endangered or Sensitive Species
MTM 97300-6J	Sauger, Spiny Softshell, Snapping Turtle, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 102757-6E	Sauger, Spiny Softshell, Snapping Turtle, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad
MTM 102757-6C	Pallid Sturgeon, Paddlefish, Blue Sucker, Sturgeon Chub, Sicklefin Chub, Sauger, Northern Redbelly Dace, Northern Redbelly X Finescale Dace, Northern Leopard Frog, Plains Spadefoot, Great Plains Toad, Spiny Softshell, Snapping Turtle

Note: The northern redbelly dace, northern redbelly x finescale dace, northern leopard frog, plains spadefoot and great plains toad may occur in all lease parcels, the sauger occurs in all lease parcels except MTM 102757-6Q.

3.6.2.2 Terrestrial Wildlife

Evaluating wildlife values at the landscape scale is key to understanding potential impacts of a project. Wildlife values, including terrestrial conservation species, species richness, game quality, and aquatic conservation connectivity, 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 variety of habitat consistent with the Northern Great Plains. Lease parcels are located within short and mixed grass prairies, riparian habitats, cultivated lands, 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". Table 6 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 7. 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*	None	Sensitive	No	Not applicable (N/A)
Grizzly Bear**	Threatened	Sensitive	No	N/A
Black-footed ferret	Endangered	Special Status Species	No	No

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
		(SSS)		
Black-tailed prairie dog	None	Sensitive	Yes	No
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	Threatened	Sensitive	Yes	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	unlikely
Whooping crane	Endangered	SSS	Yes	Yes
Yellow rail	None	Sensitive	Yes	Yes
Piping plover	Threatened, with critical habitat	SSS	Yes	Yes
Mountain plover	None	Sensitive	No	N/A
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	No	N/A
Burrowing owl	BCC	Sensitive	Yes	No
Great gray owl	None	Sensitive	No	NA
Three-toed woodpecker	None	Sensitive	No	NA
Trumpeter swan	None	Sensitive	yes	unlikely

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	No	NA
Sage thrasher	BCC	Sensitive	No	NA
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	No	NA
Short-eared owl	BCC	None	Yes	Yes
Lewis's woodpecker	BCC	None	No	NA
Red-headed woodpecker	BCC	Sensitive	Yes	Yes
Black-backed woodpecker	None	Sensitive	No	NA
Sage sparrow	BCC	Sensitive	No	NA
Grasshopper sparrow	BCC	None	Yes	Yes
Dickcissel	BCC	Sensitive	Yes	Yes
Blue-gray natcatcher	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

Species	USFWS Status	BLM Status	In Current Range	Suitable Habitat Present
Greater short-horned lizard	None	Sensitive	Yes	Yes
Milk snake	None	Sensitive	Yes	Yes
Western hog-nosed snake	None	Sensitive	Yes	Yes

Table 6 sources: Montana Bird Distibution Committee 2012; Werner, Maxell, Hendricks, and Flath. 2004; Foresman 2001; MTNHP, 2010; BLM, 2009; USDA – NRCS Plants Database, 2010
*Gray wolf has been delisted so has been moved to the sensitive list
**Grizzly bear has been delisted for the Greater Yellowstone ecosystem. In that area it is a Bureau sensitive species.

3.6.2.3 Threatened, Endangered, Candidate, and Proposed Species

Threatened, endangered, or candidate bird species may occupy habitat infrequently or seasonally within the analysis area. These species include the whooping crane, interior least tern, piping plover, 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). Lease parcels 6C, 6E, 6R, 6T, 6U, 6V, 6J, MN, and MO are located within this primary migration corridor. Nesting by whooping cranes has not been documented in the analysis area; however, stopover observations have been documented along the Missouri River.

Interior least terns migrate up both the Missouri and Yellowstone rivers and utilize gravel bars along these rivers for nesting. Lease parcels 6U and 6T are located along or within 0.25 miles of the Missouri River. Historic nesting by least terns has been documented to occur from 0.93 and 0.4 miles from these parcels at the nearest point, respectively. Lease parcel MN is located within the Yellowstone River corridor; however, least tern nesting has not been documented in the immediate area.

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. No parcels are located within unit 1.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. Lease parcels 6U and 6T are located within or immediately adjacent to the Unit 2 critical habitat designation for piping plover. The nearest recorded nesting location by piping plovers is approximately 1.4 miles east of parcel 6T. Unit 3 designates habitat around Fort Peck Reservoir. No lease parcels are located adjacent to Unit 3.

Sprague's pipit was recently classified as USFWS candidate species and occurs within the analysis area. 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). (Federal Register: September 15, 2010 (Volume 75, Number 178)) 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. Therefore, the proposed lease parcels have been identified as providing potential suitable habitat for Sprague's pipits based on a Sprague's pipit suitable habitat model utilized by the Montana Department of Fish, Wildlife, and Parks (http://apps.fwp.mt.gov/gis/maps/caps/), and aerial photography (NAIP, 2011). Ground-truthing of the parcels has not occurred to document actual habitat use by Sprague pipits, or that suitable habitat exists within all of the parcels identified by the model. However, it is likely that at least portions of these parcels provide suitable habitat for Sprague's pipits. These include parcels 6Q, FH, and 6V.

3.6.2.4 Other Sensitive Species

As noted in Table 6 above, up to 46 wildlife species considered as BLM "sensitive" have the potential to occur within the analysis area. These include 32 birds, 6 mammals, 3 amphibians, and 5 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 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.

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." 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; however, recent surveys for raptor nests have not occurred. Two lease parcels, 6E and 6J, are located within 0.5 miles of one historic American kestrel nest. Other species that

would be expected within the analysis area include red-tailed hawks, great-horned owls, northern harriers, bald and golden eagles, sharp-shinned hawks, coopers hawks, and Swainson's hawks. Peregrine falcons are also known to migrate through eastern Montana.

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, 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 3.63 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; un-passable fish & aquatic wildlife 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 topography and vegetation types exists across the analysis area. This diversity 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. A few areas contain blocks of well-functioning habitats, while other areas are composed of small, fragmented patches of native habitat and cultivated lands. In some areas, existing anthropogenic disturbance at some frequency can be expected to reduce habitat suitability for some species of wildlife intolerant to human activities.

The analysis area supports a variety of game and nongame species. Limited wildlife species and habitat surveys have been conducted within a portion of the analysis area. Although the entire area has not been comprehensively surveyed for all wildlife resources, past surveys document what species occur, and provides insight into what other species can be expected to occur within existing 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, both yearlong or seasonally. Habitat to support mule deer 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. Rough topography also provides critical escape and thermal cover important for maintenance and survival. Of the 11 proposed lease parcels, 5 of those are located within mule deer winter range. These include parcels 6R, 6T, 6U, 6V, and FH.

White-tailed deer are common in the analysis area. White-tailed deer prefer riparian drainage bottoms, hardwood draws, 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). A total of 9 parcels are proposed for lease within delineated crucial white-tailed deer winter ranges. These parcels include 6C, 6E, 6R, 6T, 6U, 6V, 6J, MN, and MO.

Pronghorn antelope are widely distributed across the analysis area. They are generally associated with grasslands and shrublands, but they also seasonally 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. Crucial winter ranges for pronghorn have not been identified within the analysis area.

The potential exists for other big game species to occupy the areas. Species include elk, moose, mountain lion, and black bear although presence would likely occur as individual's transition to preferred habitats elsewhere.

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.

Sharp-tailed grouse are the only 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. Portions of 2 lease parcels are located within 2 miles of sharp-tailed grouse leks, and most of these parcels would be expected to provide at least seasonal habitat for sharp-tailed grouse. These parcels include 6Q and 6T.

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 parcels.

3.8 Cultural Resources

The 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 sites are evaluated with reference to their eligibility for listing on the National Register of Historic Places (NRHP). Each site is considered 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 two counties with nominated lease parcels contain 5.7 percent of all prehistoric and 12.3 percent of all historic resources within the MCFO. Each of the two counties contains the following percentages of resource site types within its boundaries: Richland 2 percent prehistoric, 6.1 percent historic and Roosevelt 3.7 percent prehistoric, 6.2 percent historic.

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 10% to 15% of all sites are found to be or have the potential to be eligible for listing in 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 5 lease parcels (MTM 105431-FH and MTM 97300- MO, 6J, 6E & 6C) contain recorded cultural sites within the lease parcel boundaries. Inventory data is not available for a majority of individual lease parcels; however some parcels have incomplete coverage of cultural resource inventory.

There are four cultural site types identified within the boundaries of the reviewed parcels. 24RL0204 is the Lower Yellowstone Irrigation Project. This is a series of irrigation canals that begins near Glendive, MT and continues to near the confluence of the Yellowstone and Missouri River. The Lower Yellowstone Irrigation Project saw its construction started in 1905 and was completed by the mid-1920's. It is among the first large scale irrigation systems constructed to promote settlement of semi-arid lands in the west and territories (Kordecki et. al 2000). The irrigation system was designed to service approximately 50000 users. The irrigation system has operated without major modification to its form or function. Detailed information can be located in the references under Kordecki et. al. 2000. The other historic site types identified within the parcels are a historic energy development site (24RL0321) known as the Cabin Creek to Williston Pipeline. The pipeline was constructed in the 1930 and runs from Fallon county to Williston North Dakota, 93.3 miles. Site 24RL0230 is the Northern Pacific Railroad The site is considered eligible for listing on the National Register of Historic Places.

There was one prehistoric site identified within the boundaries of a lease parcel. The site is a single stone circle. The site has not been evaluated for eligibility for inclusion in the National Register of Historic Places and may be of interest to Native American concerns, See Section 3.9.

3.9 Native American Religious Concerns

The 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 of Historic Places 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 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.

One parcel (MTM 105431-FH) contains a single stone circle site (24RL408). The site is currently unevaluated for listing on the National Register of Historic Places, but would require additional work if a future action would impact the site. The other parcels in the sale do not contain historic sites associated with the railroad, irrigation ditches, or the historic gas pipelines.

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 resources.

The BLM utilizes the Potential Fossil Yield Classification (PFYC) as a planning tool for identifying areas with high potential to yield significant fossils. The system consists of numbers ranging from 1-5 (low to high) assigned to geological units, with 1 being low potential and 5 being high potential to have significant fossil resources. It should be pointed out that the potential to yield significant fossil resources is never 0. Rock units not typically fossiliferous can in fact contain fossils in unique circumstances.

The BLM classified geologic formations that have a high Potential Fossil Yield Classification (PFYC) of 3 or higher should be specifically reviewed for paleontological resources. The MCFO has the following classifications on the relevant geologic units:

Quaternary deposits	Class 2 and 3
Ft Union	Class 4
Hell Creek	Class 5

All or part of 9 of the 11 parcels include geologic units rated as PFYC 3-5. Two parcels do not include units that are rated higher than 3, however, there is still a potential in those parcels for

fossils. For example, Quaternary terraces can preserve the remains of Ice Age fauna, and one of the few known from the state is the Doeden fauna (Wilson and Hill, 2000) in the MCFO area. So, any discovery of fossils in these deposits would be significant, and should be mitigated appropriately.

Neither of the 2 lease parcels (MTM 102757-6T and 97300-MN) includes geologic units rated as PFYC 3-5, so no prior assessment for paleontological resources is required. However, prior to surface disturbance there should be an approved Unanticipated Resource Recovery plan for fossils.

The 9 parcels that include geologic units with a PFYC of 3 or higher are: MTM 102757-6Q, 105431-FH, 102757-6U, 102757-6R, 97300-MO, 102757-6V, 97300-6J, 102757-6E, and 102757-6C. The 2 parcels that include geologic units with a PFYC of less than 3 are MTM 102757-6T and 97300-MN.

3.11 Visual Resources

The BLM Visual Resource classifications are only applied to BLM surface, as such the affected environment for visual resources only consists of approximately 1,041 acres of BLM - administered surface in the analysis area (Table 8).

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 8: VRM Classes for the analysis area by lease parcel

Leasing Areas	VRM Class II Acres	VRM Class III Acres	VRM Class IV Acres
RICHLAND COUNTY	***131 total acres***	***575 total acres***	***255 total acres***
MTM 105431-FH	0	575	255
MTM 102757-6T	131	0	0
ROOSEVELT COUNTY	***80 total acres***	***0 total acres***	***0 total acres***
MTM 102757-6U	80	0	0

3.12 Forest and Woodland Resources

Evergreen forest habitat types occurring in the analysis area include ponderosa pine (*Pinus ponderosa*) and Rocky Mountain juniper (*Juniperus scopulorum*). Deciduous forest habitat types include Green ash (*Fraxinus pennsylvanica*)/Chokecherry (*Prunus virginiana)*, Great Plans Cottonwood (*Populus deltoids)/*Herbaceous Community, and Russian olive (Elaeagnus angustifolia) (Hansen et al. 2008). The deciduous habitat types occur along streams, rivers, lakes springs, and ponds, occupying terraces, fans, and floodplain positions. The Green ash/Choke cherry habitat types occur in V-shaped ravines (also called woody draws), where sites may occasionally be flooded by storm runoff flows. Russian olive stands typically form bands adjacent to lower gradient waterways. Russian olive, a tree native to southern Europe and western Asia, was introduced into North America during colonial times. Russian olive is currently classified as an invasive species in the United States. Table 9, summarizes forest and woodland acres in the analysis area by forest type and individual parcel.

Table 9. Forestland Acreage and Forest Type by Lease Parcel

Lease Parcel	Evergreen Forest	Deciduous Forest	Mixed Forest	Total Acres
MTM 102757-6Q		22		22
MTM 105431-FH	134	6.8	3	143.8
MTM 102757-6T		7.5		7.5
MTM 12757-6U		84		84
MTM 12757-6R				
MTM 97300-MN		8.8	3.7	12.5
MTM 97300-MO	.3	7.1		7.4
MTM 102757-6V		3.5		3.5
MTM 97300-6J				
MTM 102757-6E				
MTM 102757-6C				
Total	**134.3**	**139.7**	**6.7**	**280.7**

Source: GAP Vegetation Cover Types

The deciduous forest habitats add to the overall diversity of the landscape. They also attract wildlife and livestock for thermal cover, nesting habitat, moisture, browse and, and hiding cover. Because of this, these woodlands are focal points for some of the livestock and wildlife management. The evergreen forests occur in a mosaic patters across the grasslands. These evergreen habitats commonly occur on moderate to steep slopes. Ponderosa pine species tolerates dry environments more successfully than other native confer except Rocky Mountain juniper. Rocky Mountain juniper has an interesting ecological role in the northern Great Plans. In some cases, it can be the dominant species present in the stand or can be the understory of Ponderosa pine stands and some deciduous stands.

3.13 Livestock Grazing

A portion of the lease parcels involve only private and/or State surface ownership (MTM 97300-MO, MTM 102757-6R, MTM 102757-6V, MTM 97300-6C, MTM 97300-6E, MTM 97300-6J, MTM 102757-6Q). MTM 97300-MN and MTM 102757-6T has BLM surface ownership but has no grazing authorization. Two parcels MTM 102757-6U and MTM 105431-FH in whole or part have BLM surface ownership and grazing authorizations. These two parcels occur in Richland County and include three grazing allotments. Cattle are the only class of livestock authorized to

graze these allotments. Of the three allotments, two of the grazing authorizations do not restrict the grazing season or number of livestock due to the small percentage of public land within the allotment. One allotment is authorized under active use which has BLM seasonal and numeric restrictions. None of the allotments are under an Allotment Management Plan (AMP). These allotments contain range improvements such as fences and reservoirs that have access roads for livestock management purposes.

3.14 Recreation and Travel Management

The BLM only manages recreational opportunities and experiences on BLM-administered surface. The affected environment consists of approximately 1,036 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 1,039 BLM-administered acres proposed for lease, approximately 211 acres (MTM 102757-6U; 80 acres and MTM-102757-6T; 131 acres) are located within the Lewis and Clark Trail Special Recreation Management Area (SRMA). 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 1,039 BLM-administered acres proposed for lease have 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 11 parcels that include 2,362.63 surveyed surface acres of which 1,035.79 surveyed acres are BLM administered surface, 47.88 surveyed acres are BOR surface, and 1,278.96 surveyed acres are Non-Federal surface (private, State or other). Table 10 below categorizes the 11 parcels by surface ownership and county.

There is one lease parcels with authorized BLM Rights-of Way (ROWs) approved on BLM administered surface, MTM-105431-FH.

Table 10. Number of parcels, surface ownership, and acres by county.

County	Parcels	Owner-ship	Acres
RICHLAND			
	1 whole, 1 partial (MTM-105431-FH, MTM-102757-6U)	BLM	904.84
	4 parcel (MTM-97300-MN, 6J, MTM 102757-6E, 6C)	BOR	47.88

	3 whole, 1 partial parcels (MTM-105431-FH, MTM-97300-MO, MTM-102757-6R, 6V,)	Non-Federal	1,158.96
	10 TOTAL		**2,111.68**
ROOSEVELT			
	1 parcel (MTM-102757-6T)	BLM	130.95
	1 parcel (MTM 102757-6T)	Non-Federal	120
	1 TOTAL		**250.95**

***parcel MTM-105431-FH contains both Federal and Non-Federal surface.**

Parcels MTM-97300-MN, 6J, and MTM 102757-6E, 6C in Richland County were Acquired by the Bureau of Reclamation (BOR) and are within the boundaries of the Withdrawal created by the Secretarial Order of August 24, 1903, for the Yellowstone River Project. This Withdrawal would not affect the lands identified in the subject parcels because the Withdrawal excepted any tracts which title had passed out of the United States; and the withdrawn lands were withdrawn from settlement, entry or other form of disposal under the public land laws, except the homestead laws and remained open to the leasing laws.

3.16 Minerals

3.16.1 Fluid Minerals

It is the policy of the BLM to make mineral resources available for development 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 1,560 Federal oil and gas leases covering approximately 955,572.612 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 20.4 (195,497.180 acres) 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 11. Numbers of townships, lease acres within those townships, and development activity for all jurisdictions are summarized in Table 12.

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 11. Existing Development Activity

	FEDERAL WELLS	PRIVATE AND STATE WELLS
Drilling Well(s)	11	146
Producing Gas Well(s)(including CBNG)	510	1265
Producing Oil Well(s)	454	3954
Water Injection Well(s)	172	364
Shut-in Well(s)	172	627
Temporarily Abandoned Well(s)	97	235

Table 12. Oil and Gas Leasing and Existing Development within Townships Containing Parcels

	Richland	Roosevelt
Number of Townships Containing Lease Parcels	6	2
Total Acres Within Applicable Township(s)	139,000	45,800
Acres of Federal Oil and Gas Minerals	10926	49092
Percent of Township(s)	7.9%	19.9%
Acres of Leased Federal Oil and Gas Minerals	12806	12661
Percent of Township(s)	9.2%	27.6%
Acres of Leased Federal Oil and Gas Minerals Suspended	Zero	Zero
Percent of Township(s)	0.0%	0.0%
Federal Wells	53 Producing oil wells (46 are horizontal wells), 3 Shut in wells, 10 P&A wells, 1 service well, 12 temporarily abandoned wells.	1 P&A well, 1 POW
Private and State Wells	287 Producing oil wells (227 are horizontal), 2 abandoned converted to H2O injection, , 11 Shut Ins, 108 P&A wells, 6 service wells, 37 temporarily abandoned wells.	7 Producing oil wells (6 are horizontal wells), 7 P&A wells. No drilling, shut in, or TA wells.

3.17 Special Designations

3.17.1 Lewis and Clark National Historic Trail

Lease parcels MTM 102757-6U and 6T (approximately 211 acres) are located within the Lewis and Clark National Historic Trail (NHT). The Lewis and Clark NHT is managed in accordance with the National Trail System Act of 1968, as amended (16 USC 1241-1251) to identify and protect the historic route and its historic remnants and artifacts for public use and enjoyment. The trail would be managed to preserve the historic and cultural resources that are related to the events that occurred during the Lewis and Clark Expedition. The National Park Service (NPS), who is the lead agency for trail administration, established the overall management vision through their Comprehensive Management Plan (1982) and Foundation Document (2012). BLM works collaboratively with NPS to manage trail resources in conformance with these plans and guidance thought BLM Manual 6280.

Any changes in the landscape within view of the Lewis and Clark NHT will be guided by Class II visual resource management objectives and the Lewis and Clark SRMA.

3.17.2 Areas of Critical Environmental Concern (ACECs)

None of the 11 lease parcels fall within the boundaries of proposed or designated Areas of Critical Environmental Concern (ACEC).

3.18 Social and Economic Conditions

3.18.1 Social and Environmental Justice

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. There are 11 parcels in Richland and Roosevelt Counties proposed for leasing in the May 2014 lease sale. While the majority of nominated land is unoccupied and approximately half of the acreage is administered by the Bureau of Land Management, social and economic linkages connect nominated parcels to communities in the surrounding area. To examine how leasing proposed under the alternatives will affect local economy the analysis area was expanded to include Williams County, North Dakota since Williston, ND is the largest business center near the affected communities and , especially for oil and gas related activities, is the major oil and gas service center for activity in Richland and/or Roosevelt counties.

In 2011 the 3-county analysis area was estimated to have a total population of 45,029 people, with 18,358 households earning an average annual income of $154,494 (IMPLAN, 2011). More than half of the area's total population lived in Williston, ND (24,374 people). In 2011 the Richland-Roosevelt-Williams economy supported approximately 41, 513 jobs in 162 industrial sectors, equating to approximately 0.92 people or 2.26 jobs per household. The top five industries operating in the local economy included: support activities for oil and gas operations, State and local government, drilling oil and gas wells, wholesale trade, and truck transportation (IMPLAN, 2011). A large share of the economic activity in the region occurs in Williams County which contains Williston, ND, the largest business center and the epicenter of recent oil and gas exploration and development.

Parcels nominated for leasing in May 2014 are located in the eastern Montana counties of Richland and Roosevelt. Between 2008 and 2012 these counties produced an annual average 15,877,506 bbls of oil and 15,902,131 mcf of associated natural gas, with the majority of production occurring in Richland County. Over the last 24 months *(10/24/2011-10/17/2013)* there were 419 permits to drill issued in these two counties. During this time, 302 permits for oil wells and 1 permit for an injection-disposal well were approved in Richland County and 1 permit for a gas well, 5 permits for injection-disposal wells, and 110 permits for oil wells were approved in Roosevelt County. Of the 213 wells completed in the last 24 months 189 are producing, 9 were shut in, 8 are injection or disposal wells, 3 were dry, and 1 has been temporarily abandoned (MT DNRM, Oil and Gas Conservation Commission, 2013). These wells were drilled in the Three Forks Group whose subsurface deposits stretch across the Williston Basin from southern Saskatchewan, Canada to eastern Montana and western North Dakota. The overwhelming majority of recently completed wells are located in the sub-unit known as the Bakken formation. In 2010 the estimated average cost of drilling and equipping an oil well in the Bakken formation was $8,908,325 and $8,688,205 for dry holes (IPAA, 2011-2012). In Montana, the statewide average cost of drilling and equipping a gas well was reported to be $33,953, and the average wellhead price was $70.24 per bbl. for crude oil and $3.64 per MCF for natural gas (IPAA, 2011-2012).

The widespread adoption of horizontal drilling and other recent technological advances have significantly increased the capability and cost effectiveness of extracting fluid minerals across the Wiliston Basin. The recent surge of interest in commercial development of the Bakken's deposits has rapidly transformed the region's physical, cultural and economic landscapes. Eastern Montana and Western North Dakota have become increasingly specialized in industries that support and service the oil and gas sector, which has become the driving force behind the region's economy. The exploration, development, and production of fluid minerals directly and indirectly support thousands of jobs and millions of dollars in labor income throughout the Williston Basin. Although Federal minerals in Richland and Roosevelt counties are associated with only a fraction of the region's oil and gas activity, the leasing and development of these minerals supports local employment and income and generates public revenue for surrounding communities. The economic contributions of Federal fluid minerals are largely influenced by the number of acres leased and estimated levels of production and can be measured in terms of the jobs, income, and public revenue it generates.

Mineral rights can be owned by private individuals, corporations, Indian tribes, or by local, State, or Federal Governments. Typically companies specializing in the development and extraction of oil and gas lease the mineral rights for a particular parcel from the owner of the mineral rights. As of September, 2013, 109,436 acres were leased from the BLM for oil and gas development in Richland and Roosevelt counties. Federal oil and gas leases are generally issued for 10 years unless drilling activities result in one or more producing wells. Once production has begun on a Federal lease, the lease is considered to be held by production and the lessee is required to make royalty payments to the Federal Government. Of 109,436 acres leased from the BLM in Richland and Roosevelt Counties, 38,277 acres were held by production at the time of this analysis.

Leasing mineral rights for the development of Federal minerals generates public revenue through the bonus bids paid at lease auctions and annual rents collected on leased parcels not held by

production. Nominated parcels approved for leasing are offered by the BLM at a minimum rate of $2.00 per acre at the lease sale. These sales are competitive and parcels with high potential for oil and gas production command bonus bids in excess of the minimum bid. Recent auctions for mineral rights in Richland and Roosevelt counties have yielded an averaged bonus bid of $702 per acre. In addition to bonus bids, lessees are required to pay rent annually until production begins on the leased parcel, or until the lease expires. These rent payments are equal to $1.50 an acre for the first five years and $2.00 an acre for the second five years of the lease. Total annual lease bonus and rental revenues to the Federal Government from leasing Federal minerals in the two counties with nominated parcels average an estimated $1.3 million.

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 95 percent of the leased Federal minerals within the Miles City Field Office 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 $1.3 million in bonus bids and rent from BLM leased minerals in Richland and Roosevelt counties. Public revenue redistributed back to State and local governments is estimated to exceed $619 thousand annually.

As mentioned above, 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.

Although the MCFO's May 2014 lease sale could result in additional mineral leasing in Richland and Roosevelt counties, Williston, ND is the region's largest retail and oil and gas service center. Since most of the companies likely to drill and service wells on newly leased parcels are based out of Williston, leasing of nominated Federal minerals would generate economic activity in Richland, Roosevelt, and Williams counties. The economic contribution of oil and gas related activities 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 8,004 jobs[1] and $850.61 million in employee compensation and proprietor income in the 3-county local economy (IMPLAN, 2010).

[1] IMPLAN job estimates are not full-time equivalents and include all full-time, part-time, and temporary positions supported oil and gas activities within the planning area. These activities may support, or partially support a number of jobs annually. In this respect, 1 job in IMPLAN lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months

Currently the BLM leases 109,436 acres of Federal minerals in Richland and Roosevelt counties. Total Federal revenues from Federal oil and gas leasing, rents, and royalty payments associated with the leasing of these Federal minerals averages an estimated $121.8 million. Federal revenues disbursed to the State of Montana average an estimated $56.7 million per year and those redistributed directly back to the Richland and Roosevelt counties are estimated to exceed $15 million on annual average. 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.

On annual average the leasing, development, and extraction of Federal minerals administered by the BLM supports 2,011 local jobs (full and part-time) and about $141.7 million in local labor income within the three county local economy. This amounts to about 0.71 percent of the local employment and 1.13 percent of local labor and proprietor's income. 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 seven counties that make up the local economy.

Table 13. Current Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the 10-County Local Economy

Industry	Employment (Jobs)		Labor Income (Thousands of 2011 dollars)	
	Area Totals	BLM O&G-Related	Area Totals	BLM O&G-Related
Agriculture	3,293	2	$79,025	$90
Mining	8,086	807	$837,766	$77,651
Utilities	255	10	$25,252	$1,032
Construction	3,412	271	$224,236	$19,261
Manufacturing	748	1	$62,762	$95
Wholesale Trade	2,546	33	$237,913	$3,039
Transportation & Warehousing	2,531	17	$660,560	$2,564
Retail Trade	3,092	92	$108,153	$3,047
Information	285	10	$12,218	$451
Finance & Insurance	1,144	32	$35,523	$1,088
Real Estate & Rental & Leasing	1,296	30	$101,765	$2,101
Prof, Scientific, & Tech Services	1,390	69	$103,304	$4,829
Mngt of Companies	0	0	$0	$0
Admin, Waste Mngt & Rem Serv	941	29	$36,714	$1,045
Educational Services	240	8	$6,945	$223
Health Care & Social Assistance	2,771	85	$116,225	$3,560
Arts, Entertainment, and Rec	461	11	$24,025	$228
Accommodation & Food Services	2,339	63	$49,112	$1,267
Other Services	1,613	43	$53,502	$1,213
Government	5,070	503	$267,548	$23,910
Total Contributions of BLM O&G	41,513	2,118	3,042,548	146,695
Percent of Total	---	5.1%	---	4.82%

IMPLAN, 2010 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.

Environmental consequences are discussed below by alternative to the extent possible at this time for the resources described in Chapter 3. 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 are identified by resource below.

4.1.1 Reasonably Foreseeable Development Scenario Summary

The RFD for this EA (Appendix C) is based on information contained in the RFD developed in 2005 and revised in 2012 for the MCFO RMP. The RFD prepared for the MCFO RMP contains the number of potential oil and gas wells that could be drilled and produced in the MCFO area and used to analyze the potential number of well drilled for the 11 nominated lease parcels. These well numbers are only an estimate based on historical drilling and geologic data. A detailed description of the RFD forecast for this EA is found in Appendix C.

4.1.2 Alternative B and C Assumptions

The following assumptions are from the RFD developed for the MCFO RMP. The RFD forecasts the following level of development in the MCFO area.

No surface disturbance would occur as a result of issuing leases. For analysis purposes, the potential number of acres disturbed by exploration and development activities is shown in Tables D-1 in Appendix D. 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 offered 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 11 parcels, 2,362.63 surveyed Federal mineral acres (1,035.79 surveyed BLM administered surface, 47.88 BOR surface, and 1,278.96 surveyed private/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. Surface management would remain the same and ongoing oil and gas development would continue on surrounding Federal, private, and State leases.

There would not be new impacts from oil and gas exploration or production activities on the Federal lease parcel lands. No additional natural gas or crude oil would enter the public markets, and no royalties would 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 economic contributions of activities associated with oil and gas development on BLM administered Federal minerals are measured in terms of 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. Forward and backward linkages between businesses and people in communities surrounding parcels leased for the development of Federal minerals has enabled the oil and gas industry to attract new revenue to the region, growing the local economy and creating new employment and income opportunities in a wide range of industrial sectors. Table 13 is a summary of local revenues, employment, income, population, and household impacts of each alternative.

Alternative A is the no action alternative. Under Alternative A no additional parcels would be leased and no additional public revenue would be generated. The economic contributions of activities associated with oil and gas development would remain consistent with existing conditions described in the Economics section of Chapter 3. Economic effects are summarized and displayed in comparative form in Table 14.

Table 14. Summary Comparison of Estimated Average Annual Economic Impacts

Alternative	Acres Leased	Change in Local Revenue to Counties	Change in Total Employment (full and part-time jobs)	Total Labor Income	Change in Population	Change in Number of Households
A	0	0	0	0	0	0
B	2,363	$252,674	11	$641,292	105	16
C	2,211	$236,509	11	$600,266	105	16

***These impacts would be in addition to impacts from existing Federal leases, rents, royalties and related activities.**

4.2.2.2 Cumulative Effects:

Cumulative Effects:

The lack of measurable direct and indirect effects to economic conditions under the No Action Alternative translates to a lack of measurable cumulative effects. Under this alternative the BLM will not make any additional Federal minerals available for leasing and Federal minerals leased from the MCFO will likely continue at existing levels. Current levels of BLM mineral leasing in Richland and Roosevelt counties support jobs and income in the 3-county local economy and the economic contributions of oil and gas activities associated with these lease will continue to be similar to those discussed in Chapter 3.

Cumulative economic impacts associated with Federal mineral leasing under the alternatives are shown below in Table 15 and Table 16.

Table 15. Summary Comparison of Cumulative Annual Economic Impacts by Alternative

Activity	A	B	C
Existing Acres leased	955,573	955,573	955,573
Acres that would be leased based on this EA	0	2,363	2,211
Total acres leased	955,573	957,936	957,784
Acres held by production	195,497	195,497	195,497
Total acres leased for which lease rents would be paid	760,075	762,438	762,286
Total average annual Federal lease and rental revenue	$1,330,132	$2,992,833	$2,886,461
Average annual distribution to State*	$619,176	$1,393,164	$1,343,648
Average annual distribution to Counties	$171,421	$385,701	$371,993
Average annual oil production (bbl)**	13,046,114	13,078,370	13,096,588
Average annual gas production (MCF)**	13,066,348	13,098,654	13,076,307
Total Average annual Federal O&G royalties	$120,490,069	$147,002,536	$146,979,341
Average annual distribution to State*	$68,260,907	$68,429,681	$68,418,883
Average annual distribution to Counties	$18,898,226	$18,944,952	$18,941,963
Total average annual Federal Revenues	$147,970,104	$149,995,369	$149,865,802
Total average annual State/Local Revenues	$68,880,084	$69,822,844	$69,762,531
Total average annual revenue distributed to counties	$19,069,647	$19,330,653	$19,313,955

*25 percent of State revenue from public domain minerals is redistributed back to the counties which generated the revenue
**Estimated as BLM's share of Federal minerals production in Richland and Roosevelt counties

Table 16. Summary Comparison of Employment and Income Supported by BLM Minerals in Richland and Roosevelt Counties

Industry	Total Jobs Supported			Total Income Supported ($1000)		
	Alt. A	Alt. B	Alt. C	Alt. A	Alt. B	Alt. C
Total Contribution of BLM Minerals	2,118	2,129	2,129	$146,694,560	$147,348,166	$147,306,348

IMPLAN, 2011 database

4.3 Alternative B (Proposed Action)

Under Alternative B, the 11 parcels, 2,362.63 surveyed Federal mineral acres (1,035.79 surveyed BLM administered surface, 47.88 BOR surface, and 1,278.96 surveyed private 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 would 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 VOCs 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 criteria pollutants concentrations are below applicable air quality standards, indicating 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 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 emission 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 in the SIR for the MCFO RFD, Table 16 discloses projected annual GHG source emissions from BLM-permitted activities associated with the RFD.

Table 17. The BLM Projected Annual GHG Emissions Associated With Oil and Gas Exploration and Development Activity in the MCFO.

Source	BLM Long-Term GHG Emissions in tons/year				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e	CO_2e
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 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 2,363 acres of lease parcels with Federal minerals would be leased. These acres constitute approximately 0.4 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, 0.41 percent of the RFD for this EA total estimated BLM emissions of approximately 610,741 metric tons/year would be approximately 249 metric tons/year of CO_2e 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 lease parcel development 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 GHG emission or sequestration with the creation or mitigation of any specific climate-related environmental effects. Although the effects of GHG 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:

- flaring or incinerating hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- 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 VOCs);
- gas or electric turbines rather than internal combustions engines for compressors;
- 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-located 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;
- 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.

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 17 (reproduced from Table 6-2 in Climate Change SIR) display common methane emission technologies reported under the EPA 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
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 EPA 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 CO_2 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 emission reductions that might be feasible, the BLM estimated GHG emission reductions based on the RFD for the MCFO. For emission sources subject to BLM (Federal) jurisdiction, the estimated emission reductions represent approximately 51 percent reduction in total GHG emissions compared to the estimated MCFO Federal GHG emission inventory (Climate Change SIR, as updated October 2010, Section 6.5 and Table 6-3). The emission reductions technologies and practices are identified as mitigation measures that could be imposed during development. Furthermore, the EPA is expected to promulgate new Federal air quality regulations that would require GHG emission reductions from many oil and gas sources.

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 would 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 restoration, vegetative cover and rates of erosion would return to pre-disturbance conditions (FSEIS 2008). Exceptions would be sites that have a low potential for restoration (apx. less than 1 percent), which would require unconventional and/or site-specific restoration 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 could include avoiding areas with low potential for restoration, limiting the total area of disturbance, rapid restoration, erosion/sediment control, soil salvage, decompaction, revegetation, weed control, slope stabilization, surface roughening, and fencing.

Conducting oil and gas development with the following BMPs would enhance soil resilience and reduce soil system fragmentation, accelerated wind and water erosion, and the total area of surface disturbance with the following:

- utilizing plans of development,
- removing vegetation in the smallest area possible,
- co-locating infrastructure,
- using a single trench for utilities and piping,
- employing multiple completions per well bore and directional drilling,
- closed-loop drilling or other pit-less methods,
- ensuring restoration of all new roads at the end of the life of the well,
- preventing degradation of the watershed from produced water,
- designing impoundments or water disposal methods to minimize impacts to soil; and
- initiating interim restoration within 25 days of drilling the well.

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 would occur at the time the leases are developed.

Surface Water:

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 the time of implementation through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so would the potential effects on water resources.

Oil and gas exploration and development of a lease parcel would 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 would 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 could 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 (MDEQ 2012).

Groundwater:

Spills or produced fluids could have long-term impacts to surface and ground water resources. Oil and gas exploration/development could potentially 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).

Well bores would most likely pass through useable groundwater. Potential impacts to groundwater resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process. It is possible for chemical additives used in drilling activities to be introduced into the water producing formations without proper casing and cementing of the well bore. Changes in porosity or other properties of the rock being drilled through can result in the loss of drilling fluids. When this occurs, drilling fluids can be introduced into groundwater without proper cementing and casing. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted. In addition to changing the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore; hydraulic fracturing can also introduce chemical additives into the producing formations. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. These additives are not always used in these drilling activities and some are likely to be benign such as bentonite clay and sand. Concentrations of these additives also vary considerably since different mixtures can be used for different purposes in oil and gas development and even in the same well bore. If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and residential wells that are sourced from the affected aquifers. Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones.

Known water bearing zones in the lease area are protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely. Casing along with cement is extended well beyond fresh-water zones to insure that drilling fluids remain within the well bore and do not enter groundwater.

Potential impacts to ground water at site specific locations are analyzed through the NEPA review process at the development stage when the APD is submitted. This process includes geologic and engineering reviews to ensure that cementing and casing programs are adequate to protect all downhole resources.

Source Water Protection Areas:
The potential impacts to State-designated Source Water Protection Areas would be similar to those described above for surface water and groundwater resources.

All water used would have to comply with Montana State water rights regulations and a source of water would need to be secured by industry that would not harm senior water rights holders.

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 the area of surface disturbance; 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 implementation 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. 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, but not limited to, 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 2012) 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. Increases in erosion are typically localized, short term, and occur from the beginning of 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 Special Status Plant Species

4.3.8.1 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.

4.3.8.2 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.

4.3.9 Wildlife

4.3.9.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on wildlife. Any potential effects from the sale of lease parcels would 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 would 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 tolerance of the specific 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.

4.3.9.1.1 Threatened, Endangered, and Candidate Species

Habitat within the lease parcels exists to support USFWS threatened, endangered, or candidate species including the whooping crane, interior least tern, piping plover, pallid sturgeon, and Sprague's pipit.

The 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 leases within the whooping crane migration corridor is proposed within suitable whooping crane staging, stopover or roosting habitat, 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.

Several lease parcels are located adjacent to Interior least tern nesting habitat along the Missouri and Yellowstone River corridors. Existing stipulations from the Big Dry RMP (1995) requires a NSO stipulation within 0.25 miles of wetlands identified as interior least tern 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.

Two lease parcels are located adjacent to piping plover nesting habitat along the Missouri River corridor, and within the Unit 2 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 piping plover habitat. As a result of these stipulations, issuing the proposed lease parcels would have no affect on piping plovers or the critical habitat Unit 2 designation.

Pallid sturgeon individuals and their habitat would occur in or near lease parcel MTM 102757-6T, 6U, 6R, 6V, 6C, MTM 97300-MO, MN and have the potential to be affected by the development of oil and gas wells. 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 RMP 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 Missouri and Yellowstone Rivers. Additionally, least tern stipulations (NSO 11-10) protects pallid sturgeon habitat by providing a one-quarter mile buffer along the Missouri and Yellowstone Rivers. The stipulations apply to wetlands habitat and the BLM considers the Missouri and Yellowstone Rivers as wetlands habitat for this bird species.

The BLM has determined that issuing a lease for the seven parcels along the Missouri and Yellowstone Rivers 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 parcels, BLM would consult with the USFWS pursuant to section 7(a)(2) of ESA.

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 some of the proposed lease parcels; however, inventories have not been conducted within the parcels. Therefore, 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).

4.3.9.1.2 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 7 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). The 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 other native prairie species within the analysis area.

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 in between April 15 and July 15. Mitigation measures would be assigned at the APD stage to minimize negative effects 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. The BLM would coordinate WEMs with USFWS to assure MBTA compliance.

Take of bald and golden eagles and any other migratory raptors would not occur as a result of the act of leasing parcels. However, as development occurs after permits to drill are issued, there would be potential for take to occur as a result of raptor collisions with vehicles, power lines, and other development-related actions. Therefore, field surveys for raptors at proposed development sites would be conducted for activities planned between March 1 and August 1. To comply with MBTA and BGEPA, BLM would require protective measures and stipulations at the APD stage to prevent or minimize impacts to individual raptors and raptor populations, including bald and golden eagles. The protective measures would be required as COAs.

4.3.9.1.3 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 5 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 9 lease parcels.

Portions of 2 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 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.

4.3.9.2 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. 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.

4.3.10 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 would occur at the time the leases are developed.

Potential effects from surface disturbances associated with exploration and development activities 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. Cultural resource investigations associated with development potentially adds to our understanding of the prehistory/history of the area and discovery of sites that would otherwise remain undiscovered due to burial or omission. Indirect effects to cultural resources within the analysis area by county are as follows:

The following lease parcels have sites within their boundaries: MTM 105431-FH and MTM 97300 MO, 6J, 6Eand 6C, all within Richland County

Two lease parcels (MTM-102757- 6T and 6R) are located in Roosevelt County and include 250.95 acres. Based on modeling, the parcels might contain up to 3 cultural sites which one

could have the potential to be eligible or considered eligible for listing on the National Register of Historic Places.

There are 9 lease parcels (MTM-102757- 6Q, 6U, 6V, 6E, 6C, MTM-105431- FH, MTM 97300-MN, MO & 6J) located in Richland County and include 2111.68 acres. Based on modeling, the parcels might contain up to 23 cultural sites which 3 to 4 could have potential to be eligible or considered eligible for listing on the National Register of Historic Places.

Leasing approximately 2362.63 acres of Federal minerals within the counties described above could indirectly affect, 26 cultural sites based upon modeling (Aaberg et al 2006). Of the modeled 26 cultural sites, 3 to 4 sites may have the potential to be eligible or considered eligible for listing on the National Register of Historic Places.

The Reasonable Foreseeable Development (RFD and Appendix D) scenario for the lease parcels predicts 1 well and 7.1 acre of disturbance as a result from leasing the parcels which may affect 1 site which may have the potential to be eligible for listing on the National Register of Historic Places.

4.3.10.2 Mitigation

Application of standard lease terms, stipulations, and cultural lease notices provide mechanisms to protect vulnerable significant cultural resource values on these lease parcels (Appendix A). Lease notice LN 14-2 would be applied to 5 lease parcels (MTM 105431-FH & MTM 97300 MO, 6J, 6E &6C). . The cultural resource lease stipulation CR16-1 would be applied to all the lease parcels. The inclusion of these requirements at the leasing stage provide notification to the lessee that potentially valuable cultural resource values are or are likely to be present on the lease parcels and the potential mitigation measures that may be required. The application and implementation of these stipulations and lease notices at the development stage would provide the necessary measures to protect cultural resources.

Specific mitigation measures, include but are not limited to, site avoidance, excavation or data recovery would have to be determined when site-specific development proposals are received. Most surface-disturbing situations cultural resources would be avoided by project redesign or relocation. Unavoidable, significant properties would be site-specifically mitigated with concurrence with the State Historic Preservation Office prior to implementation of a project.

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.

Leasing parcels located near the Fort Peck Reservation in Richland and Roosevelt Counties would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007. Leasing parcels in this area would not prevent tribes from visiting sacred sites or prevent possession of sacred objects.

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 (CR 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.

Indirect impacts from the sale of leases would be from the surface disturbances associated with oil and gas exploration and development activities. It is anticipated that most significant fossil resources are located in those geologic units with a Potential Fossil Yield Classification (PFYC) of 3 or higher. However, significant fossil resources could be discovered anywhere. 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. Identified 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 retrieval and study of these newly discovered resources would expand our understanding of past life and environments of Montana.

4.3.12.2 Mitigation
The application of lease terms, the paleontological no surface occupancy stipulation (NSO 11-12), and the paleontological lease notices (LN 14-3 and LN 14-12) at leasing, provides protection to paleontological resources during development. The paleontological lease notice LN 14-12 is applied to those lease parcels that fall within geological units with a PFYC Class of 3 or higher, requiring a field survey prior to surface disturbance. These inventory requirements could result in the identification of paleontological resources. Avoidance of significant paleontological resources or implementation of mitigation prior to surface disturbance would protect paleontological resources. 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 fossil resources must be mitigated prior to implementation of a project. Also, significant fossil resources could be discovered in areas that had not been surveyed (PFYC of less than 3) during surface disturbance. Those resources must also be professionally mitigated. These mitigation measures and contingencies would be determined when site specific development proposals are received.

In order to protect paleontological resources, 9 of the parcels are recommended to have the Paleontological lease notice 14-12 applied per guidance identified in IM 2009-011 and 2008-

009. Two parcels have the general lease notice 14-3. No parcels are recommended for the no surface occupancy lease stipulation (NSO 11-12) based upon paleontological resources. See section 3.10 Paleontology for list of parcels.

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, as demonstrated in Section 3.11, Visual Resources, Table 8. 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 at the time of development.

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 MT-12-4. The stipulation is applied to lease parcels MTM 102757-6U and MTM 102757-6T, which 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. Measures 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, surface facilities, pipelines, and power-lines. 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, standing timber volume per acre, and total acres of surface facilities development. A total of approximately 280.7 forest and woodland acres could potentially be impacted under this alternative; 134.3 acres of evergreen, 139.7 acres of deciduous, and 6.7 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 would 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 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.

Lease parcel MTM 102757-6U (80 acres) and lease parcel MTM 102757-6T (131 acres) are located within the Lewis and Clark Trail Special Recreation Management Area. Indirect effects from lease parcel development are disclosed below.

Recreation indirect effects 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.). Oil and gas wells, equipment, and facilities could affect the general solitude (space and noise) and scenic value of the area.

Areas frequented by recreationists, where there is 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 would be an increase on the demand for recreational use of public land. 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

Stipulation NSO 11-13 would be attached to lease parcels MTM 102757-6U and MTM 102757-6T, which states “surface occupancy and use is prohibited within developed recreation areas and undeveloped recreation areas receiving concentrated public use to protect developed recreation areas and undeveloped recreation areas receiving concentrated public use.”

Additional 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.

Under this alternative 11 parcels that include 2,362.63 surveyed surface acres of which 1,039.29 surveyed acres are BLM administered surface, 20.2 surveyed acres are BOR surface, and 1,303.14 surveyed acres are Non-Federal surface would be offered for lease.
Facilities associated with oil and gas development could cause disturbance to the existing rights-of-way (ROWs). The only ROW is located on parcel MTM-105431-FH, for an overhead power line MTM-55529. Additional ROWs could be required across Federal surface for "off-lease" or third party facilities required for potential development of the parcels.

4.3.17.2 Mitigation
Measures would be taken to avoid disturbance to or impacts to existing rights-of-way, in the event of any oil and gas exploration and development activities. Any new "off-lease" or third party rights-of-way required across Federal surface for exploration and/or development of the 11 parcels would be subject to lands and realty stipulations to protect other resources as determined by environmental analyses. In order to protect the existing rights-of-way it is recommended that LN 14-1 be applied to lease parcel MTM-105431-FH. Additionally, to protect and disclose the BOR, Secretarial Order of August 24, 1903 Withdrawal, LN 14-1 be applied to lease Parcel MTM-97300-MN.

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 resources; however, exploration and development activities must be conducted in accordance with an approved APD. Additional natural gas or crude oil produced from any or all of the 11 parcels in Alternative B would enter the public markets. Additional subsurface information would be obtained from drilling wells. Royalties and taxes could accrue to the Federal and State treasuries from the lease parcel lands.

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.

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.

Hydraulic Fracturing
Hydraulic fracturing has been utilized by the oil and gas industry since the late 1940's. Hydraulic fracturing, in conjunction with horizontal drilling, has allowed for development of unconventional zones that were once considered uneconomical.

Hydraulic fracturing is a technique used to create additional space and connecting existing fractures and existing rock pores with newly created fractures that are located in deep underground geologic formations. The induced space allows the rock to more readily release oil and natural gas so it can flow to the surface via the well bore that would otherwise be uneconomical to develop. Wells that undergo hydraulic fracturing may be drilled vertically, horizontally, or directionally and the resultant fractures induced by the hydraulic fracturing can be vertical, horizontal, or both. The typical steps of hydraulic fracturing can be described as follows:

1. Water, sand and additives are pumped at high pressures down the wellbore.
2. The liquid goes through perforated sections of the wellbore and into the surrounding formation, fracturing the rock and injecting sand or other proppants into the cracks to hold them open.
3. Experts continuously monitor and gauge pressures along with the volume of fluids and proppants, while studying how the sand reacts when it hits the bottom of the wellbore; slowly increasing the density of sand to water as the frac progresses.
4. This process may be repeated multiple times, in "stages" to reach maximum areas of the wellbore. When this is done, the wellbore is temporarily plugged between each stage to maintain the highest water pressure possible and get maximum fracturing results in the rock.
5. Frac plugs are drilled or removed from the wellbore and the well is tested for results.
6. The water pressure is reduced and fluids are returned up the wellbore for disposal or treatment and re-use, leaving the sand in place to prop open the cracks and allow the oil/gas to flow to the well bore.

Fracturing fluid is typically more than 98 percent water and sand, with small amounts of readily available chemical additives used to carry the proppant and control the chemical and mechanical properties of the water and sand mixture. Proppant, consisting of synthetic or natural silica sand, may be used in quantities of few hundred tons for a vertical well to a few thousand tons for a horizontal well. The amount of water needed to fracture a well in the planning area depends on the geologic basin, the formation, and depth and type of well (vertical, horizontal, directional), and the proposed completion process.

Several sources of water are available for hydraulic fracturing in the planning area. The use of any specific water source on a federally administered well, requires the proposal be reviewed and analyzed through the National Environmental Policy Act (NEPA) process for BLM approval during the Application for Permit to Drill (APD) stage to ensure compliance with Montana water laws and federal regulations, and necessary permits are obtained.

Before hydraulic fracturing takes place, all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface in accordance to Onshore Order #2, Montana Board of Oil and Gas Conservation (MBOGC) rules and regulations, and American Petroleum Institute (API) standards. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation.

The State of Montana, Department of Natural Resource and Conservation, Oil and Gas Conservation Division, MBOGC, regulations also ensure that all resources including groundwater are protected. The MBOGC regulations require new and existing wells which will be stimulated by hydraulic fracturing must demonstrate suitable and safe mechanical configuration for the stimulation treatment proposed. If the operator proposes hydraulic fracturing through production casing or through intermediate casing, the casing must be tested to the maximum anticipated treating pressure. In accordance with MBOGC Rule 36.22.1015 operators are required to disclose and report the amount and type of fluids used in well stimulation to the Board or, if approved by the Board, to the Interstate Oil and Gas Compact Commission/Groundwater Protection Council hydraulic fracturing web site (FracFocus.org).

4.3.19 Special Designations

4.3.19.1 Direct and Indirect Effects

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

4.3.19.2 National Historic/Scenic Trails

Lease parcels MTM 102757-6U and 6T (approximately 211 acres) in whole or part are located within the Lewis and Clark National Historic Trail. Indirect effects from lease development on the landscape would be managed by Class II visual resource management objectives and the Lewis and Clark Trail Special Recreation Management Area. For indirect effects see sections 4.3.13 Visual Resources and 4.3.16 Recreation and Travel Management

Potential effects from surface disturbances associated with exploration and development activities after leasing have the potential to alter the characteristics of the significant Lewis and Clark National Historic Trail cultural and historic property by diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Other effects to the Lewis and Clark National Historic Trail cultural resource 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 alter or diminish the elements of a National Register eligible property and diminish the property’s eligibility status. Cultural resource investigations associated with development potentially adds to our understanding of the prehistory/history of the area and discovery of sites that would otherwise remain undiscovered due to burial or omission.

4.3.19.3 Areas of Critical Environmental Concern (ACECs)

None of the 11 parcels are situated within a proposed or designated Area of Critical Environmental Concern (ACEC). There will be no affect to ACEC’s through the proposed alternative.

4.3.19.4 Mitigation

The mitigation measures for the Lewis and Clark NHT would be the same as those described in Sections 4.3.10.2 Cultural Resources, 4.3.13.2 Visual Resources and 4.3.16.2, Recreation and Travel Management.

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.

While the act of leasing an additional 2,362 acres of Federal minerals would have no social impacts, subsequent exploration and development activities would affect people living near or using the area in the vicinity of these leases. Exploration, drilling or production could create an inconvenience to people living on or 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 would depend of 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 may support the increased employment and population related to oil and gas development. Residents of counties where the development actually occurs would also benefit from the additional revenues to counties due to oil and gas leasing and development.

4.3.20.2 Economics
4.3.20.2.1 Direct and Indirect Effects

Under Alternative B, 11 whole parcels in Richland and Roosevelt counties would be made available for leasing at the May 2014 lease auction. The leasing of an additional 2,363 acres of BLM administered minerals in these counties would generate additional public revenue, stimulate economic activity, and boost production associated with Federal minerals. It is estimated that the leasing of all minerals nominated for the May auction would generate more than $1.6 million in one-time bonus bids and $4,000 annually in rent revenue for the Federal government. Forty-nine percent of Federal revenue collected from public domain minerals is redistributed to the State which then distributes 25 percent of the revenue back to the counties where the leases exist. With federally acquired minerals (acquired under Bankhead Jones authority), 25 percent of federal revenues are distributed directly back to the leasing counties. Approximately 95 percent of federal minerals leased by the BLM within the Miles City Field Office are public domain minerals. If these additional parcels were to be leased, additional $773,987 would be paid to the State of Montana and Richland and Roosevelt counties would receive an additional $214,281from the redistribution of federal revenue.

There is a very high success rate for oil and gas wells drilled in the Three-Forks/ Bakken region resulting in production. Although it will likely take several years for drilling activities on newly leased parcels to result in producing wells, it is anticipated that a large proportion of federal minerals leased during the May 2014 lease auction will be held by production within the next ten years. Once oil and gas extraction begins annual rent payments on leased minerals stops and lessees begin to pay royalties equal 12.5 percent of the value of production (43 CFR 3103.3.1). Royalties associated with future development of nominated minerals is estimated to generate an additional $297,909 annually in federal oil and gas royalties. Of this new federal revenue, an

estimated $138,677 could be disbursed to the State and $38,393 is estimated to be redistributed back to Richland and Roosevelt counties.

In addition to generating additional public revenue, leasing an additional 2,363 acres of federal minerals in Richland and Roosevelt counties will stimulate economic activity in the private sector of the local 3-county economy. Although Alternative B proposes to lease land in two eastern Montana counties, the majority of additional drilling and support services needed to develop these federal minerals will be provided by companies based out of Williston, ND. Increased local demand for oil and gas drilling and support activities will create a ripple effect in local economy as new employment and income opportunities in oil and gas related industries indirectly creates opportunities in in nearly all other sectors of the local economy.

The total economic impact of leasing activities proposed under Alternative B is equal to direct and indirect effects of drilling activities, as well as the direct and indirect effects of additional public revenue redistributed back to Richland and Roosevelt counties. As shown in table 15, the bonus bids, rents, royalties, and drilling and support activities associated with leasing an additional 2,363 acres of federal minerals is estimated to support 11 jobs and $641,292 in personal income across the 3-county local economy (IMPLAN, 2011). These economic impacts would be spread unevenly among the counties, with impacts from public revenue highly concentrated in Richland and Roosevelt counties and those from drilling and support activities largely concentrated in Williams, ND.

Total Federal contribution of Alternative B and anticipated related exploration, development, and production of oil and gas may affect total local employment, population, number of households, average income per household, and total personal income. If the current job per capita and job per household ratios remained constant, then the local economy would be expected to grow by 105 residents or 16 households. Additional public revenue resulting from leasing nominated BLM administered minerals may increase the attractiveness of communities surrounding federally leased minerals and cause population growth to occur more rapidly. As financing for county functions such as law enforcement, maintaining roads and highways, providing fire protection, administering primary and secondary education, operating clinics/hospitals and county libraries, and local landfills increases; demand for these services may also increase as the region's population grows. The leasing and anticipated exploration, development, and production associated with the nominated 2,363 acres is unlikely to change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), and economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates) across the 3-county area because oil and gas exploration, development, and production is well established in the local economy.

Disclosure of the direct, indirect, and cumulative effects of GHG emissions provides information on the potential economic effects of climate change including effects that could be termed the "social cost of carbon" (SCC). The EPA and other Federal agencies developed a method for estimating the SCC and a range of estimated values (EPA 2013b). The SCC estimates damages associated with climate change impacts to net agricultural productivity, human health, property damage, and ecosystems. Using a 3 percent average discount rate and year 2020 values, the

incremental SCC is estimated to be $46 per metric ton of annual CO_2e increase. Based on a GHG emission estimate of 249 metric tons per year (mtpy) for Alternative B, the annual SCC associated with potential development on lease sale parcels is $11,454 (in 2011 dollars). Estimated SCC is not directly comparable to economic contributions reported above, which recognize certain economic contributions to the local area and governmental agencies but do not include all contributions to private entities at the regional and national scale. Direct comparison of SCC to the economic contributions reported above is also not appropriate because costs associated with climate change are borne by many different entities.

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). 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. GHG 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 CO_2e. Potential emissions under Alternative B would be approximately 0.041 percent of this total. Table 15 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 1,382,890 metric tons/year of CO_2e. When combined with projected annual BLM emissions, this totals 1,383,139 metric tons/year CO_2e. Potential GHG emissions under Alternative B would be 0.018 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 GHG Emissions in tons/year**				**Emissions (metric tons/yr)**
	CO_2	**CH_4**	**N_2O**	**Co_2e**	**CO_2e**
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 GHGs

Montana's GHG inventory (http://www.eia.doe.gov/oiaf/1605/archive/gg04rpt/emission.html, Center for Climate Strategies [CCS] 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 largest source of Montana's emissions is fossil fuel combustion to generate electricity, which accounts for approximately 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).

GHG emissions from all major sectors in Montana in 2005 added up to a total of approximately 36.8 million metric tons of CO_2e (CCS 2007). Potential emissions from development of BLM lease parcels included in Alternative B would represent approximately 0.007 percent of the state-wide total of GHG emissions based on the 2005 state-wide inventory (CCS 2007).

The EPA published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,822 million metric tons, and net emissions of 5,747 million metric tons (when CO_2 sinks were considered) of CO_2e in 2010 (EPA 2012). Potential annual emissions under Alternative B of this project would amount to approximately 0.000004 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 (10^9 metric tons) of CO_2e emitted. Potential annual emissions under Alternative B would amount to approximately 0.000005 percent of this global total.

As indicated above, although the effects of GHG emissions in the global aggregate are well-documented, it is currently not 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 could 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 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 2007, 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.

4.3.21.4 Cumulative Impacts to Economic Conditions

The cumulative effects of Alternative B are summarized in Table 15 and Table 16. The leasing of an additional 2,363 acres of Federal minerals by the MCFO would result in a total of 957,936 acres leased from the MCFO within Richland and Roosevelt counties. The leasing of Federal minerals in these counties by the BLM would generate more than $2.9 million in Federal revenue. The redistribution of Federal revenue associated with leasing of these Federal minerals is estimated to generate nearly $1.4 million in State revenue for Montana and $385, 701 in local public revenue in Richland and Roosevelt counties. Federal oil and gas production associated with BLM minerals in these counties is also anticipated to increase as a result of leasing under Alternative B. Royalties associated with BLM minerals in these counties are estimated to generate $147 million in Federal revenue. The redistribution of Federal royalty payments resulting from extraction of BLM minerals in Richland and Roosevelt counties would provide the State of Montana with $68.4 million in public revenue while $18.9 million would be distributed directly back to these producing counties.

Oil and gas related activities associated with Federal minerals leased from the MCFO generates millions in public revenue, stimulates economic activity in the public and private sectors, and can be attributed with supporting employment and income opportunities throughout the local rural economy. Total Federal revenue associated with the leasing and production of BLM administered minerals in Richland and Roosevelt counties under Alternative B is estimated to exceed $149.9 million. The redistribution of Federal revenue from these minerals is anticipated to generate $69.8 million in State revenue for Montana, and more than $19.3 million will likely be returned to Richland and Roosevelt counties to fund law enforcement and fire departments, roads and highway maintenance, public education, local clinics/hospitals and county libraries. Public services and infrastructure investments by the State and local municipalities with redistributed Federal dollars supports employment and income in the public sector and in industries providing goods and services to the public sector. The drilling, servicing, and production resulting from BLM leasing of Federal minerals in Richland and Roosevelt counties also stimulates economic activity in the private sector, directly and indirectly supporting local employment and income in nearly every part of the economy. The total economic contribution of oil and gas related activities and public revenue associated with BLM leased minerals in Richland and Roosevelt counties under Alternative B is estimated to be 2,129 jobs and $147.3 million in local wages and proprietor's income across the 3-county local economy.

The annual SCC associated with oil and gas development is approximately $4,643,000 (in 2011 dollars) based on 957,936 cumulative acres. As noted earlier, the estimated SCC is not directly comparable to economic contributions.

4.4 Alternative C (BLM Preferred)

4.4.1 Direct Effects Common to All Resources

Under Alternative C, 9 of the 11 lease parcels in whole, 2,211.48 surveyed Federal mineral acres (904.84 surveyed BLM administered surface, 27.68 surveyed BOR surface, and 1,278.96 surveyed private/State surface) in whole or part would be offered for competitive oil and gas lease sale. The remaining 2 whole parcels 151.15 surveyed Federal mineral acres (130.95 surveyed BLM administered surface acres and 20.2 surveyed acres of BOR surface) in whole would be deferred pending further review.

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

Air quality impacts would likely be slightly less than those for Alternative B. Fewer leased acres would likely result in less future development and fewer emissions than 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

Alternative C GHG emissions are estimated to be 17 mtpy less than those for Alternative B.

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

Under Alternative C, climate change impacts would likely be slightly 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
Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 6 percent due to approximately 151.2 acres of parcels proposed for deferral pending further review. Less than one percent of the soils rated as low potential for restoration would be deferred. There are no CSU 12-1 soils stipulations applied to the deferred parcels.

The potentially impacted acres within the Charlie Little Muddy watershed would be reduced by 6 percent and the potentially impacted acres within the Lower Yellowstone watershed would be reduced by 26 percent as compared to Alternative B. Soils are the same as those described in the Effected Environment section 3.3.

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 6.4%, due to approximately 151 acres of the lease parcels proposed for deferral pending further review.

The potentially impacted acres on water resources would be decreased by 151 acres.

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 6%, due to approximately 151 acres of the 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 6.4%, due to approximately 151 acres of the lease parcels proposed for deferral pending further review.

The potentially impacted acres on riparian resources would be decreased by 92.1 acres.

4.4.7.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.8 Special Status Plant Species
4.4.8.1 Direct and Indirect Effects
Direct and indirect impacts would be same as Alternative B; however the area potentially impacted would be reduced by 0.1%, due to approximately 151 acres of lease parcels proposed for deferral pending further review.

4.4.8.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.9 Wildlife & Fisheries/Aquatics
4.4.9.1 Direct and Indirect Effects
Direct and indirect impacts would be similar to Alternative B; however, the area impacted would be reduced by 6.4%, due to these lease parcels proposed for deferral pending further review. If deferred, this alternative would reduce the amount of parcels/acreage proposed in both white-tailed deer and mule deer winter range, interior least tern and piping plover habitat, whooping crane potential suitable habitat, Sprague's pipit habitat, and within 2 miles of sharp-tailed grouse leks. Potential impacts to these resources would be reduced under this alternative. The parcels proposed for deferral overlap with the range of four BLM sensitive aquatic species, the Snapping Turtle, Spiny Softshell, Plains Spadefoot and Great Plains Toad. If deferred, this alternative would reduce the impacts to these BLM sensitive aquatic species' habitat.

4.4.9.2 Mitigation
Mitigation would be the same as Alternative B.

4.4.10 Cultural
4.4.10.1 Direct and Indirect Effects
Impacts would be similar to those disclosed in Alternative B; however the area potentially impacted would be reduced by 6.4%, due to 151.15 acres of lease parcels proposed for deferral pending further review.

One lease parcel MTM-102757- 6R, in Roosevelt County (120 acres.) Based on modeling, the parcel might contain up to 2 cultural sites which one could have the potential to be eligible or considered eligible for listing on the National Register of Historic Places.

There are 8 lease parcels (MTM-102757- 6Q, 6U, 6V, 6E, 6C, MTM-105431- FH, MTM 97300-MO & 6J) located in Richland County and include 2091.48 acres. Based on modeling, the parcels might contain up to 23 cultural sites which 3 to 4 could have potential to be eligible or considered eligible for listing on the National Register of Historic Places.

Leasing the 2,211.48 acres of Federal minerals within the above described counties could indirectly affect 24 cultural sites with 3 to 4 sites having the potential to be eligible or considered eligible for listing on the National Register of Historic Places.

The Reasonable Foreseeable Development (RFD and Appendix D) scenario for the lease parcels is the same as Alternative B.

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~~.~~

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 less than 1%, due to approximately 151 acres of lease parcels proposed for deferral pending further review. Specifically, effects would not occur on two lease parcels in whole (MTM 97300-MN and MTM 102757-6T) proposed for deferral.

4.4.12.2 Mitigation
Mitigation would be the same as Alternative B, except the recommendation to apply Paleontological lease notice 14-12 would only apply to 9 leases because lease parcels MTM 97300-MN and MTM 102757-6T in whole are proposed for deferral.

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 due to approximately 131 acres of lease parcels proposed for deferral pending further review. Lease parcel MTM 102757-6T (131 acres), located entirely within VRM Class II; would be deferred.

4.4.13.2 Mitigation
Mitigation would be the same as Alternative B, except Stipulation MT-12-4 would only apply to lease parcel MTM 102757-6U.

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 less than 1%, due to approximately 151 acres of BLM-surface lease parcels proposed for deferral pending further review. Under this alternative, acreage potentially impacted would be approximately 134.3 acres of evergreen, 123.4 acres of deciduous, and 3 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. The deferred parcels pending further review do not have grazing authorizations.

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 due to approximately 131 acres of lease parcels proposed for deferral pending further review. Lease parcel MTM 102757-6T (131 acres) which is located within the Lewis and Clark Trail Special Recreation Management Area, would be deferred.

4.4.16.2 Mitigation

Mitigation would be the same as Alternative B, except Stipulation NSO 11-13 would only apply to lease parcel MTM 102757-6U.

4.4.17 Lands and Realty

4.4.17.1 Direct and Indirect Effects

Under this alternative 9 parcels that include 2,211.48 surveyed surface acres of which 904.84 surveyed acres are BLM administered surface and 1,278.96 surveyed acres are Non-Federal surface would be offered for lease.

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by approximately less than 1% due to approximately 151.15 surveyed surface acres of 2 lease parcels being proposed for deferral, pending further review. The parcels or portions of parcels proposed for deferral consist of 130.95 surveyed BLM administered surface acres in Roosevelt and 20.2 surveyed BOR acres in Richland County.

Based on the Master Title plats and LR2000 reports, none of the proposed deferred parcels have BLM authorized ROWs on them. Parcel MTM-105431-FH would be affected by authorized BLM ROWs on BLM administered surface.

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 3%, due to approximately 151 acres of lease parcels proposed for deferral pending further review. The remaining 9 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 compared to 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 due to approximately 151 acres of lease parcels proposed for deferral pending further review. Lease parcel MTM 102757-6T (131 acres) is located entirely within the Lewis and Clark Trail NHT, would be deferred.

4.4.19.2 Mitigation

Mitigation would be the same as Alternative B for the Lewis and Clark NHT.

4.4.20 Social and Economic Conditions

4.4.20.1 Social

4.4.20.1.1Direct and Indirect Effects

Direct and indirect impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by less than 1 percent, due to the deferral of 151 acres of lease parcels in Richland and Roosevelt Counties.

4.4.20.2 Economics

4.4.20.2.1 Direct and Indirect Impacts

Under Alternative C 2 parcels totaling 151 acres would be deferred and 2,211 acres of Federal minerals in Richland and Roosevelt counties would be made available for leasing at the May 2014 lease auction. The leasing of these BLM administered minerals would generate additional public revenue, stimulate economic activity, and boost production associated with Federal minerals. It is estimated that the leasing of all minerals nominated for the May auction would generate more than $1.5 million in one-time bonus bids and $3,800 annually in rent revenue for the Federal government. Forty-nine percent of Federal revenue collected from public domain minerals is redistributed to the State which then distributes 25 percent of the revenue back to the counties where the leases exist. With federally acquired minerals (acquired under Bankhead Jones authority), 25 percent of Federal revenues are distributed directly back to the leasing counties. Approximately 95 percent of Federal minerals leased by the BLM within the Miles City Field Office are public domain minerals. If these additional parcels were to be leased, the State of Montana would be anticipated receive nearly $1.4 million and together Richland and Roosevelt counties would receive approximately $385,701 from the redistribution of Federal revenue.

Approximately 95 percent of Federal minerals leased by the BLM within the Miles City Field Office are public domain minerals. If these additional parcels were to be leased, additional $724,471would be paid to the State of Montana and Richland and Roosevelt counties would receive an additional $200,572 from the redistribution of Federal revenue.

There is a very high success rate for oil and gas wells drilled in the Three-Forks/ Bakken region resulting in production. Although it will likely take several years for drilling activities on newly

leased parcels to result in producing wells, it is anticipated that a large proportion of Federal minerals leased during the May 2014 lease auction will be held by production within the next ten years. Once oil and gas extraction begins annual rent payments on leased minerals stops and lessees begin to pay royalties equal 12.5 percent of the value of production (43 CFR 3103.3.1). Royalties associated with future development of nominated minerals is estimated to generate an additional $278,850 annually in Federal oil and gas royalties. Of this new Federal revenue, an estimated $129,805 could be disbursed to the State and $35,937 is estimated to be redistributed back to Richland and Roosevelt counties.

In addition to generating additional public revenue, leasing an additional 2,211 acres of Federal minerals in Richland and Roosevelt counties will stimulate economic activity in the private sector of the local 3-county economy. Although Alternative B proposes to lease land in two eastern Montana counties, the majority of additional drilling and support services needed to develop these Federal minerals will be provided by companies based out of Williston, ND. Increased local demand for oil and gas drilling and support activities will create a ripple effect in local economy as new employment and income opportunities in oil and gas related industries indirectly creates opportunities in in nearly all other sectors of the local economy.

The total economic impact of leasing activities proposed under Alternative B is equal to direct and indirect effects of drilling activities, as well as the direct and indirect effects of additional public revenue redistributed back to Richland and Roosevelt counties. As shown in table 16, the bonus bids, rents, royalties, and drilling and support activities associated with leasing an additional 2,211 acres of Federal minerals is estimated to support 11 jobs and $600,266 in personal income across the 3-county local economy (IMPLAN, 2011). These economic impacts would be spread unevenly among the counties, with impacts from public revenue highly concentrated in Richland and Roosevelt counties and those from drilling and support activities largely concentrated in Williams, ND.

Total Federal contribution of Alternative B and anticipated related exploration, development, and production of oil and gas may affect total local employment, population, number of households, average income per household, and total personal income. If the current job per capita and job per household ratios remained constant, then the local economy would be expected to grow by 105 residents or 16 households. Additional public revenue resulting from leasing nominated BLM administered minerals may increase the attractiveness of communities surrounding federally leased minerals and cause population growth to occur more rapidly. As financing for county functions such as law enforcement, maintaining roads and highways, providing fire protection, administering primary and secondary education, operating clinics/hospitals and county libraries, and local landfills increases; demand for these services may also increase as the region's population grows. The leasing and anticipated exploration, development, and production associated with the nominated 2,211 acres is unlikely to change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), and economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates) across the 3-county area because oil and gas exploration, development, and production is well established in the local economy.

Based on a GHG emission estimate of 232 mtpy for Alternative B, the annual SCC associated with potential development on lease sale parcels is $10,672 (in 2011 dollars). Estimated SCC is

not directly comparable to economic contributions reported above, which recognize certain economic contributions to the local area and governmental agencies but do not include all contributions to private entities at the regional and national scale. Direct comparison of SCC to the economic contributions reported above is also not appropriate because costs associated with climate change are borne by many different entities.

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

GHG emissions are estimated to be 17 tpy less than Alternative B.

4.4.21.4 Cumulative Impacts of Climate Change

Due to the slight decrease in GHG emissions under Alternative C, cumulative climate change impacts on resources would be imperceptibly less than those for Alternative B.

4.4.21.5 Cumulative Impacts to Wildlife & Fisheries/Aquatics

Cumulative impacts would be the same as Alternative B; however, the area potentially impacted would be reduced by 2 whole parcels pending further review. If the remaining lease parcels are developed, potential additional cumulative impacts to wildlife would occur over less area than what is described in Alternative B.

4.4.21.6 Cumulative Impacts to Economic Conditions:

The cumulative effects of Alternative C are summarized in Table 15 and Table 16. The leasing of an additional 2,211 acres of Federal minerals by the MCFO would result in a total of 957,784 acres leased from the MCFO within Richland and Roosevelt counties. The leasing of Federal minerals in these counties by the BLM would generate more than $2.9 million in Federal revenue. The redistribution of Federal revenue associated with leasing of these Federal minerals is estimated to generate more than $1.3 million in State revenue for Montana and $371,993 in local public revenue in Richland and Roosevelt counties. Federal oil and gas production associated with BLM minerals in these counties is also anticipated to increase as a result of leasing under Alternative C. Royalties associated with BLM minerals in these counties are estimated to generate $147million in Federal revenue. The redistribution of Federal royalty payments resulting from extraction of BLM minerals in Richland and Roosevelt counties would provide the State of Montana with $68.7million in public revenue while $16.9 million would be distributed directly back to these producing counties.

Oil and gas related activities associated with Federal minerals leased from the MCFO generates millions in public revenue, stimulates economic activity in the public and private sectors, and can be attributed with supporting employment and income opportunities throughout the local rural economy. Total Federal revenue associated with the leasing and production of BLM administered minerals in Richland and Roosevelt counties under Alternative C is estimated to exceed $149.8 million. The redistribution of Federal revenue from these minerals is anticipated to generate $68.4 million in State revenue for Montana, and more than $18.9 million will likely be returned to Richland and Roosevelt counties to fund law enforcement and fire departments, roads and highway maintenance, public education, local clinics/hospitals and county libraries. Public services and infrastructure investments by the State and local municipalities with redistributed Federal dollars supports employment and income in the public sector and in industries providing goods and services to the public sector. The drilling, servicing, and production resulting from BLM leasing of Federal minerals in Richland and Roosevelt counties also stimulates economic activity in the private sector, directly and indirectly supporting local employment and income in nearly every part of the economy. The total economic contribution of oil and gas related activities and public revenue associated with BLM leased minerals in Richland and Roosevelt counties under Alternative C is estimated to be 2,129 jobs and $147.3 million in local wages and proprietor's income across the 3-county local economy.

The annual SCC associated with oil and gas development is approximately $4.6 million (in 2011 dollars) based on 957,784 cumulative acres. As noted earlier, the estimated SCC is not directly comparable to economic contributions.

5.0 CONSULTATION AND COORDINATION

5.1 Persons, Agencies, and Organizations Consulted

Coordination with MFWP was conducted for the 11 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. Recommendations by the USFWS applied in previous lease sale EAs were also applied to the 11 lease parcels being reviewed. A letter was sent to the USFWS and MFWP during the 15-day scoping and 30-day public comment periods requesting comments on the 11 parcels being reviewed.

The BLM consults with Native Americans under Section 106 of the National Historic Preservation Act. The 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 11 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. In addition to scoping letters, THPOs also received file search results from the preliminary review of parcels conducted by BLM. The BLM sent a second letter with a copy of the EA 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 11 parcels for sale.

5.2 Summary of Public Participation

5.2.1 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 October 21, 2013. No written or verbal comments were submitting during the 15-day scoping period.

5.3 List of Preparers

Table 20. List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
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Bobby Baker	Wildlife Biologist	Wildlife
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In addition to the primary preparers listed above, the following individuals provided document review:

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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 IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL/NO LEASING
MTM 102757-6Q	T. 25 N, R. 52 E, PMM, MT SEC. 8 S2; RICHLAND COUNTY 320.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (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) **TES 16-2** (ALL LANDS) **TL 13-3** (ALL LANDS)	NONE
MTM 105431-FH	T. 26 N, R. 52 E, PMM, MT SEC. 1 LOTS 1-4; SEC. 1 S2N2,NWSW,SE; SEC. 2 LOTS 1-4; SEC. 2 S2N2,S2; SEC. 11 W2NE,NW,NWSE; SEC. 12 S2N2; RICHLAND COUNTY 1568.48 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-1** SEC. 1 LOT 4; SEC. 1 NWSW; SEC. 2 LOTS 1-3; SEC. 2 SWNE,S2NW,SW, W2SE,SESE; SEC. 11 NWNE,W2NW; **LN 14-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **NSO 11-2** SEC. 1 LOT 4; SEC. 1 SWNW,NWSW,NESE; SEC. 2 LOTS 1, 4; SEC. 2 N2SW; SEC. 11 NWSE; **TES 16-2** (ALL LANDS) **TL 13-1** SEC. 1 LOTS 1-4; SEC. 1 S2NW,NWSW; SEC. 2 LOTS 1-4; SEC. 2 S2N2,S2; SEC. 11 W2NE,NW,NWSE;	**CR 16-1** (ALL LANDS) **CSU 12-1** SEC. 1 LOT 4; SEC. 1 NWSW; SEC. 2 LOTS 1-3; SEC. 2 SWNE,S2NW,SW, W2SE,SESE; SEC. 11 NWNE,W2NW; **LN 14-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **NSO 11-2** SEC. 1 LOT 4; SEC. 1 SWNW,NWSW,NESE; SEC. 2 LOTS 1, 4; SEC. 2 N2SW; SEC. 11 NWSE; **TES 16-2** (ALL LANDS) **TL 13-1** SEC. 1 LOTS 1-4; SEC. 1 S2NW,NWSW; SEC. 2 LOTS 1-4; SEC. 2 S2N2,S2; SEC. 11 W2NE,NW,NWSE;	NONE

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL/NO LEASING
MTM 102757-6T	T. 27 N, R. 55 E, PMM, MT SEC. 3 LOTS 1,6,7,10; ROOSEVELT COUNTY 130.95 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-4** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-2** (ALL LANDS) **NSO 11-9** (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** SEC. 3 LOT 1;	DEFER ALL LANDS	DEFER ALL LANDS Pending further review of Source Water Protection areas being analyzed in the current MCFO RMP planning effort.
MTM 102757-6U	T. 27 N, R. 55 E, PMM, MT SEC. 7 SESW,SWSE; RICHLAND COUNTY 80.00 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-4** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **NSO 11-9** (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 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **NSO 11-9** (ALL LANDS) **NSO 11-10** (ALL LANDS) **NSO 11-13** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	NONE
MTM 102757-6R	T. 27 N, R. 57 E, PMM, MT SEC. 17 S2NW,NESW; ROOSEVELT COUNTY 120.00 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-1** SEC. 17 NESW; **LN 14-12** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	**CR 16-1** (ALL LANDS) **CSU 12-1** SEC. 17 NESW; **LN 14-12** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	NONE

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL/NO LEASING
MTM 97300-MN	T. 21 N, R. 58 E, PMM, MT SEC. 12 LOTS 3,6; RICHLAND COUNTY 20.20 AC PD	**CR 16-1** (ALL LANDS) **LN 14-1** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-2** (ALL LANDS) **NSO 11-10** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **BOR 17-1** (ALL BOR LANDS) **BOR 17-2** (ALL BOR LANDS)	DEFER ALL LANDS	DEFER ALL LANDS Pending further review of Source Water Protection areas being analyzed in the current MCFO RMP planning effort.
MTM 97300-MO	T. 21 N, R. 58 E, PMM, MT SEC. 22 LOT 5 EXCL 7.00 AC IN RR ROW; SEC. 22 LOT 4 RICHLAND COUNTY 55.32 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	NONE
MTM 102757-6V	T. 26 N, R. 58 E, PMM, MT SEC. 12 NWNW; RICHLAND COUNTY 40.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	**CR 16-1** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS)	NONE

PARCEL NUMBER	PARCEL DESCRIPTION	PROPOSED FOR LEASING ALTERNATIVE B	PROPOSED FOR LEASING IF EA INCLUDES ALTERNATIVE C	PROPOSED FOR DEFERRAL/NO LEASING
MTM 97300-6J	T. 23 N, R. 59 E, PMM, MT SEC. 27 TR 1 DESC BY M&B (1.79 AC); SEC. 27 TR 2 DESC BY M&B (2.90 AC); SEC. 27 TR 3 DESC BY M&B (2.14 AC); SEC. 27 TR 4 DESC BY M&B (8.90 AC); RICHLAND COUNTY 15.73 AC ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **TL 13-4** (ALL LANDS) **BOR 17-1** (ALL BOR LANDS) **BOR 17-2** (ALL BOR LANDS)	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **TL 13-4** (ALL LANDS) **BOR 17-1** (ALL BOR LANDS) **BOR 17-2** (ALL BOR LANDS)	NONE
MTM 102757-6E	T. 23 N, R. 59 E, PMM, MT SEC. 27 TR 5 DESC BY M&B (1.45 AC); SEC. 27 TR 6 DESC BY M&B (5.92 AC); RICHLAND COUNTY 7.37 AC ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **TL 13-4** (ALL LANDS) **BOR 17-1** (ALL BOR LANDS) **BOR 17-2** (ALL BOR LANDS)	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **TL 13-4** (ALL LANDS) **BOR 17-1** (ALL BOR LANDS) **BOR 17-2** (ALL BOR LANDS)	NONE
MTM 102757-6C	T. 23 N, R. 59 E, PMM, MT SEC. 35 TR 1 DESC BY M&B (1.83 AC); SEC. 35 TR 2 DESC BY M&B (1.17 AC); SEC. 35 TR 3 DESC BY M&B (0.45 AC); SEC. 35 TR 4 DESC BY M&B (1.13 AC); RICHLAND COUNTY 4.58 AC ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **BOR 17-1** (BOR ALL LANDS) **BOR 17-2** (BOR ALL LANDS)	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-2** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-1** (ALL LANDS) **BOR 17-1** (BOR ALL LANDS) **BOR 17-2** (BOR ALL LANDS)	NONE

Appendix B - Stipulation Key

Stipulation No.	Stipulation Name/Brief Description
CR 16-1	**CULTURAL RESOURCES LEASE STIPULATION** This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities.
CSU 12-1	**CONTROLLED SURFACE USE STIPULATION** Surface occupancy or use is subject to the following special operating constraint: Prior to surface disturbance on slopes over 30 percent, an engineering/reclamation plan must be approved by the authorized officer.
CSU 12-4	**CONTROLLED SURFACE USE STIPULATION** All surface-disturbing activities, semi-permanent and permanent facilities in Visual Resource Management (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.
LN 14-1	**LEASE NOTICE** Land Use Authorizations incorporate specific surface land uses allowed on Bureau of Land Management (BLM) administered lands by authorized officers and those surface uses acquired by BLM on lands administered by other entities. These BLM authorizations include rights-of-way, leases, permits, conservation easements, and recreation and public purpose leases and patents.
LN 14-2	**LEASE NOTICE CULTURAL RESOURCES** The Surface Management Agency is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures.
LN 14-3	**LEASE NOTICE** The lessee or operator shall immediately bring to the attention of the Surface Management Agency (SMA) any paleontological resources or any other objects of scientific interest discovered as a result of approved operations under this lease, and shall leave such discoveries intact and undisturbed until directed to proceed by the SMA.
LN 14-12	**LEASE NOTICE PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT** This lease has been identified as being located within geologic units rated as being moderate to very high potential for containing significant paleontological resources. The locations meet the criteria for class 3, 4 and/or 5 as set forth in the Potential Fossil Yield Classification System, WO IM 2008-009, Attachment 2-2. The BLM is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures. Guidance for application of this requirement can be found in WO IM 2008-009 dated October 15, 2007, and WO IM 2009-011 dated October 10, 2008. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or project proponent shall contact the BLM to determine if a paleontological resource inventory is required. If an inventory is required, the lessee or project proponent will complete the inventory subject to the following: • the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. • the project proponent will, at a minimum, inventory a 10-acre area or larger to incorporate possible project relocation which may result from environmental or other

Stipulation No.	Stipulation Name/Brief Description
	resource considerations. paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by WO IM 2009-011.incorporate possible project relocation which may result from environmental or other resource considerations. paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by WO IM 2009-011.
LN 14-15	**LEASE NOTICE SPRAGUE'S PIPIT** The lease area may contain habitat for the Federal candidate Sprague's pipit. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on Sprague's pipits, their habitat, and overall population. Such measures would be developed during the application for permit to drill and environmental review processes, consistent with lease rights. If the US Fish and Wildlife Service lists the Sprague's pipit as threatened or endangered under Endangered Species Act, the BLM would enter into formal consultation on proposed permits that may affect the Sprague's pipit and its habitat. Restrictions, modifications, or denial of permits could result from the consultation process.
NSO 11-2	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed within riparian areas, 100-year flood plains of major rivers, and on water bodies and streams.
NSO 11-9	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed within one-quarter mile of wetlands identified as piping plover habitat.
NSO 11-10	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed within one-quarter mile of wetlands identified as interior least tern habitat.
NSO 11-13	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed within developed recreation areas and undeveloped recreation areas receiving concentrated public use.
TES 16-2	**ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION** The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development, and require modifications to or disapprove proposed activity that is likely to result in jeopardy to proposed or listed threatened or endangered species or designated or proposed critical habitat.
TL 13-1	**TIMING LIMITATION STIPULATION** No surface use is allowed within crucial winter range for wildlife for the time period December 1 to March 31 to protect crucial white-tailed deer, mule deer, elk, antelope, moose, bighorn sheep, and sage grouse winter range from disturbance during the winter use season, and to facilitate long-term maintenance of wildlife populations. This stipulation does not apply to operation and maintenance of production facilities.
TL 13-3	**TIMING LIMITATION STIPULATION** No surface use is allowed from March 1 to June 15 in grouse nesting habitat within two miles of a lek. This stipulation does not apply to operation and maintenance of production facilities.
TL 13-4	**TIMING LIMITATION STIPULATION** No surface use is allowed within one-half mile of raptor nest sites which have been active within the past 2 years during the time period March 1 - August 1 to protect nest sites of raptors which have been identified as species of special concern. This stipulation does not apply to operation and maintenance of production facilities.
BOR 17-1	BUREAU OF RECLAMATION - Agency lease stipulations.
BOR 17-2	BUREAU OF RECLAMATION - Agency special stipulations.

Appendix C – Reasonably Foreseeable Development (RFD) Scenario Forecast for Area of Analysis

A total of 11 lease parcels located in Richland and Roosevelt Counties are proposed for the May, 2014 leases sale. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in each of the three development potential areas where the proposed lease parcels are located. These development potential areas are specified as high, moderate, and low potential areas.

High Potential:

Of the 2363 lease parcel acres located in Richland and Roosevelt Counties, all 2363 parcel acres are in the area of High Potential development area delineated by BLM. The RFD scenario in the MCFO RMP forecasts a range of 856 to1711 oil wells and 1004 to 2009 gas wells in this development area. The range for Federal wells is 197 to 394 oil wells and 231 to 462 gas wells. The High Potential lease parcels total approximately 2363 acres, approximately 0.0391 percent of the High Potential project area identified in the MCFO RFD.

Moderate Potential:

No lease parcels nominated lie within the area of moderate development potential.

Low Potential:

No lease parcels nominated lie within the area of low development potential.

The MBOGC sets the spacing requirements for oil and gas wells in the State of Montana. Current well spacing for wildcat gas wells is set at 640 acres per well for each producing formation. For oil wells spacing is set based on the well depth. Currently, for oil wells set at a depth between 0 and 6,000 feet the spacing is one well per 40 or 80 acres, for 6,001 to 11,000 feet the spacing is one well per 160 acres, and for wells greater than 11,001 feet in depth the spacing is one well per 320 acres. MBOGC also sets the spacing for CBNG wells, which is currently one well per 640 acres. In the case of CBNG, multiple wells within the standard 640-acre spacing unit are typically required to efficiently produce CNBG. The MBOGC will review spacing when a new field is discovered and the exploration company requests the establishment of permanent spacing unit that is different from the standard statewide spacing. Well spacing can be changed by the MBOGC after lease operators provide geologic, engineering, and economic data to the Board for review. A decision is generally rendered at a Board hearing and a Board Order is issued establishing the new spacing requirements. Board orders for existing fields are available on the MBOGC website.

RFD by Alternative

Alternative	Richland County	Roosevelt County
Alt A Acres Leased	Zero	Zero
Alt B Acres Leased	2112	251
Alt C Acres Leased	2091	120
Alt A Potential Fed Wells Drilled	Zero	Zero
Alt B Potential Fed Wells Drilled	1	1
Alt C Potential Fed Wells Drilled	1	1

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

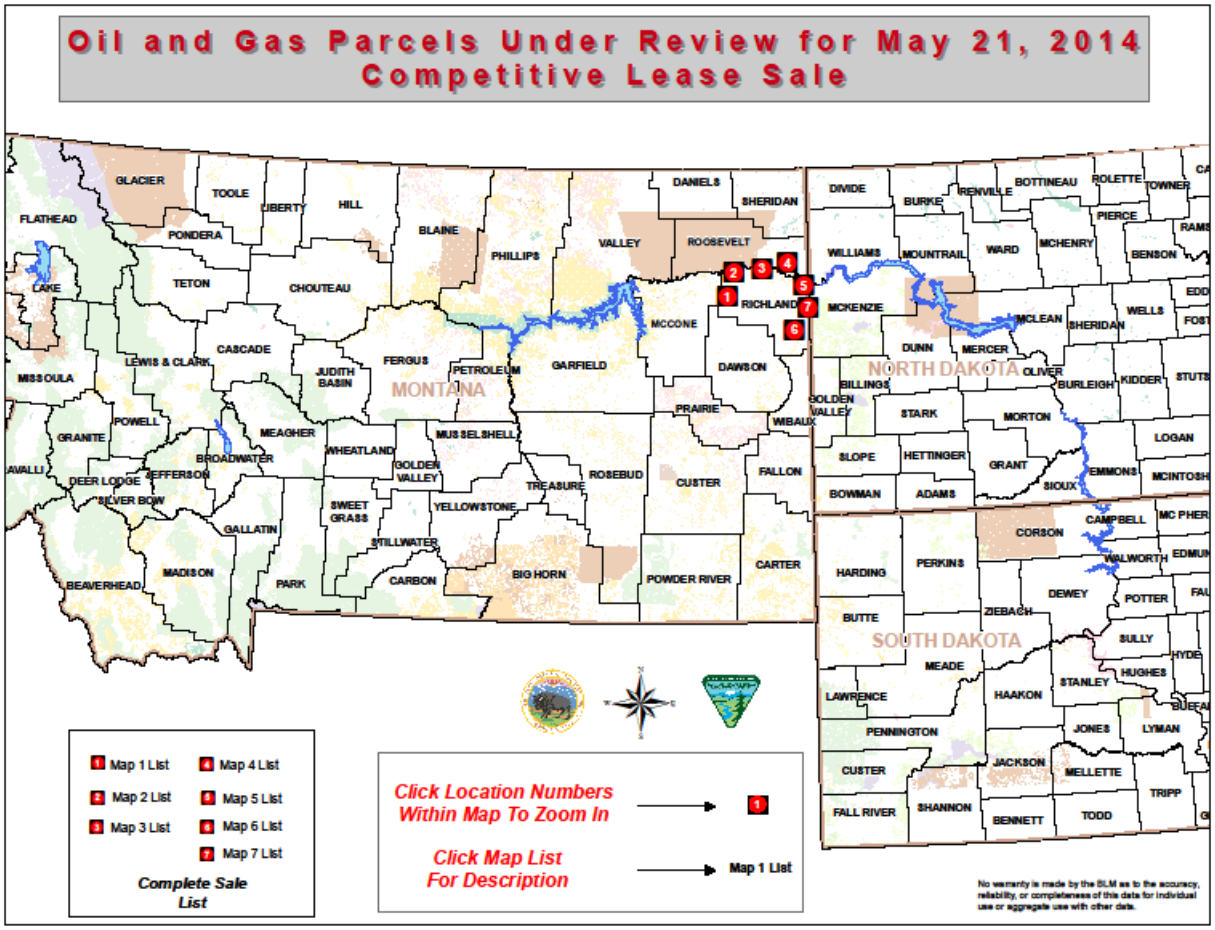
The potential number of acres disturbed by exploration and development activities is shown in Table D-2. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the MCFO. Typical exploration 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 D-1. Total RFD Projected Disturbance for Oil and Gas Wells and Associated Production Facilities

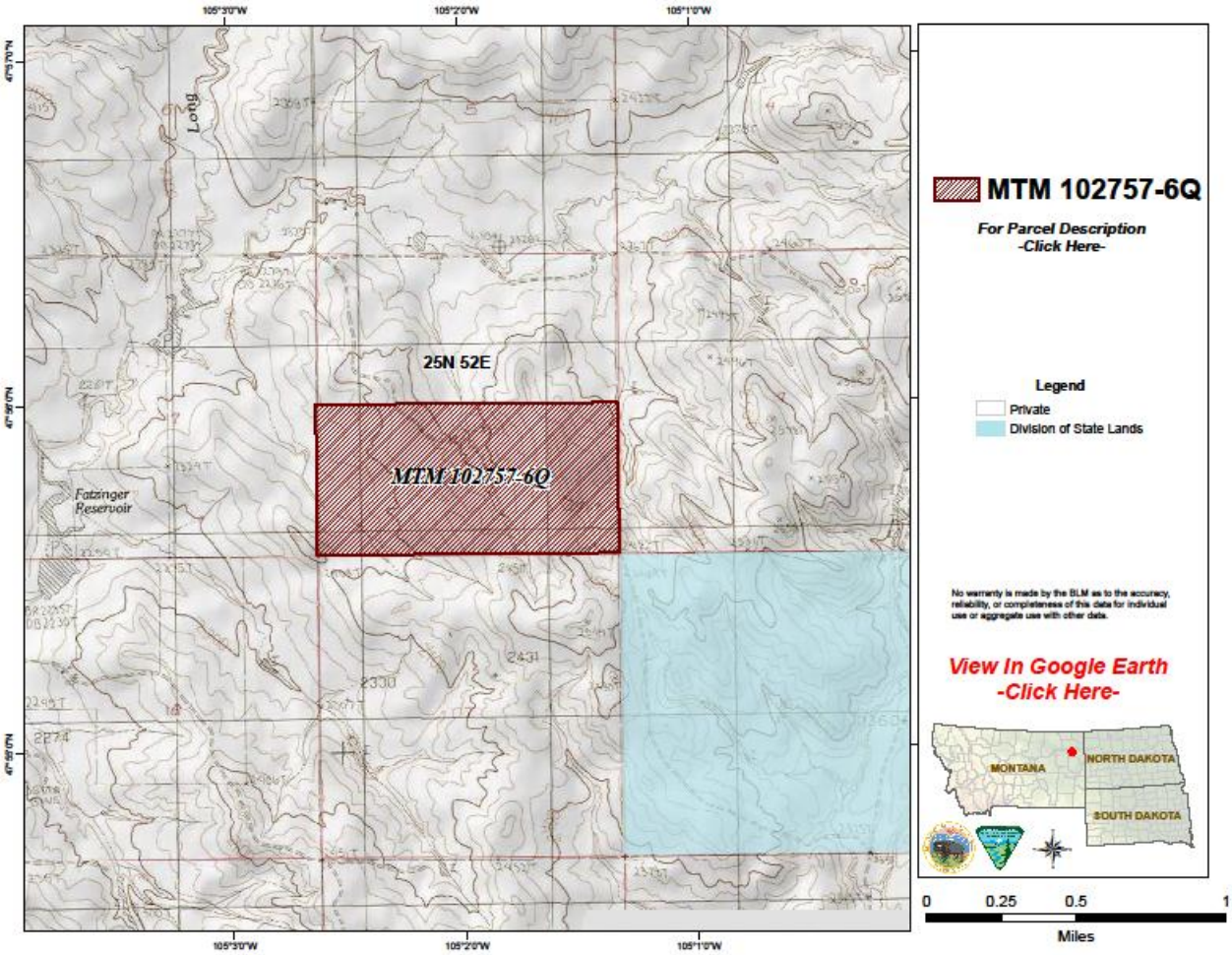
Facilities		Exploratory Well Disturbance (acres/well)	Construction Disturbance (acres/well)	Operation/Production Disturbance (acres/well)
		Short-Term – 2 Years		Long-Term
Well Pad (360-foot by 360-foot pad during drilling and construction reduced to 200-foot by 200 foot pad during operation)		3	3	1
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

Facilities		Exploratory Well Disturbance (acres/well)	Construction Disturbance (acres/well)	Operation/Production Disturbance (acres/well)
	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

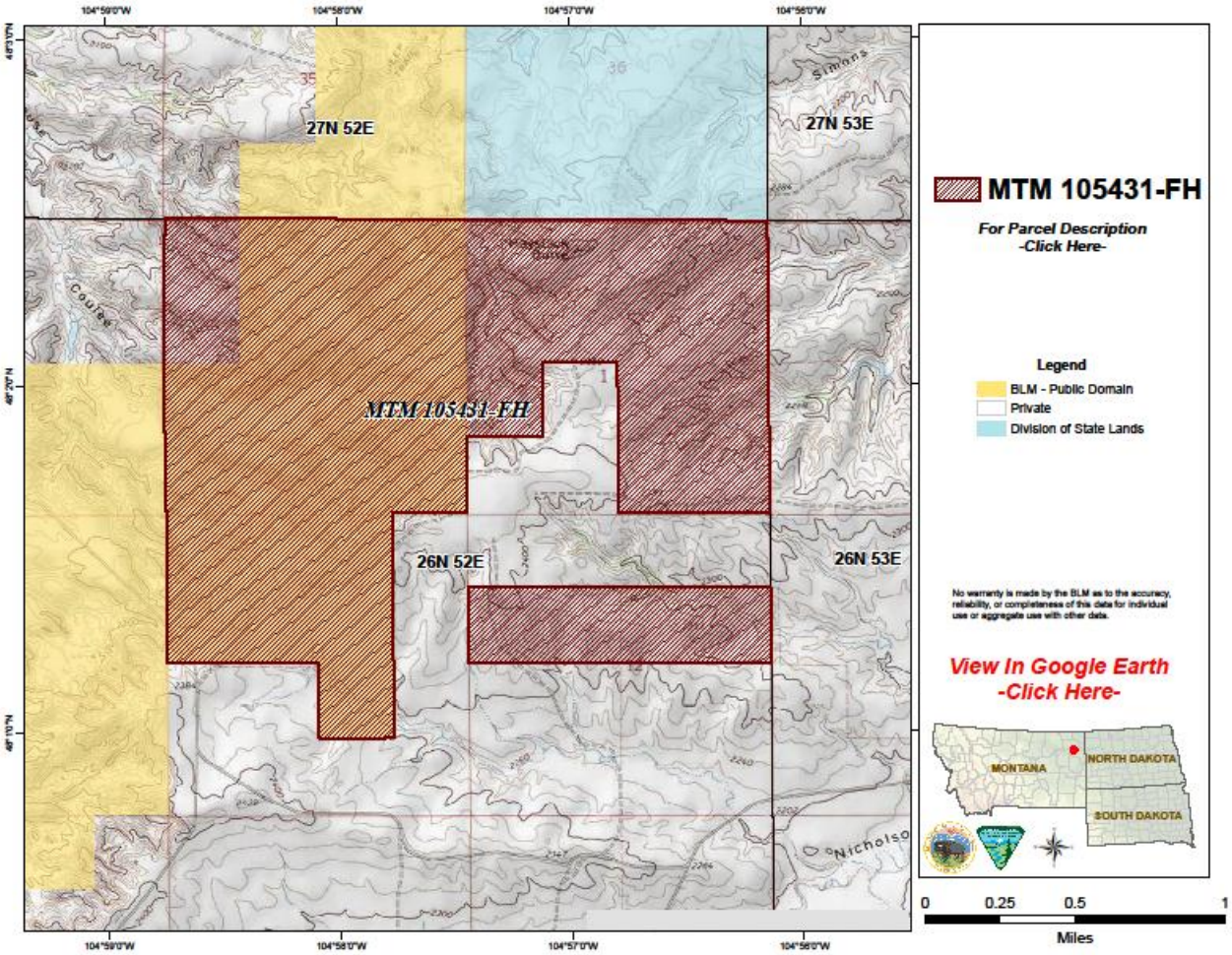
Map 1. All Nominated Lease Parcels



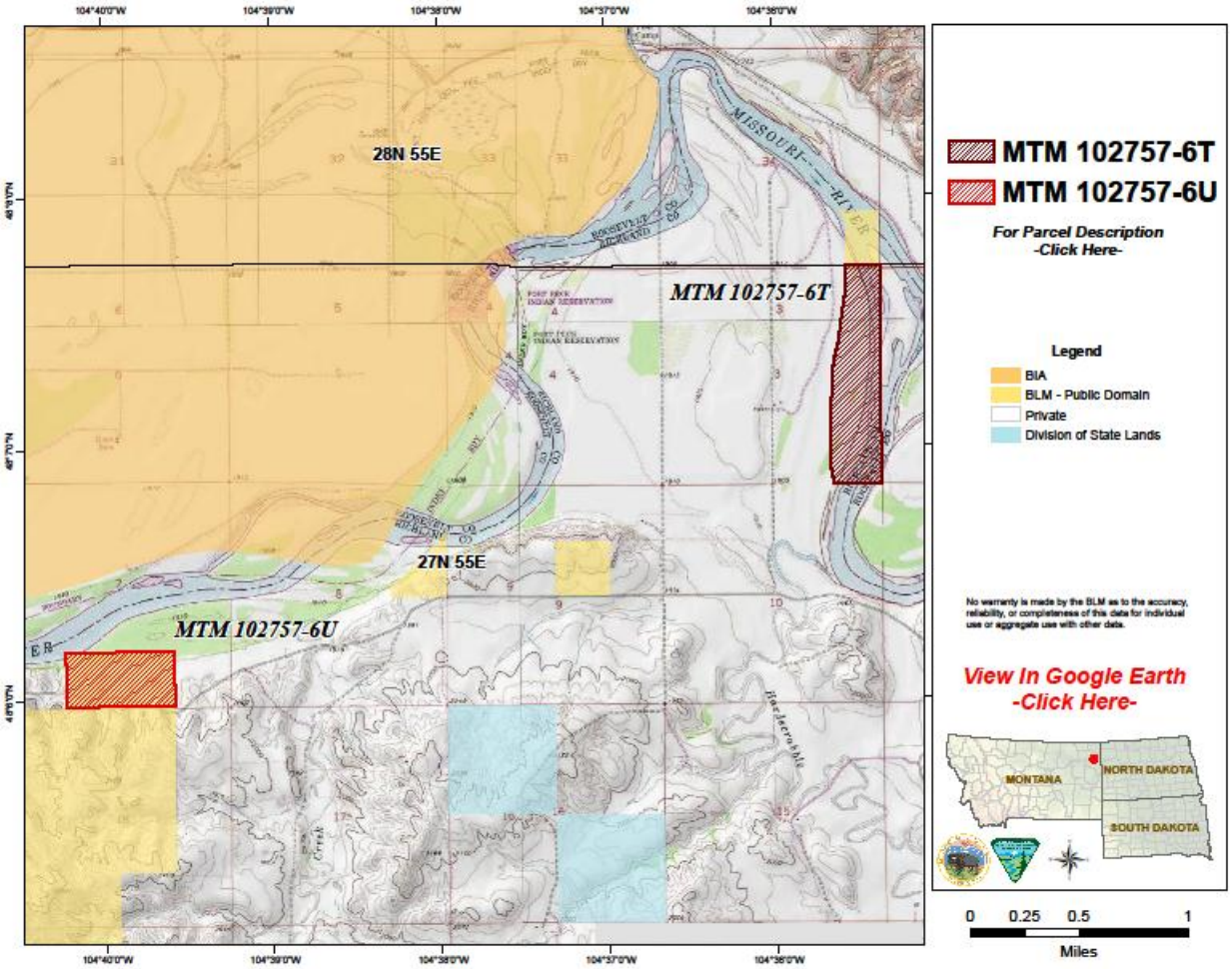
Map 2. Parcel Number MTM102757-6Q



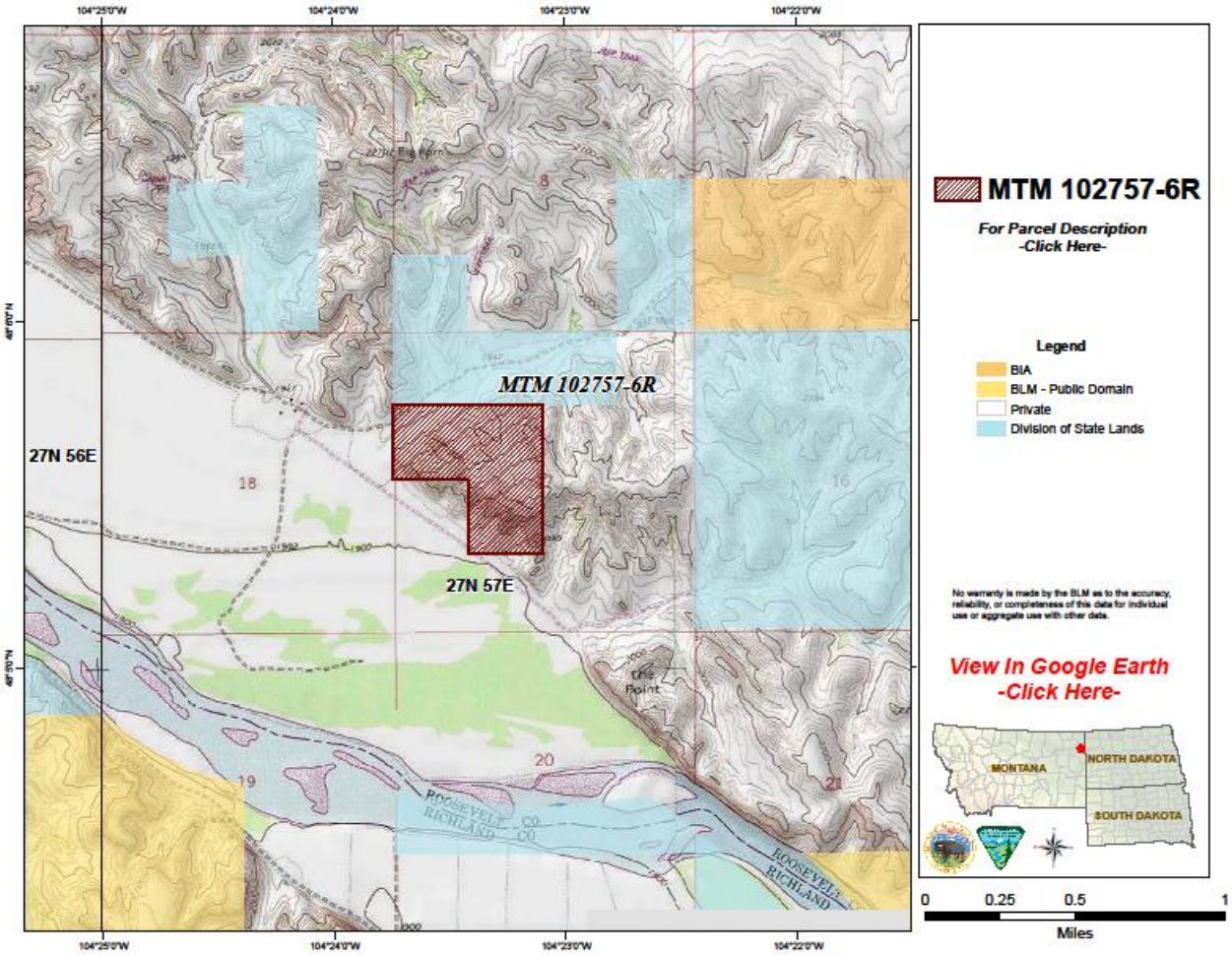
Map 3. Parcel Number MTM 105431-FH



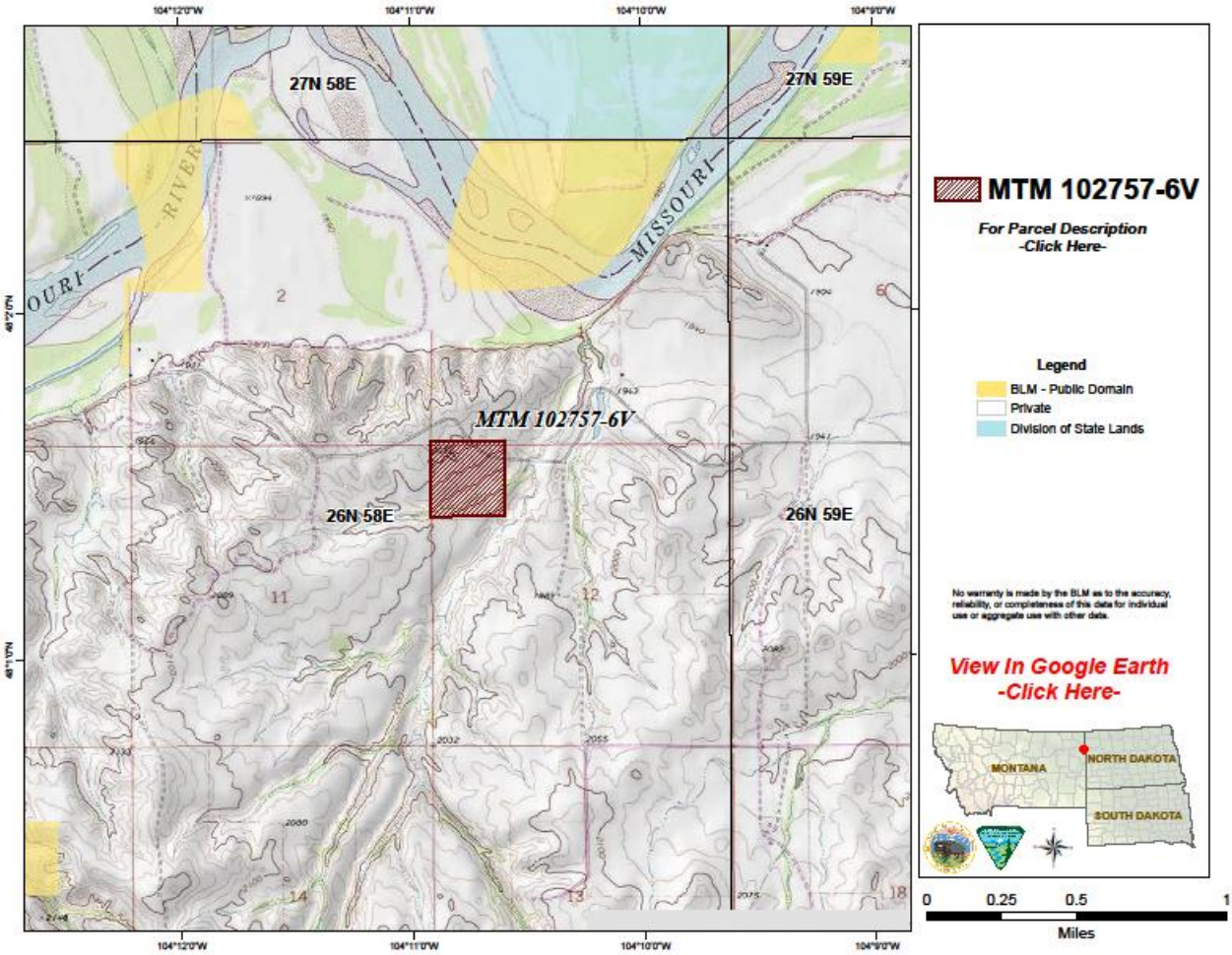
Map 4. Parcel Numbers MTM 102757-6T and MTM 102757-6U



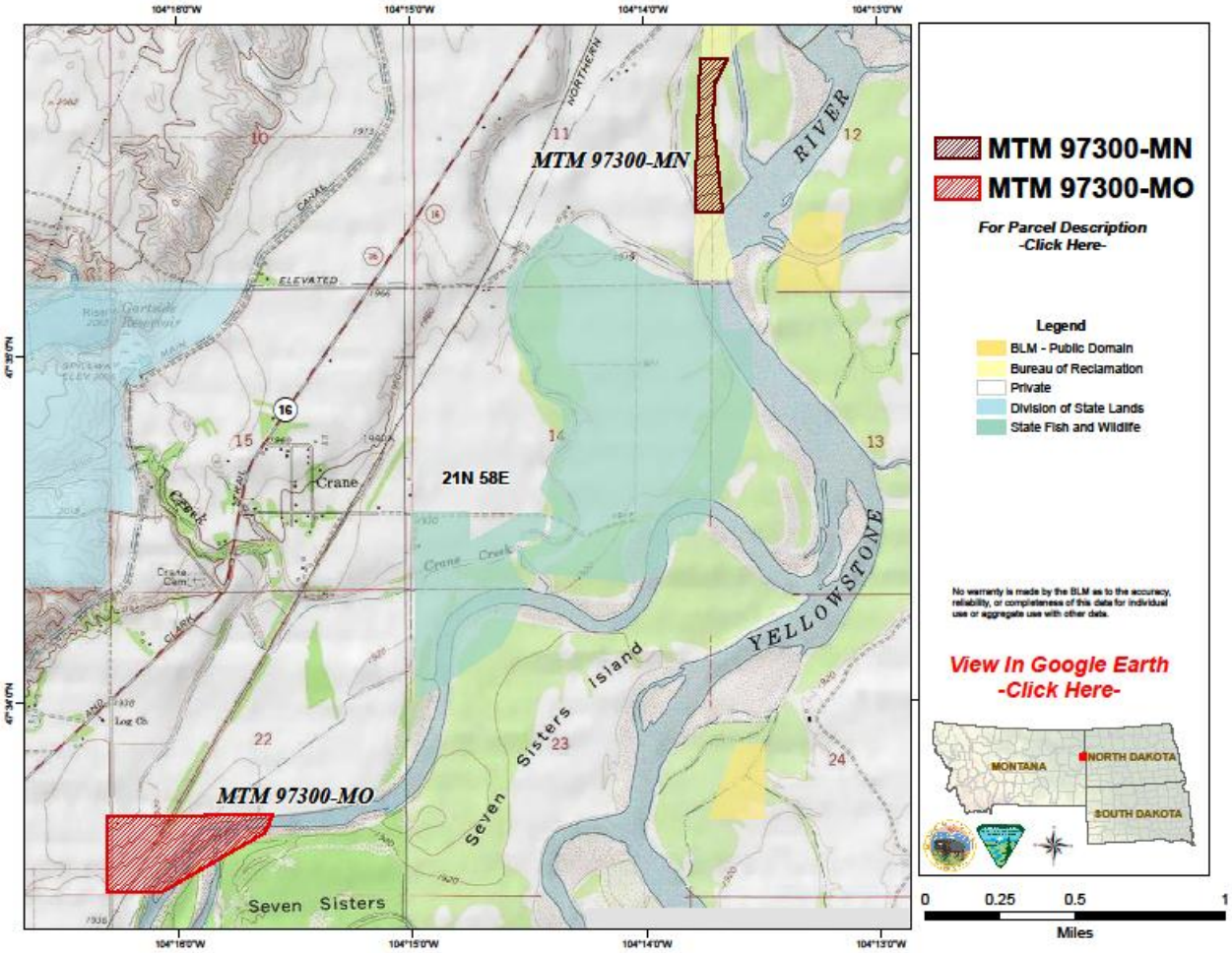
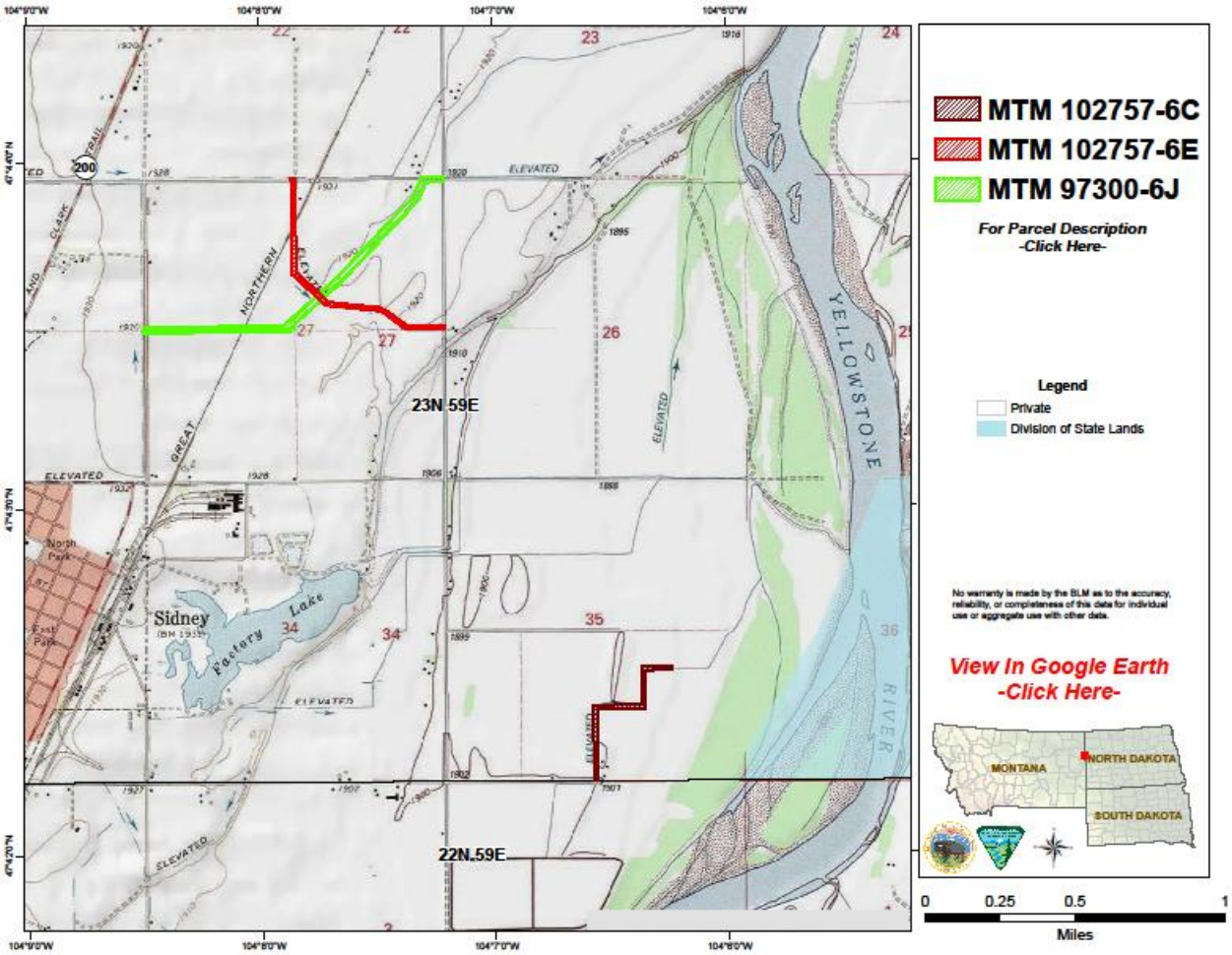
Map 5. Parcel Number MTM 102757-6R



Map 6. Parcel Number MTM 102757-6V



Map 7. Parcel Numbers MTM 97300-MN and MTM 97300-MO



Map 8. Parcel Numbers MTM 102757-6C, MTM 102757-6E, and MTM 97300-6J