United States Department of the Interior
Bureau of Land Management

Environmental Assessment DOI-BLM-MT-B070-2010-0012
August 12, 2010

Project Title: *Oil and Gas Lease EA for 38 parcels in the Butte Field Office*

Location: *Various locations throughout the Butte Field Office*

BLM

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Butte Field Office
106 North Parkmont
Butte, Montana 59701-9701
www.blm.gov/mt

In Reply Refer To:

1600/3100 (MTB070)

August 12, 2010

Dear Reader:

The Bureau of Land Management (BLM) Butte Field Office has prepared an Environmental Assessment (EA) to revisit our decisions concerning oil and gas leases that were issued in 2008, and subsequently suspended under the terms of a settlement agreement in March 2010. The EA also assesses our decisions to offer parcels for leasing from sales that have been delayed (April and June 2010). This analysis addresses four lease parcels issued in 2008 and 34 parcels nominated for subsequent lease sales.

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 September 13, 2010, to be considered. Comments may be submitted using one of the following methods:

Email: MT_ButteFO_Lease_EA@blm.gov
Mail: Butte Field Office
Attention: Oil and Gas EA
106 North Parkmont
Butte, MT 59701

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 finalized. Based on our analysis, current suspensions on parcels would be lifted. Our assessment also addresses parcels previously nominated for leasing. Those parcels recommended for leasing in our assessment would be included as part of a competitive oil and gas lease sale tentatively scheduled to occur towards the end of November 2010.

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 www.blm.gov/mt. From this home page, go to the heading titled "Frequently Requested," where you will find a number of links to information about our oil and gas program. Current and updated information about our environmental assessments can be found on the link titled "Oil and Gas Leasing EAs," and Lease Sale notices are listed under the "Current competitive oil and gas lease sale and results lists" link.

If you have any questions, or would like more information about lease sale notices or the issuance of the final EA, Decision Record and FONSI, please contact us at 406-533-7600.

Sincerely,

Richard M. Hotaling
District Manager

U.S. Department of the Interior
Bureau of Land Management
Butte Field Office
106 North Parkmont
Butte, MT 59701

Finding of No Significant Impact
Environmental Assessment DOI-BLM-MT-B070-2010-0012-EA

This unsigned Finding of No Significant Impact and the attached DOI-BLM-MT-B070-2010-0012- EA for the Butte Field Office are available for public review and comment for 30 days beginning on August 12, 2010.

Impact identification and analysis of approving the project proposal and/or alternatives(s) has been completed. Environmental analysis has been conducted based on available inventory and monitoring data files. The proposed action conforms with and is within the scope of the land use decisions described in the Butte Resource Management Plan, with Record of Decision approved April, 2009.

Based on my review of the EA and supporting documents, I have determined that the project, including the implementation of required stipulations/mitigating measures, is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No potential environmental effects associated with the project meet the definition of significance in context or intensity as defined in 40 CFR 1508.27, nor do potential effects exceed those effects described in the Butte RMP/FEIS. An environmental impact statement (EIS) is not required. In the event that parcels are leased or, where the suspension would be lifted, resultant from this decision, any future proposed development on such parcels would be subject to additional site-specific NEPA analysis and documentation.

The decision to approve or deny the proposed action and preparation of a signed Finding of No Significant Impact with rationale, as appropriate, will be released after consideration of public comments and completion of the EA.

Recommended by _____ Date_____
Richard M. Hotaling, Field Manager/District Manager

Approved by _____ Date_____
Theresa M. Hanley, Deputy State Director, Division of Resources

U.S. Department of the Interior
Bureau of Land Management
Butte Field Office
106 North Parkmont
Butte, MT 59701
Phone: 406 533 7600
FAX: 406 533 7660

Oil and Gas Lease EA for 38 parcels in the Butte Field Office
DOI-BLM-MT-B070-2010-0012-EA

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Oil and Gas Lease EA for 38 Lease Parcels in the Butte FO

DOI-BLM-MT-B070-2010-0012-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 in 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. Mineral leases can be sold on such lands as well. The Montana State Office has historically conducted five lease sales per year.

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

This environmental assessment (EA) has been prepared to disclose and analyze the environmental consequences of leasing 38 parcels located in the Butte Field Office, four of which are currently under suspension, and 34 of which would be included as part of a competitive oil and gas lease sale tentatively scheduled to occur towards the end of November, 2010.

The Butte Field Office (FO) administrative area is located in mid-western Montana. The Butte FO administers about 307,300 acres of public land surface and 660,819 acres of federal mineral estate in Broadwater, Deer Lodge, Gallatin, Jefferson, Lewis and Clark (southern portion), Silver Bow, Park, and the northern portion of Beaverhead County. Table 1 identifies BLM-administered acres and total acres within the planning area by county.

Table 1 Lands Within the Butte Planning Area			
County	**BLM Surface Acres**	**BLM Mineral Estate**	**County Acres in Planning Area**
Beaverhead	12,660	22,372	31,429
Broadwater	70,679	106,032	792,866
Deer Lodge	5,227	141,648	473,932
Gallatin	7,250	34,656	1,683,558
Jefferson	94,397	124,786	1,061,462
Lewis and Clark	63,510	113,119	895,925
Park	8,365	53,505	1,793,054
Silver Bow	45,221	64,701	460,124
TOTALS	**307,309**	**660,819**	**7,192,349**

1.2 Purpose and Need for the Proposed Action

The purpose of offering parcels for competitive oil and gas leasing is to allow private individuals or companies to explore for and develop oil and gas resources for sale on 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 significant 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 parcels in question, and, if so, what stipulations would be identified as required for specific parcels at the time of lease sale. For leased parcels currently under suspension, the decision to be made is whether the conditions under which they have been leased are still valid and in conformance with the land use plan and whether the lease suspensions should be lifted.

1.3 Conformance with Land Use Plan(s)

This EA is tiered to the decisions, information and analysis contained in the Butte RMP (April 2009) and its associated environmental impact statement (EIS). The Butte RMP is the governing land use plan for the Butte FO. A more complete description of activities and impacts related to oil and gas leasing, development, production, etc. can be found at Chapter 1 pg 94-99, Chapter 3, pg 274-276, Chapter 4, pg 330-331and Appendix M of the Butte RMP/FEIS.

The parcels to be offered are within areas open to oil and gas leasing. Site-specific analysis was conducted by Butte Field Office resource specialists who relied on professional knowledge of the areas involved, review of existing databases, and file information to ensure that appropriate stipulations have been attached to specific parcels.

At the time of this review, it is unknown whether a particular parcel will be sold and a lease issued. It is unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of projected activities and impacts was based on potential well densities discerned from the reasonably foreseeable development (RFD) scenario developed and

documented in conjunction with the Butte RMP. Detailed site-specific analysis of activities associated with any particular parcel would occur when a lease holder submits an application for permit to drill (APD).

The proposed project would not be in conflict with any local, county, or state laws or plans.

Regulations at 43 CFR 1610.5-4 require that resource management plans and supporting components be maintained to reflect minor changes in data and to further refine or document previously approved decisions incorporated in the plan. Plan maintenance does not require formal public or interagency involvement, nor does it require preparation of an environmental assessment or environmental impact statement.

A number of items associated with the Butte RMP require plan maintenance at this time. Under the Butte RMP, the BLM has adopted a number of geographic information system (GIS) coverages created by the Montana Department of Fish, Wildlife and Parks (MFWP) pertaining to specific wildlife species and habitats. Since publication of the approved Butte RMP in 2009, the following base GIS coverages have been updated by MFWP as they pertain to the Butte Field Office: Bighorn Sheep Core Areas, Bighorn Sheep Yearlong Areas, and Big Game Winter/Spring Ranges (Mule Deer, Elk, Antelope and Moose). These updated coverages were used in identifying where pertinent oil and gas leasing stipulations should apply for this project and will be used for BLM management of these habitats until updated further in the future.

Also in the context of plan maintenance, a number of specific oil and gas leasing stipulation decisions in the Butte RMP require clarification of their original intent and areas of applicability. The No Surface Occupancy (NSO) (within ½-mile) stipulations for "90-100 percent pure" westslope and Yellowstone cutthroat trout populations (pages 215-216 of Butte RMP) also apply to "conservation populations" as per the interagency conservation agreement for management of these species and their habitats to which the BLM is a party. Objective #2 on page 30 of the Butte RMP indicates that the BLM will manage habitat for westslope and Yellowstone cutthroat trout (as well as additional species) as per conservation agreements and recovery plans. Therefore this clarification of these stipulations makes the Butte RMP more clearly consistent with this objective in the RMP. An additional clarification needs to be made to the NSO stipulation for "Wetlands, Floodplains, Riparian Areas, and Water Quality" on page 218 of the Butte RMP. While not explicitly stated in the stipulation in the RMP, the reference to "Riparian Areas" needs to be clarified to indicate "Riparian Management Zones" as described on pages 21-22 of the Butte RMP.

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 Butte FO website NEPA notification log. Scoping was initiated May 25, 2010; however, comments were received through June 21, 2010. Several scoping comment letters pertained to overall issues/concerns from oil and gas leasing within the Montana/Dakotas BLM while other scoping comment letters were specific to this EA planning area. Refer to Section 5.2 of this EA for a more complete summary of the scoping comments received.

Planning issues identified through scoping related to oil and gas leasing include: greenhouse gas (GHG) emissions and impacts to climate change; protect wildlife and fisheries habitat and

corridors; preserve wildlands/pristine landscapes; protect scenic quality/viewsheds; protect cultural areas; minimize surface (soil) disturbance; and identify mitigation measures to minimize impacts from operations. One comment specifically suggested considering a no leasing alternative.

In addition to the planning issues identified above, several comments were specific to the Butte Field Office. These comments include: protect values/areas where conservation easements have been established, protect areas near/adjacent to special areas (designations such as Sleeping Giant Area of Critical Environmental Concern [ACEC], Sheep Creek Wilderness Study Area [WSA]), concern with proposed lease parcel near developed recreation area, and concerns with critical wildlife habitat corridors.

Previous coordination efforts have included conversations with conservation easement holders and extensive coordination efforts with MFWP.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

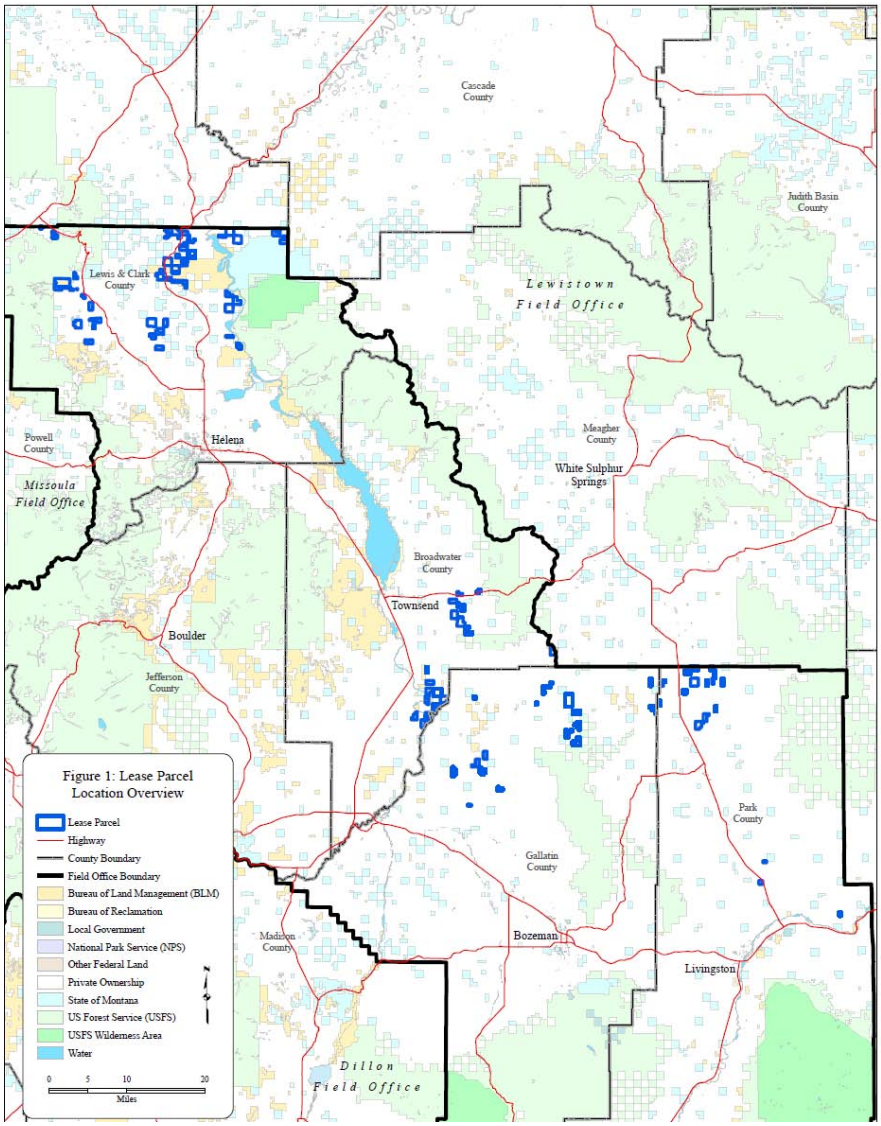
2.1 Alternative A - No Action

For environmental assessments (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. For lease parcels under suspension, parcels would remain under suspension, and would be subject to cancellation.

The No Action alternative would exclude offering 34 lease parcels in the Butte FO from the upcoming lease sale. The No Action alternative would maintain lease suspensions on 4 lease parcels, and would be subject to cancellation. 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 would be to offer 34 parcels of federal minerals for oil and gas leasing and to lift oil and gas lease suspensions on 4 parcels, covering 30,553 acres administered by the Butte FO. The parcels are located in Broadwater, Lewis and Clark, Park, and Gallatin counties (Map 1). Generally, the parcels are located in northern Lewis and Clark county, southern Broadwater County, and scattered areas in Park and Gallatin counties, generally east and west of the Bridger Range. The lease parcels have been grouped into two general areas based on their locations and resources--Geographic Land Use Boundary 1 (GLUB1), which includes virtually all the Lewis and Clark county parcels, and Geographic Land Use Boundary 2 (GLUB 2), which includes the parcels located in Broadwater, Gallatin, and Park counties. Parcel number, acreage (size) and detailed locations and associated proposed stipulations are provided in Appendix A.



Map 1. General lease parcel location

Of the approximately 30,553 acres of federal mineral estate that are considered in this EA, approximately 9,064 acres are public surface with federal mineral estate and approximately 21,489 are split-estate (private surface with federal mineral estate). All parcels would be subject to leasing stipulations as per the oil and gas leasing decisions in the Butte RMP that would protect identified resources or resource uses that otherwise might be impacted by the Proposed Action.

Approximately 21,489 acres in 18 parcels are split estate. In these instances, the BLM provided courtesy notification to private landowners that their lands would be included in this analysis. In the event of activity on such split estate 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.

Standard lease terms, conditions, and operating procedures, as well as additional stipulations as listed in Appendix A would apply to these parcels. Standard operating procedures in oil and gas

fields include measures to protect the environment and resources including groundwater, air, wildlife, historical and pre-historical concerns, and others as mentioned in the Butte RMP at Chapter 1 pg 94-99.

Standard operating procedures, best management practices and required conditions of approval and the application of lease stipulations change over time to meet overall RMP objectives. In some cases new lease stipulations may need to be developed and these types of changes may require an RMP amendment. There is no relief from meeting RMP objectives if local conditions were to become drier and hotter during the life of the RMP. In this situation, management practices might need to be modified to continue meeting overall RMP management objectives. An example of a climate related modification is the imposition of additional conditions of approval to reduce surface disturbance and implement more aggressive dust treatment measures. Both actions reduce fugitive dust, which would otherwise be exacerbated by the increasingly arid conditions that could be associated with climate change.

Oil and gas leases would be issued for a 10-year period and would continue for as long thereafter as oil or gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease, ownership of the minerals leased would revert back to the federal government, and the lease could be resold.

Drilling of wells on a lease would not be permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan as specified at 43 CFR 3162.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the affected existing environment (i.e., the physical, biological, social, and economic values and resources) that could be affected by implementation of the alternatives described in Chapter 2. Much more detail on the Affected Environment can be found in Chapter 3 of the Butte Proposed RMP/Final EIS (USDI BLM 2008a) (Butte RMP/FEIS).

3.2 General Setting

3.2.1 Geology

The Butte FO generally occupies an area known as the Montana Overthrust Belt, a complex structural zone where older rocks have been thrust eastward over younger rock units. The area includes lands in both the craton, as well as overthrust blocks to the west of the cratonic terrane. The cratonic rocks are a complex series of Archean (older Precambrian) crystalline metamorphic and igneous rocks. The overthrust rocks to the west include a series of younger Precambrian to Tertiary-aged sedimentary rocks. In some areas, cratonic rocks may also have a veneer of younger Paleozoic sedimentary rocks. During the Larimide Orogeny (60 million years BP), there were numerous episodes of igneous activity. It was this igneous activity associated with the thrusting and faulting that led to the complex geologic settings for this area as well as some of the areas mineral deposits.

The mountains in southwest Montana range in elevation from 4,000 to 11,000 feet. Valley fill reaches depths of several thousands of feet. These mountain and valley systems were predominately formed by large scale north-south striking block faulting and thrusting from the west (moved from above) as well as intrusions of granitic igneous rocks including the Boulder Batholith which occupies much of the area from Butte north to Helena.

Important fault bounded, thrust-faulted and predominantly sedimentary rock mountain ranges of the northern portion of the Rocky Mountain Physiographic Province include, from approximately north to south: the Garnet, Big Belt, Little Belt, Boulder, Tobacco Root, Bridger, Gallatin, Madison, Pioneer, and Beaverhead ranges. The Big and Little Belt Mountains are both broad, flat-crested, anticlinal uplift mountain ranges. The Crazy Mountains consist of sedimentary rocks domed by the emplacement of intrusive stocks and sills (laccolithic mountains). The Elkhorn Mountains are a volcanic range.

Much of Montana was glaciated during the Pleistocene Epoch (2.5 million to 10,000 years ago) as evidenced by the presence of many glacial cirques and sharp rugged erosional remnants of the highest mountain (arêtes and cols).

3.2.2 Soils

The Butte FO is characterized by rugged mountains and broad valleys, with average annual precipitation ranging from 9 inches in the lowlands to about 40 inches in the mountains. Principal soils in the Butte Field Office have developed from three major geologic units--older Precambrian Belt Series sedimentary rocks, Boulder batholith granite and related rocks, and younger Paleozoic sedimentary rocks and Tertiary volcanic rocks. In addition, mountain glaciations helped shape and carve the mountain topography. Eroded bedrock from the mountains was deposited in the adjacent valleys.

The granitic Boulder batholith commonly weathers to weakly developed sandy texture soil horizons over coarse sand to slightly decomposed granite subsurface layers.

Soils that have developed from Belt Series bedrock typically are fine sandy or loamy soils with high percentages of coarse fragments (Veseth and Montagne 1980). The soils are non-calcareous except for specific areas where calcareous strata (impure limestone) is exposed at or near the surface.

Soils in the Tertiary valley-fill can be highly variable in physical and chemical properties due to the inherent variability of the source rock. Soils support native communities of grasslands, shrubs, and forest land, punctuated by wetlands and riparian communities along streams.

3.2.3 Water Resources

The Butte FO generally consists of headwaters of the Missouri River (Big Hole River, Jefferson River, Madison River, and Gallatin River) and to a lesser extent, the Yellowstone River and Clark Fork River.

Topography varies from steep rugged mountains of the Madison, Gallatin, Bridger, Crazy, and Absaroka ranges to broad grassy valleys around the towns of Bozeman, Butte, and Helena. Elevations range from 11,200 feet in the Absaroka Range to 3,400 feet along the Missouri River below Holter Lake.

Precipitation patterns are affected primarily by local terrain. Mountain ranges cause rain shadow and other orographic effects, resulting in variations in annual precipitation from 10 to 15 inches in the valleys to 30 to 60 inches in the mountains (Western Regional Climate Center 2004). May and June are the wettest months; however, moisture from mountain snowpack typically sustains the major streams and rivers all year.

3.2.4 Climate

The climate of the region is modified northern Pacific Coast-type with continental components. The Rocky Mountains exert the main influence on climate. Winter days are marked by cold temperatures and cloudy days. Winter Chinook winds blow frequently from 25 to 50 miles per hour and can create warm, windy days east of the Continental Divide, while temperatures remain steadier in the mountain valleys west of the Continental Divide. In the summer, the heat and dry conditions are somewhat modified by mountainous terrain west of the Divide.

3.2.5 Vegetation

Vegetation in the Butte FO is predominantly grasslands, shrublands, and subalpine conifer forests. Grasslands and shrublands occupy valley floors and lower slopes, while subalpine conifer communities are present at higher elevations in mountains. The smaller areas of transitional vegetation, dry foothills/woodlands, and cool moist conifer forests reflect a relatively steep elevational gradient. This results in relatively narrow zones that support vegetation intermediate in ecological requirements of grassland and shrublands and higher elevation conifer forest.

Vegetation on land in the Butte Field Office is grassland (45 percent), shrubland (7 percent), and conifer forests and woodlands (45 percent).

Specific components of the environment that may be affected by this project are discussed below. Only those aspects of the affected environment that are potentially impacted by this project are described in detail.

3.2.6 Wildlife

The BLM coordinates with Montana Fish, Wildlife, and Parks (MFWP), and the U.S. Fish and Wildlife Service (FWS) to manage wildlife. While the BLM manages habitat on BLM lands, MFWP is responsible for managing all wildlife species populations. The FWS 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.

Wildlife management is factored into project planning at multiple scales and should begin early in the planning process. Evaluating wildlife values at the landscape scale is the first step to understanding potential impacts of a project. Wildlife values, including terrestrial conservation species, richness, and game quality, and aquatic conservation connectivity, conservation species, and game species, have been Mapped at the landscape level for Montana by MFWP through their Crucial Areas Planning System (CAPS: http://fwp.mt.gov/gis/Maps/caps/). The oil and gas lease parcels were reviewed in the CAPS GIS (geographic information system) 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.

Important wildlife habitats include wetlands and riparian areas, coniferous forests, shrublands, grasslands, snags (standing dead trees), cliffs and rocky outcrops, and caves and abandoned mines. Seasonally important habitats include big game winter ranges, calving and fawning areas, raptor nest sites, bat breeding and hibernation sites, waterfowl nesting areas, greater sage-grouse and sharptail grouse courtship (leks) and nesting areas, wolf denning and rendezvous sites, and grizzly bear habitat. The Butte FO includes lands that are part of an important wildlife linkage area that connects the Yellowstone Ecosystem, the Continental Divide, the Gravelly Mountains, the Tobacco Root Mountains, the Belt Mountains, and the Northern Continental Divide Ecosystem allowing the potential for movement and genetic exchange among geographically dispersed wildlife populations.

Populations and distribution of fish and wildlife in the area have been influenced by past management activities that have altered habitat or caused disturbance, including agricultural activities (including livestock grazing), mining, timber management, exclusion of fire (colonization by conifers into grasslands and shrublands), recreation, urban and suburban expansion, and highway and road construction.

3.2.7 Cultural Resources

Currently in the Butte FO there are 1,174 historic properties. Of these, 538 are prehistoric sites, 506 are historic sites, eight contain both prehistoric and historic components, and 130 sites on private land were recorded due to the effects of federal projects. In addition, 63 sites have been determined to be eligible for listing on the National Register of Historic Places, and 65 sites have

been determined not to be eligible for listing. The Butte FO has two historic properties listed on the National Register: the Crow Creek Ditch-and-Flume System and the McCormick Feed and Livery sign. The Butte FO boundaries host segments of two national trail systems--the Lewis and Clark National Historic Trail and the Continental Divide National Scenic Trail.

Prehistoric sites from each of the cultural periods identified for the Northwestern Plains region have been documented in southwest Montana. The oldest occupations in the planning area come from the Paleo-Indian period, about 12,000 to 8,000 years ago.

Mining-related sites are the most common historic sites in the field office. These sites span the period from the early 1860s to after World War II, and many retain evidence of more recent development. Sites range from individual prospect pits and test trenches to concentrations of adits, shafts, waste-rock dumps, and remains of industrial structures such as mills. Placer mining sites also exist in the field office and are almost universally identified by accumulation of placer tailing (man- or machine-made piles of gravel) along a creek or river.

3.2.8 Recreation

Recreational activities available within the Butte FO include big game hunting, upland bird and waterfowl hunting, fishing, mountain and road biking, camping, backpacking, horsepacking, river rafting, canoeing and kayaking, swimming, lake boating, downhill skiing and snowmobiling, off-highway vehicle (OHV) use, picnicking, organic materials gathering, organized festivals, and viewing wildlife and landscapes.

The BLM land along the Madison, Big Hole, Jefferson, Missouri, and Yellowstone rivers offer some of the most outstanding sport fishing opportunities in the United States. The State of Montana classifies many reaches of these streams as Class I or "blue ribbon" fisheries. In addition the Butte FO manages intensively-used land and highly developed sites along Holter, Hauser, and Toston Reservoirs on the Missouri River.

3.2.9 Socio-economic/Environmental Justice

The leases being examined are located in northern and central Park County, northern Gallatin County, southern Broadwater County and northern Lewis and Clark County.

The incorporated communities closest to the various leases are Helena (with a 2009 population of 29,939), Belgrade (8,192), Livingston (5,933), East Helena (2,134), Three Forks (1,970), Manhattan (1,677), and Clyde Park (342). The 2009 population density (persons per square mile) in the four counties with the leases ranges from 34.7 in Gallatin County and 17.9 in Lewis and Clark County to 5.7 in Park County and 4.0 in Broadwater County. These figures are compared to a statewide figure of 6.7 and a national figure of 90. The leases are located in the more rural areas of Gallatin and Lewis and Clark counties. The areas in the vicinity of the leases are home to small unincorporated communities, farms and ranches, and in some cases, U.S. Forest Service land. Oil and gas production is not currently occurring in the areas where the leases are located. Approximately two-thirds of the acreage being considered is split estate.

In 2008, the percent of American Indian population ranged from 1.0 in Gallatin County to 2.1 in Lewis and Clark County. The percent of the population living below the poverty level ranged from 10.6 in Gallatin County to 11.5 in Park and Broadwater counties. No Indian reservations

are located in the vicinity of the leases. The social environment of these counties is described in detail in the Butte RMP/FEIS.

3.3 Resource Issues Brought Forward for Analysis

3.3.1 Air Resources

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

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years.

Air Quality

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

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

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

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

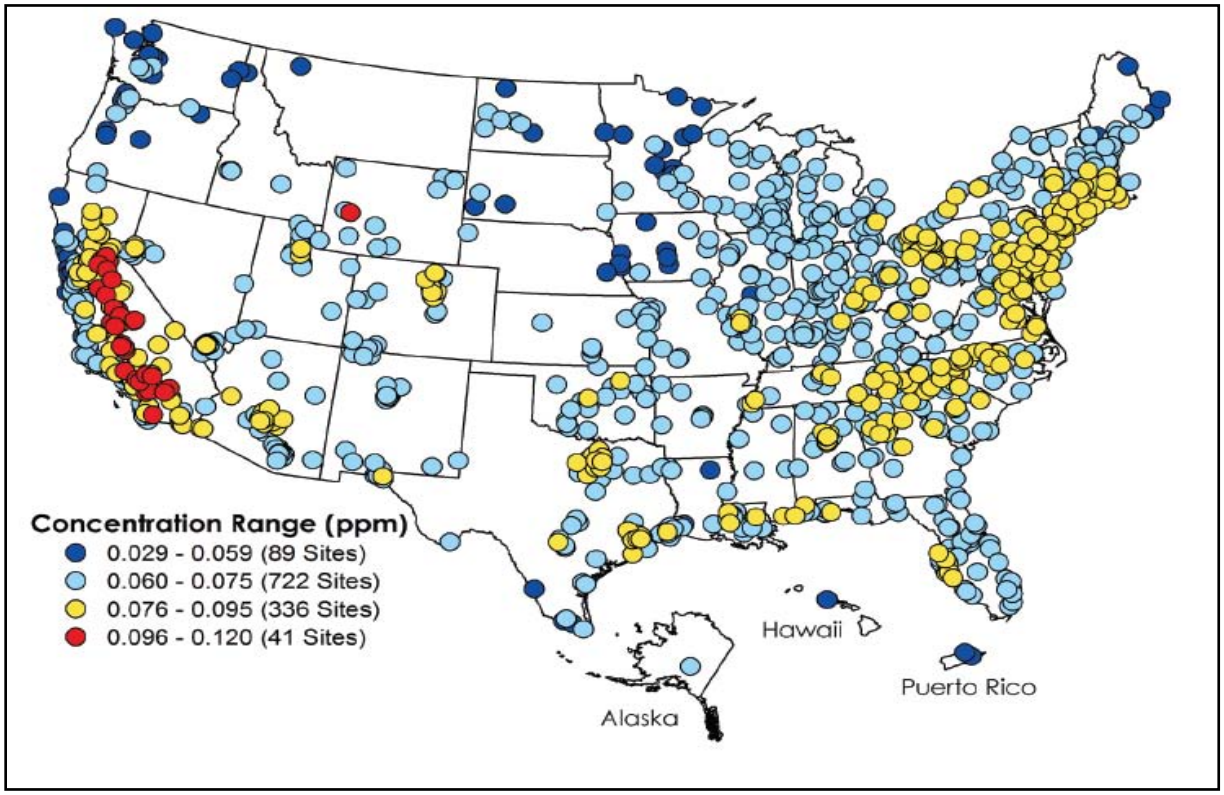


Figure A. Ozone concentrations in ppm, 2008 (fourth highest daily maximum 8-hour concentration).

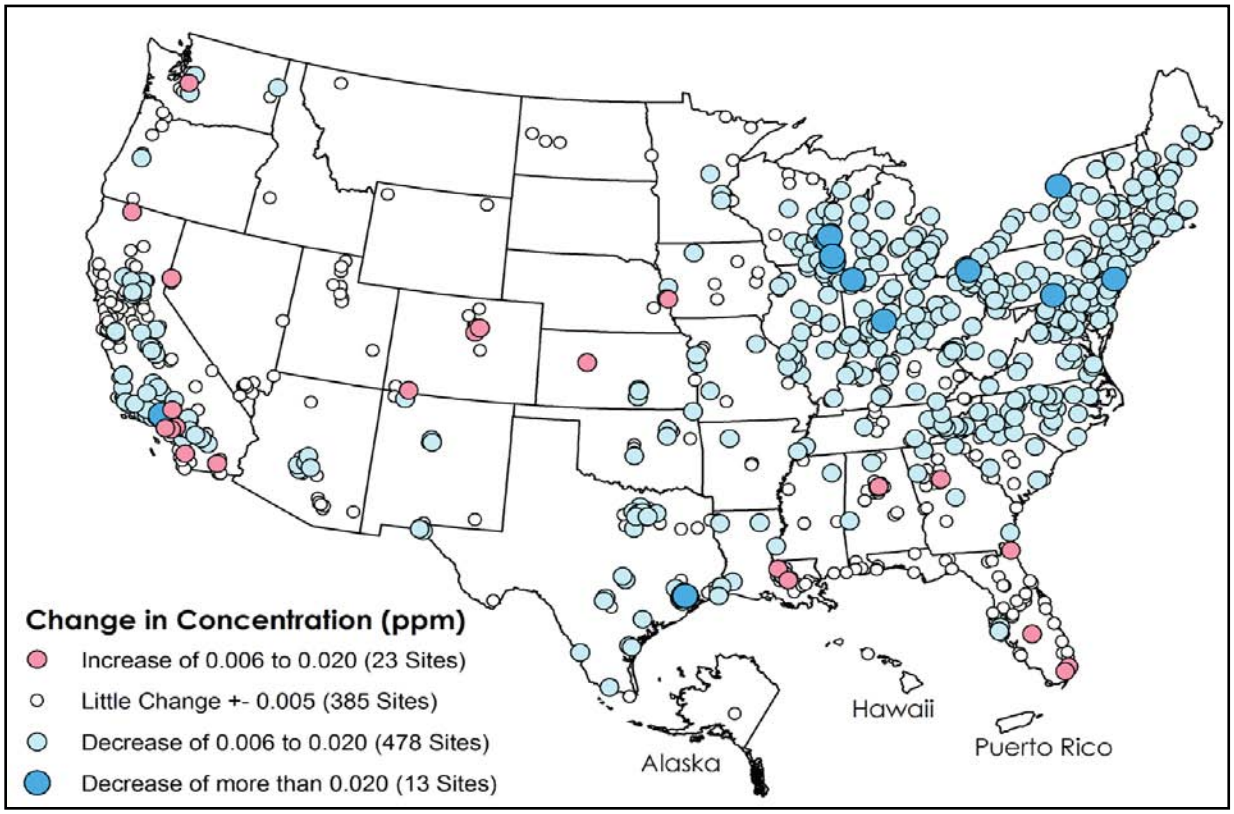


Figure B. Change in ozone concentrations in ppm, 2001-2003 vs. 2006-2008 (three-year average of the annual fourth highest daily maximum 8-hour concentrations).

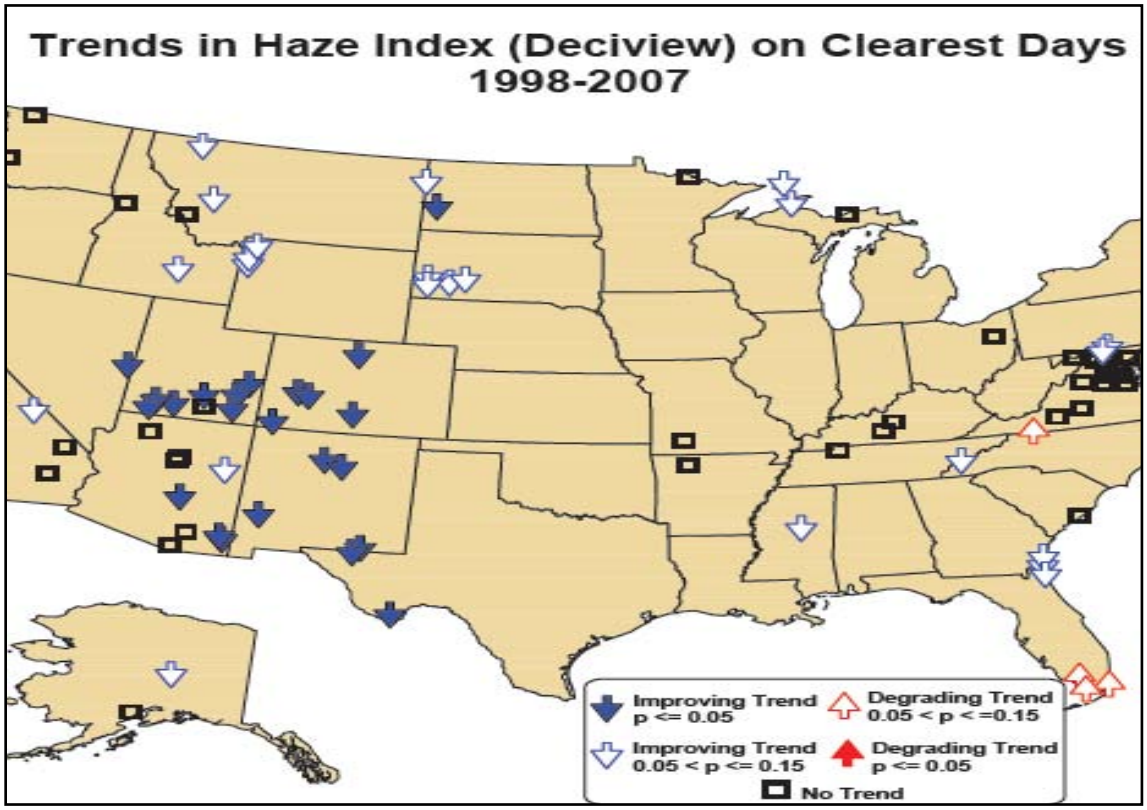


Figure C. Trends in haze index (deciview) on clearest days, 1998-2007.

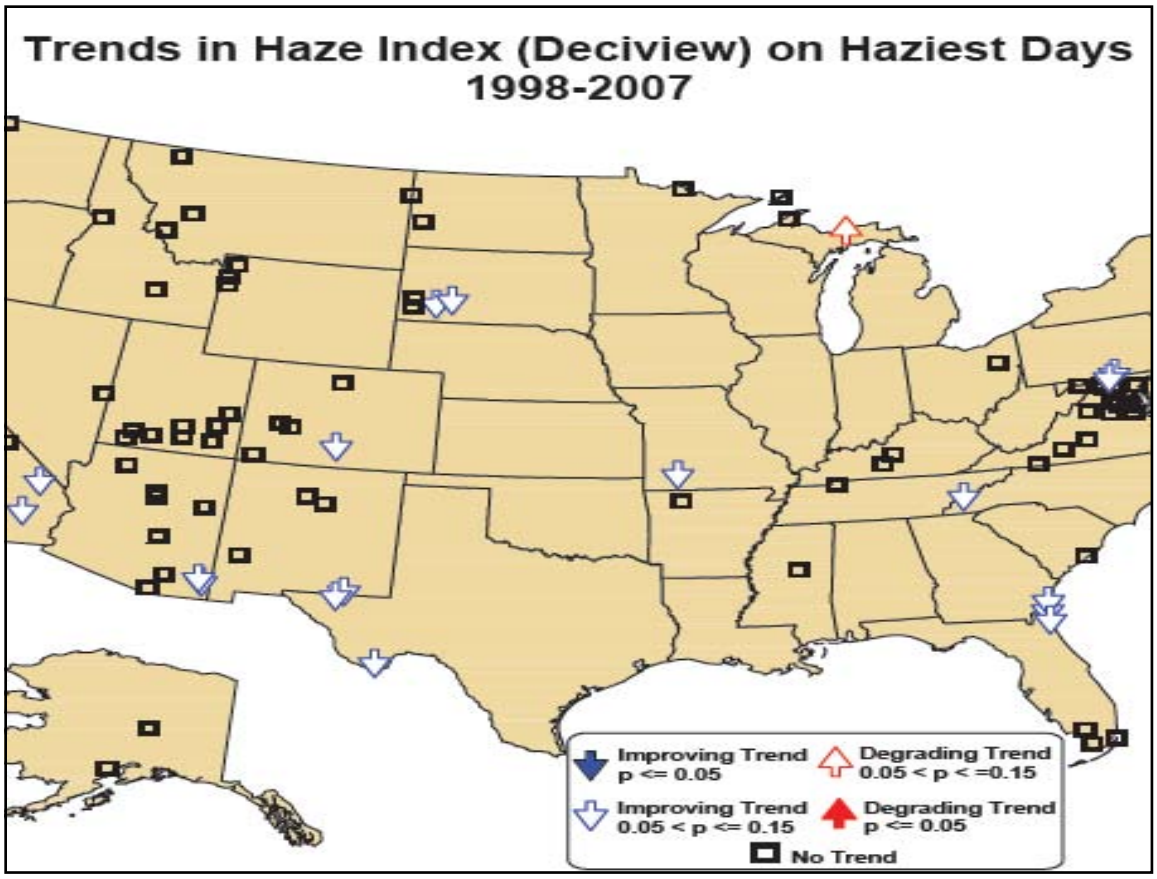


Figure D. Trends in haze index (deciview) on haziest days, 1998-2007.

The AQI data (Table 2) shows that there is little risk to the general public from air quality in the Butte FO. Between 1998 and 2008, 93 percent of the days rated "good," with six percent being "moderate." While there have been days that posed a health risk in both Lewis and Clark and Silver Bow counties, the occurrence is very rare (<0.1 percent of all records) and short-term (<1 day/year). The pollutant causing the elevated health risks in both counties has been $PM_{2.5}$. The primary air quality pollutants in the Butte FO are particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), and sulfur dioxide (SO_2).

Table 2. US EPA - Air Data Air Quality Index Report – Field Office Summary (1998-2008).							
County	State	# Days with Data	# Days Rated Good	Percent of Days Rated Good	# Days Rated Mod	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy
Lewis and Clark - 2008	MT	271	261	96	8	2	0
Lewis and Clark – 2007	MT	353	291	82	52	9	1
Lewis and Clark – 2006	MT	357	319	89	38	0	0
Lewis and Clark – 2005	MT	358	344	96	14	0	0
Lewis and Clark – 2004	MT	311	299	96	10	2	0
Lewis and Clark – 2003	MT	346	321	93	21	3	1
Lewis and Clark - 2002	MT	348	330	95	16	2	0
Lewis and Clark – 2001	MT	360	328	91	30	2	0
Lewis and Clark – 2000	MT	366	321	88	42	3	0
Lewis and Clark – 1999	MT	365	347	95	18	0	0
Lewis and Clark - 1998	MT	365	348	95	16	1	0
Lewis and Clark County		3,800	3,509	92	265 (7 percent)	24 (1percent)	2 (<1 percent)
Field Office		8,972	8,376	93	550 (6 percent)	42 (<1 percent)	4 (<1 percent)

In 2008 the lands within the Butte Field Office were in compliance with all air quality standards. The following information presents the worst case scenario because both monitoring stations are located in urban areas (Helena and Butte). In Helena, there was one day where $PM_{2.5}$ was high at both monitoring stations. This created an interesting situation. One of the stations had a very short period of record (42 days), this resulted in the "98% percentile" exceeding the 24-hour standard. However, a second station had an 82-day record which brought the "98% percentile down to only 54% of the standard. The annual $PM_{2.5}$ value for the Helena stations was only 45% of the standard. This strongly suggests that a limited period of record, and not reduced air quality, was the cause of the exceedence at the first station. In Butte, $PM_{2.5}$ is at 92.2% of the 24-hour standard and 60% of the annual standard. This data suggests that current air quality is good and that rural areas would likely fall well below applicable standards.

In Lewis and Clark County the largest contributor of $PM_{2.5}$ is fugitive dust (53 percent), followed by residential wood burning (10 percent), miscellaneous combustion (10 percent), open burning (8 percent), mineral products (8 percent), and agriculture and forestry (4 percent).

Lewis and Clark County is in non-attainment for SO_2. The primary sources of SO_2 are industrial fuel combustion (23%), off-road diesel (13 percent), miscellaneous combustion (12 percent), light duty gas vehicles and motorcycles (9 percent), highway diesels (9 percent), railroads (7 percent), commercial oil combustion (7 percent), light duty gas trucks (7 percent), and asphalt manufacturing (6 percent). Silver Bow County is also in non-attainment for PM_{10}. Primary sources of PM_{10} are fugitive dust (65 percent), mineral products (25 percent), residential wood burning (4 percent), and agriculture and forestry (3 percent).

The Butte FO includes one Class 1 Area, the Gates of the Mountains Wilderness, and is close or adjacent to several other Class 1areas, the Anaconda-Pintler Wilderness, the Bob Marshall Wilderness, the Scapegoat Wilderness, Absaroka-Beartooth Wilderness, and the Lee Metcalf Wilderness Area.

It is important to note that the presence of a source does not automatically mean that air quality is impaired. As shown above, these emissions do not necessarily lead to impaired air quality. This section is simply intended to identify those sectors which have the greatest likelihood to influence current and future air quality for this project area.

3.3.1.1 Climate Change

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

The Intergovernmental Panel on Climate Change (as cited in the Climate Change SIR, 2010) states that "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 (NOAA 2010a as cited in the Climate Change SIR, 2010). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by IPCC 2007b (as cited in the 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 (2010), earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO_2, methane, and N_2O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (USGCRP, 2009, cited in the Climate Change SIR, 2010). Current ongoing global climate change is believed by scientists to be linked to 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 (summarized in the Climate Change SIR, 2010). The buildup of GHGs such as CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires and 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, CO_2 proper may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (USEPA 2010a, as cited in the Climate Change SIR, 2010).

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

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota (Climate Change SIR, 2010) describes impacts of climate change in detail at various scales, including the state scale when appropriate. The following bullet points summarize potential changes identified by the EPA (EPA, 2008) that are expected to occur at the regional scale, where the proposed action and its alternatives are to take place. The EPA identifies this area as part of the Mountain West and Great Plains region (http://www.epa.gov/Region8/climatechange/pdf/ClimateChange101FINAL.pdf):

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

- Ecosystems would be stressed and wildlife such as the mountain line, 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 (2010). 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 in the 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 increase fire risks.
- Insect epidemics and the amount of damage that they may inflict have also been on the rise. The combination of higher temperatures and dry conditions have increases insect populations such as pine beetles, which have killed trees on millions of acres in western U.S. and Canada. Warmer winters allow beetles to survive the cold season, which would normally limit populations; while concurrently, drought weakens trees, making them more susceptible to mortality due to insect attack.

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

- Temperature increases in Montana are predicted to be between 3 to 5°F at mid-21st century and between 5 to 9°F at the end of the 21st century. As the mean temperature rises, more heat waves are predicted to occur. In the late 21st century, the number of days per year with temperatures above 100°F is predicted to be between 10 and 45, depending on the level of GHG emissions, with the largest increase in the number days over 100°F occurring in the eastern portion of the state.
- Precipitation increases in winter and spring in Montana may be up to 25 percent in some areas. Precipitation decreases of up to 20 percent may occur during summer, with potential increases or decreases in the fall. In the fall western Montana may see little change in precipitation while the northwestern portion of the state may experience 5 to 10 percent increases.
- For most of Montana, annual median runoff is expected to decrease between 2 and 5 percent, but northwestern Montana may see little change in annual runoff. Mountain snowpack is expected to decline, reducing water availability in localities supplied by meltwater.
- Glaciers are already known to be melting, and all glaciers in Glacier National Park are expected to be completely melted by 2030 or sooner.

- Wind power production potential is predicted to decline in Montana based on modeling focused on the Great Falls area.
- Conditions in Montana wetlands across much of the northern part of the state are predicted to remain relatively stable, although some wetland habitat near Cutbank is predicted to degrade to less favorable conditions.
- Water temperatures are expected to increase in lakes, reservoirs, rivers, and streams. Fish populations are expected to decline due to warmer temperatures, which could also lead to more fishing closures.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in Montana based on a 1°C global average temperature increase to be 241 to 515 percent.

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

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

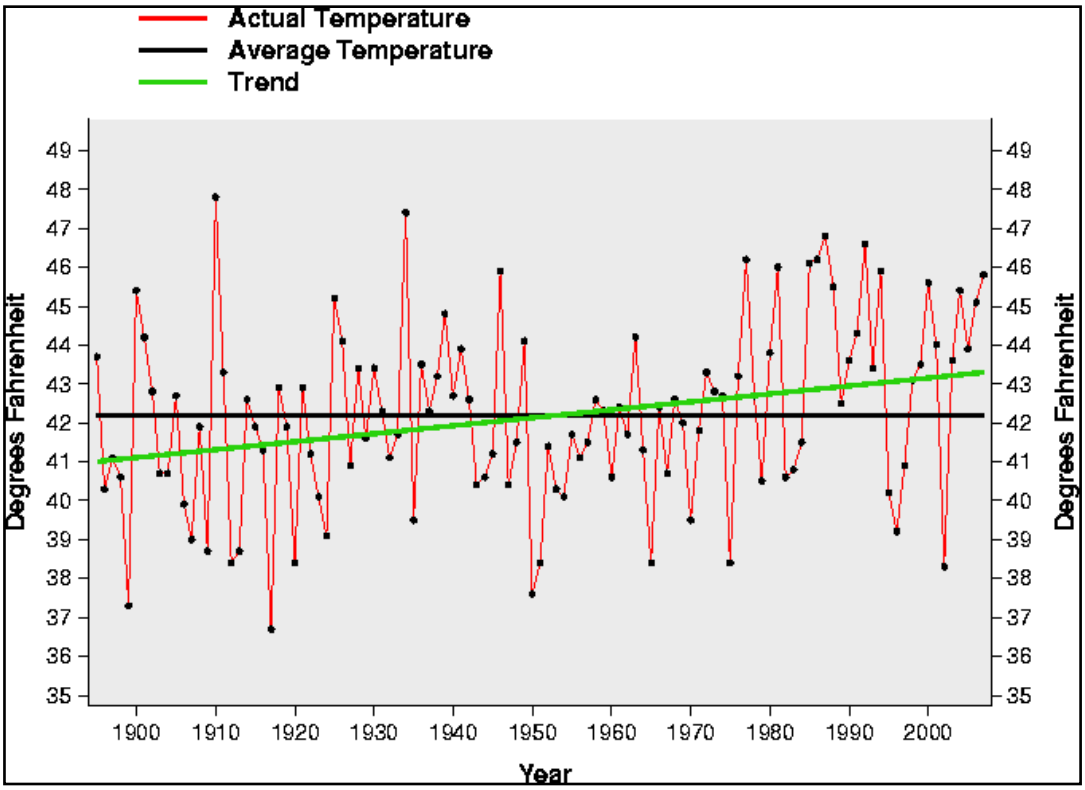


Figure E. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1895-2007. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)**

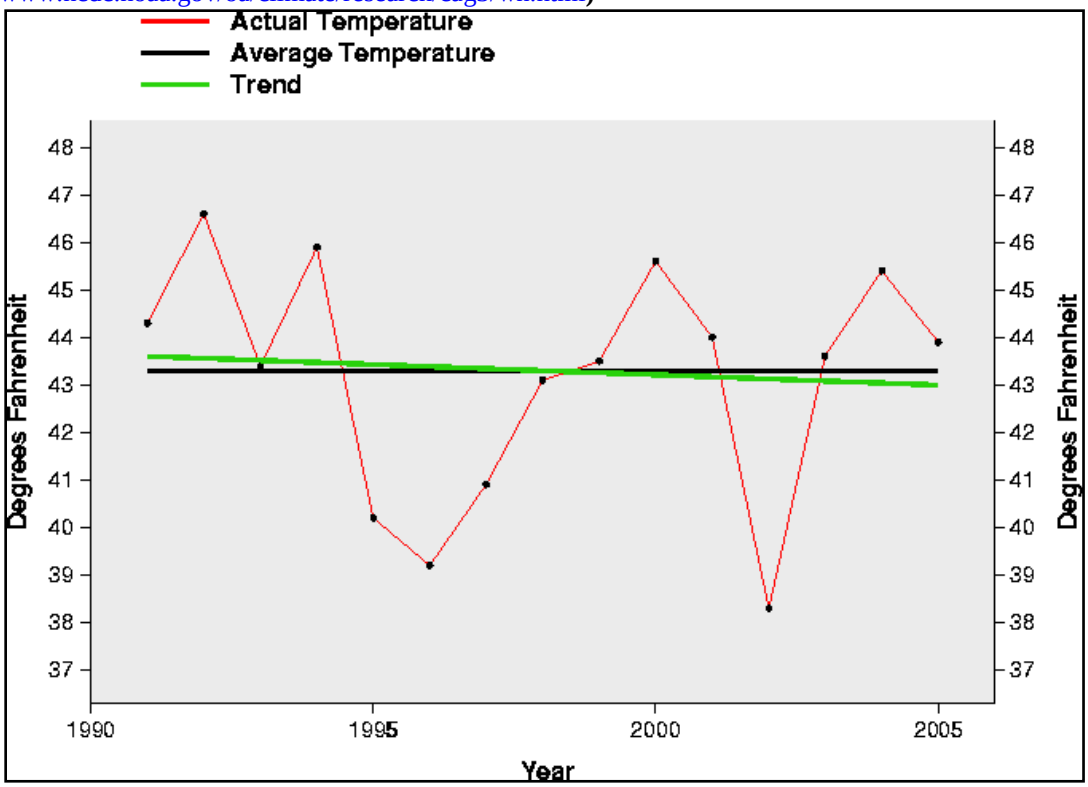


Figure F. Regional climate summary of spring temperatures (March-May) for the West North Central Region (MT, ND, SD, WY), from 1991-2005. (Source: NOAA website – http://www.ncdc.noaa.gov/oa/climate/research/cag3/wn.html**)**

3.3.2 Soil Resources

The lease area includes many soil types and complexes. These include several that are sensitive and that could be adversely impacted by oil and gas-related activities. This includes those that have high erosion ratings, those with steep slopes, and those with limitations related to construction activities and reclamation.

Because the area of disturbance related to exploration and drilling may be smaller than the lease parcels, in-depth review of proposed activities should be reviewed in subsequent applications for permitting. Over 80 inventoried soil Map units are found within the lease parcels in GLUB1. They are generally characterized as a mix of alluvium, residuum, and colluvium from limestone and argillite parent material, resulting in a variety of soil chemical and physical properties, including soil texture and structure, rock fragment content, depth and pH. Generally, the soils found in GLUB1 are coarser-textured and more alkaline than soils in GLUB2.

Over 100 inventoried soil Map units are found within the lease parcels in GLUB2. They are generally characterized as a mix of alluvium, residuum, and colluviums from shale and sandstone parent materials. As in GLUB 1, a range of soil physical and chemical soil properties is evident. Generally, soils in GLUB 2 are finer-textured, being predominantly fine-loamy and even clayey and less alkaline than soils in GLUB1.

Two primary limiting factors affecting development are present: 1) erosive soils; 2) Prime Farmland. Erosive soils are defined as those exceeding 20 percent slope on Boulder Batholith soils and exceeding 30 percent slope on non-Boulder Batholith soils. Soils with moderate to severe erosion ratings warrant concern for surface disturbance associated with oil and gas activities. Generally, most parcels (more acres) are located on the less erosive non-Batholith soils, but steep slopes generate higher erosion risk ratings. Most of the parcels are found on non-Batholith soils with a severe and moderate erosion risk, on BLM and private land. Distribution of all classes of soils presented in Table 3 is fairly even across parcels in GLUB1 and GLUB2. Acreage presented in the Table is derived from published soil survey data. Soils were inventoried at a 1:24,000 or 1:12,000 scale; therefore, actual acreage will vary and must be assessed on a site-specific basis for plans of development.

Soil Type	Rating	Landowner	Acres
Batholith	Moderate and Severe	BLM	394
Batholith	Moderate and Severe	Private	409
Non-batholith	Moderate and Severe	BLM	8278
Non-batholith	Moderate and Severe	Private	9397
Non-batholith	Moderate and Severe	State	392
Non-batholith	Slight and unrated	BLM	379
Non-batholith	Slight and unrated	Private	754
Non-batholith	Slight and unrated	State	85

Table 3. Soil Erosion Rating and Acreage

Prime Farmland is a category of land protected from development under the Food Security Act of 1985. Combinations of soil physical and chemical properties that characterize soil important for production of crops, range, and forest land, independent of land use except for urban land, are

grouped into categories considered to be Prime Farmland. Categories include Prime and Unique Farmlands, Farmlands of Statewide Importance, and Locally Important Farmland. Soil properties that define these categories are set respectively at a national, state, and local level. A total of 459 acres of some category of Prime Farmland are found within the lease parcels, and presented in Table 4.

Landowner	**Acres**
BLM	115
Private	320
State	10

Table 4. Prime Farmland

3.3.3 Water Resources

3.3.3.1 Hydrology – Surface Water Quality

The lease parcels cumulatively include approximately 118 miles of perennial or intermittent streams. Of these, 10 miles of nine streams have been identified as impaired by the Montana Department of Environmental Quality. These streams and their probable causes and sources of impairment are identified in Table 5. Of these streams, Little Prickly Pear Creek is the only one potentially impacted by oil and gas-related development based on the RFD.

Stream Name	Miles	Probable Cause	Probable Source
Deep Creek	0.2	Low flow	Diversions, loss of riparian habitat and streambank modification
Dry Creek	0.4	Phosphorous, water temperature, sedimentation	Roads, grazing and crop production
Little Prickly Pear Creek	1.8	Water temperature	Change in vegetative cover
Missouri River	0.2	Arsenic, nitrogen, sedimentation	Grazing, municipal discharge and crop production
Potter Creek	2.1	Sedimentation	Hydrostructures
Sheep Creek	1.8	NA	NA
Sixteenmile Creek	0.5	Phosphorous, sedimentation, nitrogen	Channelization and grazing
Virginia Creek	1.9	Copper, lead, zinc	Abandoned mines
Woodsiding Gulch	1.1	Phosphorous	Roads

Table 5. Impaired Streams in the Butte Field Office

Of these listed streams, Sheep Creek is an ephemeral stream and, therefore, does not have water quality issues but may deliver contaminated water to a down-gradient stream. Of the listed streams, approximately 5.4 miles are on BLM and 4.6 miles are on private land ownership.

Most parcels located on floodplains are found in GLUB2. The most significant floodplain in the affected area is found along the Missouri River in parcels MTM79010-N6 and MTM79010-3A.

Other parcels also overlay some smaller floodplains along streams, including MTM79010-8M on Deep Creek, MTM79010-8H on Greyson Creek, and a corner of MTM79010-5F on the Shields River. Several parcels also overlap other streams, which have narrower floodplains and are best described in the riparian section of this document. More detailed site-specific inventory and analyses may be required if development in floodplains is proposed.

3.3.3.2 Hydrology – Ground Water

The quality and availability of ground water varies greatly across the three-state region (Montana, North Dakota, South Dakota). Aquifers in western Montana are typically in unconsolidated, alluvial valley-fill materials within intermontane valleys. The intermontane valley aquifers often yield relatively large quantities of high-quality water to relatively shallow water wells. Because many wells are being constructed in these aquifers as development encroaches, fractured bedrock aquifers surrounding the intermontane valleys are becoming important. Residents in eastern Montana and the Dakotas commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations. The Montana Bureau of Mines and Geology (MBMG) was authorized under Montana House Bill 52 to conduct studies to characterize acquifers, including recharge rates and pathway at several sites in Montana. Parcels in GLUB1 and GLUB 2 may lie within MBMG study areas. Once data is available from the studies, it should be consulted during the consideration of plans for development (http://www.mbmg.mtech.edu/gwip/gwip.asp).

3.3.4 Vegetation Resources

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, and management boundary fence lines. Human activitites have affected vegetation communities 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.

3.3.4.1 Vegetation Communities

Rough Fescue-Bluebunch Wheatgrass Grassland

The rough fescue-bluebunch wheatgrass grassland habitat type (Mueggler and Stewart 1980) is characteristic of the majority of the grassland habitats in Analysis Area 1 (Lewis and Clark County). This habitat is one of the most highly productive grassland habitats in the Butte FO. While rough fescue and bluebunch are the most prominent species, other grasses such as Idaho fescue, Sandberg's bluegrass, and needle-and-thread grass are present. Other common species found in this habitat type include fringed sage, dotted gayfeather, and golden aster. Shrubs are not commonly found in the rough fescue-bluebunch wheatgrass habitat type.

Idaho Fescue-Bluebunch Wheatgrass Grassland

The Idaho fescue-bluebunch wheatgrass grassland habitat type (Mueggler and Stewart 1980) represents a much smaller portion of grassland habitat types in GLUB 1 and 2. Dominant species in addition to Idaho fescue and bluebunch wheatgrass include prairie junegrass, Sandberg's bluegrass, western yarrow, rose pussytoes, and Hood's phlox. Shrubs occur at a very low percentage and may include green rabbitbrush and big sagebrush.

Sagebrush Grassland
Sagebrush grasslands (Mueggler and Stewart 1980) are common in GLUB 2 (Broadwater, Gallatin, and Park counties). Dominant sagebrush subspecies that may occur within this habitat type include Wyoming big sagebrush, mountain big sagebrush, and basin big sagebrush. Dominant grass species include bluebunch wheatgrass, Idaho fescue, needle-and-thread grass, green needle grass, Sandberg's bluegrass, and prairie junegrass. A variety of forbs are common in sagebrush habitat types and may include western yarrow, rose pussytoes, and Hood's phlox.

Ponderosa Pine-mixed Grassland
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. The majority of canopy cover is provided by grasses, including rough fescue, bluebunch wheatgrass, western wheatgrass, and prairie junegrass, with forbs comprising about 41 percent of cover and 50 percent of herbaceous production.

Wetland-Riparian
Riparian-wetland areas are among the most productive and important ecosystems, comprising approximately one percent of the public lands. Characteristically, riparian-wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Some of the more common vegetative species that occur in riparian-wetland areas in the project area include bluejoint, redtop, sedges (*Carex spp.*), rushes (*Juncus spp.*), and several different species of willows, alder, chokecherry, and narrow leaf cottonwood. Healthy riparian 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 ground water recharge and base flow. Approximately 10 miles of stream reaches occur within lease parcels with BLM surface ownership. 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.

Other Disturbed Vegetation Communities
The disturbed type includes subdivision home and ranch sites, industrial, commercial, roads, powerlines, and other manifestations of human use. Historically, native rangelands in some areas were seeded with crested wheatgrass and other non-native species to improve rangeland production and restore depleted rangelands. Seeded rangelands may be found on BLM and private lands within both analysis areas.

Invasive, Non-Native Species, Noxious Weeds
Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the project area. Several invasive, non-native plant species occupy the project area including: cheatgrass, spotted knapweed, diffuse knapweed, Russian knapweed, houndstongue, Canada thistle, musk thistle, black henbane, whitetop, leafy spurge, and hoary alyssum. All of these species are aggressive invasive species that out-compete desirable vegetation for water and soil nutrients. These species may also reduce cattle grazing performance, wildlife habitat quality, and native species diversity. Cheatgrass is an invasive species well-known for completely replacing native vegetation and changing fire regimes. Noxious weed control is the responsibility of the surface management agency in cooperation

with the local weed control board. Chemical and biological control methods are utilized, with chemical control being the more predominant.

Special Status Plant Species
There are no known threatened or endangered plant species in the project area. However, two BLM sensitive plant species have been documented within close proximity of lease parcels in both analysis areas. Because sensitive species lists are updated periodically, field inspections will be required prior to any surface occupancy on lease parcels, a list of sensitive species will be provided to the lessee at the time of lease, and a report must be submitted to the BLM which documents the presence or absence of special status plant species in the area proposed for surface occupancy (Butte RMP, pg 219).

In GLUB 1, lesser rushy milkvetch (*Astragalus convallarius*) (Mincemoyer, 2005) occupies habitat on lands adjacent to a lease parcel and may also be found within adjacent lease parcels MTM96470-90, MTM96472-89, and MTM79010-1I-92. Lesser rushy milkvetch is negatively impacted in the Helena Valley by land development, which has fragmented habitat and eliminated areas of previously occupied habitat (Mincemoyer, 2005). Generally, lesser rushy milkvetch is found within grassland and open ponderosa pine woodlands in the valley and foothills in the Helena Valley, and is often found in areas containing rough fescue, Idaho fescue, and bluebunch wheatgrass. Soils associated with the plant are typically well-drained, but only limited information of soil types where the vetch is commonly found is available (Mincemoyer, 2005).

In GLUB 2, many-ribbed sedge (*Carex multicostata*) (Mincemoyer, 2005) occupies habitat on lands adjacent to lease parcels and may also be found within adjacent lease parcel MTM93699 #19. Very limited information is available on this species, and there are only a few known populations in Montana, one of which occurs in Gallatin County. Many-ribbed sedge occupies wet meadows or along springs and seeps.

3.3.5 Wildlife
3.3.5.1 Special Status Animal Species – GLUB 1
Federally Listed or Candidate Species
There are three federally listed species that occur in Lewis and Clark County (GLUB 1): grizzly bear, Canada lynx, and bull trout.

Grizzly Bear
The grizzly bear was listed as a threatened species under the Endangered Species Act (ESA) in the lower 48 states on July 28, 1975. The U.S. Fish and Wildlife Service (FWS) identified the following as factors as the need to list: (1) present or threatened destruction, modification, or curtailment of habitat or range; (2) overutilization for commercial, sporting, scientific, or educational purposes; and (3) other manmade factors affecting its continued existence. The two primary challenges in grizzly bear conservation are the reduction of human-caused mortality and the conservation of remaining habitat (USDI 1993).

Five areas in the lower 48 states currently support grizzly bear populations. These areas are located in Montana, Wyoming, Idaho, and Washington and include the Yellowstone Ecosystem, Northern Continental Divide Ecosystem, Cabinet-Yaak Ecosystem, Selkirk Ecosystem, and

Northern Cascades Ecosystem. These areas represent less than two percent of the grizzly's former range (USDI 1993).

Grizzly bear habitat across the region is best described in terms of the availability of large tracts of relatively undisturbed land that provides some level of security from human depredation and competitive use of habitat by humans (including roading, logging, grazing, and recreation) (USDI 1993). Effective habitat is often described in terms of core areas which are free of motorized access during the non-denning period. Open road and total road densities are important measurements in determining core areas and understanding the extent of habitat security for grizzly bears. Many studies have found that grizzly bears will generally avoid areas with open roads. Mace and Manley (1993) found that adult grizzly bear used habitat with open road densities greater than 1 mi/mi^2 less than expected.

Page 254 of the Butte RMP/FEIS provides more information on grizzly bear in the Butte Field Office, and the *Biological Opinion on the Effects of the Butte Bureau of Land Management Resource Management Plan on Grizzly Bears* (USDI 2009a) provides a detailed description of habitat requirements as well as threats to the grizzly bear.

Within Lewis and Clark County, there are 18,449 acres in the Northern Continental Divide Ecosystem (NCDE) Recover Zone for the grizzly bear. The NCDE Recovery Zone is an area identified in the Grizzly Bear Recovery Plan (USDI 1993) with adequate space and habitat to maintain the grizzly bear as a viable and self-sustaining species. There are no proposed lease parcels within the grizzly bear Recovery Zone.

Outside of the Recovery Zone, the FWS identified "occupied" habitat for the grizzly bear in Lewis and Clark County. This area is known as the Distribution Zone and covers 231,608 acres in Lewis and Clark County. There are roughly 4,099 acres of potential lease parcels in the Distribution Zone for the grizzly bear in Lewis and Clark County. Within the Northern Continental Divide Ecosystem, there are 67,000 acres with low road densities (<1 mi/mi^2), 84,000 acres with moderate road densities (1-2 mi/mi^2, and 148,000 acres with high road densities (>3 mi/mi^2) (USDI 2008b). The overall road density in the distribution zone of grizzly bear is 2.9 mi/mi^2 in Lewis and Clark County, higher than densities recommended by MFWP. Montana Fish, Wildlife and Parks recommends that land management agencies manage for an open road density of 1 mi/mi^2 or less in grizzly bear habitat. This is also consistent with MFWP's statewide Elk Management Plan guidelines. The lease parcels within the distribution of grizzly bear currently have approximately 10.9 miles of road (1.7 mi/mi^2).

Canada Lynx

The Canada lynx was listed as a threatened species under the ESA on April 24, 2000. The FWS identified the following as factors as the need to list: (1) present or threatened destruction, modification, or curtailment of habitat or range; (2) overutilization for commercial, sporting, scientific, or educational purposes; and (3) inadequacy of existing regulatory mechanisms.

Currently, lynx are found throughout Alaska and Canada, south through the Rocky Mountains, northern Great Lakes region, and northern New England. Resident populations currently exist only in Maine, Montana, Washington, Colorado, and possibly Minnesota (Ruediger et al. 2000).

Critical habitat for the lynx was designed in the contiguous United States distinct population segment under the ESA on March 27, 2009. In total, approximately 39,000 square miles fall within the boundaries of the revised critical habitat designation within Maine, Minnesota, Montana, Wyoming, Idaho, and Washington. In Lewis and Clark County, 169,713 acres of critical habitat is located on Forest Service managed lands. No proposed lease parcels are located within lynx critical habitat.

Outside of critical lynx habitat, there are roughly 114,102 acres of potentially suitable habitat for lynx. Most of these acres occur on the Helena National Forest to the south and east of critical habitat (78,982 acres). Of the remaining 35,120 acres, approximately 940 are located on potential lease parcels.

In Montana, lynx habitat is dominated by lodgepole pine, Engelmann spruce, aspen, subalpine fir and cool, wet Douglas fir. Snowshoe hare are the primary prey of lynx, comprising 35-97 percent of the diet. Other prey species include red squirrel, grouse, flying squirrel and ground squirrels. During the cycle when hares become scarce, the proportion and importance of other prey species, especially red squirrel, increases in the diet. However, Koehler (1990) suggests that a diet of red squirrels alone might not be adequate to ensure lynx reproduction and survival of kittens.

The Biological Assessment for the Bureau of Land Management Butte Resource Management Plan (USDI 2008b) provides a thorough description of both habitat requirements and risk factors to the Canada lynx.

Bull Trout

In July 1998, bull trout was listed as “Threatened” under the ESA and critical habitat has been proposed and finalized by the FWS. In Lewis and Clark County, critical habitat includes the Blackfoot River watershed.

Factors contributing to the decline of bull trout populations include habitat degradation and loss due to land and water management practices; isolation and fragmentation of populations by both structural (e.g. dams) and environmental (e.g. thermal or pollution) barriers; introduction of non-native fishes resulting in competition, predation and hybridization threats; historical eradication efforts; poisoning to remove non-game species; historical overharvest; and ongoing poaching and accidental harvest due to misidentification (Carnefix 2003). Small, isolated populations face increased extirpation risks as a result of direct impacts of habitat change, random demographic and environmental variation, and genetic processes (Carnefix 2003).

Montana began development of a bull trout restoration plan in 1993. The final plan, published in June 2000, identifies 115 bull trout core areas and connecting nodal habitat within twelve Restoration/Conservation Areas (RCAs); sets goals, objectives and criteria for restoration; outlines actions to meet those criteria; and establishes a structure to monitor implementation and evaluate effectiveness of the plan (MFWP 2000). The stated goal of the plan is to ensure the long-term persistence of complex (all life histories represented), interacting groups of bull trout distributed across the species' range and manage for sufficient abundance within restored RCAs to allow for recreational utilization (MFWP 2000).

The Biological Assessment for the Bureau of Land Management Butte Resource Management Plan (USDI 2008b) provides a thorough description of both habitat requirements and risk factors to the bull trout.

There are 127,400 acres of bull trout critical habitat in Lewis and Clark County. Roughly 360 acres (2 parcels) of proposed lease parcels are located in critical habitat. One parcel (approximately 39 acres) is located within ½ mile of the Blackfoot River (occupied bull trout habitat) while the other parcel (322 acres) is located approximately 1.5 miles from the river.

3.3.5.2 Federally Listed or Candidate Species – GLUB 2

GLUB 2 parcels comprise a total of 14,551 from acres in Appendix A in southern Broadwater and northern Gallatin and Park Counties. No Federally listed animal species are reasonably expected to occur in Broadwater County. Canada lynx and grizzly bear are listed Threatened in Gallatin and Park Counties. The greater sage-grouse is a Candidate species in Gallatin and Park Counties (USDI 2010). Candidate species receive no special protection under the Endangered Species Act, but are treated by BLM as Bureau Sensitive Species.

Both Critical Habitat for the lynx and suitable grizzly bear habitat are considered to be south of the I-90 corridor, and are generally part of the Greater Yellowstone Ecosystem. All lease parcels are north of the I-90 corridor. Grizzly bear and lynx may occasionally disperse north through lease areas, but habitat north of the I-90 corridor where leases are located is generally lower elevation, nonforested, and not considered suitable for these species.

Habitat for greater sage-grouse does occur on approximately 4667 acres of the parcels in GLUB 2. Data provided by MT MFWP indicates that three known leks are in close proximity (within four miles) of listed parcels. Research focused on coal-bed natural gas development has indicated that maintaining stands of sagebrush of approximately four miles around leks is necessary for sage-grouse breeding populations to persist (Walker 2007).

3.3.5.3 Sensitive Species (Lewis and Clark County) – GLUB 1

The proposed lease parcels provide habitat for a number of BLM sensitive species. Pages 255-263 of the Butte RMP/FEIS provide a description of the sensitive species found throughout the Butte Field Office. Habitat requirements and life histories for these species can be found in the MFWP Field Guide (http://fieldguide.mt.gov/default.aspx), the Butte RMP/FEIS, and numerous other sources.

Nearly half of the acres within the proposed lease parcels (roughly 7,555) are dominated by dry forest of either Douglas-fir or ponderosa pine. These forest types provide habitat for several BLM sensitive species including black-backed woodpecker, flammulated owl, northern goshawk, three-toed woodpecker, fringed myotis, long-eared myotis, long-legged myotis, northern myotis, and Townsend's big-eared bat.

The proposed lease parcels provide approximately 7,285 acres of grassland/sagebrush communities. These parcels provide habitat for BLM sensitive species that prefer or depend on grassland or sagebrush including Brewer's sparrow, burrowing owl, ferruginous hawk, golden eagle, long-billed curlew, and sage thrasher.

It's difficult to know the exact number of riparian acres found in the lease parcels but approximately 33 acres of riparian habitats are suspected to be located on the parcels. Stream and/or riparian habitats found in or near the lease parcels could provide habitat for BLM sensitive species such as the boreal toad, northern leopard frog, plains spadefoot toad and bald eagle. There are active bald eagle nests near two separate lease parcels. Wet meadows and associated adjacent forest could also provide habitat for the great grey owl.

The grey wolf, a habitat generalist, could also be found on any of the potential lease parcels (roughly 15,974 acres) in Lewis and Clark County.

Besides providing habitat for a number of BLM sensitive species, the proposed lease parcels may also provide habitat for wolverine dispersing across the landscape.

The proposed parcels provide a very small (0.2 mile) amount of occupied habitat for genetically pure or nearly genetically pure westslope cutthroat trout. However, within ½ mile of the lease parcels, there are approximately 3.58 miles of stream with genetically pure or greater than 90 percent genetically pure westslope cutthroat trout.

3.3.5.4 Sensitive Species - GLUB 2

Species designated Sensitive by Montana BLM with the potential to occur in or near the lease parcel areas in GLUB 2 are listed below.

Mammals: gray wolf, fringed myotis, long-eared myotis, long-legged myotis, Townsend's big-eared bat.

Birds (migrants only not listed): bald eagle, black-backed woodpecker, bobolink, Brewer's sparrow, ferruginous hawk, flammulated owl, golden eagle, great gray owl, greater sage-grouse, harlequin duck, long-billed curlew, McCown's longspur, mountain plover, northern goshawk, peregrine falcon, sage sparrow, sage thrasher, Sprague's pipit, Swainson's hawk, three-toed woodpecker, white-faced ibis, yellow-billed cuckoo.

Reptiles: greater short-horned lizard, milk snake.

Amphibians: northern leopard frog, plains spadefoot toad, western toad.

Fish: westslope cutthroat trout, Yellowstone cutthroat trout.

Special status animal species with stipulations specifically for them include greater sage-grouse, bald eagle, golden eagle, Swainson's hawk, peregrine falcon, ferruginous hawk, westslope cutthroat trout, Yellowstone cutthroat trout. Areas covered by stipulations for these species would encompass habitat used by other special status and non-status species.

3.3.5.5 Big Game Species - GLUB 1

Fifteen of the thirty eight lease parcels in the Butte Field Office are located in Lewis and Clark County (GLUB 1). These 15 lease parcels total approximately 15,974 acres with the majority of acres found in dry forest of either Douglas-fir or ponderosa pine or in grassland/sagebrush communities dominated by bluebunch wheatgrass and mountain big sagebrush.

Lewis and Clark County provides habitat for bighorn sheep, elk, mule deer, white-tail deer, moose and antelope. Table 6 displays the acres of habitat for each of these species as well as acres of lease parcels within these habitats.

Big Game Species	General Distribution		Core Habitat and Winter Range		Totals	
	Lewis and Clark County	Lease Parcels	Lewis and Clark County	Lease Parcels	Lewis and Clark County	Lease Parcels
Bighorn Sheep	56,658	4,602	51,923	4,941	108,581	9,543
Elk	188,606	846	612,348	15,128	800,954	15,974
Mule Deer	393,622	361	500,925	15,095	894,547	15,456
Moose	345,005	2,264	64,891	0	409,896	2,264
White-tailed Deer	384,379	9,772	56,788	39	441,167	9,811
Antelope	218,093	3,223	47,982	159	266,075	3,382

Table 6 – Acres of big game habitats in Lewis and Clark County and the proposed lease parcels.

Bighorn Sheep

Bighorn sheep in Montana are adapted to a wide variety of habitats. However, three elements, escape cover, high visibility and winter range, are essential to quality bighorn habitat and it is these elements that are degraded by plant succession or human induced activities. Escape cover is a common element in all seasonal habitats and is comprised of slopes greater than 60 percent with occasional rock outcroppings. Escape cover also has abundant open foraging areas adjacent to it. Areas with dense timber tend to receive little use. High visibility in all bighorn habitats is recognized as being important in the detection and avoidance of predators as well as access to forage and foraging efficiency. Winter range areas tend to be low elevation, south-facing slopes with escape cover in proximity to foraging areas. Winter range is defined as all escape terrain, which receives less than 10 inches of snowpack (MT MFWP 2010a).

Bighorn sheep are found in the northeastern corner of Lewis and Clark County in herds 381 and 455. Although bighorn sheep were historically present in the Sleeping Giant and Beartooth Wildlife Management areas, and numerous transplants to these areas have occurred since the late 1960s, the population on both sides of the Missouri River remains low (MFWP 2002). Bighorn sheep in this area suffer from periodic disease die-offs, vehicle collisions along Interstate 15, predation and, likely, nutritional deficiencies. The Sleeping Giant herd may be suffering from poor nutrition that is typical of low-elevation dry climates and a transplanted sheep herd that has not been able to find and utilize quality summer forage at higher elevations.

Bighorn sheep numbers in the Sleeping Giant area were roughly 72 in 1999 but after die-offs in 2001-2007, the number dropped to around seven (MFWP 2002 and MFWP 2010a). Pre-die-off numbers in the Beartooth Wildlife Management Area were roughly 300, but after a die-off in 1984, the population is estimated to be around 47 (MFWP 2010a). Threats to these herds include

disease transmission from domestic sheep, human development, road kill, and noxious weeds (MFWP 2010a).

Bighorn sheep transplants are thought to have also impacted mountain goat use of the area. The mountain goat population declined from a high of 54 in 1990 to five or less in 1997. Possible spatial and forage competition have occurred with sheep as well as the possibility of disease transmission from sheep to goats (MFWP 2002).

As seen in Table 6, 9,543 acres of bighorn sheep habitat are proposed for leasing, 9 percent of the total amount of bighorn sheep habitat in Lewis and Clark County. Of these 9,543 acres, 4,941 are located in bighorn sheep core habitat and winter range. Winter range provides areas where bighorn sheep tend to concentrate during the winter season, usually December through April. These areas are also considered part of the general distribution of sheep.

General distribution areas are locations that are predictably occupied by bighorn sheep for part or all of the sheep's year-long range. Approximately 4,602 acres of proposed lease parcels are located in the general distribution of this species.

Elk

Lewis and Clark County and the proposed lease parcels are located in the Granite Butte Elk Management Unit (EMU) (hunting districts 284, 293, 339, and 343), Birdtail Hill EMU (hunting districts 421 and 423), and Devils Kitchen EMU (hunting districts 445 and 455). Elk utilize the majority of vegetation types found within the proposed project area and are adapted to habitat in transitional areas because there is a negative correlation between levels of use and the distance from the interface between forest and non-forest communities (Skolvin 1983). This relationship is assumed to be due to elk dependence on security cover and the diversity of forage available in transitional areas. Elk are both grazers and browsers. Their forage preferences vary among seasons and years and are strongly related to forage availability.

Three areas are commonly used to discuss elk habitat: habitat effectiveness, elk vulnerability (security habitat), and winter range. Habitat effectiveness generally refers to non-hunting, summer and fall habitat conditions. Elk vulnerability specifically applies to elk security during hunting season; winter range refers to elk habitat during the non-summer and fall non-hunting period (Christensen et al. 1993). Winter range is often considered the limiting factor for elk population size; therefore, providing secure winter range and secure access to that range is crucial for maintaining elk populations.

As of 2004, elk numbers in the Granite Butte EMU had declined slightly but trend surveys showed that numbers of elk were still at EMU objectives (2,100). Loss of elk habitat or risks to elk in this EMU include development on winter ranges, loss of security habitat from timber harvest and associated roads, noxious weeds, illegal off-road motorized use, and high road densities on both public and private lands (MFWP 2005). Montana Fish, Wildlife and Parks identified increasing security habitat within this EMU as well providing input on oil and gas leasing as some of its habitat management strategies (MFWP 2005).

Winter surveys for elk have been conducted by MFWP from 1988 to the present in hunting district 343. Within this hunting district, there has been an average of 627 elk counted annually. In 2010, however, fewer elk were observed (443) compared to any year since the mid to late-

1990s (MFWP 2010b). While hunting district 343 was below population objectives established by the 2005 Elk Management Plan in 2010, it may be due to elk moving off the winter range before the survey occurred. Approximately 3,737 acres of the proposed lease parcels (23 percent of all parcels in Lewis and Clark County) are located in hunting district 343.

Montana FWP has conducted winter surveys for elk since 1989 to the present in hunting district 339. Within this hunting district, there has been an average of 817 elk counted annually. Fewer elk were observed in 2010 than in 2009, but the population is still over the objective set by MFWP (MFWP 2010c). In six of the last eight years, the number of elk observed has exceeded the population objective established for this district in the 2005 Elk Management Plan. Approximately 8,408 acres of the proposed lease parcels (53 percent of all parcels in Lewis and Clark County) are located in hunting district 339.

Elk numbers in the Devils Kitchen EMU were below objective levels between 1999 and 2004. This decline may have been due to distributional changes resulting from lack of heavy winter snow cover, high hunting pressure and past liberal hunting seasons, or movement onto private lands (MFWP 2004).

Roads can impact big game species, especially during critical phases of their life cycles. The majority of proposed lease parcels are located within two big game analysis areas, Granite Butte and Missouri River. Big game analysis areas were used to calculate road densities within blocks of winter range in the Butte FO (USDI 2008a). Page 667 of Butte RMP/FEIS provides a description of the effects of roads on big game and road densities in big game analysis areas. The Granite Butte elk analysis area contains roughly 3,737 acres. Road densities in winter range located in this big game analysis area are 1,932 acres of low road density (0-1 mi/mi^2), 3,886 miles of moderate road density (1-2 mi/mi^2) and 11,881 miles of high road density (>2 mi/mi^2) (USDI 2008a). In the Missouri River elk analysis area there are approximately 9,504 acres of lease parcels. Road densities in winter range located in this big game analysis area are 19,955 acres of low road density (0-1 mi/mi^2), 1,409 miles of moderate road density (1-2 mi/mi^2) and 2,667 miles of high road density (>2 mi/mi^2).

As seen in Table 6, 15,974 acres of elk habitat are proposed for leasing, 2 percent of the total amount of elk habitat in Lewis and Clark County. Of these 15,974 acres, roughly15,128 are located in elk winter range. Winter range provides locations where elk tend to concentrate during the winter season, usually December through April. These areas are also considered part of the general distribution of elk.

Mule deer, White-tailed deer, Moose, and Antelope

Mule deer are distributed throughout Lewis and Clark County and are found in a variety of habitat types including dry and wet forests, grassland/shrublands, and riparian habitats. There are 894,547 acres of general habitat and winter range for mule deer in Lewis and Clark County. Nearly all proposed lease parcels provide some type of habitat for mule deer, but the parcels predominately provide mule deer winter range (approximately 15,095 acres).

There are approximately 12,145 acres of lease parcels located in hunting districts 339 and 343. During the 2010 winter survey, the number of mule deer observed declined from 138 to 75 in hunting district 343 and deceased from 310 to 200 in hunting district 339. Over both hunting districts, this was a 40 percent decrease and could reflect a decline in this subpopulation (MFWP

2010d). The number of mule deer observed during the spring recruitment survey (661) was also down by roughly 140 deer compared to 2009. However, this may be within a normal range for this area (MFWP 2010e).

White-tailed deer are adapted to a variety of habitats but are often found in river bottoms and in agriculture fields. There are 441,167 acres of general habitat and winter range for white-tailed deer in Lewis and Clark County. Approximately 9,811 acres of white-tailed habitat are located in the proposed lease parcels with the majority of these acres (9,772) found in general habitat for this species (Table 6).

Moose are closely associated with dense forests and riparian habitats. There are 409,896 acres of general habitat and winter range for moose in Lewis and Clark County. No moose winter range has been identified for the lease parcels, but approximately 2,264 acres of general moose habitat is located in some of the lease localities.

Pronghorn antelope are found in open sagebrush or grassland areas. There are 266,075 acres of general habitat and winter range for antelope in Lewis and Clark County. The majority of acres, 3,223, found in the proposed lease parcels are located in general habitat for this species. A small number of acres, roughly 159, are located in winter range.

The Butte RMP/FEIS provides a description of mule deer, white-tailed deer, moose, and pronghorn antelope habitat on pages 250-251.

3.3.5.6 Big Game Species - GLUB 2

Big game common in or near the lease parcels of GLUB 2 include elk and mule deer yearlong and pronghorn antelope and white-tailed deer in the summer. All of the parcels except MTM79010-N2, just on the west side of the Missouri River, are considered to be in winter range for elk and mule deer. Moose winter range runs along the Shields River adjacent to two parcels in northern Park County. All parcels are within black bear and mountain lion range.

3.3.5.7 Dry Forest Habitats – Lewis and Clark County - GLUB 1

Nearly half of the acres within the lease parcels (roughly 7,555) are dominated by dry forest of either Douglas-fir or ponderosa pine. The Butte RMP/FEIS provides a description of dry forests on pages 231-232.

These forests provide habitat for a wide variety of wildlife species including but not limited to (not including BLM special status or big game species): black bear, mountain lion, least weasel, porcupine, raccoon, coyote, red fox, pine marten, badger, striped skunk, bobcat, mountain cottontail, northern flying squirrel, and a variety of other small mammals.

Resident bird species found in dry forest include great horned owl, northern pygmy owl, northern saw-whet owl, blue grouse, Cooper's hawk, sharp-shinned hawk, merlin, downy woodpecker, hairy woodpecker, pileated woodpecker, black-capped chickadee, mountain chickadee, red-breasted nuthatch, brown creeper, golden-crowned kinglet, Townsend's solitaire, cedar waxwing, Cassin's finch, Clark's nutcracker, and northern flicker.

3.3.5.8 Wet Forest Habitat – GLUB 1

A small number of wet forest stands, roughly 1,100 acres, are located in the proposed lease parcels. These areas are typically located adjacent to national forest lands and provide habitat for many of same wildlife species that use dry forest types as well as snowshoe hare, fisher, spruce grouse, and evening grosbeak. These forest stands also provide the only potentially suitable lynx habitat in the lease parcels. The Butte RMP/FEIS provides a description of wet forests on pages 232-233.

3.3.5.9 Riparian Habitat – GLUB 1

Approximately 33 acres of lease parcels are located within riparian habitats. Riparian habitats provide a diversity of vegetation including shrubs, grasses, forbs, and trees that supply habitat for many wildlife species. A riparian zone is the swath of land adjacent to a river or stream and is the transition area between terrestrial uplands and the stream. Riparian areas are important because they generally have better quality soils than the surrounding hill slopes and, because of their position lower in the landscape, often retain moisture over a longer period. Riparian areas support a higher diversity of plants and animals than non-riparian land. This is a result of the wider range of habitats and food types present as well as the proximity to water, microclimate, and refuge. Many native plants are found only, or primarily, in riparian areas, and these areas are essential to many animals for all or part of their lifecycle. Riparian lands also provide a refuge for native plants and animals in times of stress, such as drought or fire, and play a large role in providing corridors for wildlife movement.

Riparian habitats cover less than 1 percent of the landscape in western North America, yet they support a disproportionately large number of bird species and greater densities of birds than other forested habitats (Skagen et al. 2005). Nearly 50 percent of breeding birds in the West nest only in riparian vegetation, including 45 percent of 235 known breeding bird species in Montana (Skagen et al. 2005).

The Butte RMP/FEIS provides a description of riparian communities on pages 235-236.

3.3.5.10 Grassland and Sagebrush Habitats – GLUB 1

Sagebrush has been demonstrated to be a critical food source for several wildlife species during various seasons of the year, particularly fall, winter, and spring. Big sagebrush is a highly nutritious and digestible food source for big game animals such as mule deer. Sagebrush also provides cover (nesting, resting and escape) for a wide variety of game and non-game species (i.e., protective cover for fawns, calves, nesting birds, grouse broods, etc.) including Brewer's sparrows that nest off the ground in the foliage of big sagebrush plants. Approximately 7,285 acres of grassland and/or sagebrush communities are located on the lease parcels.

The Butte RMP/FEIS provides a description of grassland and sagebrush communities on pages 229-231.

3.3.5.11 Migratory Birds – GLUB 1 and 2

Migratory birds can be classified as canopy nesters, shrub nesters, and cavity nesters. The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC. 703-711) states that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg or product, manufactured or not. Executive Order 13186,

Responsibilities of Federal Agencies to Protect Migratory Birds (2001), addresses the need to "minimize . . . adverse impacts." This order also requires that each agency shall "restore and enhance habitat for migratory birds."

Specific surveys for neotropical birds were not done in the lease parcels. However, based on the habitats found in the parcels, it is reasonable to expect the following birds to occur (this does not include BLM sensitive bird species): Lewis's woodpecker, western flycatcher, dusky flycatcher, Hammond's flycatcher, willow flycatcher, black-headed grosbeak, common nighthawk, killdeer, ruby-crowned kinglet, red-naped sapsucker, warbling vireo, Cassin's vireo, western tanager, mountain bluebird, western bluebird, Swainson's thrush, hermit thrush, spotted towhee, white-throated swift, yellow warbler, yellow-rumped warbler, orange-crowed warbler, pine siskin, dark-eyed junco, tree swallow, violet green swallow, lazuli bunting, Bullock's oriole, grey catbird, western kingbird, vesper sparrow, lark sparrow, chipping sparrow, savannah sparrow, and white-crowned sparrow.

3.3.5.12 Priority Linkage Areas - GLUB 1

Approximately 10,229 acres of the lease parcels are located in three priority linkage areas identified by American Wildlands (American Wildlands 2009): Rogers Pass to MacDonald Pass, Clearwater Junction to Rogers Pass, and Rocky Mountain Front to Big Belt Mountains. There are only 39 acres found in the Clearwater Junction to Rogers Pass linkage area (American Wildlands 2009). This linkage area will not be discussed in detail.

Rocky Mountain Front to the Big Belt Mountains Priority Linkage Area

The Rocky Mountain Front to the Big Belt Mountains linkage area is a total of 316,031 acres and spans the Missouri River from the north end of the Big Belt Mountains through the Gates of the Mountains on the Missouri River and northwest toward Rogers Pass and the Scapegoat Wilderness Area. The area is comprised of rugged, forested mountains on the southeast, crosses through a deep river canyon with cliffs on the Missouri River, and into the foothills of the Rocky Mountain front. The area supports a variety of forested habitat depending on elevation but is dominated by ponderosa pine and Douglas fir. Lower elevations support extensive grassland areas interspersed with sagebrush.

This linkage area could function as the fastest route between the Rocky Mountain Front and the Greater Yellowstone Ecosystem.

This area currently functions as a yearlong movement corridor for grizzly bear, elk, and bighorn sheep. Much of the habitat is intact and provides an accessible area for wildlife to move from the Rocky Mountain Front into the Boulder Mountains. A major wildlife crossing occurs between the Beartooth Wildlife Management Area and near Ming Bar. Prior to construction of Holter Dam, this was a natural shallow area where animals like bighorn sheep and pronghorn crossed the Missouri River. The north end of Meriwether Canyon to the upper end of Holter Lake is another major crossing area for bighorn sheep, mountain goats, and mountain lions.

Although this linkage area is almost entirely outside of the designated distribution zone for grizzly bear (occupied habitat), it is thought that grizzlies live and move through this area to the Big Belt Mountains (American Wildlands 2009). Resident and breeding grizzlies have been documented in this linkage area.

Conservation threats identified in this linkage area include development, oil and gas exploration, livestock grazing, Interstate 15, noxious weeds, and conflict between domestic and wild sheep (disease transmission).

There are approximately 7,570 acres of lease parcels in the Rocky Mountain Front to the Big Belt Mountains Priority Linkage Area.

Rogers Pass to MacDonald Pass Priority Linkage Area

The Rogers Pass to MacDonald Pass linkage area is 211,703 acres and is almost entirely forest habitat. It extends from the town of Lincoln south through the Helena National Forest to the town of Elliston along Highway 12. The Continental Divide runs through the center of the linkage area.

The Rogers Pass to MacDonald Pass linkage connects the Sawtooth Range of the Scapegoat/Bob Marshall Wilderness with the Boulder Mountains. It also connects animals moving out of the Sawtooths that want to move east towards the Big Belt Mountains or west toward the Garnets/Flint Creek Range. On a regional scale, the linkage connects the Northern Continental Divide with the Greater Yellowstone Ecosystem.

At an average elevation of about 6,000 feet, the density of forest cover in this linkage is predominantly Douglas fir and lodgepole pine. South-facing slopes, particularly at the southern end of the linkage, are more open with interspersed areas of big sagebrush and grasslands.

This area provides a north-south movement corridor for grizzly bear, lynx, wolves, wolverine, elk, and moose. This linkage is important for north-south connectivity of wolf populations. Reports of wolf movement through the linkage date back to the mid-1980s (American Wildlands 2009).

Originally, the grizzly bear recovery program considered extending the recovery zone line all the way through Canyon Creek to Helena. It was not included but, nevertheless, indicates the importance of this linkage area for grizzly bear. Grizzly bear activity has been documented in the Nevada Mountain area, the Sauerkraut drainage, Dog Creek, and around Skelly Gulch north of Highway 12 (American Wildlands 2009).

While this is not considered excellent wolverine habitat, wolverine are moving through the area. Genetic samples from two separate male wolverines were collected near the Divide at MacDonald Pass in the winter of 2008. This area is considered occupied lynx habitat; there is good forest cover, but suitable denning habitat is harder to find. Fisher have also been documented in the linkage area. Elk are abundant, with approximately 1,000 in this area (American Wildlands 2009).

Conservation threats identified in this linkage area include development, recreation, highways, railroads, forest insects, noxious weeds, livestock grazing, and mining.

There are approximately 2,620 acres of lease parcels in the Rogers Pass to MacDonald Pass priority linkage area.

3.3.5.13 Priority Linkage Areas - GLUB 2

Maudlow Priority Linkage Area

The Maudlow linkage is rated as intermediate priority and is located between the Big Belt Mountains and Bridger Mountains. It is a pathway connecting wildlife that move north-south between the Greater Yellowstone and Northern Continental Divide ecosystems. This linkage contains primarily dry forest types, grasslands, and scattered sage communities. There are six lease parcels located within this linkage area.

Horseshoe Hills Priority Linkage Area

The Horseshoe Hills linkage is rated as low priority and is located west of the southern end of the Big Belts and the northern end of the Bridger Mountains. It provides for ungulate movement to and from these mountain ranges. The area is primarily sagebrush grassland habitat with scattered patches of limber pine and Rocky Mountain juniper, with a few patches of Douglas fir on north-facing slopes. There are three lease parcels located within this linkage area.

Absaroka to Crazies Priority Linkage Area

The Absaroka to Crazies linkage is rated as low priority and spans the Yellowstone River below the mouth of the Shields River roughly between Livingston and Springdale. It provides connectivity for local ungulate movement from the foothills into the higher elevations of the Crazy Mountains. The foothills on either side of the Yellowstone are primarily grasslands with scattered patches of juniper, limber pine, and Douglas fir. Riparian habitat along the river supports cottonwood, red-osier dogwood, and willows in fairly dense stands. There is one lease parcel located within this linkage area.

Potter Basin Priority Linkage Area

The Potter Basin linkage is rated as intermediate priority and provides connectivity for local ungulate movement east-west across Highway 89 into the foothills and higher elevations of the Crazy Mountains. Vegetation is open sagebrush grassland with a few scattered small patches of Douglas fir, Rocky Mountain juniper, and limber pine. Five lease parcels are located within this linkage area.

See the administrative record for specific lease parcels within each GLUB 2 linkage area.

3.3.5.14 Broadwater, Gallatin, and Park County - GLUB 2

Birds most commonly found along breeding bird survey (BBS) routes near GLUB 2 include western meadowlark, European starling, horned lark, vesper sparrow, red-winged blackbird, Brewer's blackbird, mourning dove, American robin, cliff swallow, black-billed magpie, and pine siskin. Birds more rarely found along the routes include loggerhead shrike, yellow-crowned warbler, merlin, dark-eyed junco, greater sage-grouse, red-breasted nuthatch (Sauer et al 2008). Habitat along the BBS routes is similar to the proposed lease parcels--primarily grassland, shrubland, agricultural land, evergreen forest, and riparian stringers in descending order.

The Missouri River flows adjacent to several parcels in GLUB 2, and numerous tributaries to the Missouri and Yellowstone Rivers occur in the action area. In addition to Yellowstone and westslope cutthroat trout, fish species commonly present include rainbow and brook trout and cutthroat trout of less than 90% or undetermined genetic purity.

Other wildlife that can be found in the lease parcel area include typical species of the region: small mammals, coyotes, foxes, skunks, badgers, snakes, arachnids, and insects.

3.3.5.14 Climate Change Effects on Wildlife

It is widely accepted by the scientific community that the earth, which has always experienced climate variation, is now undergoing a period of rapid climate change that is enhanced by anthropogenic atmospheric carbon enrichment during the past 100 years (Inkley et al. 2004). These climatic changes are accelerating and projections for the next 100 years indicate extensive warming, changing patterns of precipitation, changes in season lengths, decreasing range of nighttime versus daytime temperatures, declining snowpack, and increasing frequency and intensity of severe weather events. The many components of climate change, and especially the unprecedented rapid rate of change, are just as important as increasing temperatures.

Wildlife species are closely adapted to their environments and readily respond to climate variation. However, the climate change now underway has extensive potential to affect wildlife throughout Montana, either directly or indirectly through responses to changing habitat conditions. When considered in combination with other factors (e.g., pollution, ozone depletion, urbanization, etc.), the potential effect is even greater (Inkley et al. 2004).

Animals are showing many different types of changes related to climate. These changes include changes in ranges; abundances; phenology (timing of an event such as breeding); morphology and physiology; and community composition, biotic interactions and behavior. Although specific studies have not been completed in southwest Montana, changes are being seen in all different types of taxa, from insects to mammals, in North American as well as on many other continents (Root and Schneider 2002).

Changes in climate can influence the timing and length of seasons, which in turn can have a direct effect on plants and animals. Root and Schneider (2002) summarize evidence from 45 studies that indicate significant changes in the timing of life-cycle events for a wide range of plant and animal species in response to 20th-century climate change. These changes included trees coming into leaf sooner, grasses and forbs flowering earlier, the abundance of many insects peaking earlier, and some birds and butterflies migrating earlier. Most (80%) of the changes appeared to be linked with species' physiological tolerances.

The overall ranges of many bird species are now thought to be as much influenced directly by climate as by availability of particular habitats (Inkley et al. 2004). An example is the case of the American robin, which was found to arrive at a high-elevation site in Colorado 14 days earlier on average than they did in 1981 and for which the interval between arrival time and time at which bare ground was first observed had grown by 18 days (Inouye et al. 2000). Climate change was suspected in causing warmer winter temperatures and earlier snowmelt allowing robins to migrating from lower elevations to higher elevations earlier in the spring (Inouye et al. 2000).

An example of a shift in range can be seen with the northern expansion of the porcupine in central Canada. This extension of the porcupine's range has been associated with a warming-associated poleward shift in the location of the tree line (Root and Schneider 2002).

Although climate change is widely accepted by the scientific community and contributing to changes in wildlife behavior, range and associated habitats, the responses to climate change of biological communities, such as sagebrush, grasslands, riparian and forests, and the wildlife they support, are uncertain because many causal factors are involved and much information on specific causal relationships is missing or imperfect (ISAB 2007). Although the expected

changes in climate and the direct responses of some species to them can be predicted, there is considerable uncertainty of the final resulting communities as well as species distribution and numbers under unprecedented climatic and landscape conditions, and under unprecedented rates of change.

3.3.6 Cultural Resources

Issues regarding cultural resources on public land include the presence of prehistoric Native American sites, historic sites, and traditional cultural properties (TCP). These resources may be identified at several stages: during the leasing process, during consultation with tribal governments, during development of the lease parcel – both prior to construction, as well as inadvertently during construction.

A file search conducted by the Butte FO archeologist has yielded positive results for the following lease parcels. The file search, conducted on July 1, 2010, utilized the Butte FO manuscript files, site files, and the Montana State Historic Preservation Office (SHPO) database.

MTM 79010 - 3B	One site (unresolved[1])
MTM 79010 – 3C	Two sites (unresolved)
MTM 79010 – N2	Lewis and Clark Nat'l Historic Trail
MTM 79010 – N4	24GA0962, a possible Nat'l Register of Historic Places listing.
MTM 79010 – N3	All listed locations, 5 recorded sites
MTM 79010 – N5	All listed locations, a total of 14 recorded sites
MTM 79010 – N6	One site (unresolved)
MTM 79010 – N3	One site (unresolved)
MTM 79010 – N6	One site (not eligible)
MTM 79010 – 5F	6 sites (unresolved)
MTM 79010 – 8H	One site (unresolved)
MTM 79010 – 8L	3 sites (unresolved)
MTM 79010 – 8M	2 sites (unresolved)
MTM 79010 – QY	Sec 4; 1 site (unresolved); Sec 16; Lot 8 Stemple-Gould Historic Mining District (HMD) (eligible) Sec 17; LOTS 1 and 2 Stemple – Gould HMD Sec 17; N2NW Stemple – Gould HMD Sec 18; LOTS 1,2 Stemple – Gould HMD Sec 18; NE, E2NW Stemple – Gould HMD Sec 22; N2NE, SENE Stemple – Gould HMD
MTM 79010 – CY	Sec 7 LOTS 4-13 INCL Sec 7 E2, E2NW, SESW; Stemple-Gould HMD

1 Unresolved indicates a determination of eligibility or significance has not been made.

Table 7. Lease parcels with identified cultural resources.

Cultural resources are exempt from listing locational information. No data was available for the remaining parcels listed in this offering: MTM 79010 – N7, MTM 79010 – 7V, MTM 79010 – 8K, MTM 79010 – 3D, Presale offer MTM 93699, MTM 79010 – US, Presale offer MTM 94539, Presale Offer MTM 93698, MTM 79010 – V, MTM79010 – 1I, Presale Offer MTM

96470, Presale Offer 94672, Presale Offer 90556, MTM 79010 – DD, Presale Offer96231, and Presale Offer MTM90712.

3.3.7 Paleontology

The largest number of fossil localities have been recorded in Jefferson County, which is outside the scope of this EA. A limited number of invertebrate fossil localities have been reported in Madison formation exposures in Gallatin county. The Madison formation itself is a productive fossil-bearing unit for invertebrate fossils from the Paleozoic era. The Potential Fossil Yield Classification (PYFC) for these areas would be 3a. In rare cases, glacial outwash deposits, which are present over large areas of Lewis and Clark county and Broadwater county, have been known to contain Tertiary and Quaternary period fossils. Because their occurrence is unpredictable, the PYFC rating for these deposits would be 2.

Please refer to Volume 1, page 270, of the Butte Field Office RMP for a more detailed discussion of fossils and fossil-bearing formations in the management unit.

3.3.8 Native American Religious Concerns

The National Register of Historic Places defines a "traditional cultural property" as "… one that is eligible for inclusion the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." (National Register Bulletin #38; Guidelines for Evaluating and Documenting Traditional Cultural Properties; pg 2) The file search conducted for cultural resources did not uncover any information that would indicate a religious concern for Native American Tribes. However, consultation and the results of Class III inventories may indicate that cultural resources of religious concern may be present on lease parcels. Please refer to Section 3.3.6 for a lease parcel summary of the results of the cultural resources file search.

3.3.9 Visual Resources

Landscapes within the lease parcel areas of the Butte FO are quite variable with mountainous areas and varying densities including timbered forests to foothill slopes with patches of timber, shrubs and open parks to lower bench lands dominated with grasslands. Drainage bottoms with varying size streams and rivers are prominent with associated riparian areas. Prevailing landscape colors are greens and tans during the highest use seasons (summer and fall). These lands have been designated as VRM Class I through IV.

There are no parcel acres in VRM Class I areas.

There are approximately, 1,905 acres (GLUB 1) and 23 acres (GLUB 2) of BLM lands in VRM Class II areas. This classification means that the character of the landscape is dominated by natural features and activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes caused by management activities should repeat the basic elements found in the natural features of the existing, characteristic landscape.

There are approximately, 2,417 acres (GLUB 1) and 836 acres (GLUB 2) in VRM Class III areas. This classification means that the characteristic of the landscape has had modifications, but the level of change to the character of the landscape should be moderate. Changes caused by management activities should not detract from the existing landscape features.

There are approximately, 818 acres (GLUB 1) and 3,066 acres (GLUB 2) in VRM Class IV areas. This classification means that the characteristic landscape has had major modifications and such modifications may continue. The level of change in the basic landscape elements due to management activities is high. Such activities dominate the landscape features, but reflect basic elements of the existing landscape.

VRM is only applied to federally managed surface; therefore, the affected environment for visual resources only consists of approximately 9,064acres of the total 30,553 acres in the Proposed Action.

3.3.10 Lands with Wilderness Characteristics

There are no additional lands with wilderness characteristics other than the 6 existing Wilderness Studies Areas within the Butte FO and therefore no further analysis will occur for this resource. See page 61 of the Butte RMP/ROD.

3.3.11 Cave and Karst Resources

There are no known significant caves or karsts within the Butte FO and, therefore, no further analysis will occur for this resource. See page 49 of the Butte RMP/ROD.

3.3.12 Recreation and Travel Management

The Butte Field Office manages 49 recreation sites on BLM land only. These sites range from highly developed fee campgrounds to river access launch sites to area trailheads (THs). The Butte RMP/FEIS states that recreation sites will be managed and maintained to promote resource value protection, public safety and health, quality facilities, visitor experiences, management efficiency, and value-based returns. In order to protect these sites and user experiences, surface occupancy is prohibited within one-quarter mile of all sites in the field office. These sites and additional management direction for them is presented on pages 50 and 51 of the Approved Butte RMP/ROD.

There are about 32 lease parcel acres in GLUB 1 within three established sites (Beartooth Landing, Woodsiding TH and Sleeping Giant TH) just west of the Sheep Creek WSA and the Sleeping Giant ACEC. In GLUB 2, parcel acres within one-quarter mile of recreation sites total about 35 acres. Sites affected include Lombard, Lower Toston Dam, and Upper Toston Dam.

3.3.12.1 Special Recreation Management Areas (SRMAs)

There are nine designated SRMAs within the Butte FO that will be given high priority management. These areas and the recreation opportunities associated with them range from primitive non-motorized settings to higher developed river segments to motorized OHV riding areas. These areas and their management direction are presented on pages 51 and 52 of the Approved Butte RMP/ROD. In order to protect BLM surface land values and user experiences within these areas, controlled surface use stipulations have been established for all SRMAs. The objective of this stipulation is to protect values and prevent user conflicts and incompatible uses within in SRMAs. See Appendix A.

Approximately 3,604 total lease parcel acres are in GLUB 1 within the Sleeping Giant/Missouri River SRMA. The breakdown between BLM and private surface lands is 2,367 and 1,237

respectively. GLUB 2 lease parcel acres lie within the Uppermost Missouri River SRMA and total approximately 906 acres, of which 810 acres are on BLM surface. There are no lease parcel acres within any OHV riding areas; therefore, no further analysis will be done for travel management areas.

3.3.13 Special Designations

3.3.13.1 Wilderness Study Areas (WSA)

There are no lease parcels within any of the six WSAs; therefore, no further analysis will be conducted for the resource.

3.3.13.2 Watchable Wildlife Areas

There are no established Watchable Wildlife Areas; no further analysis will be conducted for this resource.

3.3.13.3 Wild and Scenic Rivers

The BLM has identified and evaluated various river segments to determine their potential inclusion in the National Wild and Scenic Rivers System per Section 5(d) of the Wild and Scenic Rivers Act. In the GLUB 1 area, there are about 76 lease parcel acres within one-half mile of the Missouri River. A 3.1-mile segment immediately below Hauser Dam has been recommended as preliminarily suitable in the Approved Butte RMP/ROD (pp. 60 and 61). This segment was found to be free-flowing and possess the outstandingly remarkable values for recreation, wildlife, and scenic quality. The proposed classification for the segment is Scenic. A final suitability recommendation is pending the Forest Service's study of the opposite side of the river segment. There are no lease parcels in the GLUB 2 area within one-half mile of any Wild and Scenic River under study. For additional information about Wild and Scenic Rivers refer to pages 80-83 and 308 of the Butte RMP/FEIS.

3.3.13.4 National Trails:

Continental Divide Scenic Trail

There are no lease parcels within this trail corridor. No further analysis will be done for the resource.

Lewis and Clark Historic Trail

Approximately 210 miles of the Lewis and Clark National Historic Trail traverses the Butte FO along the Missouri, Jefferson, Gallatin, and Yellowstone rivers. For additional information about this trail see page 59 and 60 of the Approved Butte RMP/ROD and pages 80 and 308 of the Butte RMP/FEIS.

GLUB 1 contains about 281 lease acres within one-mile of this National Trail (Missouri River portion from Holter Lake to Hauser Dam). GLUB 2 contains about 1,000 lease acres within one-half mile of this National Trail (Missouri River portion from Toston to Three Forks).

3.3.13.5 Scenic or Back Country Byways

There are no BLM Scenic or Back Country Byways within the Butte FO; no further analysis will occur for this resource.

3.3.13.6 Areas of Critical Environmental Concern (ACECs)

The Butte FO manages four designated ACECs totaling 70,644 acres. These areas are Sleeping Giant (11,679 acres), Elkhorns (50,431 acres), Humbug Spires (8,374 acres), and Ringing Rocks (160 acres). These ACECs were designated to protect relevant and important values. For more information about these areas see pages 53-59 of the Approved Butte RMP/ROD.

3.3.14 Lands and Realty

The lands proposed for competitive leasing of the federal mineral estate are a mix of BLM administered lands (federal surface and minerals) and private lands overlying either federal minerals or federal oil and gas. There are 16 parcels totaling 9,064 acres with full fee estate (BLM surface and federal mineral estate) under the jurisdiction of BLM. There are a total of 22 split estate parcels totaling 21,489 acres. For split estate parcels, the United States owns the minerals in the land as well as any surface entry rights. For many of the BLM parcels in GLUB 1, access is either available via existing roads or is reasonably close. The private parcels in GLUB 1 generally have more limited access. Both BLM and private parcels in GLUB 2 generally have more limited access, and in the case of many of the private parcels, there is no obvious access. Unless access to a BLM parcel is available using existing legal access, it is the responsibility of the lease holder/operator to determine appropriate access routes and make arrangements with the respective surface owners. Any access to private parcels will require arrangements with the respective surface owners. The issuance of a federal oil and gas lease does not guarantee access across adjacent private lands to access the federal oil and gas lease. It is the responsibility of the lease holder/operator to determine if legal access can be arranged through private lands.

Parcels MTM 79010-N7, and MTM 79010-1I, MTM 90556, and MTM96470, parcels near the Sleeping Giant, include lands with conservation easements with the Gallatin Valley Land Trust and the Montana Land Reliance, respectively, on the private surface. In general, these conservation easements are designed to protect open space and associated values but do not specifically prohibit oil and gas development.

Parcels MTM 79010-1I, CY,QY, DH, DU, and T6 involve lands within or adjacent to areas in which MFWP has developed block management hunting units in cooperation with private landowners in the area.

3.3.15 Forest Products GLUB 1 and GLUB 2

The 38 parcels are comprised of approximately 30,000 total acres. Of these, only 26 percent, or about 8,000 acres, is forested.

These parcels lie within the Central, West-central, and Southwestern Montana Forest regions as described by Arno (1976). The Southwestern region is both the coldest and driest of the three; it generally does not support ponderosa pine. Both the Central and Southwestern regions have a continental climate, while the West-central region has more of a modified maritime climate. The topography is mountainous in all three regions. Frost-free days vary from 70-110 in the West-central region to only 40-70 days in the Southwestern region. Forests generally occupy slopes between 5,700 feet and about 9,500 feet. Some exposed south and west facing slopes are too dry to support forest vegetation. In general, the lowest forested slopes are occupied by limber pine and/or Douglas fir. Lodgepole pine dominates forests at cooler elevations above

Douglas fir forests. Undergrowth is noticeably sparse in denser forest stands (Arno 1979, Ross & Hunter 1976).

Currently, most of the forested acres are comprised of various Douglas fir forest habitat types as described by Pfister (1977). Interior Douglas fir (*Psuedotsuga menziesii* var. *glauca* Beissn Franco) is also called Rocky Mountain Douglas fir. Rocky Mountain Douglas fir in Montana is commonly found in extensive pure stands, both even and uneven-aged. Douglas fir may also occur in mixed stands as a majority or in association with several other species. Douglas fir typically is located at mid-elevation between ponderosa pine and spruce-fir forests (Burns & Honkala 1990, Ryker and Steele 1980).

Natural fire frequency in many of these stands has been between 10 and 30 years.

Timber productivity ranges from low to moderate in these Douglas fir forests. The lowest mean square feet of basal area per acre are found on the warmest driest sites such as PSME/AGSP (Pseudotsuga menziesii/Agropyron spicatum h.t.) (e.g., 133 ft^2 +/- 38).

Undergrowth is variable among the 15 habitat types in this series. Bunchgrasses dominate the driest habitat types; blue-bunch wheatgrass (*Pseudotsuga/Agropyron spicatum*), Idaho fescue (*Pseudotsuga/Festuca idhaoensis*), and rough fescue (*Pseudotsuga /Festuca scabrella)* are examples. These three dry types account for about 29 percent of the forest acres on the parcels. Twin flower (*Pseudotsuga/Linnea borealis*) occurs on relatively moist sites and moderate slopes; it is a major habitat type in the west-central and central forest regions of Montana. This more mesic type accounts for about 22 percent of the forests found on the 38 parcels. Pinegrass (*Pseudotsuga/Calamagrostis rubescens*) occurs on moderately dry mountainsides and upper slopes. It accounts for about 14 percent of the forests found on the 38 parcels.

3.3.16 Livestock Grazing

Lease parcels occur within 20 BLM grazing allotments. The majority of the parcels that lie within BLM grazing allotments boundaries are on BLM surface with only four lease parcels located on intermingled unfenced private lands within BLM grazing allotments. Of those parcels within BLM grazing allotments, five are classified as Custodial (C) allotments, nine as Maintain (M) allotments, and six as Improve (I) allotments. BLM grazing allotments are categorized based on resource issues and allotment conditions. All of the grazing allotments are grazed by cattle; however, two of the allotments have combinations of sheep, goats, and cattle. The allotments that are currently in use have only one lessee/permittee, and five of the allotments are currently unleased. These grazing allotments have range improvements projects (RIPs) such as water developments, pipelines, troughs, and fences constructed to improve rangeland health, improve livestock distribution, provide rest, control timing and use, or totally exclude livestock from areas of interest.

3.3.17 Minerals

3.3.17.1 Fluid Minerals

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

Federal Oil and Gas Lease Information and Federal, State and Private Oil and Gas Development Activity within the External Boundaries of the Field Office

Currently there are 111 oil and gas leases covering approximately 164,780 acres in the Butte FO. There is no existing production activity on or adjacent to this lease acreage. Historical drilling activity includes 86 oil and gas test wells within the Butte FO from 1912 to 2004. 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 8. Numbers of townships, leases acres within those townships, and development activity for all jurisdictions are summarized in Table 9.

If a lease parcel receives leasing interest and oil and gas lease sales lead to lease issuance, there could be interest in exploration or development activity during the term of the lease. Exploration and development proposals in the future would require a separate environmental document to consider specific proposals and site-specific resource concerns.

	FEDERAL WELLS	PRIVATE AND STATE WELLS
Drilling Well(s)	0	0
Producing Gas Well(s)	0	0
Producing Oil Well(s)	0	0
Water Injection Well(s)	0	0
Shut-in Well(s)	0	4
Temporarily Abandoned Well(s)	0	1

Table 8. Existing Development Activity

	Broadwater County	Gallatin County	Park County	Lewis and Clark County
Number of Townships Containing Lease Parcels	7	12	6	10
Total Acres Within Applicable Township(s)	118,987	220,435	123,508	226,550
Federal Oil and Gas Minerals	26,633	15,508	7,121	77,934
Percent of Township(s)	22.4	7	5.8	34.4
Leased Federal Oil and Gas Minerals	17,445	13,354	5,454	13,925
Percent of Township(s)	14.7	6	4.4	6.1
Leased Federal Oil and Gas Minerals Suspended	2,086	245	0	0
Percent of Township(s)	1.8	0.1		
Federal Wells	0	0	0	0
Private and State Wells	0	0	Shut-in Well(s) 3 Temporarily Abandoned Well(s) 1	0

Table 9. Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels.

Geothermal
Geothermal resources are administered under the Mineral Leasing Act of 1920. The Marysville Known Geothermal Resource Area (KGRA) is approximately 15-20 miles south of the northern Lewis and Clark County parcels. This KGRA was the site of an exploratory well in 1975, but no useable resource was found. There has been little interest in the area since 1975. Boulder, south of Helena, and Corwin Springs, north of Yellowstone Park, are also KGRAs. There has been no interest in these areas.

3.3.17.2 Solid Minerals
Federal solid mineral resources are classified into three major categories: locatable minerals (e.g., base metals such as copper, lead, and zinc), precious metals (gold, silver, platinum, and palladium), limestone, marble, talc, asbestos, mica, gypsum, bentonite, and gemstones); leasable minerals (coal and phosphate); and saleable minerals (e.g., common varieties of sand and gravel and clay). Southwest and west-central Montana has a rich mineral history including the copper molybdenum deposit at Butte, several areas of historic placer gold production as well as more recent mines including the Golden Sunlight and Montana Tunnels mines. These deposits and other solid mineral resources are covered in detail in the Butte RMP (Chapter 3, page 277, and the supporting 2005 Mineral Potential Report).

Locatables
Locatable minerals are those minerals which fall under the jurisdiction of the General Mining Law of 1872 and subsequent mining laws. The group of lease parcels located in northern Lewis and Clark County include lands rated as having low to moderate potential for the occurrence of stratabound copper/silver deposits and moderate to high potential for deposits of decorative stone. Some of the land are being actively mined.

Leasables
Leasable minerals fall under the 1920 Mineral Leasing Act. In the Butte Field Office, these include coal and phosphate. There are no deposits of phosphate close to either group of lease parcels. The southern parcels in Broadwater, Gallatin, and Park counties are relatively close (20-30 miles) to the Livingston and Trail Creek Coal Fields, but these deposits are generally considered to be relatively low-quality coal. These were historically mined using underground mining methods. Both fields have very low potential for future development.

Salable Minerals
Salable minerals (mineral materials) are those common varieties of sand, stone, gravel, cinders, pumice, pumicite, and clay that may be acquired under the Materials Act of 1947. The development of salable mineral commodities such as sand and gravel are usually driven by local need and transportation costs, but the resources themselves can be found in many localities. There are no BLM mineral material sales in the general vicinity of either the proposed lease parcels.

3.3.18 Social and Economic Conditions
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. The affected local economy is made up of seven counties in Montana within the Butte FO boundaries (Broadwater, Deer

Lodge, Gallatin, Jefferson, Lewis and Clark, Park, and Silver Bow counties). The distribution of these economic effects is based on acres leased and levels of production as well as business patterns.

The seven-county local economy had an estimated 2007 population of 220,671 people. Total employment was estimated to be 157,380 part and full-time jobs; there were an estimated 87,042 households; there were 252 NAICS (North American Industry Classification System) industrial sectors represented in the local economy; average income per household was $80,056; and total personal income was $6,968 million (IMPLAN, 2007) (IMPLAN is an economic model used in the Input-Output analysis that allows the assessment of change in overall economic activity as a result of some corresponding change in one or several activities).

The local economy includes Butte, Bozeman, and Helena (three of the larger population and business center in Montana). Within this local economy, there were 1.40 people per job.

Nature of the Oil and Gas Industry in the Butte Field Office
In the nine-year period between 2000 and 2008, very little oil and gas exploration or production occurred within the seven counties (five oil wells, nine gas wells, and 12 dry holes were drilled). There was no production from any of these wells. Since drilling and production on federal minerals is anticipated in the future, relevant statewide data that will be used in this EA include the following: average wellhead prices were $64.64 per bbl (barrel) for crude oil and $5.72 per MCF (thousand cubic feet) for natural gas (IPAA [Independent Petroleum Association of America], 2008). Statewide average output per producing well was 7,144 bbl of crude oil and 14,314 MCF for natural gas (IPAA, 2008). The statewide average cost of drilling and equipping each well was $4,507,413 for oil wells, $552,867 for gas wells, and $1,311,719 for dry holes (IPAA, 2008).

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

Leasing
In 2010, there were 164,781 acres of federal minerals leased for oil and gas in the Butte FO. Currently, annual lease rental is paid on all these acres because none are held by production. Total annual lease and rental revenues to the federal government were an estimated $321,323. Federal oil and gas leases generate a one-time lease bid as well as annual rents. The minimum lease bid is $2.00 per acre; lease rental is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Typically, oil and gas leases expire after 10 years unless held by production. Annual lease rentals continue until one or more wells are drilled that result in production and associated royalties. Within the Butte FO, none of the leases are held by production. Forty-nine percent of these federal leasing revenues are distributed to the state, and the state distributes a portion back to the counties. The federal government collects an estimated annual average of about $321,000 in lease bids and rent of which an estimated $157,000 is distributed to the state/local governments.

Production
In 2007, no production from federal minerals in the Butte FO was reported (Minerals Management Service, 2008).

Local Economic Contribution
The economic contribution to a local economy is measured by estimating the employment and labor income generated by payments to counties associated with the leasing, rent, and production of federal minerals. 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 174 total jobs and $14.817 million in total employee compensation and proprietor income in the local economy (IMPLAN, 2007).

Total estimated federal revenues from federal oil and gas leasing and rents are an estimated $321,000 annually. Federal revenues distributed to the State of Montana amount to an estimated $157,000 per year. The state redistributes an estimated $39,000 to the local Montana counties with federal leases within the Butte FO boundaries per year. These revenues may help fund traditional county functions such as law enforcement, administration of justice, collection and disbursement of tax funds, provision of orderly elections, road and highway maintenance, fire protection, and record keeping. Other county functions that may be funded include primary and secondary education administration and the operation of clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

The estimated annual average local economic contribution associated with federal leases, rents, drilling, production, and royalty payments combined to support less than one total local full or part-time job and an estimated $20,000 in local labor income, respectively (IMPLAN, 2007).

Social and Environmental Justice:
The leases being examined are located in northern and central Park County, northern Gallatin County, southern Broadwater County, and northern Lewis and Clark County.

The incorporated communities closest to the various leases are Helena (with a 2009 population of 29,939), Belgrade (8,192), Livingston (5,933), East Helena (2,134), Three Forks (1,970), Manhattan (1,677), and Clyde Park (342). The 2009 population density (persons per square mile) in the four counties 34.7 in Gallatin County and 17.9 in Lewis and Clark County to 5.7 in Park County and 4.0 in Broadwater County. These figures are compared to a statewide figure of 6.7 and a national figure of 90. The leases are located in the more rural areas of Gallatin and Lewis and Clark counties. The areas in the vicinity of the leases are home to small unincorporated communities, farms and ranches, and in some cases, national forests. Oil and gas production is not currently occurring in the areas where the leases are located. Approximately two-thirds of the acreage being considered is split estate.

In 2008, the percent of population of American Indians ranged from 1.0 in Gallatin County to 2.1 in Lewis and Clark County. The percent of the population living below the poverty level ranged from 10.6 in Gallatin County to 11.5 in Park and Broadwater Counties. No Indian reservations are located in the vicinity of the leases. The social environment of these counties is described in detail in the Butte RMP/FEIS (2008).

4.0 ENVIRONMENTAL IMPACTS

4.1 Assumptions and Reasonably Foreseeable Development (RFD) 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 parcels are leased, it remains unknown whether development would actually occur, and if so, where specific facilities would be placed. This would not be determined until the BLM receives an application for permit to drill (APD) in which more detailed information about proposed activities and facilities would be clarified for particular lease parcels. Therefore, this EA discusses potential effects that could occur in the event of development.

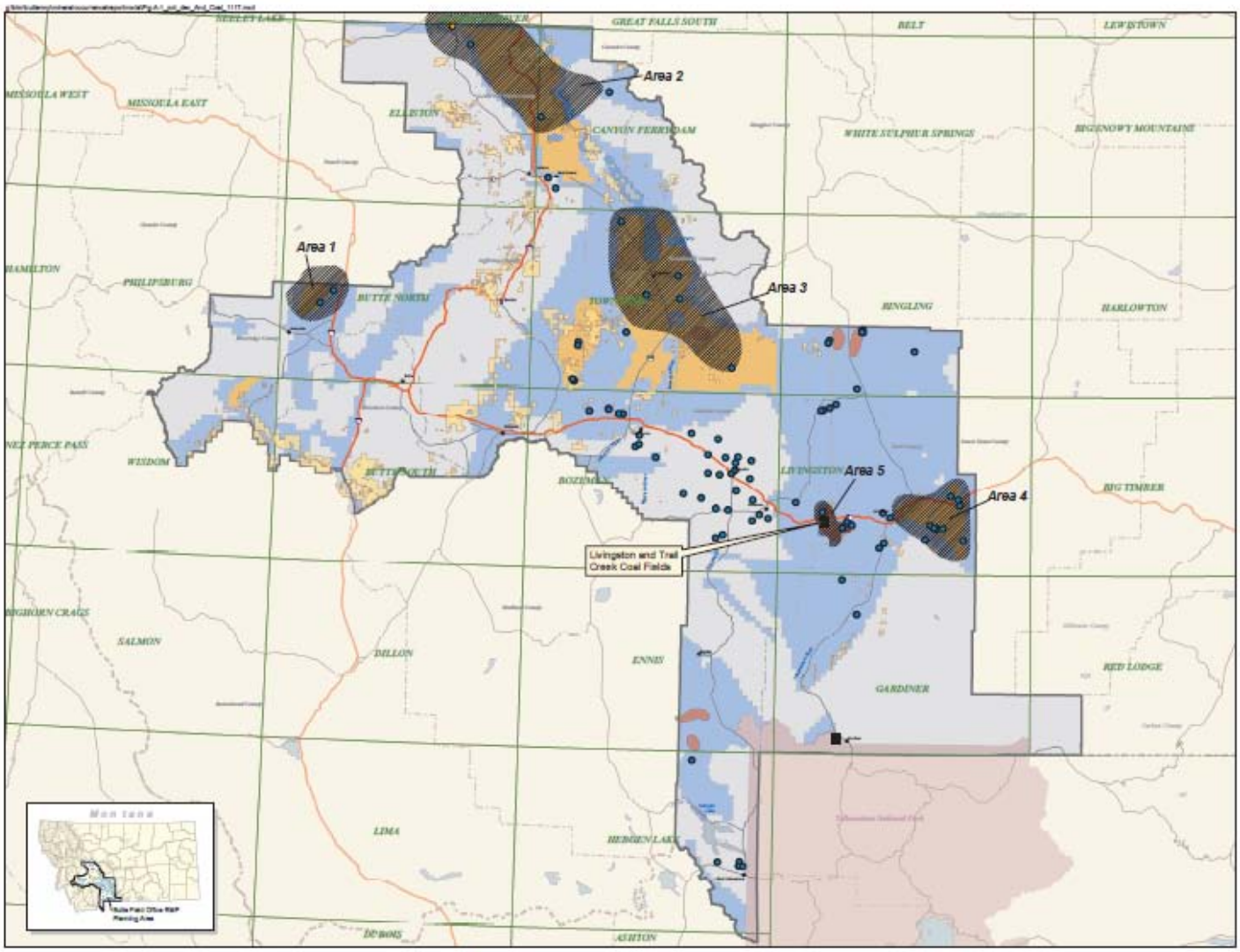
Upon receipt of an APD, the BLM would initiate a more site-specific NEPA analysis to more fully analyze and disclose site-specific effects of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of best management practices documented 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 Conditions of Approval, 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. BLM restrictions on development must be reasonable and consistent with the lease rights granted, except those required to comply with the law.

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 of the Proposed Action are identified by resource below.

The following assumptions are from the RFD developed for the Butte FO RMP. The BLM administers approximately 632,045 acres of federal minerals (for fluid minerals) available for leasing within the Butte FO. The RFD forecasts the following level of development in the Butte planning area.

The projected Butte FO total wells equal 35 wildcat wells of which 23 would be dry holes with 12 discoveries and 36 step-out wells from the discoveries. A total of 40 coalbed natural gas wells were forecast with none being federal wells. For analysis purposes, seven of the producing wildcat and step-out conventional wells were assumed to be federal wells. Individual producing areas are indicated on Map 2, which also identifies areas of moderate and low development potential.

The RFD assumes that production would be predominately natural gas. The following surface disturbance represents figures for all wells and infrastructure, including pipelines necessary to move product to existing crude oil or natural gas pipelines, regardless of mineral ownership. A total of 270.5 acres are expected to be disturbed by the dry holes during drilling and then reclaimed. For the productive wells, a total of 734.2 acres would be disturbed during drilling with all but 272.25acres reclaimed within two years.



Map 2. Reasonably Foreseeable Development Map (Figure A-1) from the Butte RMP

	Unsuccessful Wildcat Wells		Productive Wells	
	Acres Disturbed Pre-Site Reclamation	Post-Site Reclamation	Acres Disturbed Pre-Site Reclamation	Post-Site Reclamation
	Conventional Oil and Gas			
Well Sites	45.5	0	63	21.5 (2 years)
Access Roads	221	0	189.6	103.7 (2 years)
Pipelines	0	0	254.5	0 (2 years)
	CBNG			
Well Sites	1	0	7.5	5 (2 years)
Compressors, Pipelines and Access Roads	3	0	220	147 (2 years)
Total Acres Disturbed	270.5	0	734.6	272.2 (2 years)

Table 10. Total RFD Projected Direct Cumulative Surface Disturbance

The context of alternatives considered in this EA relative to these assumptions is described below.

4.2 Alternative A (No Action Alternative)

Under the No Action Alternative, the proposed parcels would not be leased and the suspended parcels would remain in suspension and would be subject to cancellation. There would be no new impacts associated with natural resources from oil and gas production on the 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. The No Action Alternative would result in the continuation of the current land and resource uses on the parcels. The four parcels previously suspended would remain in suspension and would be subject to cancellation.

Unless specifically indicated by resource area, no further analysis of the No Action Alternative is presented in the following sections.

4.3 Alternative B (Proposed Action)

The act of leasing the parcels and lifting the suspensions, would, in and of itself, have no impact on any natural resources in the Butte FO. Standard terms and conditions as well as special stipulations would apply to the lease parcels. All impacts would link to as yet undetermined future levels of lease development.

If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years) and long-term impacts are those that would substantially remain for more than five years.

This EA considers a total of 38 parcels. The parcels are located in Broadwater, Gallatin, Lewis and Clark, and Park counties. These parcels fall into two logical groups based on the analysis in the RFD scenario completed for the Butte RMP. For the purpose of this EA the groups are designated GLUB 1 and GLUB 2.

The first group of parcels is located in Lewis and Clark County (GLUB 1) in an area of very low and low development potential far enough away from the area labeled on Figure A-1 in the RMP as the "Imbricate Thrust Area" that only a very low level of exploratory activity is expected. These parcels are located in T. 12 N., R. 6 W.; T. 13 N., R 6 W.; T. 14 N., R. 2 W.; T. 14 N., R. 3 W.; and T. 14 N., R. 7 W. These six parcels under consideration are located in five different townships. Active (not currently suspended) federal oil and gas leases occur on approximately 3.1 percent of these five townships. The parcels total about 6,506 acres, approximately 5.6 percent of the five-township area.

The other parcels in Lewis and Clark County (also GLUB1) are located in or immediately adjacent to the area labeled as the "Imbricate Thrust Zone." The RFD considers development potential as low to moderate and predicts potential for production activity for this area. Drilling and development forecast in the RFD include five total wildcat wells with one discovery well. According to the RFD, the wildcat discovery would lead to a three-well gas field covering three square miles based on state-wide spacing. However, the RFD also states it is possible that one or more of the five wildcat wells would develop federal minerals, but the likelihood of a discovery from a federal well is small. Well pads would cover 3.5 acres for the short term with interim reclamation decreasing the area to 2.3 acres. Seventeen acres would be the maximum area cleared per access road which would decrease to nine acres. From this area gas transportation would likely proceed west for approximately 18 miles to a main transmission line. Wells would be 10,000 to 15,000 feet deep. These nine parcels under consideration are located in five different townships. Active federal oil and gas leases occur on approximately 8.9 percent of these five townships. The parcels total about 9,756 acres, approximately 8.5 percent of the five township-area and 4.4 percent of the Imbricate Thrust Zone Development Area identified in the Butte RMP/FEIS.

The next group of parcels lies in Broadwater and Gallatin Counties (GLUB2). These parcels all lie within Broadwater and Gallatin counties either within or adjacent to an area designated as the "Helena Salient Gas Play Zone." The parcels are predominately in an area of moderate development. Three parcels are in low and very low potential areas. The RFD scenario forecasts four wildcat wells for the area with one discovery leading to production in this area. The discovery well would lead to a three-well gas field covering three square miles. However, the RFD states it is unlikely that any federal wells would occur because of the amount and availability of federal minerals in this area. Well pads would cover 3.5 acres for the short term with interim reclamation decreasing the area to 2.3 acres. Seventeen acres would be the maximum area cleared per access road which would decrease to nine acres. Gas from this area would proceed south approximately 30 miles to a main east-west pipeline. These 15 parcels under consideration are located in 13 different townships. Active federal oil and gas leases occur on approximately 7.8 percent of these 13 townships. The parcels total about 10,486 acres, approximately 3.5 percent of the 13 township-area and 3.5 percent of the Helena Salient Gas Play Zone Development Area identified in the Butte RMP/FEIS.

The RFD forecast an additional productive area for natural gas. The parcels in northern Park County in T. 5 N., R. 7 through 9 E. and T. 4 N., R. 7 through 9 E. are in this area (GLUB2). This is in an area of low potential. The forecast for the area is a result of drilling activity that began during preparation of the RMP. All of the wells in this drilling plan are currently on file with the Montana Board of Oil and Gas Conservation with plans for final plugging and abandonment. The RFD forecast four wildcat wells with two discoveries. This would lead to a

six-well field covering six square miles. However, the RFD predicts these wells and fields would be primarily on lands with private mineral rights although one well could be a federal well. Well pads would cover 3.5 acres for the short term with interim reclamation decreasing the area to 2.3 acres. Seventeen acres would be the maximum area cleared per access road which would decrease to nine acres. Gas would move from this area in a pipeline 30 miles south to a main east-west pipeline. These five parcels under consideration are located in six different townships. Active federal oil and gas leases occur on approximately 1.5 percent of these six townships. The parcels total about 3,825 acres, approximately 2.8 percent of the six township-area.

The RFD forecast an additional productive area for natural gas. A single parcel in Park County west of Springdale ,Montana, is located in the area identified as the Crazy Mountain Oil and Gas Play Development Area. This is in an area of moderate potential. The RFD forecast a potential for four wells in this area including one deep well east of Livingston around Interstate 90 and three shallow wells exploring for Cretaceous gas resources. The RFD projects the deep well and one of the shallow wells would yield discoveries that warrant step-out drilling of two holes for each discovery. However, these wells would more than likely be on national forest l, or more likely, on lands with private mineral rights that make up about 94 percent of this potential development area. Well pads would cover 3.5 acres for the short term with interim reclamation decreasing the area to 2.3 acres. Seventeen acres would be the maximum area cleared per access road which would decrease to nine acres. Gas would move from this area by pipeline only a few miles south to tie into the main east-west pipeline that parallels Interstate 90. The parcel under consideration is located in a single township. Active federal oil and gas leases occur on zero percent of this township. The parcel totals 80 acres, approximately 0.3 percent of the township and 0.08 percent of the Crazy Mountain Oil and Gas Play Development Area identified in the Butte RMP.

Two parcels in Park County (GLUB2) are in an area of low potential. Being outside of the RFD-identified productive areas, a low level of exploratory activity is expected. These two parcels under consideration are located in a single township. Active federal oil and gas leases occur on zero percent of this township. The parcels total about 240 acres, approximately 1 percent of the township area.

4.3.1 Air Resources

Direct and Indirect Effects

Air Quality

Lifting lease suspensions on four parcels and leasing the remaining 34 parcels under the Proposed Action would have no direct impacts on air quality. Any potential effects on air quality from activities on these lease parcels would occur at such time that the leases were developed.

Current monitoring data show that the criteria pollutants fall below applicable air quality standards, which indicates good air quality. The potential level of development and mitigation (see below) is expected to maintain this level of air quality by limiting emissions. In addition to the limited level of development, 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.

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

Greenhouse Gas Emissions at the Butte FO and Project Scales

Sources of GHGs associated with development of lease parcels may 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 or lift lease suspensions. No specific development activities are currently proposed or potentially being decided upon for any parcels being considered in this EA. Potential development activities would be analyzed in a separate NEPA analysis effort if the BLM receives an application for permit to drill on any of the parcels considered here.

Anticipated GHG emissions presented in this section are taken from the Climate Change Supplementary Report for Montana, North Dakota, and South Dakota (Climate Change SIR 2010). Data are derived from emissions calculators developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, based on methods described in the Climate Change SIR (2010). Based on the RFD assumptions summarized above for the Butte FO RFD, Table 11 discloses projected annual greenhouse gas source emissions from BLM-permitted activities associated with the RFD.

Table 11. BLM projected annual emissions of greenhouse gases associated with oil and gas exploration and development activity in the Butte Field Office.

Source	BLM Projected Greenhouse Gas Emissions in tons/year from Butte FO RFD			Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e
Conventional Natural Gas	420.2	9.4	0.0	560.8
Coal Bed Natural Gas (none forecasted in RFD)	0.0	0.0	0.0	0.0
Oil (none forecasted in RFD)	0.0	0.0	0.0	0.0
Total	**420.2**	**9.4**	**0.0**	**560.8**

Under Alternative A, there would be no greenhouse gas emissions resultant from this project, because under this alternative, no additional parcels would be leased and the suspended lease parcels would remain under suspension, and would be subject to cancellation.

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

1. The proportion of each project-level action alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing (and/or lifting of lease suspensions) 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 to estimate GHG emissions for that particular alternative.

Under the Proposed Action, approximately 30,553 acres of lease parcels with federal minerals would be leased or would have lease suspensions lifted. These acres constitute 4.8 percent of the total federal mineral estate of approximately 632,045 acres identified in the Butte RMP. Therefore, based on the approach described above to estimate GHG emissions, 4.8 percent of the Butte RFD total-estimated BLM emissions of 560.8 metric tons/year would be approximately 27.1 metric tons/year of CO_2e if the parcels within the Proposed Action were to be developed.

4.3.1.1 Climate Change

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

It is currently not possible to know with certainty the net impacts from developing lease parcels on climate. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. It is therefore beyond the scope of existing science to relate a specific source of 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, as 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 would occur at the exploration/development stage.

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 may also be required as conditions of approval on permits by either the BLM or the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

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

- flare or incinerate hydrocarbon gases at high temperatures to reduce emissions of incomplete combustion;
- install emission control equipment of a minimum 95 percent efficiency on all condensate storage batteries;
- install emission control equipment of a minimum 95 percent efficiency on dehydration units, pneumatic pumps, produced water tanks;
- vapor recovery systems where petroleum liquids are stored;
- tier II or greater, natural gas or electric drill rig engines;
- secondary controls on drill rig engines;
- no-bleed pneumatic controllers (most effective and cost effective technologies available for reducing volatile organic compounds (VOCs));
- gas or electric turbines rather than internal combustions engines for compressors;
- nitrogen oxides (NOx) 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 revegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads;
- co-locate wells and production facilities to reduce new surface disturbance;

- directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores;
- gas-fired or electrified pump jack engines;
- install velocity tubing strings;
- cleaner technologies on completion activities (e.g., 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 NOx and ozone (O3).

More specific to reducing greenhouse gas emissions, Section 6 of the Climate Change SIR (2010) identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coalbed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR (2010) and summarized below in Table 12 (reproduced from Table 6-2 in the Climate Change SIR (2010)). The Table displays common methane emission technologies reported under the EPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 12. Selected Methane Emission Reductions Reported Under the EPA 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

Table 12. Selected Methane Emission Reductions Reported Under the EPA 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)
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 USEPA Natural Gas STAR Program documents. Individual documents are referenced in CC 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).

4.3.2 Soil Resources

Direct and Indirect Effects

While the act of leasing a tract would produce no impacts, the development of the leases would result in reasonably foreseeable disturbances to soils. Construction and operation of well pads,

access roads, pipelines, powerlines, reserve pits, and other facilities would result in the exposure of mineral soil, soil compaction, loss of soil productivity, and increased susceptibility to wind and water erosion. The likelihood and magnitude of these occurrences is dependent upon local site characteristics, climatic events, and the specific mitigation applied. Potential impacts would be addressed in more detail at the APD stage.

Mitigation

In the event of exploration/development, a number of measures would be taken to prevent, minimize, or mitigate impacts to soil resources. The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation. Once this topsoil is applied and vegetation is re-established the impacts would be remediated.

Reserve pits would be recontoured and reseeded as described in attached conditions of approval. Upon abandonment of wells and/or when access roads are no longer in service, the authorized officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas as described in attached conditions of approval.

Road constructions requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage. Lease stipulations regarding steep slopes and erosive soils would minimize potential impacts. For the purpose of protecting slopes or fragile soils, surface disturbance would not be allowed on slopes over 30 percent. Development on batholith soils greater than 20 percent slope would require approval of an engineering/reclamation plan that address issues of soil stability.

Additional mitigation measures and/or best management practices would be assigned once a site-specific plan of development is proposed.

Most parcels in both GLUBs have soils with a moderate to severe risk of erosion, due primarily to steep slopes. Avoidance of erosive soils for siting and design for mitigation would occur and be addressed on a site-specific basis for an APD. Depending on the scale of disturbance, it should be possible to mitigate risk of soil erosion. See Appendix A for soil erosion risk stipulations by parcel. All 38 parcels have stipulations attached to protect soil resources.

4.3.3 Water Resources

Direct and Indirect Effects

The action of leasing the parcel itself would not have any impact on water resources. The subsequent development of the leases could result in reasonably foreseeable disturbances to hydrologic resources. Stipulations regarding steep slopes, erosive soils, and activities on floodplains and in wetlands would minimize potential impacts and are applied (refer to Appendix A).

Floodplain function along streams may be affected by oil and gas activities by the physical alteration of banks, introduction of contaminants and sediments, and removal of riparian vegetation. Maintaining floodplain function is important to dissipate stream energy during high-flow events, thereby preventing flooding downstream and providing vegetative cover for shading/thermal regulation of streams and riparian habitat.

The development of the lease (construction and operation of well pads, access roads, pipelines, powerlines, reserve pits, and other facilities) would create surface disturbances that can subsequently lead to surface and ground water degradation through non-point source pollution. The likelihood and magnitude of these occurrences is dependent upon local site characteristics, climatic events, and the success of the specific mitigation measures applied. Potential impacts would be addressed in more detail at the APD stage.

Mitigation

In the event of exploration/development, a number of measures would be taken to prevent, minimize, or mitigate impacts to water resources. The same mitigation measures used to protect the soil resource would also be used to protect water resources.

The use of plastic-lined reserve pits would reduce or eliminate the risk of drilling fluid seeping into the soil and eventually reaching groundwater. Spills or produced fluids (e.g., saltwater, oil, and/or condensate in the event of a breech, overflow, or spill from storage tanks) could result in contamination of the soils onsite or offsite and may potentially impact surface and groundwater resources in the long term. The casing and cementing requirements imposed on proposed wells would reduce or eliminate the potential for groundwater contamination from drilling muds and other surface sources.

Additional mitigation measures and/or BMPs would be assigned once a site-specific plan of development is proposed. Thirty-four of the 38 parcels have stipulations attached to protect water and riparian resources. See Appendix A for riparian stipulations by parcel.

4.3.4 Vegetation Resources

At this stage (lease sale) there would be no impacts. Impacts (both direct and indirect) would occur when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis prior to oil and gas development and during the APD stage of development.

Direct and Indirect Effects

Potential impacts to native vegetation would depend on the native vegetation type, the topography of the lease parcels, soils, and the amount of precipitation. The lease parcels contain a combination of grassland, shrubland, and woodland vegetation communities. In areas of habitat disturbance with limited precipitation, it typically takes more time to reestablish desirable native vegetation. The threat of less desirable species that establish more quickly is high on most of the lease parcels. The impacts associated with well pads and roads, however, would be very site-specific and are not expected to significantly affect these habitats at the community scale. The footprint of the disturbance is also expected to be a small proportion of the habitat area.

Impacts to riparian and wetland vegetation would be limited due to the no surface occupancy (NSO) stipulations in addition to the riparian buffers on lease parcels containing riparian areas. However, any overland water flows resulting from well development on uplands containing weeds could provide a source for weed establishment within riparian areas that would compete against desirable native vegetation and may reduce the amount of habitat occupied by riparian vegetation.

Establishment of noxious weeds and invasive species is likely to occur given the relative frequency of noxious weeds and invasive species within the project area. Weed seeds may be

transported on equipment during well development, and the soil surface disturbance provides gaps where noxious weeds and invasive species may become easily established or where they may easily expand if already present.

Topography can play a role in the amount of surface disturbance that results from well and road construction. Flat areas would require little or no cut and fill, and road routes would not be constrained by topography. In hilly areas, cut and fill may be required which disturbs additional land. Roads routes could be longer to meet engineering requirements and may also require cut and fill, which would cause further disturbance and potential removal of surface vegetation. Areas lacking roads near potential drilling sites would have more disturbance, because the entire access route would need to be constructed rather than just a short spur route from an existing road. Roadways are often very prone to weed establishment transported by vehicle tires and undercarriages. Greater amounts of surface disturbance increases the impacts expected on vegetation.

Potential impacts to plants include direct mortality from earth excavation or crushing by vehicles. Adverse impacts could also result from soil erosion resulting 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 because both current and future generations would be adversely affected. Weeds which are introduced and/or promoted by soil-disturbing activities compete against and displace native vegetation.

Soil-disturbing activities directly affect species by destroying habitat, churning soils, impacting biological crusts, disrupting seedbanks, burying individual plants, and generating sites for undesirable weedy species. Weeds may be introduced during construction and operation of the lease. Dust generated by construction activities and travel along dirt roads can affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil or other chemical spills could contaminate soils so as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term impacts could be expected on vegetation resources.

Mitigation

The parcels in this lease auction are generally grassland and shrubland habitats that return to their pre-project composition and structure relatively easily and quickly. To obtain desirable rehabilitation of vegetation resources, adequate data on plant composition and cover inventory must be completed prior to any site disturbance. Parcel lessees would be required to spray weeds prior to, during, and after development and keep vehicle undercarriages clean prior to driving onto parcels to help mitigate impacts to vegetation from weed expansion.

Mitigation would also be addressed at the site-specific APD stage of development. Needed mitigation and conditions of approval would be identified and addressed during planning at the APD stage. All 38 parcels have stipulations attached to protect sensitive vegetative resources. See Appendix A for special status plant stipulations by parcel.

4.3.5 Fish and Wildlife

Energy exploration and development on public lands can cause obvious changes in wildlife habitats such as the replacement of native vegetation with well pads, roads, and pipelines.

Added to these direct losses may be the subtle or indirect habitat losses caused by behavioral avoidance of areas in and around structures associated with development. Behavioral changes may result from increased levels of traffic, noise, pollution, or human activity.

Direct and Indirect Effects
Special Status Species
Federally Listed or Candidate Species
Adverse effects of oil and gas development can be divided into six general categories: 1) direct loss of habitat; 2) physiological stress to wildlife; 3) disturbance and displacement of wildlife; 4) habitat fragmentation and isolation; 5) introduction of competitive and predatory organisms; and 6) secondary effects created by work force assimilation and growth of service industries. Collectively, the amount of disturbance may encompass a small portion of the land. However, avoidance and stress responses by wildlife extend the influence of each well pad, road, and facility to surrounding habitats.

Grizzly Bear – GLUB 1
To protect grizzly bear within the distribution zone, a timing limitation stipulation was developed that prohibits activity from April 1 through June 30 and from September 1 through October 15 (USDI 2008a).

Habitat fragmentation is significant for large carnivores requiring wide vegetative and topographic habitat diversity (Servheen 1986). Loss and fragmentation of habitat is particularly relevant to the survival of grizzly bears. Large expanses of unfragmented habitat are important for feeding, breeding, sheltering, traveling, and other essential behavioral patterns. Grizzly bears occur at low densities, have low reproductive rates, exhibit individualistic behavior and are largely dependent on riparian habitats also used extensively by people; thus, grizzly bear populations are susceptible to human influences. Grizzly bears may avoid key habitats due to human-generated disturbances or become habituated and food-conditioned, which may ultimately lead to the animal being destroyed. Historically, as human settlements, developments, and roads increase in grizzly bear habitat, grizzly bear populations became fragmented. Linkage zones, or zones of habitat connectivity within or between populations of animals, foster the genetic and demographic health of the species. The *Biological Opinion on the Effects of the Butte Bureau of Land Management Resource Management Plan on Grizzly Bears* (USDI 2009a) provides a detailed description of threats to the grizzly bear.

Oil and gas development has the potential to negatively impact grizzly bears by increasing road densities which can lead to disturbance and avoidance of an area by bears; loss of habitat by an increase in noxious weeds; increased hunter activity and potential for bear mortality; and risk of bears becoming habituated to human food sources.

Grizzly bears have the potential to occupy four lease parcels (4,099 acres) in the distribution zone of the grizzly bear. Although grizzly bears in the distribution zone would be protected against disturbance from April 1 through June 30 and September 1 through October 15, they would not be protected from increases in road densities and development due to oil and gas activities. Roads could be required to be closed when not in use, but use by companies and trespass could result in potential displacement of animals. Roads, pads, pipelines, and other associated infrastructure would result in direct loss of grizzly bear habitat. Roads also act as a conduit for weeds, which would also result in a net loss of grizzly bear habitat. Currently, road

densities in the distribution zone of Lewis and Clark County are fairly high at 2.9 mi/mi^2. Any increases in open roads would contribute to further reduction of the quality and quantity of bear habitat in the county.

Of the 4,099 acres in the grizzly distribution zone, approximately 550 acres fall under an NSO stipulation applied for westslope cutthroat trout. These 550 acres could be fully protected against any activities associated from oil and gas development.

Although resident grizzly bear are also known to occur near Wolf Creek and likely migrate to the Big Belt Mountains, the proposed lease parcels in this area are outside of the distribution zone of the bear and would not be protected with the timing limitation stipulation for grizzly bear. However, NSO stipulations in riparian zones and for bighorn sheep would help protect movement corridors and habitat for the grizzly bear.

As long as the grizzly bear remains threatened under the Endangered Species Act (ESA), this species would also be protected by a controlled use stipulation which states that the BLM may recommend modifications to exploration and development proposals to protect any threatened or endangered species and may require modification of or disapprove activities that could result in jeopardy to listed species.

Direct and indirect effects from the development of a proposed lease parcel could occur, and the effects could be low to moderate to the grizzly bear.

Mitigation Measures
To help reduce the effects to grizzly bear within the distribution zone, food storage regulations would be followed to minimize bear-human conflicts, and all new roads would be closed when not in use.

Grizzly Bear GLUB 2
All parcels of GLUB 2 are outside of the grizzly distribution zone, so no stipulations are applied at this time to any of these parcels for this species. Occasional individual grizzly bears may disperse and seek new territory in the vicinity of a lease parcel and avoid the area if development were to occur. If a grizzly bear were found near a parcel, the controlled use stipulation under the ESA mentioned above would apply, and modifications to proposals could be made.

Canada Lynx GLUB 1
No proposed lease parcels are located within lynx critical habitat, and only a small number of acres, approximately 1,100, of potentially suitable habitat are located on the lease parcels. There are no specific stipulations identified for the lynx, but like the grizzly bear, this species would be protected by the threatened, endangered and special status species controlled surface use stipulation that protects listed and special status species. Half of the 1,100 acres (550) would be protected with a NSO stipulation applied for westslope cutthroat trout. The remaining 550 acres would have timing limitations applied for big game and grizzly bear which would prevent lynx in the area from disturbance during the winter and spring months.

Direct and indirect effects from oil and gas development of the proposed lease parcels would be expected to be low for the Canada lynx.

Canada Lynx GLUB 2
Lynx habitat does not occur on or near any of the GLUB 2 parcels. An occasional individual lynx may disperse or travel near a lease parcel and avoid the area if development were to occur. Lynx would not be expected to take up residence near any GLUB 2 parcel.

Bull Trout GLUB 1 (Not applicable to GLUB 2)
Two proposed lease parcels totaling, roughly 360 acres, are in critical habitat for bull trout. Neither of these parcels has bull trout streams flowing through them, but one parcel (39 acres) is located within one-half mile of the Blackfoot River; approximately 18 acres would be protected from leasing with a NSO stipulation for bull trout. Although the other parcel located in critical habitat for bull trout is over one mile from the Blackfoot River, roughly 144 acres would also be protected with a NSO stipulation due to westslope cutthroat trout found in an adjacent stream. In total, approximately 198 acres in bull trout critical habitat would be available for oil and gas leasing. All development associated with oil and gas leasing would be further than one-half mile from a bull trout stream or tributary. Direct and indirect effects to bull trout would be expected to be low from leasing of these parcels.

Sensitive Species – GLUB 1
Breeding, foraging, security, and migration habitats for BLM sensitive species could be directly lost from oil and gas activities due to the construction of wells, well pads, roads, pipelines, powerlines, and buildings. Construction and implementation activities could also cause sensitive species to be displaced, preventing use of previously occupied habitats. Access roads could disturb and displace sensitive species, especially during crucial seasons such as breeding or overwintering.

Within dry forest habitats, approximately 3,570 acres would be protected from oil and gas development with NSO to protect bighorn sheep core habitat and in a wildlife management area. The remaining 3,985 acres in this habitat type would have timing limitations for big game that would protect wildlife found in dry forest habitats from disturbance during the winter and spring. These stipulations would help protect sensitive species found in and adjacent to the lease parcels. All sensitive species found in dry forest habitat are either bat or avian species. Direct and indirect effects to these sensitive species would be expected to be low. The exceptions are the northern goshawk and flammulated owl which could experience moderate impacts from disturbance and loss of habitat due to oil and gas development of a parcel.

Approximately 2,180 acres of sagebrush/grassland habitat for BLM sensitive species would be protected with NSO stipulations applied for bighorn sheep, bull trout, bald eagle, and class 1 fisheries. The NSO would protect habitat and prevent disturbance for those species found in sagebrush and grasslands including Brewer's sparrow, burrowing owl, ferruginous hawk, golden eagle, long-billed curlew and sage thrasher. Direct and indirect effects to these sensitive species would be expected to be low to moderate from oil and gas activities in a lease parcel.

The exact number of acres of riparian habitat in the lease parcels is not known, but it is estimated to be 33 acres. All riparian habitats would have a NSO stipulation applied. The width of the riparian area protected with the NSO would depend on the type of stream, as outlined on pages 21-22 of Butte ROD (2009b). Riparian vegetation would be protected and would continue to provide forage, breeding, and dispersal habitat for all sensitive species that use these areas.

Activity on roads and in and around wells, however, could still cause direct mortality to dispersing boreal toads. Habitat around bald eagle nest sites would by protected with a NSO stipulation within one-half mile of the nest and a timing limitation that prevents disturbance from February 1 through August 31 within one mile of a nest site. Direct and indirect effects from oil and gas activities to those sensitive species that depend on or use riparian habitat would be expected to be low.

All streams that are occupied with genetically pure or greater than 90 percent genetically pure westslope cutthroat trout would be protected with a one-half mile NSO stipulation. Roughly 550 acres adjacent to westslope cutthroat trout streams would be fully protected from oil and gas activities. Although cumulative impacts at a watershed level can have serious detrimental effects to aquatic habitats and fish species, direct and indirect effects from oil and gas activities on nearly pure or genetically pure westslope cutthroat trout would be expected to be low.

Sensitive Species – GLUB 2

While there would be no direct impacts from leasing the proposed parcels, impacts to special status species could occur from subsequent development of leased parcels in the future. Sensitive mammal species would likely avoid areas of development and be deprived of the amount of habitat involved.

Reptiles (greater short-horned lizards and milk snakes) could be crushed by equipment or have burrows crushed, and direct mortality and/or loss of reproductive success could be a result. Amphibians dispersing to new areas could also be victims of accidental direct mortality from equipment; however, the NSO stipulation for riparian areas would likely prevent direct mortality in their home ranges.

Similarly, NSO stipulations for riparian areas and cutthroat trout habitat should prevent negative impacts to these species. However, some tributaries used for spawning by cutthroat trout may not be recognized as habitat and would be under the NSO riparian stipulation rather than the NSO within one-half mile stipulation covering their recognized habitat. Westslope cutthroat trout do not occur near any parcels in the GLUB 2 area. A portion parcel MTM79010-5F is within one-half mile of a known Yellowstone cutthroat trout population. Development would only be permitted on the southeast quarter of this parcel.

The following parcels are within four miles of known greater sage-grouse leks: MTM93698, MTM94539, MTM93699, MTM79010-V, and MTM79010-US. Additionally, the following parcels are within suitable greater sage-grouse habitat: MTM79010-5F, MTM79010-T6, MTM79010-N3, MTM79010-N4, MTM79010-N7. No surface occupancy and timing limitation (TL) stipulations would be in effect for these parcels. However, the NSO stipulation is for within one-quarter mile around known leks. Research has indicated that a one-quarter-mile buffer may not be adequate to ensure lek persistence over time (Walker 2007). Lek attendance and the reproductive success of greater sage-grouse could be reduced as a result.

Mitigation

Parcel-specific stipulations can be found in Appendix A. These include NSO, TL, and controlled surface use (CSU) for special status species. Further information on general Butte FO lease terms and stipulations can be found in Table 23 and Appendix H of the Butte RMP/FEIS.

Development activities can be displaced by up to 60 days and/or 200 meters if justified by wildlife concerns such as special habitat, hunting season access, block management areas, etc, through additional analysis.

Offsite mitigations such as habitat restoration in other locations could be developed if needed, depending on the site and duration of proposed developments. Other types of mitigations could be developed depending on the details of any APDs received.

Big Game GLUB 1

Big Game Species	General Distribution		Core Habitat and Winter Range		Stipulations	
	Lewis and Clark County	Lease Parcels	Lewis and Clark County	Lease Parcels	NSO	Timing Limitation
Bighorn Sheep	56,658	4,602	51,923	4,941	5,417	4,126
Elk	188,606	846	612,348	15,128	6,302	9,672
Mule Deer	393,622	361	500,925	15,095	6,302	9,154
Moose	345,005	2,264	64,891	0	144	2,120
White-tailed Deer	384,379	9,772	56,788	39	3,669	6,142
Antelope	218,093	3,223	47,982	159	1,716	1,706

Table 13. Acres of big game habitat in Lewis and Clark County, the proposed lease parcels and protective oil and gas stipulations.

Bighorn Sheep

Industrial developments such as hard rock mining, oil and gas development and exploration, and electrical transmission lines have resulted in direct loss of habitat, deterioration of habitat, reduced bighorn populations, displacement to less productive habitats, and fragmentation of existing habitats (MFWP 2010). Bighorn sheep are much more susceptible to stress caused by disturbances than most other ungulates (MacArthur et al. 1982). Elevated stress levels in sheep have been linked to depressed immune response, loss of condition, reduced lamb survival, and elevated mortality rates.

As seen is Table 13, all bighorn sheep habitat is protected with either an NSO stipulation or timing limitation. Approximately 5,417 acres (57 percent of bighorn sheep habitat in the lease parcels) would have NSO and completely protect bighorn sheep in “core” and winter sheep habitat. All bighorn sheep habitat in core habitat (4,941 acres) would be protected with the NSO for bighorn sheep, and an additional 476 acres within “general” sheep habitat would be also be protected with a NSO because these areas are located within a wildlife management area.

The remaining 4,126 acres of bighorn sheep habitat in the lease parcels are located in what is considered "general" habitat where sheep can be found during some time of the year. These acres would be protected through a timing limitation that would restrict activity between November 1 and June 30. The stipulation would protect bighorn sheep in the rut as well as sheep on the winter range and during lambing. Although oil and gas development on the lease parcels could remove habitat for bighorn sheep and cause disturbance during the summer season, the direct and indirect effects to this species would be expected to be low to moderate.

Elk

Environmental disturbance can affect use of home range by large, free-ranging ungulates. Elk seasonal and annual use of range and habitat were surveyed at Line Creek in southcentral Montana from 1988-1991 before, during, and after installation of an oil well (VanDyke 1996). Use of range by elk during the post-drilling period in autumn was different from use during drilling and pre-drilling periods, but use of range also changed during the same periods in another local population of elk not subjected to disturbance from oil drilling. The use of locations containing or adjacent to the well site declined during the post-drilling period, but seasonal and annual sizes in range and boundaries for the population were similar in all periods. Distances between individually marked elk did not differ across periods, suggesting that drilling did not affect the social stability of elk. Use of forest habitats in autumn increased after the initiation of drilling. Results suggested that elk compensated for site-specific environmental disturbance by shifts in use of range, centers of activity, and use of habitat rather than in the abandonment of range (VanDyke 1996).

Security habitat occurs throughout the yearlong range and throughout the winter and parturition ranges in Lewis and Clark County. Elk security habitat are areas that, because of geography, topography, vegetation, or a combination of these features, hold elk during periods of stress, especially during the hunting season. Security habitat is typically defined as nonlinear blocks of hiding cover greater than a minimum size (250 acres) and a specific distance from disturbance sources (one-half mile from open roads) (USDI 2008a). Elk security habitat is important to minimize stress to elk related to human disturbance as well as providing fair chase during big game hunting. The most common and detrimental impact to elk security cover is open roads.

Roads can impact big game species, especially during critical phases of their life cycle. Disturbance and displacement of big game species can increase stress and energy demands on animals during critical periods such as the winter, breeding, or calving seasons and reduce survival, especially during the winter and spring months. Motorized use of roads can produce disturbance that prevents full utilization of available habitat. The loss in potential use of habitat can exceed 50 percent when open road densities exceed 2 mi/mi^2 (Christensen et. al. 1993). During the hunting season, the probability of bull elk survival in proximity to open roads is much lower than in areas away from roads. Road kill causes direct mortality of elk, and major interstate freeways may act as movement barriers in some cases.

Road densities can be a good indicator of security habitat for big game, especially elk. The proposed lease parcels are predominately found within two big game analysis areas, Granite Butte and Missouri River (USDI 2008a). The big game analysis areas are blocks of elk winter range where road densities were calculated during the Butte RMP/FEIS. Roughly 3,737 acres of the proposed lease parcels are located in the Granite Butte big game analysis area. Road densities in the Granite Butte area are high with 11,881 miles of high road density (>2 mi/mi^2)

and only 1,932 acres of low road density (0-1 mi/mi^2). In contrast, approximately 9,504 acres of lease parcels are found in the Missouri River big game analysis area where road densities are predominately low, 19,955 acres of low road density (0-1 mi/mi^2) and 2,667 miles of high road density (>2 mi/mi^2).

An increase of roads and other associated development due to oil and gas activities in the Granite Butte area would continue to degrade elk habitat that is currently at risk from development on the winter range, high road densities, noxious weeds, off-road vehicle use, and loss of security habitat due to vegetation management.

Increasing roads and other associated development due to oil and gas activities in the Missouri River big game analysis area would reduce the quality and quantity of habitat on elk winter range in an area with fairly low road densities.

Much of the elk habitat located in the lease parcels is also located in habitats for other species and would have stipulations applied for those species. Although the only specific stipulation that protects elk are timing limitations in winter range and calving areas (USDI 2009b), 6,302 acres would be fully protected from oil and gas development with a NSO applied for bighorn sheep, bald eagle, fish, and wildlife management areas. An additional 7,655 acres would have more restrictive timing limitations due to bighorn sheep and grizzly bear. The big game timing stipulation of December 1-May 15 would be applied to the remaining 2.017 acres. In the event that other stipulations are not applied, all lease parcels located in elk winter range (15,128 acres) would still have the big game timing limitation stipulation applied.

The stipulations for mule deer habitat would be the big game timing limitation of December 1-May 15 on 2,017 acres, the bighorn sheep timing limitation of November 1-June 30 on 4,126 acres, grizzly bear and big game timing limitations of September 15-October 15 and from December 1–June 30 on 3,529 acres, and NSO for other species (bighorn sheep, bald eagle, class 1 fishery, wildlife management area, bull trout, and westslope cutthroat trout) on 6,302 acres.

Development due to oil and gas activities could result in a direct loss of habitat for elk because of roads and well pads as well as through an increase in invasive weeds. Oil and gas activities could also result in both short and long-term disturbance depending on the type and location of development. There could be the potential for elk to be displaced and change their use of an area due to these types of activities. Protection of 6,302 acres through the use of NSO would protect against loss of habitat in these areas and prevent additional disturbance to elk. The use of timing limitations would protect elk on approximately 9,672 acres from disturbance during the winter season. Applying the bighorn sheep and grizzly bear timing limitations on 7,655 acres would also help to protect elk calving habitat.

The direct and indirect effects to elk from the leasing of oil and gas parcels in Lewis and Clark County would be expected to be low to moderate.

Mule deer, White-tailed deer, Moose, and Antelope

Like elk, mule deer, white-tailed deer, moose and antelope are all susceptible to disturbance by increases in roads and other development associated with oil and gas activities. These species can also be directly impacted by the inevitable loss of habitat from roads, well pads, and an increase in noxious weeds. The same stipulations for bighorn sheep, grizzly bear and NSO for

other species would apply to the same acres for mule deer habitat as for elk. The big game timing limitation from December 1 to May 15 would be applied to 1,499 acres.

The stipulations for white-tailed deer habitat would be the big game timing limitation of December 1-May 15 on 83 acres, the bighorn sheep timing limitation of November 1-June 30 on 4,126 acres, grizzly bear and big game timing limitations of September 15-October 15 and from December 1–June 30 on 1,933 acres, and NSO for other species (bighorn sheep, bald eagle, class 1 fishery, wildlife management area, bull trout and westslope cutthroat trout) on 3,669 acres

Stipulations applied in moose habitat would be bighorn sheep timing limitation of November 1-June 30 on 1,188 acres, grizzly bear and big game timing limitations of September 15-October 15 and from December 1–June 30 on 932 acres, and NSO for other species (bull trout and westslope cutthroat trout) on 144 acres.

Stipulations applied in pronghorn antelope habitat would be Bighorn Sheep Timing Limitation of November 1 - June 30 on 1,188 acres, Big Game Timing Limitation of December 1 - May 15 on 518 acres, and NSO for other species (bighorn sheep, bald eagle, class 1 fishery) on 1,716 acres.

Each of these big game species would be given additional protective stipulations because their habitats are located within the range of other species with more restrictive requirements. All of these species would have some of their range within an NSO area. This would allow a greater amount of protection than if the big game timing stipulation alone was applied. In addition, more restrictive timing restrictions are also provided where the range of these species overlaps with grizzly bear and/or bighorn sheep.

As with elk, if any of the stipulations for other species is waived, the big game timing restriction (no activity from December 1-May15) would be applied for all these species within winter range.

The direct and indirect effects to mule deer from the leasing of oil and gas parcels in GLUB 1 would be expected to be low to moderate. The direct and indirect effects to white-tailed deer, moose, and antelope would be expected to be low.

Forest, Grassland/Sagebrush and Riparian Wildlife and Habitats GLUB 1
Approximately 8,655 acres of forest found are found on the lease parcels. These stands provide a variety of conditions and habitat for a wide variety of wildlife species. Proposed lease parcels are also located in sagebrush/grasslands (roughly 7,285 acres) and riparian habitats.

Potential impacts from oil and gas activities include direct mortality or injury, loss of breeding, foraging and security habitat, displacement, and human disturbance. Displacement of animals could result in predation and/or difficulty of finding suitable replacement habitat. Human disturbance could alter the behavior of wildlife and lead to a decrease in survival.

Within dry forest habitat, approximately 3,570 acres would be protected from oil and gas development with NSO applied to protect bighorn sheep core habitat and in a wildlife management area. The remaining 3, 985 acres in the habitat type would have timing limitations for big game that would protect wildlife found in dry forest habitats from disturbance during the winter and spring months. Direct and indirect effects to those species that depend on or use dry forest habitats would be expected to be low to moderate.

Approximately 1,100 of wet forest are located on the lease parcels. One-half of these acres (550) would be protected with an NSO stipulation applied for westslope cutthroat trout. The remaining 550 acres would have timing limitations for big game and grizzly bear that would protect wildlife through the winter and spring months. Direct and indirect effects to those species that depend on or use wet forest habitats would be expected to be low.

Sagebrush and grassland habitats would be protected with NSO on roughly 2,180 acres. The remaining 5,105 acres would be given some level of protection from disturbance during the winter and spring with timing limitations that would be applied for big game (including bighorn sheep) and grizzly bear. Direct and indirect effects to those species that depend on or use sagebrush/grassland habitats would be expected to be low to moderate.

All riparian habitats would have an NSO stipulation applied. The width of the riparian area protected with the NSO would depend on the type of stream as outlined on pages 21-22 of Butte RMP/ROD (2009b). Riparian vegetation would be protected and would continue to provide forage, breeding, and dispersal habitat for many wildlife species. Direct and indirect effects to those species that depend on or use riparian habitats would be expected to be low.

Nonsensitive Wildlife Species – GLUB 2

Indirect impacts to wildlife could occur from leasing if a well is developed on the offered lease parcels. These impacts would be similar to those for special status species. Small mammals, reptiles, migrating amphibians, and birds could be crushed or have burrows or nests crushed resulting in direct accidental mortality or reproductive failure. Big game summer range could be reduced by the amount of habitat involved in the action. (Winter range would be protected by the timing limitation stipulation.) Development activities could result in avoidance of migration and travel routes.

Mitigation

Stipulations for non-special status species wildlife in the Butte RMP/FEIS include NSO for wildlife management areas, timing limitations for big game winter/spring range and birthing areas, timing limitations for raptor breeding territories, NSO for streams with high restoration potential or Class I fisheries. Other mitigations could be developed for wildlife similarly to special status species, depending on the details of any APDs received. All of the 38 parcels have stipulations attached to protect wildlife resources and help reduce impacts from potential lease activities. See Appendix A for wildlife resources by parcel.

Migratory Birds

Effects to migratory birds from oil and gas development include direct loss of habitat from roads, well pads and other infrastructure, disturbance, powerline strikes and accidental direct mortality, fragmentation of habitat, change in use of habitats, and potential threats and competition from edge species such as the brown-headed cowbird. Field surveys for nesting birds at proposed development sites would be conducted for activities planned between May 1 and August 30. Direct and indirect effects to migratory birds would be expected to be low to moderate.

Priority Linkage Areas

There are approximately 7,570 acres of lease parcels in the Rocky Mountain Front to the Big Belt Mountains Priority Linkage Area. Approximately 51 percent of lease parcels (3,860 acres)

within this priority linkage area would be protected by an NSO applied for bighorn sheep, bald eagle, and Class 1 fishery. Using NSO stipulations would protect this valuable priority linkage area from several threats identified by American Wildlands (2009) including development, oil and gas exploration and noxious weeds. If any of the NSO stipulations, however, should be waived in this priority linkage area, timing limitations for big game species (including bighorn sheep stipulations) would still be applied. Although this would not prevent loss of habitat or disturbance, it would allow wildlife to remain free of disturbance during the winter and spring.

Of the 7,570 acres in the Rocky Mountain Front to the Big Belt Mountain Priority Linkage Area, roughly 3,710 would be protected with timing limitations for big game species, including bighorn sheep stipulations. Although up to half of the lease acres in this priority linkage area could be fully protected from surface disturbance through NSO stipulations applied for several different wildlife species, there is still a risk of activities associated with oil and gas development on 3,701 acres. This linkage area is located within an area with moderate potential for oil and/gas and in a location with "reasonably foreseeable development and drilling activity" (USDI 2008). Direct and indirect effects to wildlife and wildlife habitats within this important linkage area would be expected to be low to moderate depending on the location of activities, number of wells, roads, powelines, and disturbance.

There are approximately 2,620 acres of lease parcels in the Rogers Pass to MacDonald Pass Priority Linkage Area. Approximately 15 percent of the lease parcels (405 acres) within this priority linkage area would be protected by an NSO stipulation applied for westslope cutthroat trout. This NSO stipulation would protect a minimal amount of habitat in this priority linkage area from several threats identified by American Wildlands (2009) including development, roads, and noxious weeds. If the NSO stipulation for westslope cutthroat trout should be waived in this priority linkage area, timing limitations for grizzly bear and big game would still be applied. Although this would not prevent loss of habitat or disturbance, is would allow wildlife to remain free of disturbance during the winter and spring.

Of the 2,620 acres in Rogers Pass to MacDonald Pass Priority Linkage Area, roughly 2,215 would be protected with timing limitations for grizzly bear and big game. This linkage area is located in an area with "very low" potential for oil and gas development (USDI 2008a). Direct and indirect effects to wildlife and wildlife habitat in the Rogers Pass to MacDonald Pass Priority Linkage Area from oil and gas development would be expected to be low to moderate if development should occur.

The Absaroka to Crazies linkage area contains a total of 75,443 acres and is considered low priority. Only one parcel is located in this linkage area. If this parcel were developed, effects to wildlife would not be significant.

The Potter Basin linkage area contains a total of 132,439 acres and is considered intermediate priority. Parcels are scattered throughout this linkage area. If all parcels in this linkage area were developed ungulate movement patterns could be altered or hindered.

The Horseshoe Hills linkage area contains a total of 151,528 acres and is considered low priority. Parcels are scattered through the central portion of this linkage area. Development of these parcels could have a slightly negative effect on ungulate movement.

The Maudlow linkage contains a total of 193,402 acres and is considered intermediate priority. Parcels are generally clustered in the southeast and northwest portions of this linkage area. Development of these parcels could have a slightly negative effect on wildlife movement between the Greater Yellowstone and Northern Continental Divide ecosystems.

4.3.6 Cultural Resources

Direct and Indirect Effects

Leasing a nominated parcel gives a basic right to the operator to develop the lease. Leasing would not, however, result in effects to cultural resources. It is only when the lease is developed that there is a potential for cultural resources to be affected by the Proposed Action. That is when the drilling location is known and cultural resource investigations can be centered on that location and other related developments such as roads, transmission lines, and pipelines.

Direct and Indirect impacts would not be anticipated from leasing nominated parcels. It is at the APD stage of development that specific impacts can be correctly assessed. Potential impacts to cultural resources at the APD stage include damage to archaeological sites through construction activities and the possibility of removal of, or damage to, archaeological materials by increased human activity in the area. Conversely, cultural resource investigations associated with development potentially adds to our understanding of the prehistory and history of the area under investigation.

Forty sites have been identified for the parcels listed in this sale offer and EA. For a summary of the results of the file search please refer to Section 3.8.

Mitigation

Specific mitigation measures, including, but not limited to possible site avoidance or excavation and data recovery, would have to be determined when site-specific development proposals are received.

Based on existing information, there are 40 cultural resources located on the nominated parcels. If developed, these properties could be potentially impacted by a site-specific proposal.

Each nominated lease parcel has the standard lease notice attached (stipulation 12-8) and the special cultural resource stipulation as written in IM 2005-030:

"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. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated."

Where known resources are of such high value, field offices can consider deferring the parcel from sale or applying a stipulation; i.e., a CSU or an NSO. Refer to Appendix A of this document for pertinent parcel-specific lease stipulations as needed.

4.3.7 Paleontology

Direct and Indirect Effects

The act of leasing a nominated parcel would not impact paleontological resources; however, subsequent development could have impacts on those resources. For areas known to contain or have the potential to contain paleontological resources, a survey should be conducted when a specific development may impact those resources.

Two paleontological localities have been listed in Gallatin County and one in Park County, but the locational information is not specific enough to say if they are located on the lease parcels.

Mitigation
Specific mitigation measures could include, but are not limited to, site avoidance or excavation. These measures would be determined when site-specific development proposals are received.

4.3.8 Native American Religious Concerns
Direct and Indirect Effects
Leasing of nominated parcels would not have an impact on TCPs and/or areas of religious or cultural importance to tribes. A lease sale would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007. It would not prevent tribes from visiting sacred sites or prevent possession of sacred objects. A specific development authorized through the APD process may, however, have an impact Native American religious practices and TCPs.

4.3.9 Visual Resources
Direct and Indirect Effects
Based on the RFD, BMPs, and existing stipulations, potential impacts from oil and gas development would be extremely low. Development activities on all parcels located on BLM surface would be mitigated so that contrasts conform to VRM class guidelines. Oil and gas development activities on private surface would be guided by BMPs and other resource mitigation measures.

Mitigation
Should any new oil and gas developments occur, they would be subject to BLM BMPs for VRM in order to minimize contrasts to the existing landscape. This include such things as proper site selection, minimizing disturbance, selecting color schemes that blend with the background, and reclaiming areas that are not in active use. Wherever practical, no new development would be allowed on ridges or mountain tops. Overall, the goal is to minimize impacts to the existing visual resources that currently exist and to ensure conformance with the VRM class of the area.

All BLM parcels have CSU stipulations in order to mitigate disturbances and ultimately conform to the appropriate VRM classifications. The Butte RMP specifies that contrast rating be conducted for all proposed projects in Class I and II areas and for proposed projects in Class III and IV areas that have potentially high impacts or are located within highly sensitive areas. Sixteen of the 38 parcels have stipulations attached to protect visual resources. See Appendix A for VRM stipulations by parcel.

4.3.10 Recreation and Travel Management
Direct and Indirect Effects
Based on the RFD, BMPs, and existing stipulations, potential impacts to recreation from oil and gas activities would be extremely low. There are no potential impacts to recreation sites because

they are protected by a stipulation of NSO within one-quarter mile. Potential impacts to existing SRMAs, should any development activities occur, would be minimal because CSU stipulations are in place. In other non-SRMA areas, where there are no recreation stipulations in place, the sights and sounds of oil and gas activities could create impacts to some dispersed recreation opportunities and visitors' experiences such as hunting, hiking, and motorized travel. The creation of routes from oil and gas activities on BLM lands could lead to motorized travel management conflicts/problems since riders could also use these roads.

Mitigation

Recreation sites have an NSO within one-quarter mile stipulation while SRMAs are protected with CSU stipulations. Recreation uses would also be mitigated through the use of BMPs and other resource stipulations. Sixteen of the 38 parcels have stipulations attached to protect recreation values. See Appendix A for these stipulations by parcel.

There are no lease stipulations to mitigate impacts to recreation values or user experiences for BLM lands outside the boundaries of recreation sites and SRMAs beside standard BMPs and undue and unnecessary degradation standards. Based on the RFD scenario discussed above, there are no foreseeable effects in recreation activities.

4.3.11 Special Designations

Direct and Indirect Effects

Wild and Scenic Rivers

In GLUB 1 there are about 76 lease parcel acres (MTM96470) within one-half mile of the Missouri River Segment (3.1 mile reach immediately below Hauser Dam) that has been recommended as preliminarily suitable in the Butte RMP/ROD (pp. 60 and 61). In order to protect this river segment, surface occupancy is prohibited within one-half mile of the BLM's west side of the active river channel.

Based on the RFD, BMPs, and existing stipulations, potential impacts from oil and gas development would be extremely low. The 76 lease acres would be issued within the one-half-mile corridor with the NSO stipulation in place. Other resource NSO stipulations in place include bald eagle nesting, Class I fisheries, and cultural resources. Given these existing stipulations, it is highly unlikely that any noticeable impacts would occur to the outstanding remarkable values of this preliminarily suitable river segment.

Lewis and Clark Historic Trail

Based on the RFD, BMPs, and existing stipulations, potential impacts from oil and gas development would be extremely low. Lease acres within the one-half-mile corridor of the designated trail would have the NSO stipulation in place. Given these existing stipulations, it is highly unlikely that any corridor impacts would occur to resource values along Lewis and Clark National Historic Trail.

Areas of Critical Environmental Concern (ACECs)

Based on RFD, BMPs, and existing stipulations, potential impacts from oil and gas development would be extremely low. Sleeping Giant is the only area of the four designated ACECs that has lease parcels within its boundaries (GLUB 1). Lease acres total about 438 acres and are located in the extreme northwestern part of the ACEC. Although there are no lease stipulations for ACECs, other resource stipulations in place would provide protection for this lease portion of the

ACEC. These stipulations include NSO for bighorn sheep and restrictions due to slopes, VRM, and SRMAs.

4.3.12 Forest Products

Direct and Indirect Effects

At this stage (lease sale) there would be no impacts to forest products. Impacts (both direct and indirect) would occur if a lease is developed in the future. The potential impacts would be analyzed on a site-specific basis prior to oil and gas development and during the APD stage of development. Based on the RFD scenario discussed above, there are no foreseeable effects to forest products.

Mitigation

Mitigation would be deferred to the site-specific APD stage of development. Best management practices would be incorporated into conditions of approval (COA) and might include slash treatment, rootwad removal/disposal, and commercial or non-commercial product removal.

4.3.13 Livestock Grazing

Direct and Indirect Effects

At this stage (lease sale) there would be no impacts to livestock grazing. Impacts (both direct and indirect) would occur if a lease is developed in the future. The potential impacts would be analyzed on a site-specific basis prior to oil and gas development during the APD stage of development.

Impacts possible at the APD stage of development would include a loss of forage as a result of drill-site development which includes pad, reserve pit, earthen pit, roads, surface facilities, pipelines, powerlines, and herbicide use. In some cases, there may be a temporary loss of AUMs. Based on the RFD scenario discussed above there are no foreseeable effects in livestock use levels.

Mitigation

Mitigation would be deferred to the site-specific APD stage of development. Best management practices would be incorporated into COAs.

Fencing of facilities would be considered as needed to minimize conflicts between oil and gas exploration/development and livestock grazing.

4.3.14 Lands and Realty

Direct and Indirect Effects

Leasing BLM lands for oil and gas exploration and production in the project area would not typically impact land uses because the potential of a successful new find is low.

Along with the ownership of the minerals, the government retains the right to use any part of the surface for exploration or development. These “surface entry rights” can cause distress for private surface owners who do not wish to see new roads and well pads on their land. Adjacent private lands can also be impacted due to leasing if new road access to the leased areas is necessary. Although the responsibility for obtaining access to leased areas is the lessee’s and not

BLM's, leasing can sometimes cause an indirect impact to adjacent lands due to the need for road access.

Any surface-disturbing activity requires BLM approval. For those parcels that are split estate, the BLM requires the lessee/operator to make a good faith effort to obtain an agreement with the private surface owner prior to access on the leased land issued through competitive bid.

Several of the parcels include lands with conservation easements on the private surface. In general, these conservation easements are designed to protect open space and associated values, but do not specifically prohibit oil and gas development. Stipulations developed through the normal staff review process have been applied to these parcels and generally protect the natural values that supported the conservation easement.

Parcels MTM 79010 CY, MTM 79010-DU, and MTM 79010-QY involve lands within or adjacent to areas where MFWP has developed block management hunting units in cooperation with private landowners in the area. The BLM believes that the standard lease terms provide the flexibility to protect the values for which these block management units have been developed. Stipulations developed through the normal staff review process have been applied to these parcels.

The Butte Field office has received notification from the Montana Wilderness Association that they are in the process of developing Wilderness legislation for the Sleeping Giant and Sheep Creek WSAs. Approximately 780 acres of lease parcels (portions of MTM 79010-S1 and MTM 7910-DD) would lie within their proposed expanded land boundaries (outside the current WSA). Although there are no wilderness stipulations in place, some of the 780 acres would be protected from lease activities by other resource stipulations including NSO for Bighorn Sheep.

4.3.15 Minerals

4.3.15.1 Fluid Minerals

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Leases issued with major constraints (NSO stipulations) may decrease some lease values, increase operating costs, and to a lesser extent require relocation of well sites and modification of field development. Leases issued with moderate constraints (timing limitation and CSU stipulations) may result in similar but reduced impacts and delays in operations and uncertainty on the part of operators regarding restrictions.

If areas are deferred, some development plans could be delayed, relocated, or completely dropped because of the need to include federal acreage as part of an exploration or development plan.

Direct and Indirect Effects

Under the Proposed Action, approximately 6,721 acres would be offered for lease subject to no surface occupancy stipulations, 17,912 acres would be leased subject to controlled surface use, and 29,502 acres would be leased with timing limitation. Less than 10 percent of the leased lands would be offered for lease subject only to standard terms and conditions.

4.3.15.2 Solid Minerals

Based on the RFD scenario discussed above, there are no foreseeable changes in solid minerals activity under either alternative.

4.3.16 Social and Economic Conditions/Environmental Justice

4.3.16.1 Alternative A:

Economic impacts associated with Alternative A would be similar to those described in the Economic section of the Affected Environment. These effects are summarized in Table 14. Compared to current levels, average annual average federal royalty payments would increase by an estimated $9,000. Annual distribution of these royalties to state/local governments would be an estimated $4,000. Estimated average annual total local employment would increase by about five jobs, and average total local income would increase by an estimated $180,000 per year.

Alternative B:

Public Revenues Related to Leasing, Rent, and Production

Leasing an additional 8,169 acres of federal minerals (Alternative B) would increase average annual oil and gas leasing and rent revenues to the federal government by an estimated $16,000 (Table 14). Estimated average annual leasing and rent revenues that would be distributed to state/local governments would increase by about $8,000. Estimated average annual federal oil and gas royalties would increase by an about $9,000 over current levels and by about $500 compared to Alternative A. Estimated royalties distributed to the state/counties would increase by an average annual amount of about $4,000 over current levels and by about $200 compared to Alternative A.

Total estimated average annual federal revenues related to leasing an additional 8,169 acres of federal minerals and associated annual rent and royalty revenues related to annual production of federal minerals would amount to about $346,000. This would be an estimated $16,000 more than Alternative A. Total estimated annual revenues distributed to the state and counties would be about $170,000, about $8,000 more than with Alternative A.

Federal oil and gas production in Montana is subject to production taxes or royalties. These federal oil and gas royalties generally equal 12.5 percent of the value of production (43 CFR 3103.3.1). Forty-nine percent of these royalties are distributed to the state. In Montana, 25 percent of the royalty revenues that the state receives is redistributed to the counties of production (Title 17-3-240, MCA). Between 2000 and 2008, no federal royalty revenues were collected by the federal government or distributed to the state and counties for federal mineral production within these counties.

Table 14. Summary of Estimated Average Annual Economic Impacts by Alternative

Activity	Alternative		
	A	B	Alt. B-Alt. A
Existing Acres leased*	164,781	164,781	0
Acres that would be leased based on this EA **		8,169	8,169
Total acres leased	164,781	172,950	8,169
Acres held by production*	0	0	0
Total acres leased for which lease rents would be paid	164,781	172,950	8,169
Lease rental first 5 years ($1.50/acre)	123,586	129,713	6,127
Lease rental second 5 years ($2.00/acre)	164,781	172,950	8,169
Minimum lease bid ($2.00/ac.)	32,956	34,590	1,634
Total annual federal lease and rental revenue	321,323	337,253	15,930
Distribution to State/local government	157,448	165,254	7,805
Annual oil production (bbl)***	786	825	39
Annual gas production (MCF)	3,150	3,307	156
Federal oil royalty (bblx$64.64x0.125)	6,352	6,667	315
Federal gas royalty (MCFx$5.72x0.125)	2,253	2,364	112
Total annual federal Oil and Gas royalties	8,605	9,031	427
Distribution to State/local government	4,216	4,425	209
			0
Total annual federal revenues	329,928	346,284	16,356
Total annual State/local revenues	161,665	169,679	8,015
Total annual revenue distributed to counties	40,416	42,420	2,004

*LR2000, BLM, May 21, 2010
**RFD, May 28, 2010
***Estimated 2007 federal production level

Local Economic Contribution

The estimated combined total average annual employment and income supported by federal oil and gas leasing, distributions of royalties to local governments, drilling wells, and production would amount to less than five total jobs and about $210,000 within the local economy (IMPLAN, 2007). Table 15 shows that this probably would not cause an annual increase in total jobs and less than a $10,000 increase in labor income over levels anticipated with Alternative A. There would be an estimated increase in local population of less than ten people (about the same as with Alternative A).

Conclusion

Because of the size of the local economy, total federal contribution of Alternative B (leasing an additional 8,169 acres of federal minerals and anticipated related exploration, development, and production of oil and gas) would have negligible effects on local population, total local employment, number of households, average income per household, and total personal income, i.e., the effects would be less than 0.01percent of current levels. The economic effects would continue to be spread unevenly among the counties. Compared to Alternative A, leasing the additional 8,169 acres and anticipated exploration, development, and production under Alternative B would provide about $2,000 per year of additional funds for county functions such as law enforcement, justice administration, tax collection and disbursement, provision of orderly elections, road and highway maintenance, fire protection, and/or record keeping. Other county functions that may be funded include primary and secondary education administration and the

operation of clinics/hospitals, county libraries, county airports, local landfills, and county health systems.

Leasing of the additional 8,169 acres and anticipated exploration, development, and production would not change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), or economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates).

Table 15 Estimated Average Annual Employment and Income by Major Industry by Alternative

Industry	Total Jobs Contributed			Total Income Contributed ($1000)		
	Current	Alt. A	Alt. B	Current	Alt. A	Alt. B
Agriculture	0	0	0	$0.0	$1.0	$1.1
Mining	0	2	2	$0.3	$96.3	$102.4
Utilities	0	0	0	$0.2	$2.5	$2.6
Construction	0	0	0	$1.5	$4.7	$4.9
Manufacturing	0	0	0	$0.2	$3.3	$3.5
Wholesale Trade	0	0	0	$0.3	$6.7	$7.1
Transportation and Warehousing	0	0	0	$0.3	$7.6	$8.1
Retail Trade	0	0	0	$0.5	$5.7	$6.0
Information	0	0	0	$0.1	$1.4	$1.5
Finance and Insurance	0	0	0	$0.8	$7.1	$7.5
Real Estate and Rental and Leasing	0	0	0	$0.4	$4.1	$4.4
Prof, Scientific, and Tech Services	0	1	1	$1.6	$24.9	$26.5
Mngt of Companies	0	0	0	$0.0	$4.3	$4.6
Admin, Waste Mngt and Rem Serv	0	0	0	$0.3	$2.3	$2.5
Educational Services	0	0	0	$0.0	$0.5	$0.5
Health Care and Social Assistance	0	0	0	$0.7	$8.4	$8.9
Arts, Entertainment, and Rec	0	0	0	$0.1	$0.7	$0.7
Accommodation and Food Services	0	0	0	$0.3	$2.8	$3.0
Other Services	0	0	0	$0.3	$3.5	$3.7
Government	0	0	0	$10.5	$12.7	$13.3
Total Federal Contribution	0	5	5	$18.4	$200.4	$212.9

Direct and Indirect Effects

The Proposed Action would have a beneficial effect on mineral exploration and development, since the land would be offered for competitive auction. The practical utilization of the lands would have a positive local effect in the generation of long-term jobs and revenues to the state and county. The royalties and rentals from competitive auctions are also a dependable source of long-term income for the federal government. The impacts from this particular auction may be small, including an unknown (but probably relatively small) amount of new reserves, due to the small amount of acreage offered. However, the positive action of the auction would provide the industry with increased opportunity for exploration, potentially resulting in increased stability and profitability of domestic companies.

Social and Environmental Justice
While the act of leasing federal minerals in and of itself would result in no social impacts, subsequent development of a lease may generate impacts to people living near or using the area in the vicinity of the lease. Oil and gas exploration, drilling, or production could create an inconvenience to these people due to increased traffic and traffic delays, noise, and visual impacts. This could be especially noticeable in rural areas where oil and gas production has not occurred previously. The amount of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, length of time and season these activities occurred, etc. Creation of new access roads into an area could allow increased public access and the exposure of private property to vandalism. For split estate leases, surface owner agreements, standard lease stipulations, and BMPs could address many of the concerns of private surface owners. There would be no disproportionate effects to low income populations, except possibly to American Indians. Refer to Appendix A for stipulations addressing cultural stipulations. Consultation with potentially affected tribes would occur at the APD stage.

4.4 Cumulative Impacts
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. 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.

Cumulative effects associated with all BLM programs in the Butte FO, including implementation of the RFD scenario described above, are described in the Butte RMP/FEIS on pages 496-511. 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 all resources and programs other than air resources and climate. This previous analysis is hereby incorporated by reference to this EA.

4.4.1 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 discussed in detail in the Butte RMP/FEIS on pages 496-511 and are incorporated by reference.

4.4.2 Cumulative Impacts by Resource

4.4.2.1 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change
This section incorporates an analysis of the potential contributions to GHG emissions in the event that the Proposed Action lease parcels are ever developed, 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 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 Butte FO 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 to provide a 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 560.8 metric tons/year CO_2e. Potential emissions under the Proposed Action would be approximately 4.8 percent of this total. Table 16 displays projected GHG emissions from non-BLM activities included in the Butte FO RFD. Total projected emissions of non-BLM activities in the RFD are 4,885.8 metric tons/year of CO_2e. When combined with projected annual BLM emissions, this totals 5,446.6 metric tons/year CO_2e. Potential GHG emissions under the Proposed Action would be 0.50 percent of the estimated emissions for the entire RFD. Potential incremental emissions of GHGs from exploration and development of fluid minerals on parcels within the Proposed Action would be minor in the context of projected GHG contributions from the entire RFD for the Butte Field Office.

Table 16. Projected non-BLM GHG emissions associated with the Butte FO Reasonably Foreseeable Development Scenario for fluid mineral exploration and development.

Source	Non-BLM Projected Greenhouse Gas Emissions in tons/year for Butte FO RFD			Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e
Conventional Natural Gas	630.4	14.1	0.0	840.9
Coal Bed Natural Gas	1,218.9	59.6	0.0	2,242.8
Oil	1,890.7	3.3	0.1	1,802.1
Total	**3,740**	**77**	**0.1**	**4,885.8**

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

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

GHG emissions from all major sectors in Montana in 2005 totaled approximately 36.8 million metric tons of CO_2e (Center for Climate Science (CCS) 2007). Potential emissions from development of lease parcels in the Proposed Action of this project represent approximately 0.000074 percent of the state-wide total of GHG emissions based on the 2005 state-wide inventory (CCS 2007).

The EPA (Climate Change SIR 2010) published an inventory of U.S. GHG emissions, indicating gross U.S. emissions of 6,957 million metric tons and net emissions of 6,016 million metric tons (when CO_2 sinks were considered) of CO_2e in 2008. Potential annual emissions under the Proposed Action would amount to approximately 0.00000039 percent of gross U.S. total emissions. Global GHG emissions for 2004 (Climate Change SIR 2010) indicated approximately 49 gigatonnes (10^9 metric tons) of CO_2e emitted. Potential annual emissions under the Proposed Action would amount to approximately 0.000000055 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 credibly possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under the Proposed Action, potential GHG emissions described above would incrementally contribute to the total volume of GHGs emitted to the atmosphere and, ultimately to climate change.

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

4.4.2.2 Cumulative Impacts of Climate Change

As previously discussed in the Air Quality section of Chapter 4, it is difficult to impossible to identify specific impacts of climate change on specific resources within the project 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 (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).

4.4.2.3 Cumulative Impacts on Resources

Wildlife and Special Status Animal Resources

Cumulative Effects (GLUB 1)

Wildlife habitat in Lewis and Clark County have been affected by roads, historic and current mineral exploration and mining, timber harvest, weed infestations, urbanization and development, recreation, powerline corridors, and communication sites. Pages 587-589 of the

Butte RMP/ROD (2009b) provide a thorough description of cumulative effects for the Lewis and Clark Travel Plan area which is similar to the effects that could be found throughout Lewis and Clark County.

Oil and gas exploration and development could lead to an increase in negative cumulative effects by reducing suitable habitat for a variety of wildlife species (from roads, powerlines, buildings, noxious weeds, etc.), increasing fragmentation, increasing disturbance, and increasing direct mortality (from roads and powerline strikes).

Cumulative Effects (GLUB 2)
Cumulative impacts to wildlife and special status species would include loss and fragmentation of habitat in addition to other human activities such as subdivisions and conversion of natural habitat to agricultural land. The disturbance of development would also add to other human activities causing wildlife avoidance of previously used areas.

Soil Resources
Contamination of soil from drilling and production wastes and/or spills could cause a long-term reduction in site productivity. Some of these impacts can be reduced or avoided through proper design, construction, and maintenance and implementation of best management practices. Given the need for site-specific locations, development techniques, and mitigation, more specific descriptions of cumulative impacts is not reasonable at this time

Water Resources
Where facilities cross or are close to waterways, the likelihood of project impacts would increase. These impacts could include increased sedimentation; increased salt loading; contamination by petroleum products, chemicals, or produced waters; and flow alterations. Similarly, possible leaks from reserve and evaporation pits could degrade surface and groundwater quality. Some of these impacts can be reduced or avoided through proper project design, construction, and maintenance activities and implementation of best management practices.

Authorization of the proposed projects would require full compliance with BLM directives and stipulations that relate to surface and groundwater protection. Given the need for site-specific locations, development techniques, and mitigation, more specific descriptions of effects is not reasonable at this time.

5.0 CONSULTATION AND COORDINATION:

5.1 Persons, Agencies, and Organizations Consulted

Table 17 lists the persons, agencies, and organizations consulted during development of this EA along with the findings and conclusions associated with consultations.

Name	Purpose and Authorities for Consultation or Coordination	Findings and Conclusions
Kate Wright GVLT	Conservation Easement	Called to get a copy of the Conservation Easement
Michael Downey MLR	Conservation Easement	Called to get a copy of the Conservation Easement
Montana Fish, Wildlife and Parks	Wildlife Coordination	General discussion of game numbers, stipulation review and the EA process.

Table 17. List of all Persons, Agencies and Organizations Consulted for this EA.

5.2 Summary of Public Participation

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 May 25, 2010; however, scoping comments were received through June 21, 2010. The BLM also sent surface owner notification letters which briefly explained the oil and gas leasing process and planning process. The surface owner notification letter requested written comments regarding any issues or concerns that should be addressed in the environmental analysis. The BLM sent 325 surface owner notification letters for the oil and gas leasing analysis process in the entire Montana/Dakotas BLM. Sixty-eight of those surface owner letters (about 21 percent) were geographically specific to the Butte Field Office.

The BLM received 14 written comment letters and 23 phone/verbal comments. The written and verbal communication resulted in a total of 108 individual scoping comments pertaining to oil and gas leasing in the Montana/Dakotas. Of the 108 scoping comments, 42 (almost 40 percent) were specific to the Butte Field Office.

Of the 108 comments, about 20 were comments/requests for information (e.g., split estate brochure) regarding the general process of oil and gas leasing, split estate, questions about the planning process, and questions regarding the verification of mineral ownership. Other comments ranged from the need to address GHG emissions and cumulative impacts to climate change; concerns about impacts to wildlife and fisheries habitat and fragmenting wildlife corridors; concerns related to wilderness, pristine landscapes, and scenic viewsheds/quality. Other comments provided specific information pertaining to cultural areas, suggestions for mitigation measures from surface disturbance and compliance with the NEPA process, including allowing for public comment, addressing a no-leasing alternative and addressing direct, indirect, and cumulative impacts.

Comments specific to the Butte Field Office (42 comments) pertained to several split estate parcels that have conservation easements on the private surface; concerns about protecting areas near or adjacent to special area designations, including wilderness study areas, ACECs, parcel locations near developed recreation areas and parcels located within/adjacent to wildlife habitat, including bighorn sheep re-introduction areas. Comments regarding viewsheds, wildlands, uniqueness/character of the area were also received.

5.3 List of Preparers:

Name	Title	Responsible for the Following Section(s) of this Document
David Williams	Geologist	Project Lead, Geology and Solid Minerals Sections
Sherri Lionberger	Assistant Field Manager Nonrenewables	Editorial review
Carrie Kiely	Archaeologist	Cultural Resources
Scot Franklin	Wildlife Biologist	Wildlife (GLUB 2)
Sarah LaMarr	Wildlife Biologist	Wildlife (GLUB 1)
Tanya Thrift	Range Conservationist	Range, Plants, Riparian
Corey Meier	Soil Scientist	Soils
John Thompson	Economist	Social/Economic
Joan Trent	Economist	Environmental Justice
Mike Philbin	Soil Scientist	Climate
Brad Rixford	(NRS) Recreation	Recreation, VRM, Special Management Areas
Kelly Acree	Realty Specialist	Lands
Brian Mueller	GIS Specialist	GIS Support

Table 18. List of Preparers.

5.4 List Reviewers and Roles:

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

Name	Title	Responsible for the Following Section(s)
Sherri Lionberger	Assistant Field Manager Nonrenewables	Editorial Review
Richard M. Hotaling	Butte District Manager	General Review

Table 19. List of Reviewers and Roles.

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Appendix A: Descriptions of Parcels and Lease Stipulations by Parcel

Parcel Number	Acres	Legal Description	Proposed Stipulations
MTM 79010-N2	641.99	T. 4 N, R. 2 E, PMM, MT Sec. 14 NENE,S2NE,SESW,SE; 24 POR TR 38 (2.52 AC); 24 LOT 1; 24 NE,NESE,W2SE; 25 POR TR 38 (3.14 AC); T. 4 N, R. 3 E, PMM, MT Sec. 19 POR TR 38 (1.87 AC); Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-10 T. 4 N, R. 2 E, PMM, MT Sec. 24 LOT 1; 24 NE,N2SE,SWSE, CSU 12-18 (All Lands) CSU 12-19 T. 4 N, R. 2 E, PMM, MT Sec. 24 POR TR 38; 24 LOT 1; 24 NE,NESE,W2SE; 25 POR TR 38; T. 4 N, R. 3 E, PMM, MT Sec. 19 POR TR 38; Cultural Resources 16-1 (All Lands) NSO 11-2 T. 4 N, R. 2 E, PMM, MT Sec. 14 S2SE,NESE; 24 LOT 1; 24 W2SE; 25 POR TR 38; T. 4 N, R. 3 E, PMM, MT Sec. 19 POR TR 38; NSO 11-26 T. 4 N, R. 2 E, PMM, MT Sec. 14 E2NE; 24 POR TR 38; 24 LOT 1; 24 E2NE,SWNE,N2SE,SWSE; 25 POR TR 38; T. 4 N, R. 3 E, PMM, MT Sec. 19 POR TR 38; NSO 11-44 T. 4 N, R. 2 E, PMM, MT Sec. 14 NENE; 24 POR TR 38; 24 LOT 1; 24 E2NE,NESE,W2SE; 25 POR TR 38; T. 4 N, R. 3 E, PMM, MT Sec. 19 POR TR 38; TES 16-2 (All Lands) TL 13-28 T. 4 N, R. 2 E, PMM, MT Sec. 24 POR TR 38; 25 POR TR 38; T. 4 N, R. 3 E, PMM, MT Sec. 19 POR TR 38 FERC 19-1 (All FERC Lands)
MTM 79010-N3	80.00	T. 2 N, R. 3 E, PMM, MT Sec. 12 S2SE; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 12 SWSE; Cultural Resources 16-1 (All Lands)

Parcel Number	Acres	Legal Description	Proposed Stipulations
			TES 16-2 (All Lands) TL 13-14 (All Lands) TL 13-28 (All Lands)
MTM 79010-N4	320.00	T. 3 N, R. 3 E, PMM, MT Sec. 22 NWNE,S2NE,SE; 27 NWNE; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 22 SWSE; 27 NWNE; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-14 Sec. 22 S2NE,SE; 27 NWNE;
MTM 79010-N5	1191.10	T. 4 N, R. 3 E, PMM, MT Sec. 4 LOTS 1,2,3,4; 4 S2N2,N2SW,SWSW,NWSE; 6 LOTS 4,5,10; 6 SENW,E2SW; 8 N2NE,NW,SWSW; 18 LOTS 10,11; 18 E2SW; Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-10 Sec. 4 LOTS 1,2,3,4; 4 S2N2,N2SW,SWSW,NWSE; 8 N2NE,NW,SWSW; 18 LOTS 10,11; 18 E2SW; CSU 12-18 Sec. 4 LOTS 1,2,3; 4 S2N2,N2SW,SWSW,NWSE; 6 LOTS 4,5,10; 6 SENW,E2SW; 8 N2NE,NW,SWSW; 18 LOTS 10,11; 18 E2SW; CSU 12-19 Sec. 6 LOT 10; 6 E2SW, 8 SWSW; 18 LOTS 10,11; 18 E2SW; Cultural Resources 16-1 (All Lands) NSO 11-7 Sec. 8 S2NW,NWNW,SWSW; 18 LOTS 10,11; 18 E2SW; NSO 11-20 Sec. 6 LOTS 4,5,10; 6 SENW,E2SW; 8 N2NW,SWNW; NSO 11-26 Sec. 6 LOTS 4,5,10; 6 SENW,E2SW; 8 N2NW,SWNW,SWSW; 18 LOTS 10,11; 18 E2SW; NSO 11-43 Sec. 6 Lot 10; 6 E2SW; TES 16-2 (All Lands) TL 13-25

Parcel Number	Acres	Legal Description	Proposed Stipulations
			Sec. 18 E2SW; TL 13-28 (All Lands)
MTM 79010-3A	194.25	T. 4 N, R. 3 E, PMM, MT Sec. 18 POR LOT 7 (33.80 AC); 18 POR LOT 8 (21.30 AC); 18 LOTS 2,4,9,12; 18 SWSE; Broadwater County (007) Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 Sec. 18 POR LOT 7; 18 POR LOT 8; 18 LOTS 2,4,9; 18 SWSE; CSU 12-19 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 18 POR LOT 7; 18 POR LOT 8; 18 LOTS 2,4,9,12; NSO 11-7 (All Lands) NSO 11-26 (All Lands) NSO 11-43 Sec. 18 LOT 2; NSO 11-44 Sec. 18 POR LOT 7; 18 POR LOT 8; 18 LOTS 2,4,9,12; 18 SWSE; TES 16-2 (All Lands) TL 13-25 Sec. 18 POR LOT 7; 18 POR LOT 8; 18 LOTS 9,12; 18 SWSE; TL 13-28 (All Lands) FERC 19-1 (All FERC Lands)
MTM 79010-N6	1458.83	T. 5 N, R. 3 E, PMM, MT Sec. 18 LOTS 2,3,4; 30 LOTS 1,2; 30 NE,E2NW; 31 LOTS 1,2,3,5,6,7,8; 31 W2NE,E2NW,NESW; 32 ALL; Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-10. Sec. 18 LOTS 2,3,4; 30 LOTS 1,2; 30 NE,E2NW; 31 LOTS 1,2,3,6,7,8; 31 E2NW,W2NE,NESW, 32 ALL; CSU 12-18 (All Lands) CSU 12-19 Sec. 31 LOTS 3,6,7,8; 31 NESW, Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 30 LOTS 1,2; 30 NENW,SENW; 31 LOTS 5,6,7,8; 31 NESW,E2NW,W2NE; 32 SWSE; NSO 11-20 Sec. 31 LOTS 1,2,3,5,6,7,8; 31 SWNE,E2NW,NESW, 32 SWSW;

Parcel Number	Acres	Legal Description	Proposed Stipulations
			NSO 11-26 Sec. 31 LOTS 1,2,3,5,6,7,8; 31 E2NW,NESW, NSO 11-52 Sec. 31 LOT 6; TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-8H	1735.57	T. 6 N, R. 3 E, PMM, MT Sec. 2 LOT 4; 2 SENE,S2NW,SW; 10 E2,E2W2; 11 LOTS 3,4,5; 14 W2NE,NW,S2; 24 N2NW,SWNW,NWSW,S2S2; Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 2 LOT 4; 2 SENE,S2NW,SW; 10 E2,E2NW; 11 LOTS 3,4,5; 14 W2NE,NW,S2; 24 N2NW,SWNW,NWSW,S2S2; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 11 LOT 3; 14 S2SE,SESW; 24 S2SW; TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-7V	480.00	T. 7 N, R. 3 E, PMM, MT Sec. 26 W2SW,SESW,SWSE; 34 S2; Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 26 NWSW; TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-N7	1200.00	T. 3 N, R. 4 E, PMM, MT Sec. 8 E2; 18 E2,S2SW; 20 SWNE,NWNW,S2NW,N2SW,SESW,NWSE; 34 E2SW,S2SE; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-10. Sec. 8 E2; CSU 12-18 Sec. 8 E2; 18 E2,S2SW; 20 S2NW,NWNW,SWNE,N2SW; 34 E2SW,S2SE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 18 W2SE,NWNE,SWSW; 34 NESW; TES 16-2 (All Lands) TL 13-14 Sec. 20 SWNE,NWNW,S2NW,N2SW, SESW,NWSE; 34 E2SW,S2SE; TL 13-28 Sec. 8 E2; 20 SWNE,NWNW,S2NW,N2SW, SESW,NWSE; 34 E2SW,S2SE;
MTM 79010-8L	51.00	T. 4 N, R. 4 E, PMM, MT Sec. 6 LOT 3; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands)

Parcel Number	Acres	Legal Description	Proposed Stipulations
			NSO 11-2 (All Lands) TES 16-2 (All Lands) TL 13-28 (All Lands) FERC 19-1 (All FERC Lands)
MTM 79010-8M	80.00	T. 7 N, R. 4 E, PMM, MT Sec. 30 SENE,NWSE; Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 30 NWSE; TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-3B	40.00	T. 4 N, R. 5 E, PMM, MT Sec. 4 SESW; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-8K	411.09	T. 5 N, R. 5 E, PMM, MT Sec. 2 POR LOT 2 (4.16 AC); 2 POR LOT 3 (32.37 AC); 2 POR SWNE (22.20 AC); 2 POR NESE (2.80 AC); 2 POR NWSE (38.70 AC); 2 POR SWSE (37.80 AC); 2 LOT 4; 2 S2NW,SW; Broadwater County (007) PD	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-3C	205.00	T. 5 N, R. 5 E, PMM, MT Sec. 26 NWSW; 34 N2N2NE,N2S2N2NE, E2NENENW,NESENENW, W2NWNENW,NWSWNENW, N2NWNW,N2S2NWNW, S2NWSW,SWSW; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 26 NWSW; 34 N2NW,N2NE; TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-3D	2397.50	T. 4 N, R. 6 E, PMM, MT Sec. 6 LOTS 1-22 INCL; 6 E2SW,SE; 8 S2; 20 NE,SENW,N2SE,SESE; 30 LOTS 1,2,3,4; 30 NENE,SENW,E2SW; 32 NE,S2; Gallatin County (031) PD	CSU 12-1 (All Lands) CSU 12-10 Sec. 6 LOTS 2,3,4; CSU 12-18 Sec. 6 LOTS 2-7,9-22; 6 S2SE,NESE,E2SW, 8 S2; 20 NE,SENW,N2SE,SESE; 30 LOTS 1,2,3,4; 30 NENE,SENW,E2SW; 32 NE,S2; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 6 LOTS 3,5,6,12,17,22; 6 E2SE; 8 W2SE,SESE; 20 SENW,NWNE;

Parcel Number	Acres	Legal Description	Proposed Stipulations
			30 LOTS 1,2; 30 SENW; 32 E2SW,W2SE; TES 16-2 (All Lands) TL 13-28 (All Lands)
Presale Offer: MTM 93699	801.65	T. 4 N, R. 7 E, PMM, MT Sec. 12 NE,N2NW,SENW,E2SE; T. 5 N, R. 7 E, PMM, MT Sec. 26 E2E2; T. 4 N, R. 8 E, PMM, MT Sec. 6 LOT 14; 6 E2SW; T. 5 N, R. 8 E, PMM, MT Sec. 30 LOTS 3,4; 30 SWNE,SESW; Gallatin County (031) Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 T. 4 N, R. 7 E, PMM, MT Sec. 12, SENW, SWNE, NESE; TES 16-2 (All Lands) TL 13-14 (All Lands) TL 13-28 (All Lands) TL 13-30 T. 4 N, R. 7 E, PMM, MT Sec. 12, SESE; T. 4 N, R. 8 E, PMM, MT Sec. 6 LOT 14; 6 E2SW; T. 5 N, R. 8 E, PMM, MT Sec. 30 LOTS 3,4; 30 SWNE,SESW;
MTM 79010-US	480.00	T. 4 N, R. 8 E, PMM, MT Sec. 24 N2NE,SWNE,W2,NWSE; Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 24 W2,NWNE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 24 NW,NENE,W2SW,SESW; TES 16-2 (All Lands) TL 13-14 (All Lands) TL 13-28 (All Lands) TL 13-30 (All Lands)
Presale Offer: MTM 94539	720.00	T. 5 N, R. 8 E, PMM, MT Sec. 14 S2; 22 NE,E2NW; T. 5 N, R. 9 E, PMM, MT Sec. 18 SE; Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 T. 5 N, R. 8 E, PMM, MT Sec. 14 SW,W2SE,SESE; T. 5 N, R. 9 E, PMM, MT Sec. 18 W2SE,SESE; Cultural Resources 16-1 (All Lands) TES 16-2 (All Lands) TL 13-14 (All Lands) TL 13-28 (All Lands) TL 13-30 T. 5 N, R. 8 E, PMM, MT Sec. 14 S2; 22 SENW,SWNE; T. 5 N, R. 9 E, PMM, MT Sec. 18 SE;
Presale Offer: MTM 93698	1358.46	T. 5 N, R. 8 E, PMM, MT Sec. 26 ALL; 34 SW; T. 5 N, R. 9 E, PMM, MT Sec. 20 W2W2; 28 W2W2;	CSU 12-1 (All Lands) CSU 12-18 T. 5 N, R. 8 E, PMM, MT Sec. 26 ALL T. 5 N, R. 9 E, PMM, MT Sec. 20 W2W2;

Parcel Number	Acres	Legal Description	Proposed Stipulations
		30 LOTS 2,3,4; 30 E2NE,NESE; Park County (067) PD	28 W2W2; 30 LOTS 2,3; 30 NESE; Cultural Resources 16-1 (All Lands) NSO 11-2 T. 5 N, R. 8 E, PMM, MT Sec. 26 SWNW,E2SW,W2SE; 34 W2SW,NESW; T. 5 N, R. 9 E, PMM, MT Sec. 20 SWSW; 28 NWNW; TES 16-2 (All Lands) TL 13-14 T. 5 N, R. 8 E, PMM, MT Sec. 26 ALL; 34 SW; T. 5 N, R. 9 E, PMM, MT Sec. 20 W2W2; 30 LOTS 2,3,4; 30 E2NE,NESE; TL 13-28 (All Lands) TL 13-30 (All Lands)
MTM 79010-V	464.40	T. 4 N, R. 9 E, PMM, MT Sec. 8 W2NE,NWSE; 18 LOTS 1,2,3,4; 18 NWNE,E2W2; Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 8 NWNE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 8 SWNE,NWSE; 18 LOTS 1,2; 18 SENW,E2SW; TES 16-2 (All Lands) TL 13-14 (All Lands) TL 13-28 (All Lands) TL 13-30 (All Lands)
MTM 79010-T6	80.00	T. 1 N, R. 10 E, PMM, MT Sec. 20 N2NE; Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) TES 16-2 (All Lands) TL 13-14 (All Lands) TL 13-28 (All Lands)
MTM 79010-5F	160.00	T. 1 N, R. 10 E, PMM, MT Sec. 32 SW; Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 32 N2SW; Cultural Resources 16-1 (All Lands) NSO 11-48 Sec. 32 N2SW,SWSW; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-14 (All Lands)
Presale Offer: MTM 96231	989.35	T. 14 N, R 2 W, PMM, MT Sec. 2 LOTS 1,2,4; 2 SENE,S2NW,SW,NWSE,S2SE; 12 N2NE,SENE,NENW,S2; Lewis and Clark County (049)	NSO 11-2 Sec. 2 LOT 2; 2 NWSE; 12 SENE,NESE,SW; CSU 12-1 (All Lands) CSU 12-10

Parcel Number	Acres	Legal Description	Proposed Stipulations
		PD	Sec. 2 S2SE,S2SW,NWSW; CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-15. Sec. 12 N2NE,SENE,NENW,S2; TES 16-2 (All Lands) TL 13-27 (All Lands) TL 13-28 (All Lands)
MTM 79010-1I	159.11	T. 12 N, R. 3 W, PMM, MT Sec. 14 LOTS 1,2,3,4; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 14 LOTS 1,2,3; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 14 LOTS 1,2,3; NSO 11-20 Sec. 14 LOT 1; NSO 11-26 Sec. 14 LOTS 1,2; NSO 11-44 (All Lands) TES 16-2 (All Lands) TL 13-26 (All Lands) TL 13-28 (All Lands)
Presale Offer: MTM 96470	120.00	T. 12 N, R. 3 W, PMM, MT Sec 24 W2NE,SENE; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-20 (All Lands) NSO 11-26 (All Lands) NSO 11-2 Sec. 24 SWNE; NSO 11-44 (All Lands) NSO 11-53 (All Lands) TES 16-2 (All Lands) TL 13-26 (All Lands) TL 13-28 (All Lands) TL 13-25 Sec. 24 NWNE,SENE;
Presale Offer: MTM 96472	40.00	T. 12 N, R. 3 W, PMM, MT Sec. 24 NESE; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 (All Lands) NSO 11-44 (All Lands) TES 16-2 (All Lands) TL 13-25 (All Lands) TL 13-26 (All Lands)TL 13-28 (All Lands)
Presale Offer: MTM 90556	1400.00	T. 13 N, R. 3 W, PMM, MT Sec 14 SWNW,SW,S2SE; 24 W2,SE; 26 ALL; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) CSU 12-19 Sec. 14 SWNW; 24 W2,SE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 14 SESE; 24 W2NW,E2SW,S2SE,NESE; 26 S2SW;

Parcel Number	Acres	Legal Description	Proposed Stipulations
			NSO 11-7 Sec. 24 E2SE; NSO 11-20 Sec. 24 NENW,E2SE; NSO 11-26 Sec. 14 SWNW,N2SW,SESW,S2SE; 24 E2SE; NSO 11-42 (All Lands) NSO 11-43 Sec. 14 SWNW,N2SW; TES 16-2 (All Lands) TL 13-27 (All Lands) TL 13-28 (All Lands)
Presale Offer: MTM 90712	1421.92	T. 14 N, R 3 W, PMM, MT Sec 2 LOTS 1,2,3,4; 2 S2N2,S2; 10 N2N2; 12 ALL; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 2 LOTS 1,2,3,4; 2 S2NW,SWNE,NWSE,N2SW,SWSW; 10 NENE; 12 E2,W2NW; NSO 11-26 Sec. 10 NWNW; NSO 11-42 (All Lands) TES 16-2 (All Lands) TL 13-27 (All Lands) TL 13-28 (All Lands)
MTM 79010-DH	1938.43	T. 12 N, R. 4 W, PMM, MT Sec. 4 LOTS 3,4; 4 S2NW,SW; 6 LOTS 1-7, INCL; 6 S2NE,SENW,E2SW,SE; 8 S2NE,SENW,SW,N2SE,SESE; 18 NE,NENW; 20 S2; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 4 S2NW; 6 LOTS 1-7 INCL; 6 S2NE,SENW,N2SE,E2SW; 8 SW,SENW,SENE; 18 NE; 20 NWSW; TES 16-2 (All Lands) TL 13-28 (All Lands)
MTM 79010-DD	TBD	T. 13 N, R. 4 W, PMM, MT Sec. 4 LOT 5 EXCL (TBD) AC IN RR ROW MTM 041254; 4 LOTS 3,4,6,7; 4 NESW EXCL (TBD) AC IN RR ROW MTM 041254; 4 N2SE EXCL (TBD) AC IN RR ROW MTM 041254; 5 LOTS 1,2,3,4; 5 S2N2,E2SW,SE; 10 N2N2; 11 NE,N2NW,E2SE; Lewis and Clark County (049)	CSU 12-1 (All Lands) CSU 12-10 Sec. 4 LOT 5 EXCL (TBD) AC IN RR ROW MTM 041254; 4 LOTS 3,4,6,7; 4 NESW EXCL (TBD) AC IN RR ROW MTM 041254; 4 N2SE EXCL (TBD) AC IN RR ROW MTM 041254; 5 S2SE,SESW; 10 N2N2; 11 NE,N2NW,E2SE; CSU 12-18 (All Lands) CSU 12-19 Sec. 4 LOT 5 EXCL (TBD) AC IN RR

Parcel Number	Acres	Legal Description	Proposed Stipulations
		PD	ROW MTM 041254; 4 LOTS 6,7; 4 NESW EXCL (TBD) AC IN RR ROW MTM 041254; 4 N2SE EXCL (TBD) AC IN RR ROW MTM 041254; 10 N2N2; 11 NE,N2NW,E2SE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 4 LOT 4; 4 LOT 5 EXCL (TBD) AC IN RR ROW MTM 041254; 4 NESW EXCL (TBD) AC IN RR ROW MTM 041254; 4 NWSE EXCL (TBD) AC IN RR ROW MTM 041254; 5 LOTS 2,3; 5 SENW; 10 N2NW; 11 N2NW,E2NE,SWNE; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-27 (All Lands)
MTM 79010-S1	1463.26	T. 14 N, R. 4 W, PMM, MT Sec. 2 S2 EXCL 12.68 AC IN RR ROW MTM 041254; 12 LOT 3; 12 W2W2,SWSE; 14 SWNW EXCL 4.76 AC IN RR ROW MTM 041254; 14 N2NE,SENE,S2; 24 W2NE,NW,NESW,SE; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 (All Lands) CSU 12-19 Sec. 24 W2NE,NW,NESW,SE; Cultural Resources 16-1 (All Lands) NSO 11-42 (All Lands) NSO 11-7 Sec. 2 E2SE,NWSE; NSO 11-2 Sec. 2 W2SW; 12 W2SW; 14 NWNE,SENE,SWNW,N2SE,SESE; 24 W2NW,SENW,NESW,S2SE; TES 16-2 (All Lands) TL 13-26 Sec. 12 LOT 3; TL 13-27 (All Lands) TL 13-28 (All Lands)
MTM 79010-ER	2222.51	T. 14 N, R. 4 W, PMM, MT Sec. 3 LOTS 3,4; 3 SWNE,S2NW,S2; 4 LOTS 1,2,3,4; 4 S2NW,NESW,SESE; 9 LOTS 10-15 INCL; 10 SENE; 22 SE; 24 NWSW,S2SW; 26 SE EXCL 0.50 AC IN SESESE WITHIN WSA BDY; 26 N2NE,SWNE,W2W2;	CSU 12-1 (All Lands) CSU 12-10 Sec. 4 LOT 4; 4 SESE; 9 LOTS 10-15 INCL; 10 SENE; 22 SE; 24 NWSW,S2SW; 26 SE EXCL 0.50 AC IN SESESE WITHIN WSA BDY; 26 N2NE,SWNE,W2W2; 34 N2,N2S2,SWSW,SESE; CSU 12-18 (All Lands)

Parcel Number	Acres	Legal Description	Proposed Stipulations
		34 N2,N2S2,SWSW,SESE; Lewis and Clark County (049) PD	CSU 12-19 Sec. 22 SE; 24 NWSW,S2SW; 26 SE EXCL 0.50 AC IN SESESE WITHIN WSA BDY; 26 N2NE,SWNE,W2W2; 34 N2,N2S2,SWSW,SESE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 3 LOTS 3,4; 3 SWNE,N2SE; 4 LOT 1; 4 SWNW,SESE; 9 LOTS 11,15; 24 SESW; 26 NESE,SWSE; 34 NW,SWNE,N2SW,NWSE,SESE; NSO 11-42 Sec. 24 NWSW,S2SW; 26 SE EXCL 0.50 AC IN SESESE WITHIN WSA BDY; 26 N2NE,SWNE,W2W2; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-27 Sec. 3 LOTS 3,4; 3 SWNE,S2NW,S2; 10 SENE; 22 SE; 24 NWSW,S2SW; 26 SE EXCL 0.50 AC IN SESESE WITHIN WSA BDY; 26 N2NE,SWNE,W2W2; 34 N2,N2S2,SWSW,SESE;
MTM 79010-EG	1051.10	T. 14 N, R. 4 W, PMM, MT Sec. 26 SENE,E2W2; 28 ALL EXCL 28.90 AC IN RR ROW MTM 041254; 32 SE; 34 SESW,SWSE; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-10 Sec. 28 ALL EXCL 28.90 AC IN RR ROW MTM 041254; 32 SE; 34 SESW,SWSE; CSU 12-18 (All Lands) CSU 12-19 Sec. 26 SENE,E2W2; 28 ALL EXCL 28.90 AC IN RR ROW MTM 041254; 34 SESW,SWSE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 26 SENE,E2W2 28 S2NW,NENW,NWNE,S2SW,NWSW, N2SE,SWSE; 32 SWSE; 34 SESW,SWSE; TES 16-2 (All Lands)

Parcel Number	Acres	Legal Description	Proposed Stipulations
			TL 13-28 (All Lands) TL 13-27 (All Lands)
MTM 79010-DU	1289.26	T. 12 N, R. 6 W, PMM, MT Sec. 1 LOTS 1,2,3,4; 2 LOTS 1-4,7,10; 2 NWSE; 4 LOTS 6-12 INCL; 4 N2S2,SESW,S2SE; 14 SW; 15 NWSE,S2SE; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-10 Sec. 15 SWSE; CSU 12-18 Sec. 1 LOTS 1,2; 2 LOTS 4,7,10; 2 NWSE; 4 LOTS 6-12 INCL; 4 N2S2,SESW,S2SE; 14 SW; 15 NWSE,S2SE; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 1 LOTS 3,4; 2 LOTS 1,2,3,7; 2 NWSE; 4 LOTS 6,7,8,10,11; 4 S2SE,NWSE; 15 W2SE; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-31 Sec. 1 LOTS 1,2,3,4; 2 LOTS 1-4,7,10; 2 NWSE; 4 LOTS 6-12 INCL; 4 N2S2,SESW,S2SE; 15 NWSE,S2SE;
MTM 79010-QY	1132.03	T. 13 N, R. 6 W, PMM, MT Sec. 4 LOTS 6,9,10,13,14; 4 S2SE; 16 LOT 8; 17 LOTS 1,2; 17 N2NW; 18 LOTS 1,2; 18 NE,E2NW; 22 N2NE,SENE; 26 E2; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-10 Sec. 4 LOTS 6,9,10,13,14; 4 S2SE; 16 LOT 8; 17 LOTS 1,2; 17 N2NW; 18 LOTS 1,2; 18 NE,E2NW; CSU 12-18 (All Lands) Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 4 LOTS 6, 9,10,13,14; 17 LOT 2; 22 NENE; 26 SWSE; NSO 11- 51 Sec. 18 LOT 1; 18 NWNE,NENW; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-31 (All Lands)
MTM 79010-CY	1269.09	T. 13 N, R. 6 W, PMM, MT Sec. 7 LOTS 4-13 INCL; 7 E2,E2NW,SESW;	CSU 12-1 (All Lands) CSU 12-10 (All Lands) CSU 12-18 (All Lands)

Parcel Number	Acres	Legal Description	Proposed Stipulations
		8 ALL; Lewis and Clark County (049) PD	Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 7 LOTS 8,9,10,11,12,13; 7 N2SE,SWNE; 8 NENE,N2SW,SESW,SWSE; NSO 11 – 51 Sec. 7 LOTS 4-13; 7 W2NE,E2NW,N2SE,SESW; TES 16-2 (All Lands) TL 13-28 (All Lands) TL 13-31 (All Lands)
MTM 79010-BG	359.25	T. 14 N, R. 7 W, PMM, MT Sec. 1 E2SW,SWSE; 3 LOT 1; 12 NE,SENW; Lewis and Clark County (049) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 1 E2SW,SWSE; 12 NE,SENW; Cultural Resources 16-1 (All Lands) NSO 11-2 Sec. 12 N2NE; NSO 11-18 Sec. 1 E2SW,SWSE; 12 N2NE, SENE; NSO 11-47 Sec. 3 LOT 1; TL 13-28 (All Lands) TL 13-31 (All Lands) TES 16-2 (All Lands)
MTM 79010-TW	80.00	T. 1 S, R. 11 E, PMM, MT Sec. 24 E2SE; Park County (067) PD	CSU 12-1 (All Lands) CSU 12-18 Sec. 24 SESE; Cultural Resources 16-1 (All Lands) TES 16-2 (All Lands) TL 13-28 (All Lands)

Stipulation Number	Stipulation Name/Brief Description
Cultural Resources 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.
NSO 11-7	**NO SURFACE OCCUPANCY STIPULATION** Surface occupancy and use is prohibited within 1 mile of identified peregrine falcon nesting sites.
NSO 11-18	**NO SURFACE OCCUPANCY STIPULATION** Surface occupancy and use is prohibited within one-half mile from centerline of stream containing known populations of 99 to 100% genetically pure westslope cutthroat trout.
NSO 11-42	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy. Activity is prohibited within the bighorn sheep core areas.
NSO 11-44	**NO SURFACE OCCUPANCY STIPULATION**

	Activity is prohibited within 1/2 mile of bald eagle nest sites and within bald eagle nesting habitat in riparian areas.
NSO 11-48	**NO SURFACE OCCUPANCY STIPULATION** No activity allowed within 1/2 mile from centerline of streams containing known populations of 90-100% genetically pure yellowstone cutthroat trout.
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 13-14	**TIMING LIMITATION STIPULATION** Surface use is prohibited from December 1 through May 15 within winter and spring range for sage grouse.
TL 13-27	**TIMING LIMITATION STIPULATION** No activity from November 1 through June 30 within Bighorn Sheep range
TL 13-28	**TIMING LIMITATION STIPULATION** No activity from December 1 through May 15 within winter range for wildlife.
TL 13-29	**TIMING LIMITATION STIPULATION** Activity is prohibited from April 1 through June 30 in big game birthing areas.
TL 13-30	**TIMING LIMITATION STIPULATION** Activity is restricted from March 1 through June 30 in nesting and early brood rearing habitat (defined as within three miles of leks).
TL 13-31	**TIMING LIMITATION STIPULATION** Activity is prohibited from April 1 to June 30 and from September 15 – October 15 in the grizzly bear distribution zone.
FERC 19-1	**Federal Energy Regulatory Commission -** Agency lease stipulations.

Appendix B: MITIGATION MEASURES TO REDUCE WILDLIFE IMPACTS ASSOCIATED WITH OIL AND GAS DEVELOPMENT

Roads

– Use existing roads and two-tracks if they are sufficient and not within environmentally sensitive areas.
  – Construct the minimum number and length of roads necessary..
– Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
– Salvage topsoil from all road construction and re-apply during interim and final reclamation.
– Locate roads away from bottoms of drainages, which often provide the most important sources of cover and forage for wildlife.
– Design road crossings of streams to allow fish passage at all flows. Types of crossing structures that minimize aquatic impacts, in descending order of effectiveness, are: a) bridge spans with abutments on banks; b) bridge spans with center support; c) open bottomed box culverts; and d) round culverts with the bottom placed no less than one foot below the existing stream grade. Perched culverts block fish passage and are unacceptable in any stream that supports a fishery.
– Locate and construct all structures crossing intermittent and perennial streams such that they do not decrease channel stability or increase water velocity.
– Use a variety of native grasses and forbs to establish effective, interim reclamation on road shoulders and borrow areas.

Wells

– If geologically and technically feasible, drill multiple wells from the same pad using directional (horizontal) drilling technologies (up to 16 wells per pad, as technologically feasible).
  – Disturb the minimum area (footprint) necessary to efficiently drill and operate a well.
– Salvage topsoil from all well pad excavations and re-apply during interim and final reclamation.
– If geologically and technically feasible, locate well pads in the least environmentally sensitive areas, well away from riparian habitats, streams or drainages, below ridge lines, away from important sources of forage, cover, reproductive habitats, winter habitats, parturition areas, brood-rearing habitats, etc.
– Use a variety of native grasses and forbs to establish effective, interim reclamation on all well pads and associated disturbances.

Ancillary Facilities

– Locate facilities including tanks, transfer stations, shops, equipment shelters, utility towers, etc. in the least environmentally sensitive areas, well away from riparian habitats, streams or drainages, below ridge lines, away from important sources of forage, cover, reproductive habitats, winter habitats, parturition areas, brood-rearing habitats, etc.
– Salvage topsoil from all facilities construction and re-apply during interim and final reclamation.
– Design all facilities such that they will not be used as perching or nesting substrates by raptors, crows, and ravens in open prairie or shrub-steppe environments.
– Modify new and existing power poles to prevent raptor electrocutions and perching.
– Use existing utilities, road and pipeline corridors to the extent feasible.
  – Bury power lines in or adjacent to roads where possible.
– Establish effective, interim reclamation on all surface disturbances associated with ancillary facilities, including equipment staging areas. Interim reclamation should be achieved using a variety of native grasses and forbs.

Noise

– Minimize noise generally. All compressors, vehicles, and other sources of noise should be equipped with effective mufflers or noise suppression systems (e.g., “hospital mufflers”).
– To minimize the effects of continuous noise on bird populations, reduce noise levels to 49 dBA or less, particularly during the bird nesting season (1 April through 30 June). Constant noise generators should be located far enough away from sensitive habitats or muffled such that noise reaching those habitats is less than 49 dBA.

Traffic

– Develop a travel plan that minimizes the amount of vehicular traffic needed to monitor and service wells and other facilities.

– Prohibit or substantially limit traffic during high wildlife use hours (within 3 hours of sunrise and sunset) to the extent possible.
  – Use pipelines to transport condensates off site, or install larger capacity storage tanks when frequent truck trips would impact habitat effectiveness.
– Transmit instrumentation readings from remote monitoring stations to reduce maintenance traffic.
– Post speed limits on all access and maintenance roads to reduce wildlife collisions and limit dust: 30-40 mph is adequate in most cases.

Pollutants, Toxic Substances, Fugitive Dust, Erosion and Sedimentation

– Avoid exposing or spilling hydrocarbon products on the surface. Oil pits should not be used, but if absolutely necessary, they should be enclosed in small-mesh netting and fence to prevent entrapment of birds and mammals. All netting and fence should be maintained and kept in serviceable condition.
  – Limit the permitted discharge of produced water to those areas where it can be beneficially used by wildlife, provided water quality standards for wildlife and livestock are met. Produced water should not be discharged on the surface within big game crucial winter ranges or near complexes of sage grouse leks. New water sources within crucial winter ranges encourage yearlong use by livestock and wildlife, and may result in reduced or depleted forage during winter. Additional water sources near lek complexes could increase vulnerability of sage grouse to mosquito-borne, West Nile virus. However, produced water of suitable quality may be used for supplemental irrigation to improve reclamation success.
– Employ erosion control practices and sediment retention structures to prevent sediment transport off site during precipitation events and runoff.
– Sour gas (hydrogen sulfide) should not be released into the environment.
– Use dust abatement procedures including reduced speed limits, and application of [environmentally compatible] chemical suppressants or suitable quality water.

Monitoring and Environmental Response

– Monitor conditions or events that may indicate environmental problems. Such conditions or events can include any significant chemical spill or leak, detection of multiple wildlife mortalities, sections of roads with frequent and recurrent wildlife collisions (especially big game or sage grouse), poaching and harassment incidents, severe erosion into tributary drainages, raptor electrocutions, structures associated with frequent bird or bat collisions, migration impediments (e.g., pronghorn concentrating along a fence), wildlife entrapment, sick or injured wildlife, or other unusual observations.
– Promptly report observations of potential wildlife problems to the regional office of the MT Fish,Wildlife and Parks and, as applicable, the U.S. Fish and Wildlife Service.

Research and Special Studies

– Where questions or uncertainties exist about the degree of impact to specific resources, or the effectiveness of mitigation, companies should consider funding or cost-sharing special studies to collect data for evaluation and documentation.

Noxious Weeds

– Control noxious and invasive plants that become established along roads, on well pads, or adjacent to other facilities.
– Clean and sanitize all equipment brought in from other regions. Seeds and propagules of noxious plants are commonly imported by equipment and mud clinging to equipment.
– Request employees to clean mud from boots/work shoes before traveling to the work site, to prevent importation of noxious weeds.

Final Reclamation

– Salvage topsoil during decommissioning operations and reapply to reclaimed surfaces.
– Replant a mixture of forbs, grasses, and shrubs that are native to the area and suitable for the specific ecological site.
– Restore vegetation to achieve cover, composition, and diversity that are commensurate with the ecological site.
– Continue to monitor and treat reclaimed areas until plant cover, composition, and diversity standards have been met.

Stream habitats and Riparian Corridors

– Line reserve pits with a suitable, impermeable barrier to eliminate possible contamination of soil and groundwater.
– Design drill pad sites to drain excess water storm water and other fluids into a properly sized reserve pit. The pit should have adequate capacity to intercept and hold excess precipitation. Discharges from the pit should meet NPDES standards or otherwise assure the discharged water is of suitable quality.
– All pipeline crossings of a watercourse should be protected against surface disturbances and damage to the pipeline, which could result in a spill event.
– Any stream crossing of a pipeline should be protected by installation of automatic shutoff valves.
– Any pipeline crossing of a perennial stream should be done by boring underneath the stream rather than trenching
— Design road crossings of streams to allow fish passage at all flows. Types of crossing structures that minimize aquatic impacts, in descending order of effectiveness, are: a) bridge spans with abutments on banks; b) bridge spans with center support; c) open bottomed box culverts; and d) round culverts with the bottom placed no less than one foot below the existing stream grade. Perched culverts block fish passage and are unacceptable in any stream that supports a fishery.
– Locate and construct all structures crossing intermittent and perennial streams such that they do not decrease channel stability or increase water velocity.
– Avoid stripping riparian canopy or stream bank vegetation if possible. It is preferable to crush or shear streamside woody vegetation rather than completely remove it. Any locations from which vegetation is stripped during installation of stream crossings, should be revegetated immediately after the crossing is completed.
– Staging, refueling, and storage areas should not be located in riparian zones or on flood plains. Keep all chemicals, solvents and fuels at least 500 feet away from streams and riparian areas.
– Hydrostatic test waters released during pipeline construction could cause alterations of stream channels, increased sediment loads and introduction of potentially toxic chemicals or invasive species into drainages. Avoid discharging hydrostatic test waters directly to streams. Release these waters first into a temporary, sediment retention basin if the concentration of total suspended solids is significantly higher than in the receiving water. Dewater temporary sedimentation basins in a manner that prevents erosion.
– Locate pipelines that parallel drainages, outside the 100-year floodplain. Construct pipeline crossings at right angles to all riparian corridors and streams to minimize the area of disturbance.
– Use the minimum practical width for rights-of-way where pipelines cross riparian areas and streams.