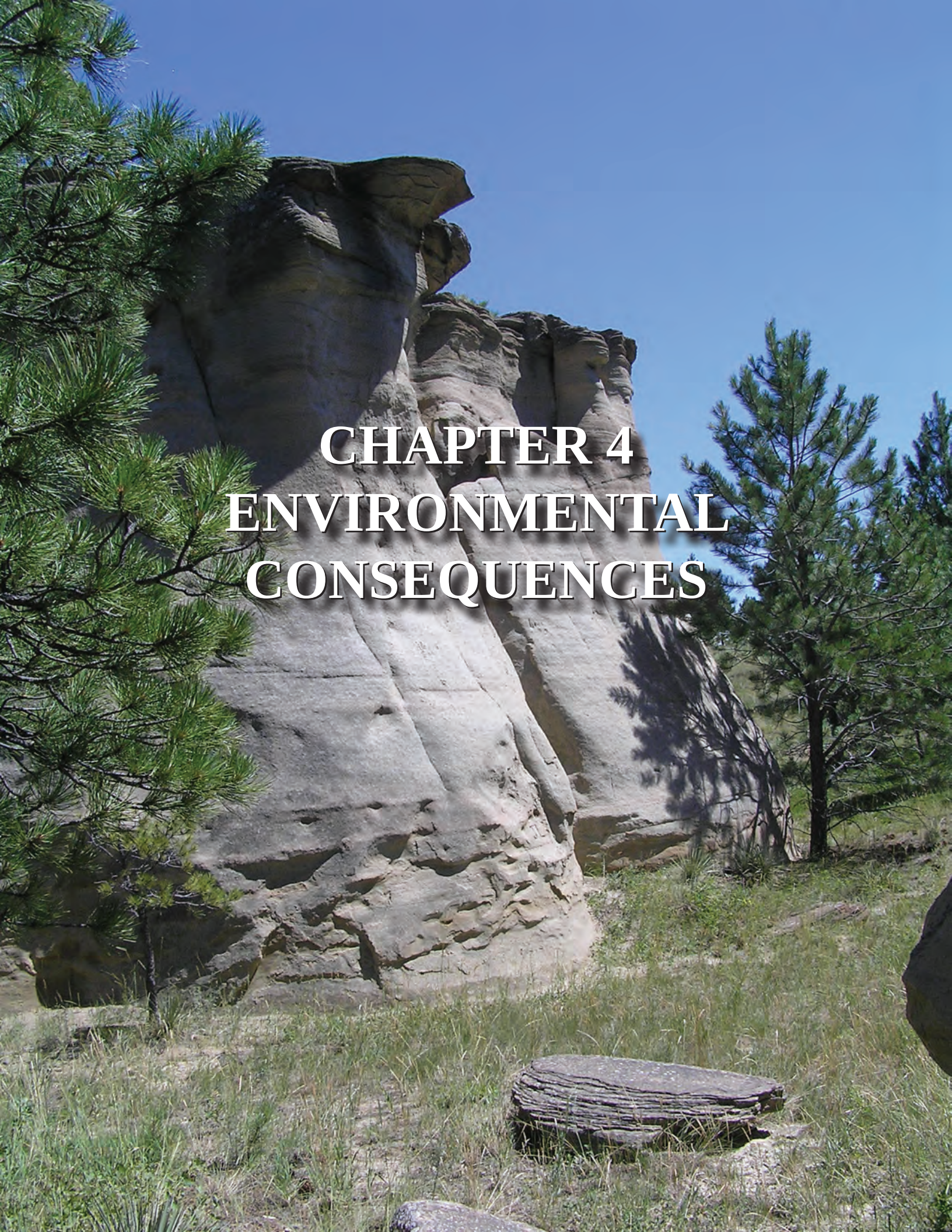


CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Chapter 4
Environmental Consequences

Introduction

Chapter 4 describes the environmental, economic and social consequences of implementing the alternatives presented in Chapter 2. The impact analyses and conclusions are based on interdisciplinary team knowledge of resources within the planning area, reviews of existing literature, and information provided by other agencies, institutions, and individuals. (Chapter 3 provides a detailed description of each resource). Spatial analysis was conducted using ESRI's ArcGIS Desktop 9.1 software. Effects are quantified where possible; in the absence of quantitative data, best professional judgment was used. Impacts are sometimes described using ranges of potential effects or in qualitative terms if appropriate. Since the alternatives provide general management direction, the analyses may represent best estimates of impacts since specific locations and proposed actions are often unknown. The analyses are presented here by resource and alternative.

Chapter 4 is presented in the following sections:

- Reasonable Foreseeable Future Actions
- Reasonable Foreseeable Development Scenarios
- Acres of Surface Disturbance
- Impacts from the Alternatives (including Analysis Assumptions and Guidelines, and Impacts Common to All Alternatives)
- Unavoidable Adverse Impacts
- Short-Term Use versus Long-Term Productivity
- Irreversible and Irretrievable Commitment of Resources

The environmental impacts of the alternatives are summarized in Table 2.22 at the end of Chapter 2.

GIS Calculations

Acreages displayed in this document should be considered approximations even when displayed to the nearest acre. Most acreages were calculated from GIS datasets and as a result may not match acres provided in prior published documents that contained calculations from master title plats or other base data. For example, acres calculated for wilderness study areas and reported in the 1991 Montana Statewide Wilderness Study Report vary from the GIS calculated acres for those same areas. The data used throughout this document is for land use planning purposes and not necessarily for actual on-the-ground implementation.

Hawley Creek Area, Phillips County Photo by Kathy Tribby

Reasonable Foreseeable Future Actions

Keystone XL Pipeline

The proposed Keystone Gulf Coast Expansion Project (Keystone XL) is complementary to the Keystone Pipeline and would serve existing refineries and markets on the U.S. Gulf Coast in Texas. It would link a growing and reliable supply of Canadian crude oil with a rising North American demand for energy.

The proposed project is an approximate 1,980 mile (3,200 kilometer), 36 inch crude oil pipeline that would begin at Hardisty, Alberta and extend southeast through Saskatchewan, Montana, South Dakota and Nebraska. It would incorporate a portion of the Keystone Pipeline to be constructed through Kansas to Cushing, Oklahoma, before continuing through Oklahoma to a delivery point near existing terminals in Nederland, Texas to serve the Port Arthur, Texas marketplace. Approximately 42 miles of the pipeline would cross BLM land in Montana and South Dakota, of which about 22 miles would cross BLM land in the planning area.

An auxiliary development that would be necessary for the addition of the Keystone XL Pipeline is the construction of transmission lines to the pump stations in order to provide the necessary power to operate the electric pumps on a year-round basis. It is expected that 115 kilovolt transmission lines would be sufficient to carry the 25-50 megawatts to the respective pump stations. Approximately 113 miles of transmission line would be constructed to facilitate two pump stations located in Phillips and Valley Counties, Montana, with an estimated 34.3 miles to be located on BLM land.

Keystone will be operated as one integrated pipeline system which will include the proposed Keystone XL pipeline project.

Reasonable Foreseeable Development Scenarios

Three reasonable foreseeable development scenarios (RFDs) were developed for the HiLine Resource Management Plan (RMP): fluid minerals, wind energy, and solid minerals. These RFDs are the basis for assessing cumulative impacts from further mineral exploration and development and the impacts from potential wind farms on BLM land.

Fluid Minerals

A description of oil and gas operations and a summary of the RFD for fluid minerals are contained in Appendix E.1. The complete RFD is available on the internet at http://blm.gov/8qkd. Appendix E discusses the general exploration and development process and projects the level of anticipated activity, including the number of oil and natural gas wells.

Drill Rig BLM Photo

The number of new oil and gas wells in the planning area (both federal and non-federal mineral estate) projected under each alternative over the next 20 years is shown in Tables 4.1 and 4.2.

Table 4.1
Total Wells by Development Potential Category and Alternative

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Coalbed Natural Gas					
Very Low Potential	149	137	146	149	144
Bowdoin Natural Gas Project Area (BNGPA)					
High Potential	0	0	0	0	0
Moderate Potential	989	494	863	991	946
Low Potential	77	51	69	77	75
Very Low Potential	0	0	0	0	0
Non-BNGPA					
High Potential	1,665	1,229	1,606	1,679	1,623
Moderate Potential	1,670	1,560	1,650	1,672	1,661
Low Potential	1,298	1,193	1,275	1,299	1,285
Very Low Potential	166	123	147	167	162
Total	6,014	4,787	5,756	6,034	5,896

Table 4.2
Federal Wells by Development Potential Category and Alternative

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Coalbed Natural Gas					
Very Low Potential	23	11	20	23	18
Bowdoin Natural Gas Project Area (BNGPA)					
High Potential	0	0	0	0	0
Moderate Potential	558	72	434	561	516
Low Potential	44	7	35	43	41
Very Low Potential	0	0	0	0	0
Non-BNGPA					
High Potential	434	167	388	442	405
Moderate Potential	434	211	398	440	415
Low Potential	338	162	308	341	321
Very Low Potential	43	17	34	44	40
Total	1,874	647	1,617	1,894	1,756

For the purpose of quantifying associated surface disturbance with the drilling of the above-mentioned wells, the following assumptions were made:

Coalbed Natural Gas (CBNG)

- Currently, no existing CBNG wells are located in the planning area.
  - New exploratory and development CBNG wells drilled in the planning area would have short-term disturbance figures of 1.85 acres for the access road/pipeline and 1 acre for the well pad, which equates to a total of 2.85 acres of short-term disturbance for a new CBNG well.

- New exploratory and development CBNG wells drilled in the planning area would have long-term disturbance figures of 0.25 acres for the access road/pipeline and 0.5 acres for the well pad, which equates to a total of 0.75 acres of long-term disturbance for a new CBNG well.

Bowdoin Natural Gas Project Area (BNGPA)

- Existing wells in the Bowdoin Dome area in northern Phillips County have disturbed 0.75 acres per well.
  - New exploratory and development wells drilled in the BNGPA would have short-term disturbance figures of 1.85 acres for the access road/pipeline and 1 acre for the well pad, which equates to a total of 2.85 acres of short-term disturbance for a new well drilled in the BNGPA.
  - New exploratory and development wells drilled in the BNGPA would have long-term disturbance figures of 0.25 acres for the access road/pipeline and 0.5 acres for the well pad, which equates to a total of 0.75 acres of long-term disturbance for a new well drilled in the BNGPA.

Non-BNGPA

- Existing wells in the planning area, exclusive of the BNGPA, have disturbed 0.92 acres per well.
  - New exploratory and development wells drilled in the planning area, exclusive of the BNGPA, would have short-term disturbance figures of 3.1 acres for the access road/pipeline and 2.1 acres for the well pad, which equates to a total of 5.2 acres of short-term disturbance for a new well drilled outside of the Bowdoin Dome area.
  - New exploratory and development wells drilled in the planning area, exclusive of the BNGPA, would have long-term disturbance figures of 0.78 acres for the access road/pipeline and 0.14 acres for the well pad, which equates to a total of 0.92 acres of long-term disturbance for a new well drilled outside of the Bowdoin Dome area.

In order to assess the environmental impacts associated with fluid mineral development, planning assumptions were developed to aid in calculating potential surface disturbance from the future development of fluid minerals within the planning area. For the HiLine RMP, an estimated amount of surface-disturbing acres, both short-term and long-term, were applied to each of the following scenarios (Table 4.3):

- new CBNG wells across the entire planning area;
- new exploratory and development oil and gas wells drilled within the BNGPA;
- existing wells within the BNGPA;
- new exploratory and development oil and gas wells drilled in the planning area outside of the BNGPA; and
- existing wells in the planning area outside of the BNGPA.

For the purpose of this planning document, the same figures were applied to new CBNG wells drilled across the entire planning area and new exploratory and development wells drilled within the BNGPA for both long-term and short-term disturbance. These figures, in addition to the numbers used for the existing wells in the BNGPA, are based upon average well pad sizes and access road/pipeline distances that were extracted from a representative sample of existing wells within the BNGPA.

Since the disturbance footprint from exploratory CBNG well development would look similar to existing development in the BNGPA, it was appropriate to apply the same figures. For the remaining figures that were applied to new exploratory and development oil and gas wells drilled in the planning area outside of the BNGPA and existing wells in the same category, the numbers were pulled from an analysis performed for a potential development project in southern Blaine County.

Since a large amount of drilling that occurs outside of the BNGPA is considered exploratory, it is appropriate to apply these numbers to all new exploratory, development and existing wells outside of the BNGPA. This approach should be

considered conservative since some operators utilize directional drilling from existing pads and new infill (developmental) drilling would typically not require as much surface disturbance as an exploratory well.

Table 4.3
Fluid Mineral (Oil and Gas) Development Potential Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Short-Term Disturbance from BLM Actions	9,564	4,440	8,547	9,663	9,068
Reclaimed from BLM Actions	7,142	2,896	6,309	7,227	6,731
Long-Term Disturbance from BLM Actions	2,422	1,544	2,238	2,436	2,337
Short-Term Disturbance from non-BLM Actions	27,010	27,005	27,010	27,010	27,009
Reclaimed from non-BLM Actions	18,205	18,201	18,206	18,206	18,204
Long-Term Disturbance from non-BLM Actions	8,805	8,804	8,804	8,804	8,805

Disturbance effects from oil and gas activities for each alternative were based on the total number of active wells anticipated under each alternative which included existing wells.

Estimated well densities were calculated by potential area using the total number of wells (new plus current) divided by the acreage for each potential area minus areas closed and no surface occupancy (NSO). Actual well densities may be more or less in portions of each potential category depending on the distribution of oil and gas resources.

Where there are no effects, or effects are not known for species or species groups, they are not addressed in the discussion of each alternative.

Wind Energy

The RFD for wind energy is contained in Appendix O. The RFD describes existing, proposed, and potential wind farms near or within the planning area. Specific data from a wind farm proposal that is no longer under consideration were used for hypothetical modeling of potential future wind farms.

Currently, no wind farms are proposed on BLM land. To determine the reasonable foreseeable wind energy development scenario for the planning area, two types of wind farms were hypothetically described. Table 4.4 shows the two hypothetical wind farms, one small and one large, which are somewhat representative of possible future development. They are based on the Phase II and Phase IV proposals of the Valley County Wind Farm, a proposal that was discontinued by the developer during the planning stages. It is assumed that the two hypothetical wind farms would be located in high or moderate development potential areas for wind resources.

In addition to turbines, it is expected that collector substations, collector systems, new access roads, internal road networks, turbine string turnaround areas, turbine foundations, pad-mounted transformers, material staging areas, transmission lines, and operations and maintenance buildings could be included in a wind farm proposal as associated facilities.

Table 4.4
Large and Small Hypothetical Models of Wind Farms and Associated Facilities (Acres)
(Not Including Potential Transmission Lines)

	Small			*Large*		
Number of Turbines	63			134		
Overall Area (acres)	2,800			10,706		
Power Generated (MW)	100			200		
	Short-Term	*Long-Term*	*Total*	*Short-Term*	*Long-Term*	*Total*
Operations and Maintenance Buildings	4	2	2	4	2	2
Collector Substation	3	1	2	3	1	2
Collector System	18	18	0	82	82	0
New Access Road	15	9	6	15	9	6
Internal Road Network	58	21	37	266	95	171
Turbine String Turnaround Area	6	6	0	22	22	0
Wind Turbine Foundations	0.3	0	0.3	1	0	1
Pad-Mounted Transformers	0.3	0	0.3	1	0	1
Turbine Work Areas/Material Staging	96	96	0	334	334	0
Total	200	48	152	727	183	544

A small wind farm is expected to utilize 2,800 acres of land as a general "footprint" for construction staging areas, turbines, and associated facilities. These associated facilities are assumed to create 200 acres of short-term surface disturbance and 48 acres of long-term surface disturbance (post-reclamation) for a small wind farm proposal.

A large wind farm is expected to utilize 10,706 acres for construction staging areas, turbines, and associated facilities. The acres of surface disturbance for a large wind farm would be 727 acres of short-term surface disturbance and 183 acres of long-term surface disturbance (post-reclamation).

Solid Minerals

The RFD for locatable solid minerals in contained in Appendix P. The RFD describes the extent of exploration and mine development within the foreseeable future, broken into specific geographic areas with high development potential and by alternative. This includes development of known resource occurrence and of undiscovered resource bodies resulting from prospecting and exploration activity.

The acres of disturbance due to foreseeable locatable mineral activity by alternative are shown in Table 4.5

Table 4.5
Solid Minerals (Locatable) Development Potential Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)		*Alternative B*	*Alternative C*	*Alternative D*		*Alternative E (Preferred Alternative)*
Geographic Region	*Short-Term*	*Long-Term*	*Short-Term and Long-Term*	*Short-Term and Long-Term*	*Short-Term*	*Long-Term*	*Short-term and Long-Term*
Brazil Creek	150	150	115	115	115	115	115
Little Rocky Mountains	130	2,170	130	130	10	10	130
Sweet Grass Hills	110	175	110	110	110	175	110
Total	390	2,495	355	355	235	300	355

Acres of Surface Disturbance

In addition to the Keystone XL Pipeline and RFDs, a number of other activities may occur on BLM land in the future including prescribed fires, mechanical treatments, range improvements, and rights-of-way. These activities, which are discussed in the following section, may potentially cause surface disturbance in both the short and long-term and are the basis for assessing cumulative impacts but should not be considered an allocation of resources.

Since cumulative impacts must be assessed "regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7), the BLM also estimated the amount of surface disturbance on non-BLM lands in the planning area. These estimates assume the same level of activity on non-BLM land (see Tables 4.6 through 4.11), and are based on the percentage of land ownership or vegetation type (forests and woodlands) in the planning area. However, the projected level of surface disturbance would be the same as Alternative A, since the range of alternatives would not affect these activities on non-BLM land.

Fire Management and Ecology

Prescribed fire could occur in the future to reduce fuels, improve land health, and restore fire regimes. For Alternative A, it is assumed that a total of 343 acres would be treated each year multiplied by 20 years for the life of the plan, for a total of 6,860 acres (Table 4.6). These acres were derived from actual acres treated from the year 2001 through May 2008. They are an average per year for all prescribed fire treatments (both grass/shrub and forested settings). Forested acres burned have averaged 43 acres per year, and grass/shrub acres burned have averaged 300 acres per year for a total of 343 acres.

For Alternatives B through E, the assumption is made that 1,333 acres could be treated with management-ignited prescribed fire, multiplied by 20 years for the life of the plan, for a total of 26,660 acres (Table 4.6). These acres were derived from existing vegetation types on BLM land within the planning area. Through GIS analysis conifer forest types were isolated from LANDFIRE's Existing Vegetation Type. Based on the total acres of ponderosa pine forest and an average fire return interval of 25 years in Fire Regime 1 (Fischer and Clayton 1983), 1,033 acres of ponderosa pine type were calculated to be burned per year. This value was added to the grass/shrub acres from Alternative A of 300 acres. The total of forested acres projected for burning plus the grass/shrub acres would be 1,333 acres. Because of concerns such as sage-grouse habitat, it was determined that the acres of grass/shrub likely would not change from current levels, so the 300 acres is the same for grass/shrub among all alternatives.

Table 4.6
Management-Ignited Prescribed Fire Potential Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Short-Term Disturbance from BLM Actions	6,860	26,660	26,660	26,660	26,660
Reclaimed from BLM Actions	6,860	26,660	26,660	26,660	26,660
Long-Term Disturbance from BLM Actions	0	0	0	0	0
Short-Term Disturbance from non-BLM Actions	38,828	38,828	38,828	38,828	38,828
Reclaimed from non-BLM Actions	38,828	38,828	38,828	38,828	38,828
Long-Term Disturbance from non-BLM Actions	0	0	0	0	0

Forests and Woodlands

Mechanical treatments could occur in the future to reduce fuels, improve land health, and restore fire regimes. This includes silvicultural treatments and management activities as a change agent that is necessary in the development of healthy forests and woodlands.

For Alternative A, 237 acres could be treated including conifer encroachment treatments per year, multiplied by 20 years for the life of the plan (Table 4.7). These acres were derived from actual acres treated from the year 2001 through May 2008. They are an average per year for all mechanical treatments (both grass/shrub and forested settings). Forested acres mechanically treated have averaged 182 acres per year since 2001, and grass/shrub acres mechanically treated (encroachment) have averaged 55 acres per year since 2001 for a total of 237 acres.

For Alternatives B through E, the 7,820 acres of disturbance is based on the assumption of being able to treat 1% of treatable ground per year (100 year rotations). Treatable ground is that ground which could have an actual footprint of work done on it, or ground where activity could likely occur (a total of all the available forested acres less those acres not treatable due to things like scree slopes, streamside management zones, etc.). The acres of treatable ground total approximately 39,100 acres. If 1% (391 acres/year) was treated every year, and the life of the plan was 20 years, then the total treated acres for the life of the plan would be approximately 7,820 acres.

Table 4.7
Forests and Woodlands – Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Short-Term Disturbance from BLM Actions	4,740	7,820	7,820	7,820	7,820
Reclaimed from BLM Actions	4,740	7,820	7,820	7,820	7,820
Long-Term Disturbance from BLM Actions	0	0	0	0	0
Short-Term Disturbance from non-BLM Actions	47,874	47,874	47,874	47,874	47,874
Reclaimed from non-BLM Actions	47,874	47,874	47,874	47,874	47,874
Long-Term Disturbance from non-BLM Actions	0	0	0	0	0

Livestock Grazing – Range Improvements

Maintenance and/or reconstruction of water developments may occur in the future to meet Standards for Rangeland Health.

The assumption for the number of water developments was developed from the number of reservoirs in the planning area using the Range Improvement Project System (RIPS) database (Table 4.8). A 20-year life span for each existing reservoir was used as a replacement number and it was determined that approximately 100 reservoirs per year need to be replaced across the planning area. The pipeline estimate was determined using data from the previous ten years, using an average number of miles of pipeline built and projecting that out for the life of the plan.

Table 4.8
Livestock Grazing Development Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Pipeline Development					
Short-Term Disturbance from BLM Actions	60	75	75	60	75
Reclaimed from BLM Actions	60	75	75	60	75
Long-Term Disturbance from BLM Actions	0	0	0	0	0
Short-Term Disturbance from non-BLM Actions	340	340	340	340	340
Reclaimed from non-BLM Actions	340	340	340	340	340
Long-Term Disturbance from non-BLM Actions	0	0	0	0	0
Reservoir Development					
Short-Term Disturbance from BLM Actions	660	495	495	660	495
Reclaimed from BLM Actions	460	345	345	460	345
Long-Term Disturbance from BLM Actions	200	150	150	200	150
Short-Term Disturbance from non-BLM Actions	3,736	3,736	3,736	3,736	3,736
Reclaimed from non-BLM Actions	2,604	2,604	2,604	2,604	2,604
Long-Term Disturbance from non-BLM Actions	1,132	1,132	1,132	1,132	1,132
Well Development					
Short-Term Disturbance from BLM Actions	80	100	100	80	100
Reclaimed from BLM Actions	70	88	88	70	88
Long-Term Disturbance from BLM Actions	10	12	12	10	12
Short-Term Disturbance from non-BLM Actions	453	453	453	453	453
Reclaimed from non-BLM Actions	396	396	396	396	396
Long-Term Disturbance from non-BLM Actions	57	57	57	57	57

Rights-of-Way

Applications for rights-of-way may increase to accommodate energy development, especially oil and gas, as well as communication site usage for public safety and homeland security. However, the number of authorizations for rights-of-way has remained steady at around 22-23 grants over the last three years. Surface disturbance resulting from 2007 authorizations are as follows:

- four temporary use permits for 6.38 acres of disturbance;
- seven road rights-of-way for 16.15 acres of disturbance;
- two powerline rights-of-way for 1.58 acres of disturbance;
- three buried telecommunications rights-of-way for 32.8 disturbed acres; and
- seven oil and gas pipeline rights-of-way for 7.42 acres of disturbance, for a total of 64.69 acres of surface disturbance.

The average surface-disturbing area by right-of-way development activity is shown in Table 4.9.

Table 4.9
Right-of-Way Development
Average Surface-Disturbing Area by Activity

Powerlines	42 acres
Telecommunication Lines	36 acres
Roads/Highways	33 acres
Communication Sites	3 acres
Oil/Gas Pipelines and Facilities	21 acres
Oil/Gas Roads	5 acres
Material Sites	11 acres
Water Facilities	65 acres
Railroads	53 acres

Upland Vegetation – Mechanical Treatments

Mechanical treatments in the uplands may occur in the future to meet Standards for Rangeland Health.

The 500 acres of mechanical treatment per year was developed using professional judgment, the previous history of treatments over the last 20 years, and an educated estimate of future potential mechanical treatment projects (Table 4.10).

Table 4.10
Vegetation – Mechanical Treatments Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Short-Term Disturbance from BLM Actions	10,000	10,000	10,000	10,000	10,000
Reclaimed from BLM Actions	10,000	10,000	10,000	10,000	10,000
Long-Term Disturbance from BLM Actions	0	0	0	0	0
Short-Term Disturbance from non-BLM Actions	56,600	56,600	56,600	56,600	56,600
Reclaimed from non-BLM Actions	56,600	56,600	56,600	56,600	56,600
Long-Term Disturbance from non-BLM Actions	0	0	0	0	0

Solid Minerals – Salables

Mineral material sales may occur in the future within the planning area. Table 4.11 shows the projected acres of surface disturbance associated with mineral material sales.

Table 4.11
Solid Minerals – Mineral Material Sales Surface Disturbance by Alternative (Acres)

	Alternative A (Current Management)	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Short-Term Disturbance from BLM Actions	80	80	80	80	80
Reclaimed from BLM Actions	0	0	0	0	0
Long-Term Disturbance from BLM Actions	80	80	80	80	80
Short-Term Disturbance from non-BLM Actions	216	216	216	216	216
Reclaimed from non-BLM Actions	0	0	0	0	0
Long-Term Disturbance from non-BLM Actions	216	216	216	216	216

Other Treatments

In addition to the reasonable foreseeable development scenarios and acres of surface disturbance, other treatments may occur such as biological control of noxious weeds but do not result in surface disturbance.

Table 4.12 shows the projected acres of invasive species that could be treated annually in the planning area.

Table 4.12
Projected Average Annual Invasive Species Treatments (Acres)

	Glasgow Field Office	*Malta Field Office*	*Havre Field Office*	*Total Planning Area*
Biological – Non-Classical	0	0	110	110
Biological – Classical*	50	20	20	90
Chemical-Ground	85	356	254	695
Chemical-Air	285	0	90	375
Other treatments	0	4	5	9
Total	420	380	479	1,279

* Classical biological control represents only releases made in a given year. Established classical biological control treats hundreds of acres each year as they establish and expand their populations. This is not reflected in this table. Classical biological control is the use of natural enemies from a target plant's native range and is usually a species of herbivorous insect/arthropod or a plant pathogen.

** Non-classical biological control is the use of targeted grazing to affect plant populations. The goal of non-classical biological control is not livestock production, although in some instances that can be a secondary benefit.

Impacts from the Alternatives

This section describes for each resource the analysis assumptions and guidelines, impacts common to all alternatives, and the impacts from the alternatives presented in Chapter 2. Only those resources that could be impacted by a particular alternative are discussed.

In order to improve the readability of this document and to enable the reader to easily locate referenced tables/sections, the resource discussions are organized alphabetically. The resource sections are noted in the document footers, along with the page numbers.

The assumptions and guidelines provide the basis for the cumulative impacts analysis, which is addressed in the environmental consequences for each resource and summarized at the end of each section. The cumulative impacts assessment prepared for each resource accounts for past, present, and reasonably foreseeable future actions that are relevant to determining the significant adverse impacts of the alternatives. These actions include, but are not necessarily limited to the reasonable foreseeable future actions and development scenarios described above.

Throughout the planning area, BLM-authorized activities associated with all resources and all resource use programs would be subject to mitigation and minimization guidelines and Best Management Practices (BMPs) (Appendix C), including specific Mitigation Measures and Conservation Actions for Greater Sage-Grouse (Appendix M). For analysis purposes, it has been assumed that these practices and conservation actions would be implemented during site-specific project planning where appropriate.

Northern Blaine County Photo by Craig Miller

Air Resources

Assumptions and Guidelines

The air resources impact analysis includes emission inventories for each alternative, quantitative analysis for near-field air resource impacts, and qualitative descriptions of potential impacts to far-field air pollutant concentrations and air quality related values (AQRVs), including visibility and deposition.

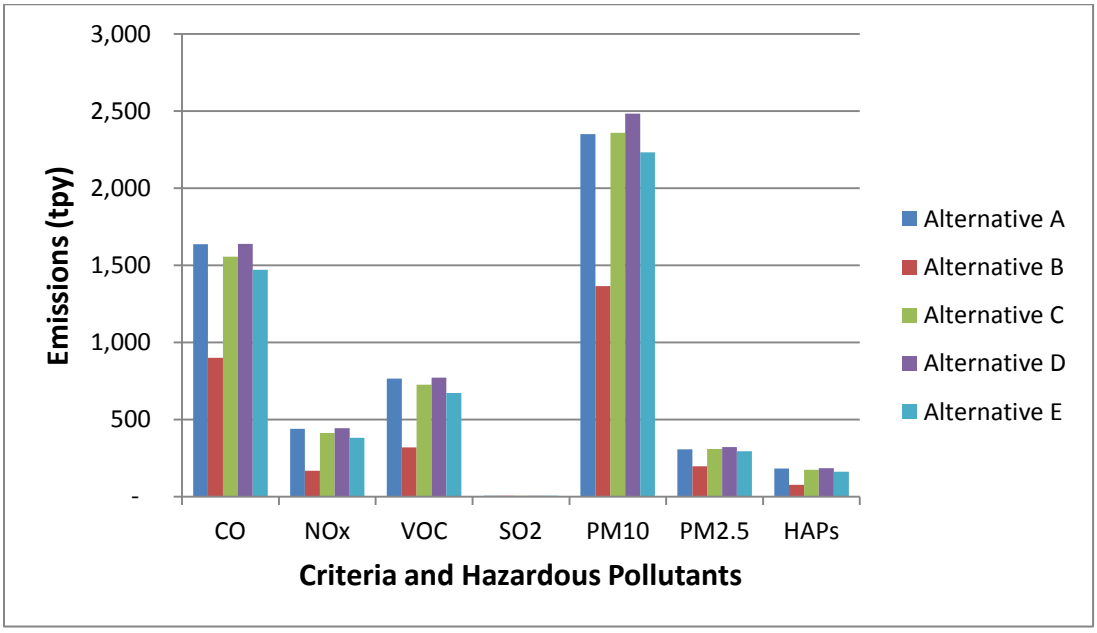
Emission inventories include BLM sources and non-BLM sources within the planning area. Criteria pollutants include CO, NO_x, ozone, $PM_{2.5}$, PM_{10}, and SO_2, as well as VOCs, which are ozone precursors. Hazardous air pollutants (HAPs), such as benzene and toluene, are also included in the inventories. Due to a lack of lead-emitting sources, lead emissions were not estimated. As described in Chapter 3, ozone is not emitted directly into the atmosphere; instead, it is formed in atmospheric reactions involving NO_x and VOCs. Greenhouse Gas (GHG) emissions (CO_2, CH_4, and N_2O) are described in the Climate Change impact analysis. Emission inventories, modeling methods, and modeling results are included in the HiLine Resource Management Plan Air Resource Technical Support Document (ARTSD) (BLM 2013).

Impacts Common to All Alternatives

Air Pollutant Emissions

BLM emission sources include energy development (conventional natural gas, coalbed natural gas, and oil); rights-of-way activities (telephone and fiber optics, pipelines, roads, powerlines, communication sites, other facilities); mineral development (sand and gravel, bentonite); fuels management (prescribed fire, mechanical vegetation treatment); resource road maintenance, forest and woodland treatments, and livestock grazing. These emissions would be long-term emissions because most activities would be expected to occur over the life of the plan. However, if activities cease, concentrations of criteria pollutants and HAPs would decrease due to emission reductions. In this respect, air resource impacts would be short-term, reversible impacts. BLM-authorized emissions of criteria pollutants and HAPs are shown in Figure 4.1.

Figure 4.1
Criteria and Hazardous Air Pollutant Emissions from BLM Sources in the HiLine Planning Area



With one exception (CO emissions under Alternative B), the largest BLM criteria pollutant and HAP emission sources would be associated with energy development, including conventional natural gas, coalbed natural gas, and oil. Detailed emission breakdowns by resource are included for each of the alternatives. For most of these resources, emissions would be similar to emissions associated with current levels of activity. For example, forestry management and BLM road travel would not be expected to increase over current activity levels and emissions from these activities would remain relatively constant. Consequently, emissions from ongoing resource management activities would not represent increases to regional emissions. However, oil and gas emissions would reflect increased activity in future years and would add to regional emissions. Oil and gas emission estimates reflect the year with the greatest total emissions from development and production activities.

Oil and gas emission inventories were generally based on emission standards required by the Montana Department of Environmental Quality (DEQ) and the Environmental Protection Agency (EPA). One exception is that emission estimates were based on use of Tier 4 nonroad engine standards for diesel drill rig engines, which would be required under best management practices and as an initial mitigation measure. A list of initial mitigation measures to be applied upon issuance of the Record of Decision is included in the Draft HiLine District Air Resource Management Plan provided in Appendix B. For drill rig and completion engines greater than 750 horsepower, generator set engines with low emission rates were assumed when developing the emission inventories. With regard to other oil and gas emission sources, emissions were estimated conservatively because they do not include more stringent emission controls mandated by EPA on August 16, 2012. New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) will substantially decrease emissions from many types of oil and gas equipment (GPO 2012). For example, the final rule will decrease national oil and gas VOC emissions by approximately 25% and will also substantially decrease HAP emissions. Some of these emission reduction requirements apply only to sources with emissions exceeding specified levels. For those types of sources, the oil and gas emission inventories assume no control in order to be conservative. Because some of these sources would be subject to control, the emission inventories overestimate emissions.

Emissions associated with each of the alternatives represent a small fraction of 2008 emissions in the planning area (presented in Chapter 3), as shown in Table 4.13. Criteria pollutant and HAP emissions associated with management actions included in this RMP would be between 1% and 20% of total emissions in Big Horn, Blaine, Chouteau, Glacier, Hill, Liberty, Phillips, Toole, and Valley Counties, as reported by EPA in its National Emission Inventory (NEI) for calendar year 2008. The NEI emissions include stationary sources, nonroad sources, and vehicle sources. However, the NEI emissions do not necessarily include all existing oil and gas emissions, since small individual oil and gas sources may not be included. Furthermore, Version 1.5 of the NEI does not include PM_{10} and $PM_{2.5}$ emissions from agricultural tilling. If the agricultural tilling emissions were included, the PM_{10} and $PM_{2.5}$ percentages in Table 4.13 would be less than those shown.

Table 4.13
Estimated Maximum Annual Criteria and Hazardous Air Pollutant Emissions as a Percentage of Existing Emissions

	Percentage of Total Emissions Within HiLine Counties (%)					
Alternative	***CO***	***NOx***	***VOC***	***SO_2***	***PM_{10}*** [1]	***$PM_{2.5}$*** [1]
Alternative Emissions for Multi-Resource Activities Excluding Wildfire Smoke [2]						
A	7%	3%	19%	3%	10%	10%
B	4%	1%	8%	3%	6%	6%
C	7%	3%	18%	3%	10%	10%
D	7%	3%	20%	3%	11%	10%
E	6%	3%	17%	3%	9%	9%

Table 4.13
Estimated Maximum Annual Criteria and Hazardous Air Pollutant Emissions as a Percentage of Existing Emissions

	Percentage of Total Emissions Within HiLine Counties (%)					
Alternative	***CO***	***NOx***	***VOC***	***SO_2***	***PM_{10}*** [1]	***$PM_{2.5}$*** [1]
Oil and Gas Alternative Emissions [3]						
A	5%	3%	19%	<1%	7%	6%
B	2%	1%	7%	<1%	2%	2%
C	4%	3%	18%	1%	6%	5%
D	5%	3%	19%	1%	7%	6%
E	4%	3%	16%	1%	6%	5%

[1] Data obtained from Version 1.5 of the NEI, which did not include particulate emissions from agricultural tilling. PM_{10} and $PM_{2.5}$ percentages would be lower if agricultural tilling is included.
[2] Wildfire smoke is excluded since it is caused by natural events and is not included as part of the NEI.
[3] Oil and gas emissions represent an increase above NEI emissions.

Near-Field Criteria Air Pollutant Concentrations

Impacts to criteria air pollutant concentrations would be direct impacts with durations similar to the duration of emission-producing activities. Near-field dispersion modeling was performed for oil and gas development and production using the AERMOD model, which is the EPA guideline model for estimating near-field air quality impacts for most air pollutants. AERMOD is suitable for modeling near-field receptors up to a distance of 50 kilometers from emission sources, and provides conservative estimates of potential air quality impacts. Ozone (and VOC ozone precursors) is not predicted with AERMOD because it cannot model the chemical transformations associated with atmospheric ozone formation. Ozone would be modeled using photochemical grid modeling (PGM) when sufficient emission and monitoring data become available to perform this type of modeling as described in Appendix B. Detailed information describing AERMOD emissions, meteorology, modeling parameters, and data processing is provided in the ARTSD (BLM 2013) and is summarized below.

Three well pad development scenarios (construction, drilling, and completion) were modeled at a central well pad. Well development activities would be temporary and would occur at different times at a well pad. Well pad construction would occur first over a period of up to three days of active site construction involving soil movement (e.g., digging and grading). Drilling would occur next, with up to 15 days of active drilling. Then well completion would occur over up to 5 days. Once well development is complete, a long-term production phase typically begins. The construction modeling scenario has the greatest short-term (24-hr) emission rates for PM_{10} and $PM_{2.5}$. Temporary drilling activities account for the greatest short-term (1-hr) emission rates for all non-particulate criteria air pollutants. Completion activities have greater non-particulate emissions than the construction phase. In order to represent production activities at nearby wells, estimated oil and gas production emissions were modeled at four operating wells surrounding the central pad. These emissions were modeled concurrently with each of the three well development scenarios (construction, drilling, and completion).

Potential emissions from each of the scenarios were modeled and the resulting modeled concentrations were compared to PSD increments (described below). Ambient background concentrations represent current air quality. Comparisons to the National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (MAAQS) are done by adding modeled concentrations that reflect additional oil and gas activity to background concentrations and comparing the total concentrations to the standards. The results of the near-field modeling performed for Alternative A are provided in Table 4.14. Alternative A near-field modeling represents dense well pad and equipment spacing that could occur in localized areas within high potential oil and gas activity areas. Because this dense spacing could also

occur under Alternatives B, C, and D, the Alternative A modeling results conservatively predict impacts that could occur in localized areas under each of the alternatives.

Table 4.14 provides the largest predicted concentration (in the form of the standards) that was modeled for each scenario and for each modeled year (2007-2011). Additional modeling results are included in the ARTSD (BLM 2013). The maximum total 1-hr CO concentration of 4,329 µg/m^3 was predicted based on drilling activities using meteorology from year 2011. Approximately 7% of the total 1-hr CO concentration was attributable to modeled sources. In contrast, modeled activities accounted for up to 71% of total 24-hr PM_{10} predicted concentrations. Predicted concentrations are well below the NAAQS and MAAQS, as shown by the percentages in the last column of the table. Total concentrations of 50% of a NAAQS or greater were predicted for the 1-hour NO_2, 24-hour PM_{10}, and 24-hour $PM_{2.5}$ standards. The maximum 1-hour NO_2 impacts were due to heavy-duty construction equipment exhaust during the brief well construction period, as were maximum 24-hour PM_{10} and $PM_{2.5}$ impacts. Predicted ambient concentrations associated with production activities are much less than emissions associated with temporary activities.

Table 4.14
Oil and Gas Activity Near-Field Criteria Air Pollutant Concentration Summary for All Alternatives

Pollutant	*Avg. Period*	*Model Output Rank*	*Modeled Concen-tration (µg/m^3)*	*PSD Increment (µg/m^3)*		*Background Concen-tration [1] (µg/m^3)*	*Total Concen-tration (µg/m^3)*	*NAAQS or MAAQS (µg/m^3)*	*Percent of NAAQS or MAAQS*
				Class I	*Class II*				
CO	1-hour	H2H	322	None	None	4,007	4,329	26,450 [6]	16%
	8-hour	H2H	251	None	None	2,175	2,426	10,000	24%
NO_2	1-hour	H8H [2]	84	None	None	40	124	188	66%
	Annual	H1H [3]	0.41	2.5	25	6	6.4	94 [6]	7%
PM_{10}	24-hour	H2H	72	8	30	30	102	150	68%
	Annual	H2H	1.2	4	17	8	9.2	50 [6]	18%
$PM_{2.5}$	24-hour	H8H [4] (H2H) [7]	8.5 (19.7)	2	9	22.5	31	35	88%
	Annual	H1H	1.4	1	4	5.5	6.9	15	46%
SO_2	1-hour	H4H [5]	3.3	None	None	35	38.3	196	18%
	24-hour	H2H	0.64	5	91	11	11.6	365 [6]	4%
	Annual	H1H	1.8E-03	2	20	3	3.0	80 [6]	6%

H1H = highest-first-high
H2H = highest-second-high
H4H = highest-fourth-high
H8H = highest-eighth-high
µg/m^3 = micrograms per cubic meter
MAAQS = Montana Ambient Air Quality Standards
NAAQS = National Ambient Air Quality Standards
PSD = Prevention of Significant Deterioration
[1] Background concentrations were provided by the MDEQ (MDEQ 2012a, MDEQ 2012b).
[2] Five-year average of the 98th percentile (H8H) 1-hour modeled NO_2 concentrations. Post processed using the 1-hour and annual NO_2 Tier 2 method using 80% conversion of modeled NO_x to NO_2.
[3] Post processed using the annual NO_2 Tier 2 method using 75% conversion of modeled NO_x to NO_2.
[4] Five-year average of the 98th percentile (H8H) 24-hour modeled $PM_{2.5}$ concentrations.
[5] Five-year average of the 99th percentile (H4H) 1-hour modeled SO_2 concentrations.
[6] This is a Montana standard.
[7] The H2H rank provided in parentheses is used to compare to the PSD increments, while the H8H rank is compared to the NAAQS.

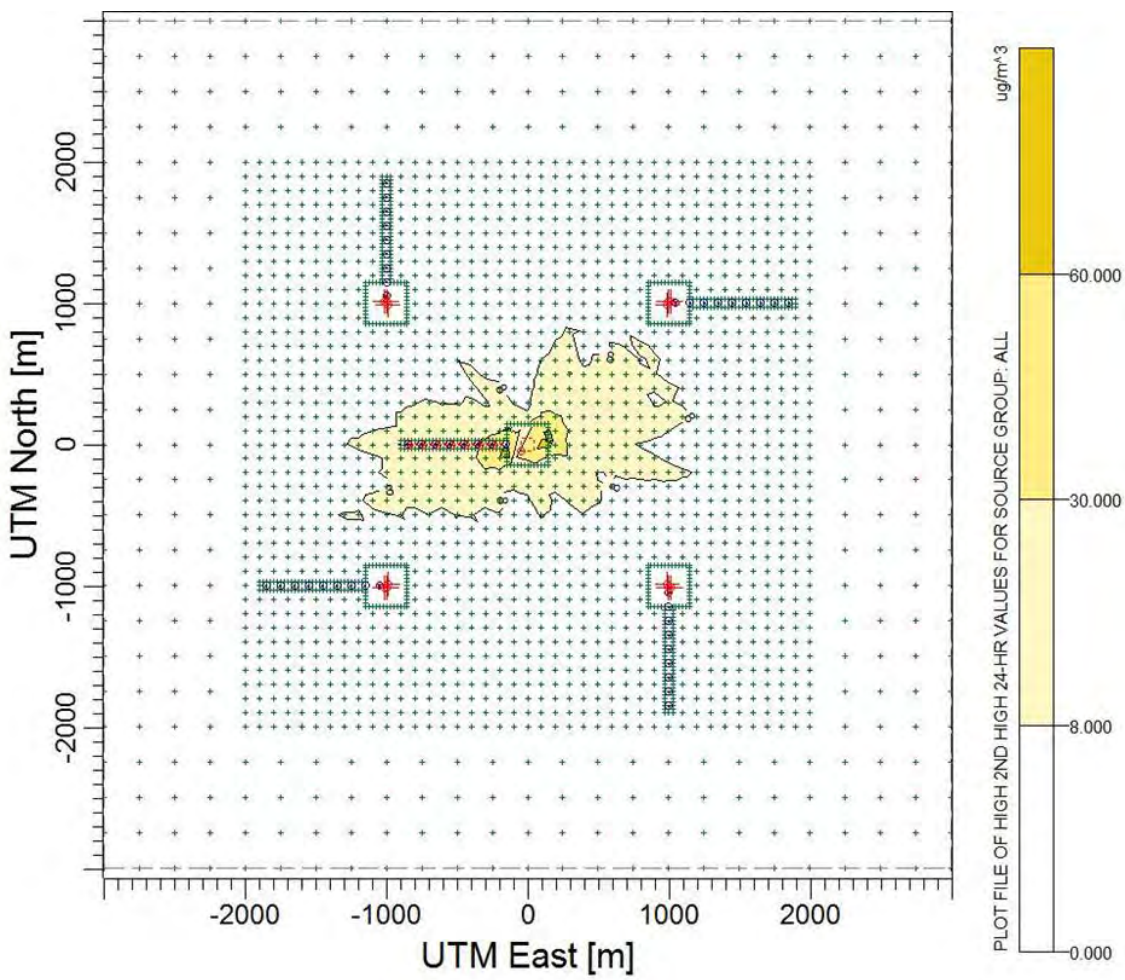
Modeled concentrations can also be compared to PSD increments, which are designed to prevent good air quality from deteriorating to the level set by the NAAQS. In areas attaining the NAAQS, PSD increment analysis is required prior to construction of a major stationary source of air pollutants that has the potential to emit at least 100 tons per year (tpy) or

250 tpy of criteria air pollutants. The sources included in this near-field modeling analysis do not meet the definition of a major source of criteria air pollutants and would not be required to undergo PSD analysis. The following PSD analysis is not a regulatory analysis; its purpose is to provide context for evaluating potential air quality impacts.

EPA established PSD increments for Class I areas (e.g., national parks and large wilderness areas) and Class II areas (all non-Class I areas in Montana). Oil and gas activities are expected to occur within Class II areas and the modeled (not total) concentration can be compared directly to the Class II increment. Temporary 24-hr PM_{10} and $PM_{2.5}$ concentrations greater than the Class II PSD increments are predicted to occur during construction (PM_{10} only) and completion, construction, and drilling activities ($PM_{2.5}$). Temporary concentrations above the Class I increments for PM_{10} or $PM_{2.5}$ are also possible during construction, drilling, and completion if these activities would be located near a Class I area.

Air pollutant concentrations generally decrease as distance from the source increases. Figure 4.2 provides an illustration of 24-hr PM_{10} modeled concentrations during 2010. At the center of the figure is a well pad with short-term construction activities. The four surrounding well pads are modeled with emissions representing production activity. Red markers indicate emission sources and green markers indicate receptors (points at which concentrations are calculated). Shaded areas indicate the extent of the area for which the PSD Class I increment would be exceeded on the day of the year with the second-highest PM_{10} modeled concentration. In this case, the maximum extent with a predicted concentration above the Class I increment would be approximately 1,000 meters. Concentrations of this magnitude could occur only on days when well pad construction activity is concurrent with meteorological conditions causing the greatest ambient PM_{10} concentration.

Figure 4.2
Example of Extent of Area Exceeding the PM_{10} 24-hour Class I Increment During Construction



Near-Field Hazardous Air Pollutant Concentrations

Impacts to HAP concentrations would be direct impacts with durations similar to the duration of emission-producing activities. Similar to the criteria air pollutant modeling, near-field HAP modeling was conducted to determine predicted ambient air quality impacts of HAP emissions. Additional HAP modeling results are included in the ARTSD (BLM 2013). HAPs are defined by EPA as toxic air pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. HAP modeling consisted of the same three scenarios modeled for criteria air pollutants. Modeled impacts were compared to established health-based thresholds to determine the incremental increase in risk associated with the proposed activities. Health-based thresholds are established for both short-term (acute, typically 1-hour) and long-term (chronic, one year) exposures. The short-term thresholds used in the analysis consisted of acute Reference Exposure Levels (RELs) and are defined as short-term concentrations at or below which no adverse health effects are expected. The long-term non-carcinogenic thresholds used in the analysis consisted of chronic Reference Concentrations (RfCs) and are the threshold at which no long-term, non-carcinogenic adverse health effects are expected. The long-term carcinogenic thresholds used in the analysis consisted of Unit Risk Factors (URFs) to estimate the increased risk of contracting cancer that is associated with the ambient concentration of the HAP being analyzed. Six HAPs were modeled, consisting of benzene, ethyl benzene, formaldehyde, n-hexane, toluene, and xylene. Table 4.15 provides a breakdown of the health effects for each modeled HAP.

Table 4.15
Health Effects of Modeled HAPs

HAP	*Short-Term (Acute)*	*Long-Term (Non-Carcinogen)*	*Long-Term (Carcinogen)*
Benzene	✓	✓	✓
Ethyl Benzene	✓	✓	✓
Formaldehyde	✓	✓	✓
N-Hexane	✓	✓	
Toluene	✓	✓	
Xylene	✓	✓	

Table 4.16 presents the results of the acute HAP modeling. The maximum acute impacts for benzene and n-hexane are predicted to occur during completion activities, while the greatest concentrations of ethyl benzene, formaldehyde, toluene, and xylene are expected to occur during construction operations. Acute HAP modeling impacts were well below the RELs. Table 4.17 presents the results of HAP modeling of potential chronic effects and compares them to RfCs.

Table 4.16
Acute Short-Term HAP Modeling Results for All Alternatives

HAP	*Modeled 1-Hour Concentration ($\mu g/m^3$)*	*REL ($\mu g/m^3$)*	*Percent of REL*
Benzene	1.46	1,300	<1%
Ethyl Benzene	3.20	350,000	<1%
Formaldehyde	8.07	55	15%
N-Hexane	10.97	390,000	<1%
Toluene	1.13	37,000	<1%
Xylene	0.76	22,000	<1%

Table 4.17 Chronic Non-Carcinogenic HAP Modeling Results for All Alternatives			
HAP	***Modeled Annual Concentration (µg/m³)***	***RfC (µg/m³)***	***Percent of RfC***
Benzene	0.03	30	<1%
Ethyl Benzene	0.11	1,000	<1%
Formaldehyde	0.03	10	<1%
N-Hexane	0.32	700	<1%
Toluene	0.03	5,000	<1%
Xylene	0.02	100	<1%

Of the HAPs evaluated, only benzene, ethyl benzene, and formaldehyde are identified by EPA as being carcinogens. Cancer unit risk factors (URFs) were derived based on assuming a person is exposed to a HAP for a 70-year lifetime. Cancer risk was estimated by multiplying the annual model-predicted concentrations by the URF for each carcinogen. The resulting calculations were then scaled by adjustment factors to represent the most likely exposure (MLE) and maximally exposed individual (MEI) risks. The MEI adjustment takes into account the lifetime of the project, which was assumed to be 50 years. The MLE adjustment takes into account the average duration that a family remains at a residence as well as the time spent at home versus time spent elsewhere. Table 4.18 presents the results of the carcinogenic HAP modeling for both the MLE and MEI exposure assumptions. Maximum predicted cancer risks for all modeled scenarios and HAPs are below an incremental increase in cancer risk of 1 per million.

Table 4.18 Carcinogenic HAP Modeling Results for All Alternatives					
HAP	***Modeled Annual Concentration (µg/m³)***	***URF (µg/m³)⁻¹***	***Adjustment Factor***	***Cancer Risk (Per Million)***	***Risk Exceeds 1 Per Million?***
Most Likely Exposure (MLE)					
Benzene	0.026	7.80×10-6	0.0949	0.02	No
Ethyl Benzene	0.110	2.50×10-6	0.0949	0.03	No
Formaldehyde	0.027	1.30×10-5	0.0949	0.03	No
Maximally Exposed Individual (MEI)					
Benzene	0.026	7.80×10-6	0.71	0.14	No
Ethyl Benzene	0.110	2.50×10-6	0.71	0.20	No
Formaldehyde	0.027	1.30×10-5	0.71	0.23	No

Far-Field Criteria Air Pollutant Concentrations

Due to the relatively low density of expected oil and gas activity in most of the HiLine, far-field criteria air pollutant concentrations are expected to remain low. The following qualitative assessment describes potential impacts based on available data.

Ozone is the pollutant with ambient concentrations closest to the NAAQS based on a percentage basis. Ozone concentrations are variable and highly dependent on weather conditions. Compliance with the ozone NAAQS is based on a three-year average of the fourth highest daily maximum 8-hour concentration. The nearest rural ozone monitor in an oil and gas area with sufficient historical data to calculate this 3-year average is located in Sidney. The 2009–2011 average was 0.056 ppm, which is equivalent to 75% of the standard.

NO_x and VOC emissions contribute to ozone formation. Cumulative emission increases were estimated to be up to 3% for NO_x and up to 19% for VOCs. However, more stringent VOC emission controls for oil and gas sources will decrease VOC emissions below the levels shown in Table 4.13. Predicted emission increases would be unlikely to cause or contribute to a violation of the ozone NAAQS.

Additional ozone monitoring data are needed to determine if high ozone concentrations may occur in rural areas during winter. With funding provided by the BLM, the MDEQ installed two new monitors during July 2012 in Malta (in Phillips County within the planning area) and in Lewistown (Fergus County) south of the planning area. Additional information concerning these monitors is provided in the Air Resource Management Plan (ARMP) within Appendix B. In addition to assessing ozone concentrations on a real-time basis, these monitors would also provide ozone concentration data that would be used in future modeling efforts. As described in the ARMP, the BLM would perform future photochemical grid modeling to predict ozone concentrations in the HiLine planning area and surrounding areas.

Qualitative assessments of far-field air resource impacts for additional criteria air pollutants are provided below.

- CO — CO concentrations throughout Montana are low and are monitored in only a few locations. The nearest Montana CO monitor, located in Great Falls, indicates CO concentrations are approximately 10% of the 8-hour NAAQS and 5% of the 1-hour NAAQS. A 2–5% emission increase in the planning area would cause a negligible or minor increase in CO concentrations.

- NO_2 — The nearest NO_2 monitor is located in Sidney and indicates that NO_2 concentrations are approximately 11% and 3% of the 1-hour and annual NAAQS, respectively. An emission increase of less than 1–3% in the planning area would cause a negligible or minor increase in NO_2 concentrations in most areas. A larger increase in ambient concentrations may occur in some localized areas where large engines operate continuously.

- SO_2 — SO_2 concentrations monitored in Sidney are very low, at <1–8% of the NAAQS, depending on the averaging time. Because increased SO_2 emissions would be 3–9% of planning area emissions and would be dispersed over large areas, these emissions would cause a minor increase in SO_2 concentrations.

- PM_{10} — PM_{10} concentrations monitored at Sidney are approximately 68% of the NAAQS. An emission increase of 3–9% would cause a minor increase in PM_{10} concentrations in some areas. At locations with construction activities, vehicle traffic on unpaved roads, or off-road travel, temporary PM_{10} concentration increases may be moderate or could be high if adverse weather conditions occur.

- $PM_{2.5}$ — $PM_{2.5}$ concentrations monitored at Sidney are approximately 40% and 50% of the 24-hour and annual NAAQS, respectively. An emission increase of 3-8% in the planning area could cause a minor increase in $PM_{2.5}$ concentrations. At locations with construction activities, vehicle traffic on unpaved roads, or off-road travel, temporary $PM_{2.5}$ concentration increases may be moderate or could be high if adverse weather conditions occur.

- Lead — Lead emissions would be negligible and no measurable increase in lead concentrations is expected.

Future monitoring data and PGM results would inform BLM air quality management actions, as described in the ARMP in Appendix B.

Far-Field AQRV Impacts

The best modeling method to determine far-field AQRV impacts for large modeling domains is PGM, which can model long-range regional transport of air pollutants that cause atmospheric deposition and visibility impacts. Reliable PGM requires comprehensive regional emission inventories and ambient monitoring data throughout the 48 contiguous United States. As described in the ARMP in Appendix B, the BLM is actively acquiring needed data to perform PGM, which is expected to be completed after this RMP is complete. For the Draft RMP, the following qualitative analysis is provided for atmospheric deposition and visibility. Due to a request from the U.S. Fish and Wildlife Service (FWS) and the National Park Service (NPS), a limited modeling effort using the CALPUFF model would be performed to assess visibility impacts at the UL Bend Wilderness Class I area and the Medicine Lake Wilderness Class I area, and at nearby

potential sensitive Class II areas. The CALPUFF modeling effort would include estimated emissions from BLM-authorized oil and gas activities. This modeling would be completed prior to publication of the Final RMP/EIS.

Atmospheric Deposition

Sulfur and nitrogen deposition impacts would likely be minor at Class I and sensitive Class II areas. Increases in NO_x and SO_2 emissions would be less than 3% and 12%, respectively. Potential total nitrogen and sulfur deposition would likely remain below the levels of concern (3.0 kg/ha/yr and 5.0 kg/ha/yr, respectively). Precipitation pH would be unlikely to become acidified due to predicted emission increases. Due to proximity to energy development areas, the UL Bend Wilderness, Fort Peck Indian Reservation, and Medicine Lake Wilderness Class I areas could be affected by increased atmospheric deposition. With regard to potential sensitive Class II areas listed in Table 3.5, some of these areas could experience small increases in deposition. As part of the future photochemical modeling effort mentioned above, deposition impacts would be quantitatively assessed as described in Appendix B.

Visibility

A qualitative analysis of visibility impacts based on the relative emission increase is provided below. Potential visibility impacts are likely to be small for the following reasons.

- Increases in emissions of haze-inducing pollutants (primarily SO_2, NO_x, and $PM_{2.5}$) would be relatively low.
- Emission sources would be spread over a large geographic area that would likely lead to relatively low concentration increases of haze-inducing pollutants.

Under the highest-emission alternative, total emissions of NO_x and SO_2 were estimated to be 445 tpy, compared to NEI emissions of 14,112 tpy. This represents a regional emission increase of 3%. In localized areas with oil and gas activities. the percentage increase in emissions would be greater.

Montana has a state visibility standard of 3×10^{-5}/m, which is equivalent to a visual range of approximately 21 miles. Standard visual range data are 57 and 168 miles at the UL Bend Wilderness during the average haziest 20% of days and clearest 20% of days, respectively. As part of future modeling efforts, visibility impacts at nearby Class I and sensitive Class II areas will be quantitatively assessed as described in Appendix B.

ARMP and Adaptive Management Strategy for Oil and Gas Resources

The ARMP for oil and gas activities is provided in Appendix B. The ARMP describes the air quality adaptive management strategy that would be used to assess future air quality and AQRVs. The goal of the strategy is to maintain the good air quality that the HiLine currently enjoys. By assessing monitored and modeled air resource and AQRV impacts, the BLM can identify mitigation measures to address unacceptable impacts that may be associated with future oil and gas development. As described in the ARMP, the BLM would work with the Montana Department of Environmental Quality (MDEQ) and the AQTW to identify successful strategies to address air quality and AQRV concerns.

The adaptive management strategy focuses on oil and gas activity because aggregated emissions from multiple small sources at well sites can potentially cause significant air quality and AQRV impacts under certain circumstances. Many of these small oil and gas emission sources are not required to obtain air quality permits from the MDEQ, unlike large stationary sources such as coal mines that are permitted and inspected by the MDEQ. The oil and gas adaptive management strategy was prepared in collaboration with the U.S. Environmental Protection Agency (EPA) and three federal land management agencies under the *Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act [NEPA] Process* (DOI 2011). This Memorandum of Understanding (MOU) is summarized in Appendix B.

The ARMP includes both near-term actions and long-term actions. In the near term, the ARMP sets forth initial mitigation measures to maintain good air quality until regional PGM can be performed to further assess potential impacts to air quality (including ozone) and AQRVs. Additional monitoring data and regional emission inventory data are being

acquired to support PGM, which is expected to be completed in 2015. In the longer term, the ARMP provides ongoing management strategies to assess and adapt to new air quality and AQRV ambient monitoring and modeling data during the life of this RMP.

The ARMP includes a multifaceted approach involving the following activities.

- Oil and gas activity assessment
- Ambient air quality monitoring support
- Air quality and AQRV assessment
- Future air quality and AQRV modeling
- Mitigation

Pollutants addressed by the ARMP include NO_2, O_3, PM_{10}, and $PM_{2.5}$. The ARMP also addresses modeling and mitigation for the following AQRVs.

- Deposition of sulfur and nitrogen
- Lake acid neutralizing capacity
- Visibility

The adaptive management strategy for oil and gas resources provides the flexibility to respond to changing conditions that could not have been predicted during RMP development. The strategy also allows for the use of new technology and methods that may minimize or reduce impacts.

Impacts under Alternative A (Current Management)

Alternative A has a high level of oil and gas activity and the greatest bentonite mining activity. Under Alternative A, emissions would be larger than emissions under each of the other alternatives, except for Alternative D. Resource-specific emissions are provided in Table 4.19, which indicates that oil and gas activities would be the largest emission sources for each pollutant.

Table 4.19
BLM Source Emissions under Alternative A (Current Management) (Tons/Year)

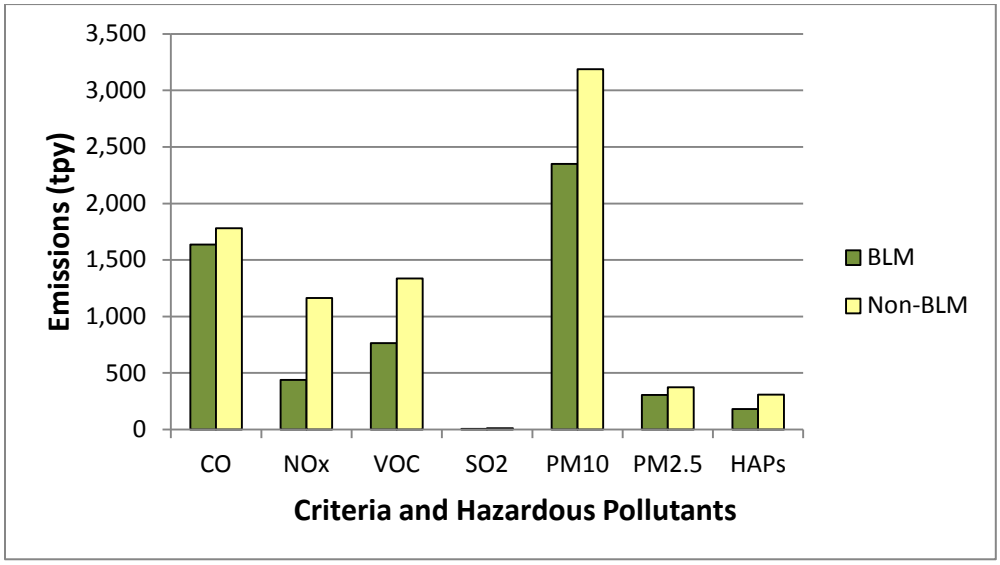
Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
Oil and Gas							
Oil	36	16	0	39	5	117	7
Natural Gas	1,044	389	1	1,542	173	615	153
Coalbed Natural Gas	10	5	1	25	3	4	1
Bentonite Mining	61	0	0	39	8	0	0
BLM Travel	2	0	0	24	2	0	0
BLM Road Maintenance	0	0	0	4	0	0	0
Fire Management [1]	465	20	4	94	44	25	22
Forestry Management	2	3	0	5	1	0	0
Land and Realty	1	3	0	18	2	0	0
Livestock Grazing	1	1	0	15	2	0	0
Sand and Gravel	1	0	0	540	67	0	0
Vegetation Management	13	0	0	5	1	3	0
BLM Emission Total	**1,636**	**439**	**6**	**2,350**	**307**	**765**	**183**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Cumulative Impacts

Emissions from BLM sources would be much less than non-BLM emissions in the planning area. Figure 4.3 shows criteria pollutant and HAP emissions from BLM and from non-BLM oil and gas sources based on the RFD. Cumulative impacts from BLM sources, projected future non-BLM oil and gas sources, and existing sources would not be expected to exceed the NAAQS or MAAQS for any pollutant. Cumulative impacts under Alternative A would be larger than for each of the other alternatives, except for Alternative D. As described in the ARMP in Appendix B, ambient concentrations would be monitored at existing and new air quality monitors to assess impacts. Furthermore, pollutant concentration impacts as well as deposition and visibility impacts would be predicted using future photochemical modeling.

Figure 4.3
Long-Term Emissions from BLM and Non-BLM Sources in the HiLine Planning Area under Alternative A (Current Management)



Impacts under Alternative B

Alternative B has the lowest level of oil and gas activity and low bentonite mining activity. Under Alternative B, emissions would be less than emissions under each of the other alternatives. Resource-specific emissions are provided in Table 4.20, which indicates that oil and gas activities would be the largest emission sources for each pollutant, except CO. Fire management activities, including emissions from prescribed fires, would be the greatest source of CO emissions.

Table 4.20
BLM Source Emissions under Alternative B (Tons/Year)

Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
Oil and Gas							
Oil	30	13	0	36	4	94	5.8
Natural Gas	331	124	0	464	52	195	48.4
Coalbed Natural Gas	5	3	0	13	1	2	0.3
Bentonite Mining	49	0	0	147	20	0	0.0

Table 4.20
BLM Source Emissions under Alternative B (Tons/Year)

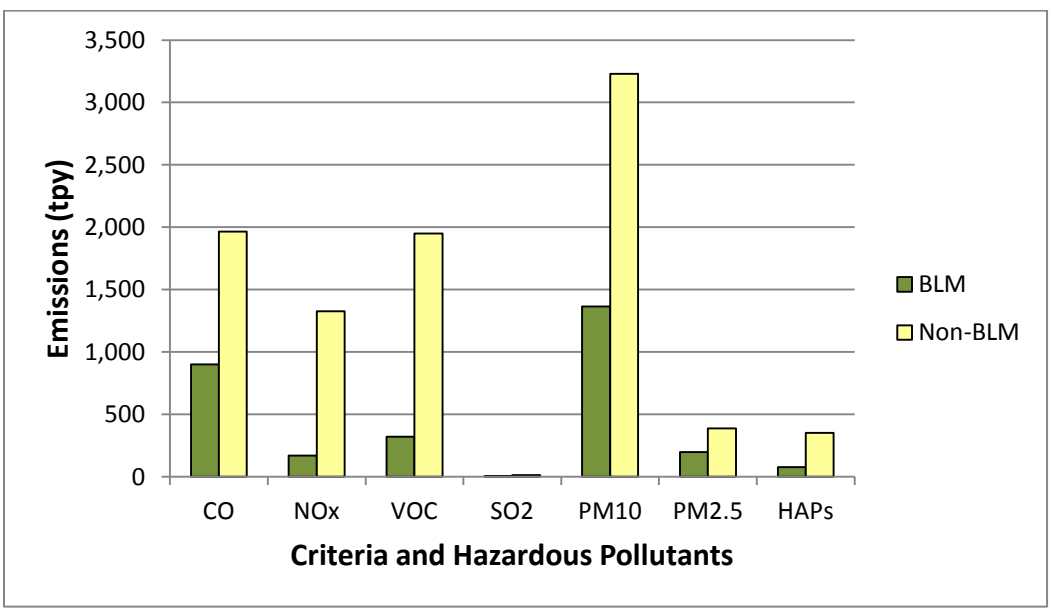
Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
BLM Travel	2	0	0	24	2	0	0.0
BLM Road Maintenance	0	0	0	4	0	0	0.0
Fire Management [1]	465	20	4	94	44	25	21.9
Forestry Management	2	3	0	5	1	0	0.0
Land and Realty	1	3	0	18	2	0	0.0
Livestock Grazing	1	1	0	15	2	0	0.0
Sand and Gravel	1	0	0	540	67	0	0.0
Vegetation Management	13	0	0	5	1	3	0.3
BLM Emission Total	**900**	**167**	**5**	**1,364**	**196**	**320**	**76.9**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Cumulative Impacts

Figure 4.4 shows criteria pollutant and HAP emissions from BLM and from non-BLM oil and gas sources based on the RFD. Cumulative impacts from BLM sources, projected future non-BLM oil and gas sources, and existing sources would not be expected to exceed the NAAQS or MAAQS for any pollutant. Cumulative impacts under Alternative B would be less than those for any other alternative.

Figure 4.4
Long-Term Emissions from BLM and Non-BLM Sources in the HiLine Planning Area under Alternative B



Impacts under Alternative C

Alternative C would allow moderate oil and gas activity and low bentonite mining activity. Under Alternative C, emissions would be less than emissions under Alternatives A and D and more than emissions under Alternatives B and E. Resource-specific emissions are provided in Table 4.21, which indicates that oil and gas activities would be the largest emission sources for each pollutant.

Table 4.21
BLM Source Emissions under Alternative C (Tons/Year)

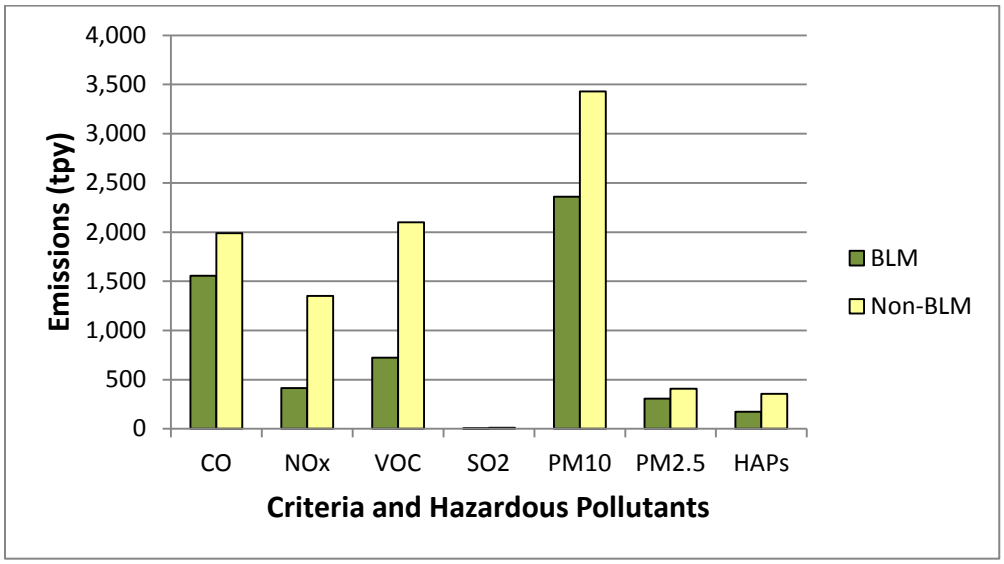
Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
Oil and Gas							
Oil	36	16	0	39	5	117	7
Natural Gas	977	365	16	1,444	162	576	143
Coalbed Natural Gas	8	4	1	25	3	3	1
Bentonite Mining	49	0	0	147	20	0	0
BLM Travel	2	0	0	24	2	0	0
BLM Road Maintenance	0	0	0	4	0	0	0
Fire Management [1]	465	20	4	94	44	25	22
Forestry Management	2	3	0	5	1	0	0
Land and Realty	1	3	0	18	2	0	0
Livestock Grazing	1	1	0	15	2	0	0
Sand and Gravel	1	0	0	540	67	0	0
Vegetation Management	13	0	0	5	1	3	0
BLM Emission Total	**1,555**	**413**	**21**	**2,358**	**308**	**725**	**173**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Cumulative Impacts

Figure 4.5 shows criteria pollutant and HAP emissions from BLM and from non-BLM oil and gas sources based on the RFD. Cumulative impacts under Alternative C would be greater than those for Alternatives B and E, but less than those for Alternatives A and D. Cumulative impacts from BLM sources, projected future non-BLM oil and gas sources, and existing sources would not be expected to exceed the NAAQS or MAAQS for any pollutant. As described in the ARMP in Appendix B, ambient concentrations would be monitored at existing and new air quality monitors to assess impacts. Furthermore, pollutant concentration impacts as well as deposition and visibility impacts would be predicted using future photochemical modeling.

Figure 4.5
Long-Term Emissions from BLM and Non-BLM Sources in the HiLine Planning Area under Alternative C



Impacts under Alternative D

Alternative D would have the highest level of oil and gas activity and low bentonite mining activity. Under Alternative D, emissions would be greater than emissions under each of the other alternatives. Resource-specific emissions are provided in Table 4.22, which indicates that oil and gas activities would be the largest emission sources for each pollutant.

Table 4.22
BLM Source Emissions under Alternative D (Tons/Year)

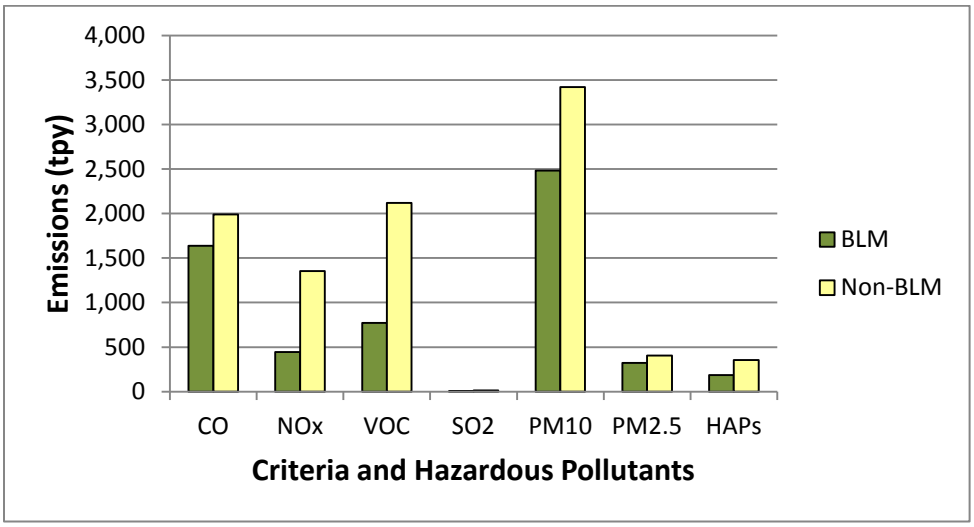
Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
Oil and Gas							
Oil	36	16	0	39	5	117	7
Natural Gas	1,057	394	17	1,568	176	622	154
Coalbed Natural Gas	10	5	1	25	3	4	1
Bentonite Mining	49	0	0	147	20	0	0
BLM Travel	2	0	0	24	2	0	0
BLM Road Maintenance	0	0	0	4	0	0	0
Fire Management [1]	465	20	4	94	44	25	22
Forestry Management	2	3	0	5	1	0	0
Land and Realty	1	3	0	18	2	0	0
Livestock Grazing	1	1	0	15	2	0	0
Sand and Gravel	1	0	0	540	67	0	0
Vegetation Management	13	0	0	5	1	3	0
BLM Emission Total	**1,637**	**444**	**23**	**2,483**	**322**	**771**	**184**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Cumulative Impacts

Figure 4.6 shows criteria pollutant and HAP emissions from BLM and from non-BLM oil and gas sources based on the RFD. Alternative D cumulative impacts would be greater than those for any other alternative, and cumulative pollutant concentrations are expected to be less than the NAAQS and MAAQS. As described in the ARMP in Appendix B, pollutant concentrations would be monitored at existing and new air quality monitors to assess impacts. Furthermore, pollutant concentration impacts as well as deposition and visibility impacts would be predicted using future photochemical modeling.

Figure 4.6
Long-Term Emissions from BLM and non-BLM Sources in the HiLine Planning Area under Alternative D



Impacts under Alternative E (Preferred Alternative)

The preferred alternative has the second-lowest level of oil and gas activity and low bentonite mining activity. Under Alternative E, emissions would be less than emissions under Alternatives A, C, and D, and greater than emissions under Alternative B. Resource-specific emissions are provided in Table 4.23, which indicates that oil and gas activities would be the largest emission sources for each pollutant.

Table 4.23
BLM Source Emissions under Alternative E (Preferred Alternative) (Tons/Year)

Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
Oil and Gas							
Oil	35	16	0	38	5	113	7
Natural Gas	891	332	14	1,317	148	525	130
Coalbed Natural Gas	9	5	1	25	3	3	1
Bentonite Mining	49	0	0	147	20	0	0
BLM Travel	2	0	0	24	2	0	0
BLM Road Maintenance	0	0	0	4	0	0	0
Fire Management [1]	465	20	4	94	44	25	22
Forestry Management	2	3	0	5	1	0	0

Table 4.23
BLM Source Emissions under Alternative E (Preferred Alternative) (Tons/Year)

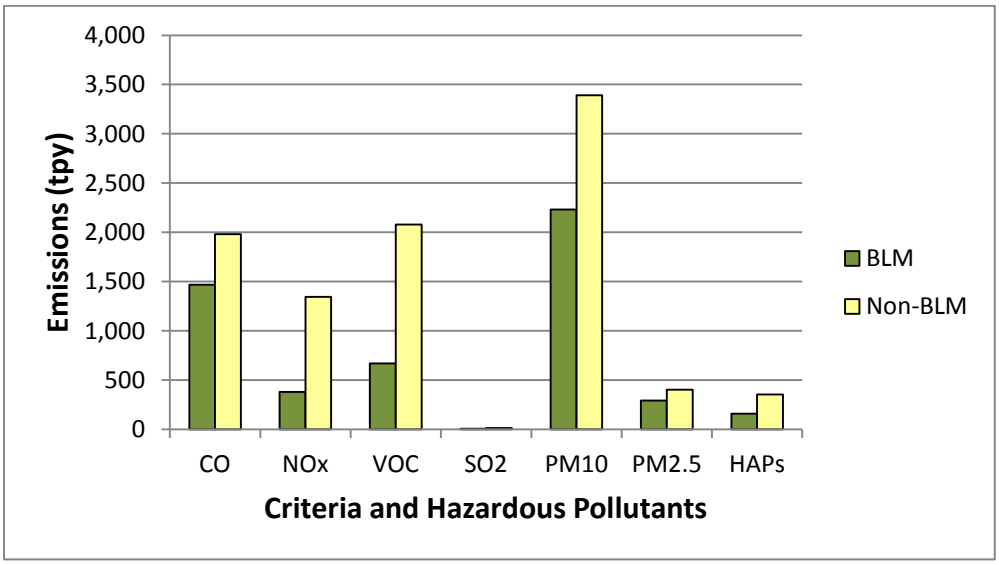
Resource	*CO*	*NOx*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*	*VOC*	*HAP*
Land and Realty	1	3	0	18	2	0	0
Livestock Grazing	1	1	0	15	2	0	0
Sand and Gravel	1	0	0	540	67	0	0
Vegetation Management	13	0	0	5	1	3	0
BLM Emission Total	**1,469**	**381**	**20**	**2,232**	**293**	**671**	**160**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Cumulative Impacts

Figure 4.7 shows criteria pollutant and HAP emissions from BLM and from non-BLM oil and gas sources based on the RFD. Cumulative impacts under Alternative E would be less than those for Alternatives A, C, and D, but more than those for Alternative B. Alternative E cumulative pollutant concentrations are expected to be less than the NAAQS and MAAQS. As described in the ARMP in Appendix B, pollutant concentrations would be monitored at existing and new air quality monitors to assess impacts. Furthermore, pollutant concentration impacts as well as deposition and visibility impacts would be predicted using future photochemical modeling.

Figure 4.7
Long-Term Emissions from BLM and non-BLM Sources in the HiLine Planning Area under Alternative E (Preferred Alternative)



Climate Change

Proposed management activities would cause GHG emission increases from many types of sources. This section quantifies emissions from each alternative and provides a qualitative discussion of potential climate impacts. As described in Chapter 3, climate change is occurring and will continue to occur for many years due to the longevity of GHGs that are already in the atmosphere. Approximate atmospheric lifetimes for CO_2, CH_4, and N_2O are 50–200 years, 12 years, and 120 years, respectively (EPA 2010b). Consequently, GHG emissions would generally be considered to have long-term impacts.

Assumptions and Guidelines

A growing body of evidence indicates that Earth's atmosphere is warming. Records show that surface temperatures in Montana have risen approximately 1–3° Fahrenheit since the 1960 to 1979 baseline years (USGCRP 2009). The largest increase in average temperature has occurred in the winter months in the central and eastern portions of the state. Relatively cold days in the region are becoming less frequent and relatively hot days are becoming more frequent (USGCRP 2009). Observed changes in oceans, ecosystems, and ice cover are consistent with this warming trend (NRC 2006).

Ongoing scientific research has identified the potential impacts of GHG emissions – including CO_2, CH_4, N_2O, water vapor, and several trace gases – on global climate change. Through complex interactions at regional and global scales, atmospheric GHG concentrations cause a net warming of the atmosphere (which makes surface temperatures suitable for life on Earth), primarily by decreasing the amount of heat energy Earth radiates back into space. Although GHG concentrations in the atmosphere and climatic conditions have varied throughout Earth's history, recent industrialization and combustion of fossil fuels have caused global atmospheric CO_2 concentration to increase dramatically; this most recent CO_2 increase is likely to contribute to overall climatic changes (NRC 2006). Global atmospheric concentrations of CO_2, CH_4, and N_2O have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values (as determined from ice cores spanning many thousands of years).

The global increase in CO_2 concentrations is due primarily to fossil fuel use and land use change, while those of CH_4 and N_2O are due to agricultural soil management, animal manure management, sewage treatment, and mobile and stationary combustion of fossil fuels (IPCC 2007). According to climate change researchers, the impacts of climate change are expected to vary by region, season, and time of day (NRC 2006, USGCRP 2009). Computer model forecasts indicate that increases in temperature will not be evenly or equally distributed, but are likely to be accentuated at higher latitudes. Warming during winter is more likely than increases in daily maximum temperatures (NRC 2006).

Within North America, warming is predicted to affect many resources and human health. In western mountain areas, warming is projected to cause decreased snowpack, more winter flooding, and reduced summer flows, which would exacerbate competition for over-allocated water resources. In the early decades of the century, moderate climate change is projected to increase aggregate yields of rain-fed agriculture by 5 to 20%, but with important variability among regions; major challenges are projected for crops that are near the warm end of their suitable range or which depend on highly utilized water resources. Cities that currently experience heat waves are expected to be further challenged by an increased number, intensity, and duration of heat waves during the course of the century, with potential for adverse health impacts. Specific modeling and/or assessments of the potential impacts for the planning area currently do not exist.

The lack of scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change even at local scales limits the ability to quantify current and future impacts of climate change in the planning area. The following paragraphs describe potential future impacts of climate change that can be reasonably anticipated for the planning area; some of these impacts are known to already be occurring in the area. However, over the next 20 years, tools will become available that will allow for a better site-specific analysis of the impacts of a proposed activity on GHG and the site-specific impact from climate change. The U.S. Geological Survey (USGS), for example, is developing GIS-based tools to determine the carbon storage of specific soils. Ongoing research is analyzing the response of different vegetation types to increasing CO_2, longer growing seasons, higher heat, and more unpredictable rain patterns.

Increasing temperatures in the planning area are likely to contribute to increased evaporation, drought frequencies, and declining water quantity. The warming of lakes and rivers will adversely affect the thermal structure and water quality of hydrological systems, which will add additional stress to water resources in the region (IPCC 2007). The planning area depends on temperature-sensitive springtime snowpack to meet demand for water from municipal, industrial, agricultural, and recreational uses, and BLM-authorized activities. The USGS notes that mountain ecosystems in the western United States are particularly sensitive to climate change, especially in the higher elevations, where much of the snowpack occurs. Some of these areas have experienced three times the global average temperature increase over the past century (USGS 2010). Higher temperatures are causing more winter precipitation to fall as rain rather than snow, which contributes to earlier snowmelt. Additional declines in snowmelt associated with climate change are projected,

which would reduce the amount of water available during summer (USGCRP 2009). Rapid spring snowmelt due to sudden and unseasonal temperature increases can also lead to greater erosive events and unstable soil conditions.

Increasing temperatures could affect the amount of water vapor in the atmosphere, the timing and amount of precipitation, the intensity of storm systems, snow melt, and soil moisture. These factors can affect climate, day-to-day weather conditions, and air quality in the planning area. There is evidence that recent warming is affecting terrestrial and aquatic biological systems (IPCC 2007). Warming temperatures are leading to earlier timing of spring events such as leaf-unfolding, bird migration, and egg-laying (IPCC 2007). The range of many plant and animal species has shifted poleward and to higher elevation, as the climate of these species' traditional habitat changes. As future changes in climate are projected to be even greater than those in the recent past, there will likely be even larger range shifts in the coming decades (Lawler, et al. 2009). Warming temperatures are also linked to longer thermal growing seasons (IPCC 2007). In aquatic habitats, increases in algal abundance in high-altitude lakes have been linked to warmer temperatures, while range changes and earlier fish migrations in rivers have also been observed (IPCC 2007). Climate change is likely to combine with other human-induced stress to further increase the vulnerability of ecosystems to other pests, invasive species, and loss of native species. Climate change is likely to affect breeding patterns, water and food supply, and habitat availability to some degree. Sensitive species in the planning area such as greater sage-grouse, which are already stressed by declining habitat, increased development and other factors, could experience additional pressures as a result of climate change.

The observed change in western Montana glaciers indicates that these changes will influence land management decisions in the planning area. These factors may change migration patterns of wildlife, change appropriate seasons for livestock grazing, increase fire intensity, and intensify weed spread. With climate fluctuations expected to cause hotter and drier summers in the northern Rocky Mountains, the planning area could see an increase in West Nile virus (which responds positively to this type of climate condition).

Climate change also poses challenges for many resource uses on BLM-administered land. Increased temperatures, drought, and evaporation may reduce seasonal water supplies for livestock and could impact forage availability. However, in non-drought years, longer growing seasons resulting from thermal increases may increase forage availability throughout the year. Shifts in wildlife habitat due to climate change may influence hunting and fishing activities, and early snowmelt may impact winter and water-based recreational activities. Drought and resulting stress on vegetation is likely to increase the frequency and intensity of mountain pine beetle and other insect infestations, which reduces the potential for sale of forest products on BLM-administered lands.

Increases in average summer temperatures and earlier spring snowmelt in the planning area are expected to increase the risk of wildfires by increasing summer moisture deficits (USGCRP 2009). Studies have shown that earlier snowmelts can lead to a longer dry season, which increases the incidence of landscape-level fire (Westerling, et al. 2006). Together with historic changes in land use, climate change is anticipated to affect the variability in the occurrence of wildfire throughout the western United States. Although the impact of climatic factors varies by ecosystem type and from year to year, drought, low winter precipitation, wind conditions, and high summer temperatures are positively associated with wildfire occurrence (NPS 2010). During the last 20 years, research has shown that these factors have led to an increase in the frequency of very large wildfires and total acres burned throughout the Rocky Mountain region (NPS 2010).

Climate change science and predictions of climate change impacts are a continually growing and emerging science. Additional and recent information on climate change and regional predictions can be found at http://www.globalchange.gov/ and the Intergovernmental Panel on Climate Change at http://www.ipcc.ch/.

Impacts Common to All Alternatives

GHG Emissions

Due to the inability to accurately model the effects of local GHG emissions on climate change, this analysis provides a summary of GHG emissions associated with the alternatives and a comparison of these emissions to other GHG inventories. GHG emissions were estimated using methodologies similar to those used for criteria air pollutants and included GHG emissions that would be directly emitted from sources related to energy development, rights-of-way, mineral development, fuels management, resource road maintenance, forest and woodland treatments, and livestock

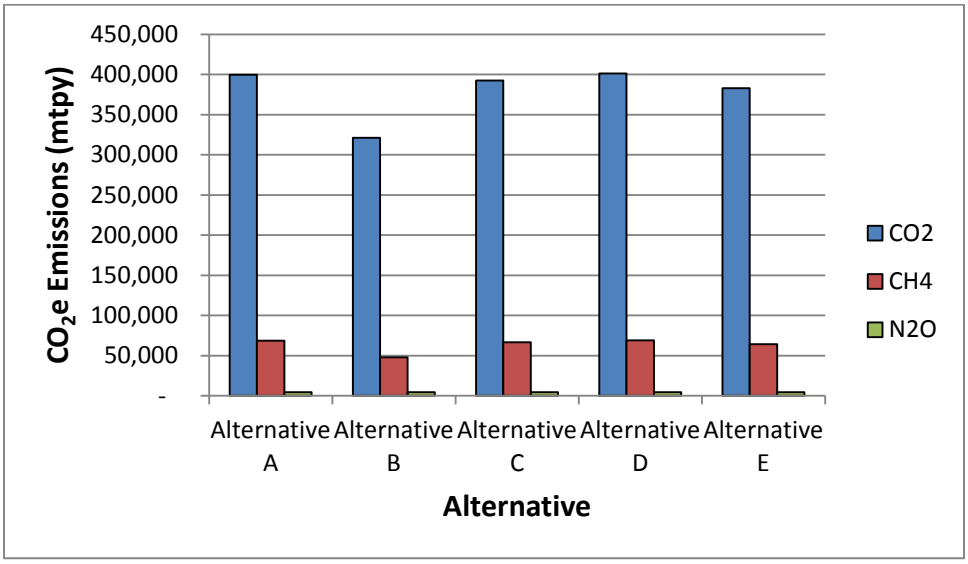
grazing. The emission estimates reflect GHG emissions from BLM-authorized activities occurring within the planning area. GHG emissions from activities outside the planning area were not included because insufficient data exist to accurately quantify these emissions. For example, combustion emissions associated with oil and natural gas produced within the planning area and combusted outside the planning area were not included in the inventory. GHG emissions from wildfire were not included in the emission inventories because these emissions would be beyond the BLM's control and occur every year, though wildfire intensity and magnitude vary from year to year. GHG emissions from prescribed fire and fire prevention activities were included in the inventory since these activities result from BLM-authorized activities. A copy of the GHG emission inventories can be obtained from the Havre Field Office in Havre, Montana.

GHG emission sinks due to sequestration and changes in land use were not estimated due to insufficient data and methodologies for estimating carbon uptake in vegetation and soils. BLM activities that improve forest and vegetation health would tend to increase CO_2 uptake from the atmosphere and reduce atmospheric concentrations. Increased carbon sequestration on land administered by the BLM would offset GHG emission increases from other BLM sources.

GHG emission inventories developed as part of this analysis are expressed in short tons per year because emission factors used to calculate emissions were available in units of pounds and short tons. However, state, national, and global emission inventories are typically provided in terms of metric tons per year (mtpy). Consequently, GHG emissions provided in this section are given in terms of short tons per year and mtpy in order to compare Alternative emissions with other GHG inventories.

Potential GHG emissions from BLM sources are shown in Figure 4.8 in terms of CO_2e given in mtpy. Under each Alternative, fire management activities account for the greatest quantities of CO_2 and N_2O emissions, while livestock grazing accounts for the greatest CH_4 emissions.

Figure 4.8
GHG Emissions in Terms of CO_2e for Each Alternative



Cumulative Emission Impacts

GHG emissions due to the highest-emitting alternative would be a small percentage of Montana, U.S., and global emissions. Based on emission inventory data included in Table 3.4, Alternative D CO_2e emissions would be approximately 0.942% of Montana emissions, 0.007% of U.S. emissions, and 0.001% of global GHG emissions. Due to the relatively small differences in GHG emissions, differences in cumulative GHG emission impacts among the alternatives would be negligible.

GHG Emission Mitigation

GHG emissions from multiple activities would likely decrease in future years due to future federal regulation of GHGs. EPA's August 16, 2012 NSPS and NESHAP rule is expected to decrease national CH_4 emissions from affected oil and gas systems by approximately 26% (GPO 2012). A previous light-duty vehicle regulation imposed CO_2 emission standards for new vehicles. As new vehicles replace existing vehicles, CO_2 emissions will decline on a per-mile basis. EPA is collecting GHG emission data and is considering additional future regulation.

Climate Change Impact Mitigation

Several federal initiatives have been launched to improve the ability to understand, predict, and adapt to the challenges of climate change. The Secretary of the Interior signed Secretarial Order 3289 on February 22, 2010, establishing a Department-wide, scientific-based approach to increase understanding of climate change and to coordinate an effective response to impacts on managed resources. The order reiterated the importance of analyzing potential climate change impacts when undertaking long-range planning issues, and also established several initiatives including the development of eight Regional Climate Science Centers. Regional Climate Science Centers would provide scientific information and tools that land and resource managers can apply to monitor and adapt to climate changes at regional and local scales (USDI 2010). The North Central Climate Science Center, which will incorporate the planning area, was established in 2011.

Given the broad spatial influence of climate change which requires response at the landscape level, the Department of the Interior also established Landscape Conservation Cooperatives, which are management-science partnerships that help to inform management actions addressing climate change across landscapes. These Cooperatives are formed and directed by land, water, wildlife and cultural resource managers and interested public and private organizations to increase the scope of climate change response beyond federal lands.

In addition to efforts being undertaken to better respond and adapt to climate change, other federal initiatives are being implemented to mitigate climate change. The Carbon Storage Project was implemented to develop carbon sequestration methodologies for geological (i.e., underground) and biological (e.g., forests and rangelands) carbon storage. The project is a collaboration of federal agency and external stakeholders to enhance carbon storage in geologic formations and in plants and soils in an environmentally responsible manner. The Carbon Footprint Project is a project to develop a unified GHG emission reduction program for the Department of the Interior, including setting a baseline and reduction goal for the Department's GHG emissions and energy use. More information about Department's efforts to respond to climate change is available at: www.doi.gov/archive/climatechange/.

Impacts under Alternative A (Current Management)

Alternative A has a high level of oil and gas activity and the greatest bentonite mining activity. Under Alternative A, GHG emissions would be larger than emissions under all other alternatives, except for Alternative D. Resource-specific emissions are provided in Table 4.24.

Table 4.24
BLM Source GHG Emissions under Alternative A (Current Management)

	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
Oil and Gas Development and Production					
Oil	3,583	17	0	3,940	3,574
Natural Gas	125,691	1,582	1	159,096	144,331
Coalbed Natural Gas	928	12	0	1,185	1,075
Bentonite Mining	113	0	0	114	103
BLM Travel	108	0	0	113	103

Table 4.24 BLM Source GHG Emissions under Alternative A (Current Management)					
	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
BLM Road Maintenance	40	0	0	40	37
Fire Management [1]	309,193	58	15	315,074	285,835
Forestry Management	363	0	0	365	331
Land and Realty	308	0	0	309	281
Livestock Grazing	150	1,940	0	40,884	37,090
Sand and Gravel	101	0	0	104	94
Vegetation Management	52	0	0	53	48
BLM Emission Total	**440,630**	**3,608**	**17**	**521,277**	**472,903**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Impacts under Alternative B

Alternative B has the lowest level of oil and gas activity and low bentonite mining activity. Under Alternative B, GHG emissions would be less than emissions under each of the other alternatives. Resource-specific emissions are provided in Table 4.25.

Table 4.25 BLM Source GHG Emissions under Alternative B					
	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
Oil and Gas Development and Production					
Oil	3,107	13	0	3,394	3,079
Natural Gas	39,937	502	0	50,544	45,853
Coalbed Natural Gas	445	6	0	569	516
Bentonite Mining	109	0	0	109	99
BLM Travel	108	0	0	113	103
BLM Road Maintenance	40	0	0	40	37
Fire Management [1]	309,193	58	15	315,074	285,835
Forestry Management	363	0	0	365	331
Land and Realty	308	0	0	309	281
Livestock Grazing	150	1,940	0	40,884	37,090
Sand and Gravel	101	0	0	104	94
Vegetation Management	52	0	0	53	48
BLM Emission Total	**353,913**	**2,519**	**16**	**411,559**	**373,367**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Impacts under Alternative C

Alternative C would allow moderate oil and gas activity and low bentonite mining activity. Under Alternative C, GHG emissions would be less than emissions under Alternatives A and D and more than emissions under Alternatives B and E. Resource-specific emissions are provided in Table 4.26.

Table 4.26
BLM Source GHG Emissions under Alternative C

	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
Oil and Gas Development and Production					
Oil	3,583	17	0	3,940	3,574
Natural Gas	117,704	1,481	1	148,987	135,161
Coalbed Natural Gas	740	10	0	950	862
Bentonite Mining	109	0	0	109	99
BLM Travel	108	0	0	113	103
BLM Road Maintenance	40	0	0	40	37
Fire Management [1]	309,193	58	15	315,074	285,835
Forestry Management	363	0	0	365	331
Land and Realty	308	0	0	309	281
Livestock Grazing	150	1,940	0	40,884	37,090
Sand and Gravel	101	0	0	104	94
Vegetation Management	52	0	0	53	48
BLM Emission Total	**432,451**	**3,506**	**16**	**510,929**	**463,515**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Impacts under Alternative D

Alternative D has the highest level of oil and gas activity and low bentonite mining activity. Under Alternative D, GHG emissions would be greater than emissions under all other alternatives. Resource-specific emissions are provided in Table 4.27.

Table 4.27
BLM Source GHG Emissions under Alternative D

	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
Oil and Gas Development and Production					
Oil	3,583	17	0	3,940	3,574
Natural Gas	127,523	1,602	1	161,353	46,380
Coalbed Natural Gas	928	12	0	1,185	1,075
Bentonite Mining	109	0	0	109	99
BLM Travel	108	0	0	113	103

Table 4.27 BLM Source GHG Emissions under Alternative D					
	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
BLM Road Maintenance	40	0	0	40	37
Fire Management [1]	309,193	58	15	315,074	285,835
Forestry Management	363	0	0	365	331
Land and Realty	308	0	0	309	281
Livestock Grazing	150	1,940	0	40,884	37,090
Sand and Gravel	101	0	0	104	94
Vegetation Management	52	0	0	53	48
BLM Emission Total	**442,458**	**3,629**	**17**	**523,531**	**474,947**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Impacts under Alternative E (Preferred Alternative)

The preferred alternative has the second-lowest level of oil and gas activity and low bentonite mining activity. Under Alternative E, GHG emissions would be less than emissions under Alternatives A, C, and D, and greater than emissions under Alternative B. Resource-specific emissions are provided in Table 4.28.

Table 4.28 BLM Source GHG Emissions under Alternative E (Preferred Alternative)					
	(Tons/Year)				*(mtpy)*
Resource	***CO_2***	***CH_4***	***N_2O***	***CO_2e***	***CO_2e***
Oil and Gas Development and Production					
Oil	3,504	16	0	3,849	3,492
Natural Gas	107,372	1,351	1	135,903	123,291
Coalbed Natural Gas	815	11	0	1,044	947
Bentonite Mining	109	0	0	109	99
BLM Travel	108	0	0	113	103
BLM Road Maintenance	40	0	0	40	37
Fire Management [1]	309,193	58	15	315,074	285,835
Forestry Management	363	0	0	365	331
Land and Realty	308	0	0	309	281
Livestock Grazing	150	1,940	0	40,884	37,090
Sand and Gravel	101	0	0	104	94
Vegetation Management	52	0	0	53	48
BLM Emission Total	**422,115**	**3,376**	**16**	**497,848**	**451,648**

[1] Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.

Cultural Resources

Assumptions and Guidelines

The criteria for assessing impacts were those stipulated in the regulations for Protection of Historic Properties (36 CFR §800), which state that an undertaking may have an effect when it may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR §800.5(a)(1)).

Examples of effects include:

- physical destruction, damage, or alteration of all or part of the property;
- property alteration that is not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR §68) and applicable guidelines;
- removal of the property from its historic location; and
- disturbance of the visual setting of an historic property, such as in the case of a Traditional Cultural Property (TCP).

Impact analysis assumptions for cultural resources include the following:

- Discoveries of cultural resources will continue throughout the planning area.
- A direct correlation exists between the number of sites that could be impacted by various actions and the degree, nature, and quantity of surface-disturbing activities within the planning area.
- A direct relationship exists between the frequency of human use in an area and the potential for cultural resources to be impacted.
- The assessment methodology used to analyze cumulative impacts on cultural resources includes the entire planning area and those management activities expected to occur within the planning area.

Impacts Common to All Alternatives

The potential exists for disturbing cultural resources across all alternatives from casual, unauthorized activities (such as dispersed recreational activity, OHV use, and vandalism) and natural processes (natural decay, deterioration, or erosion). Under all alternatives, unquantified indirect impacts would occur. Management activities occurring within the planning area are not expected to affect cultural resources outside of the planning area.

Under all alternatives the BLM would continue to mitigate impacts to cultural resources from authorized uses through project abandonment, redesign, and if necessary, data recovery investigations. However, cultural resources would continue to deteriorate through natural agents, unauthorized public use, and vandalism.

Cultural Resources: The proactive management of historic properties in the planning area would be a beneficial effect to cultural resources as historic properties could receive funding for research.

Fire Management and Ecology: In some instances, cultural or historic sites could be damaged or destroyed when fire suppression efforts are critical to protect human life or property. The types of adverse effects expected to occur from wildfire suppression efforts are damage and/or destruction to historic buildings from fire and dozer impacts to surface and/or buried cultural sites. Under standard protocols, impacts to known cultural resources would be considered and mitigated.

Fire rehabilitation efforts would generally increase the protection of cultural sites that may have remained unaffected from wildfire by preventing or reducing erosion and encouraging rapid revegetation of denuded surfaces. Potential impacts from rehabilitation activities (such as mechanical reseeding) would be mitigated under standard procedures.

Surface disturbance from both wildfire and fuels management activities occur most often when full suppression is required. During full suppression efforts the likelihood of surface disturbance rises when the use of bulldozers, hand-cut trenches and large water pumper trucks are necessary. This would most likely be the case during a wildfire situation or an escaped prescribed fire. The potential for effects such as archaeological sites being damaged and/or destroyed during a prescribed fire is reduced by the mitigation efforts of Section 106 of the National Historic Preservation Act (NHPA).

It is anticipated that wildfire could occur in the planning area. Natural and prescribed fire could damage sites composed of combustible materials. Both prescribed fire and mechanical treatments could occur. Effects to cultural resources from fuels management projects would be minimized by pre-planning and Section 106 (NHPA). Fuels treatment projects should minimize the potential for wildfire, therefore minimizing the potential adverse effects to cultural resources.

Fluid Minerals: Per Montana BLM policy, oil and gas companies conduct small block surveys (10 acre minimum) for well proposals (cultural resource inventories), which has created an irregular sample of cultural resource information. This could potentially create issues concerning how cultural sites are recorded. In an effort to avoid sites within the small 10 acre blocks, several cultural sites recorded over the years may be linked to other sites, yet are potentially one large site rather than several small sites. As a result of the small-block surveys, these larger sites have been severely dissected by pipelines, roads and wells. This creates an adverse visual setting for the cultural resources within areas such the Bowdoin Field. It may also lead to the same adverse effects to the visual setting in the North Blaine and Bears Paw South Field Development Areas. It is important to note that these small block surveys have significantly contributed to the archaeological site information database.

Two areas have leases dating as far back as the 1920s. Active drilling has been ongoing since then. These areas are the Big Bend of the Milk River Area of Critical Environmental Concern (ACEC) and the Kevin Rim ACEC. Both areas are ACECs for unique prehistoric properties. In fact, some of the wells and associated infrastructure are historic sites as well. All of the Kevin Rim ACEC is currently leased and only a small portion of the Big Bend of the Milk River ACEC remains unleased. The unleased area of the Big Bend of the Milk River ACEC will be subject to the stipulations in the preferred alternative. Those existing leases in both ACECs will be subject to the stipulations of their lease at issuance. If any leases are to expire within these ACECs throughout the life of this plan, the leases will be subject to the stipulations in the preferred alternative.

Lands and Realty

Access: Acquiring new access to BLM land could have an indirect effect of exposing cultural resources to increased damage from illegal collection of artifacts and vandalism.

Rights-of-Way, Leases and Permits: The issuance of rights-of-way, leases and permits that result in surface-disturbing activities could cause direct, indirect or inadvertent impacts to cultural resources. Direct impacts would be mitigated under standard avoidance or recovery procedures. Indirect or inadvertent impacts are expected to be minimal and perhaps proportional to the number and extent of rights-of-way, leases, and permits issued on an annual basis. Surface disturbance from rights-of-way could potentially occur over the next 20 years (720 acres for telephone or fiber optic lines, 160 acres for pipelines, 360 acres for roads, 40 acres for powerlines, and 140 acres for other facilities). Effects are expected to be minimal through standard avoidance or recovery procedures.

Livestock Grazing: Grazing management which meets established Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a) should reduce the amount and extent of impacts or damage to cultural resources resulting from grazing on BLM land. However, cattle congregating near salt licks and/or water sources could have a potential adverse effect to historic properties not yet recorded.

Mechanical treatments for improving vegetative composition such as chisel plowing could have direct impacts to historic properties but could be mitigated under standard avoidance or recovery procedures. A total of 10,000 acres could potentially receive mechanical treatments (less than 1% of the BLM land).

OHV Use and Travel and Transportation Management: Developing new or upgrading existing transportation facilities could result in the permanent mitigated loss of cultural resources. Again, increased accessibility to resources could lead

to vandalism and unauthorized collection of artifacts, but could also better facilitate the traditional use of sacred locations.

Recreation: Impacts from dispersed recreational activity (e.g., camping, hiking, horseback riding, mountain biking, OHV use) are difficult to assess, particularly as such activities may impact cultural resources that have yet to be identified and recorded. Indirect and inadvertent impacts to cultural resources may occur by attracting additional attention or visitation to certain areas such as Special Recreation Management Areas. Increased visitation and recreational use could lead to the collection of artifacts and/or vandalism which is illegal under the Archaeological Resources Protection Act of 1969.

Providing public interpretation of cultural and historic resources may enhance appreciation and understanding of the fragile and finite nature of cultural resources. Similarly, promoting the adaptive reuse of historic buildings and structures for recreational purposes would help preserve and protect significant historic properties, helping fulfill the requirements of Section 110 of the NHPA.

Solid Minerals: Surface-disturbing activities associated with leasable and salable mineral exploration and development could result in mitigated impacts to cultural resources. In addition, the potential for indirect and inadvertent impacts would increase proportionally to the amount of land available for leasable and salable mineral exploration and development. Although opening lands for mineral exploration could have a direct impact on cultural resources, impacts would be mitigated under standard avoidance or recovery procedures.

Abandoned mine land reclamation and remediation have a direct impact to historic mining features and properties that may be mitigated through additional data recovery, recordation, and photo documentation. However, the impacts of comprehensive reclamation and remediation programs on historic mining districts and landscapes may be difficult to assess and more cumulative in nature.

Cumulative Impacts

Potential cumulative impacts to cultural resources would result primarily from surface-disturbing activities that cause erosion from vehicular traffic and/or machinery, soil compaction, and landscape alteration. Such activities could result in exposure, damage, and/or destruction of cultural resources. The policies associated with the cultural resource management program that require identification and mitigation of cultural resources prior to surface-disturbing activities would help to reduce potential impacts. Implementation of these requirements would also increase the potential for identification, recordation, and evaluation of cultural resources, although the potential would still exist for damage and/or destruction of previously unknown cultural resources discovered during construction. In addition, illegal OHV use, dispersed recreation, and other surface-disturbing activities not subject to a permitting process could result in exposure, damage, destruction, theft and/or vandalism of cultural resources.

Impacts under Alternative A (Current Management)

Fire Management and Ecology: Prescribed fire would be utilized to reduce hazardous fuels. A total of 4,740 acres could receive mechanical fuels treatments and 6,860 acres could be treated by prescribed fire (less than 1% of the BLM land). Adverse effects from these activities would be mitigated under standard Section 106 procedures. Prescribed fire and mechanical fuels treatments would be utilized to promote a healthy landscape and reduce the potential for wildfire. A healthy landscape would also help protect historic properties from wildfire and fire suppression activities.

Fluid Minerals: The surface disturbance that can reasonably be predicted to occur from leasing subsurface fluid minerals includes well pad construction, drilling, road construction, pipeline construction, vehicular travel during construction, well maintenance and reclamation. These types of surface-disturbing activities should not have an adverse effect on historic properties if the properties are located, recorded, and either avoided or mitigated prior to construction.

A total of 102,298 acres would be closed to leasing in Alternative A, including 27,768 acres in the Little Rocky Mountains TCP. An NSO lease stipulation would be placed on 282,062 acres in the planning area, including two areas containing historic properties: Big Bend of the Milk River ACEC (1,979 acres) and Sweet Grass Hills ACEC (6,248 acres). The remaining area (3,107,090 acres) available for leasing would require mitigation through Section 106 of the

NHPA. Minor constraints such as a timing stipulation are not considered a beneficial effect to historic properties as drilling is only delayed. It is not anticipated that historic properties would be directly adversely affected because of mitigation through the Section 106 process.

Lands and Realty:

Access: Alternative A identifies access acquisition areas to the Kevin Rim and Sweet Grass Hills ACECs, but could include other ACECs. Increasing access to the Sweet Grass Hills ACEC would be a benefit for traditionalists. Traditional users of the Sweet Grass Hills for spiritual purposes would have legal access to those areas critical to their spiritual needs. Discussions with tribal elders from Rocky Boy's Reservation indicate that legal access would be beneficial to them for carrying out traditional religious practices. However, opening up legal public access to sensitive areas poses a potential adverse effect to sacred sites from vandalism and/or looting.

Avoidance Areas: The Sweet Grass Hills and Kevin Rim ACECs are avoidance areas under Alternative A. Rights-of-way may be granted in avoidance areas only when no feasible alternative routes and/or sites are available. In avoidance areas, right-of-way stipulations from BLM Manual Handbook H-2801-1 would be used to protect resource values, including visual qualities. Construction activities such as transmission lines and/or new roads could impact archaeological sites on the ground in addition to creating a visual intrusion to the setting.

Under this alternative, Big Bend of the Milk River ACEC would not be an avoidance area; therefore, it is considered open to those realty actions. The steps to mitigate impacts to cultural resources in the Big Bend ACEC would be provided for under Section 106 of the NHPA and tribal consultation.

Land Ownership Adjustment: Lands identified for retention and acquisition within ACECs is a beneficial effect for cultural resources. Three ACECs are identified for cultural values: Big Bend of the Milk River ACEC, Sweet Grass Hills ACEC, and Kevin Rim ACEC. Acquiring private land adjacent to these ACECs would contribute to the value of the ACEC, and potentially to the historic integrity of the sites within. Also acquiring unpatented and patented mining claims and private minerals near the Devils Chimney Cave and mineral estate of patented mining claims within and adjacent to the Sweet Grass Hills ACEC would be beneficial toward providing further protection of traditional sacred sites.

OHV Use and Travel and Transportation Management: The Fresno OHV area is currently open and has been in use for many years. A field inventory in 2011 determined that no significant cultural sites are located within the boundary of the Fresno OHV area or in the immediate vicinity. No adverse effects to cultural resources would occur from keeping the Fresno OHV area open.

The Glasgow OHV area (40 acres) was also inventoried in 2011 and a determination was made that no significant cultural sites are located within the boundary of the OHV area or in the immediate vicinity. No adverse effects to cultural resources would occur from keeping the Glasgow OHV area open.

Renewable Energy: Wind energy rights-of-way would be excluded within 1 mile of National Historic Trails. All other areas would be open to wind energy rights-of-way with minor constraints or avoidance areas, including ACECs, TCPs and National Register eligible sites. The installation of either wind turbines or transmission lines in these areas could have adverse effects to cultural resources and the viewshed. Surface-disturbing activities could be mitigated through the Section 106 process, but the viewshed could not be mitigated. A total of 11,590 acres of National Register eligible sites are located in high potential areas for wind energy development. Under this alternative no special protection would be afforded these sites except mitigation under Section 106 of the National Historic Preservation Act.

Solid Minerals: Currently, the only surface disturbance occurring from mining for solid minerals is the bentonite mining occurring in south Valley County and a few claim pits in south Phillips County. Mitigation for any surface disturbance associated with ongoing bentonite mining would be through Section 106 of the NHPA.

Reclamation earthwork from past gold and silver mining in the Little Rocky Mountains has been completed but ongoing water treatments and stabilization is still occurring. It is unknown how many archaeological sites were lost to the gold and silver mining in the Little Rocky Mountains which began over a century ago. However, the high density of remaining historic properties suggests that several sites could have been destroyed by mining activities.

A withdrawal for the Zortman/Landusky mine reclamation area is in effect until 2015 (Public Land Order No. 7753). Upon expiration of the withdrawal, the area would again be available for mining claim location. However, the remaining federally owned subsurface acres are currently open to solid mineral entry. The expiration of the withdrawal would open up an additional 3,530 acres for solid mineral location and development. Of those acres, 1,200 acres are anticipated to have development in already disturbed areas and 710 acres have a potential for mining expansion. Any mining development which occurs in previously disturbed areas would not have a direct impact to cultural properties but could have indirect impacts to the viewshed and create unwanted noise for traditionalists using the surrounding areas.

The Little Rocky Mountains is a TCP and areas within are used for spiritual practices. Mining activities could have indirect impacts to those practitioners. If mining expansion occurs in areas that have never had prior surface disturbance, there is a potential for direct impacts to buried cultural properties that could be missed by a Class III Cultural Resource Inventory. Additionally, the same indirect impacts to the surrounding areas are anticipated. Although the federally owned subsurface acres would all be open to mining and development when the withdrawal expires, the likelihood of extensive mining is low due to current state law which bans cyanide heap leach mining, to date the most viable method of removing the low-grade ore. Other technologies are available for removing the gold and/or silver, but may not be economically viable. If such technology becomes available in the life of this plan, then effects described above would likely occur.

The Sweet Grass Hills are currently withdrawn from mineral entry until 2017, at which time the area would be available for mining claim location if the withdrawal is not extended. Due to the potential for damage and/or destruction of sacred sites, mining activities such as excavation, road construction, material stockpiling, and associated infrastructure construction would have an adverse effect indirectly on the visual landscape and potentially, directly on sacred sites. The visual and auditory disruptions would have an adverse effect on the traditional religious practices that currently occur in the Sweet Grass Hills. The Blackfeet, Assiniboine, Chippewa-Cree, Gros Ventre, and Confederated Salish and Kootenai Tribes have all expressed concern about preserving the sacredness of the Sweet Grass Hills (BLM 1996b). The Rocky Boy's Reservation has formally gone on record as opposing both mining claim entry and oil and gas leasing in the Sweet Grass Hills (BLM 1996b).

All areas are open to salable minerals, but adverse effects to cultural resources would be mitigated through inventory, avoidance or excavation by Section 106 of the NHPA.

Special Designations: Special stipulations for all ACECs covering oil and gas leasing, solid mineral exploration, renewable energy, certain realty actions, and off-road travel provide more protection for cultural resources in the planning area. The ACECs include Big Bend of the Milk River, Kevin Rim, Sweet Grass Hills, Bitter Creek, Mountain Plover, and Prairie Dog Towns within the 7km Complex. These ACECs all place constraints on oil and gas leasing and the Sweet Grass Hills ACEC prohibits locatable solid mineral entry. These measures provide more protection by prohibiting surface-disturbing activities that threaten to damage and/or destroy cultural resources. The three ACECs specific to cultural resources are Big Bend of the Milk River, Kevin Rim, and Sweet Grass Hills.

Visual Resources: Under Alternative A, no acreage would be assigned to Visual Resource Management (VRM) Class I. Cultural resources located in Class II areas (417,334 acres) would receive greater protection than those located in Class III (58,513 acres) and Class IV (1,961,591 acres). VRM Class II areas allow very little surface-disturbing activity, and any such activities may be seen, but should not attract the attention of the casual observer. The Class III and IV areas would be open for development. Surface-disturbing activities in Classes II, III and IV would be subject to mitigation under Section 106 of the NHPA.

Cumulative Impacts

Alternative A provides less protection for TCPs and ACECs because those areas would be open to renewable energy development. This could have an overall adverse effect to the cultural resources located within these areas. Through Section 106 of the NHPA and tribal consultation, some adverse effects could be mitigated.

Renewable energy development in other areas is not expected to have adverse effects to cultural resources as they could be mitigated through Section 106. Several wind energy projects are being proposed (none on BLM land) and several are under construction on private lands throughout the HiLine area. It is expected that wind energy development will

continue across the planning area. The visual intrusion caused by wind energy projects could have some adverse visual effects to cultural resources not yet recorded that may be eligible for the National Register.

Cumulative effects from the Keystone XL pipeline are not expected to be adverse as Section 106 of the NHPA should mitigate all negative impacts to sites through avoidance and/or excavation. Tribal consultation has been ongoing throughout the survey phase of the project and several tribes have opted for Traditional Cultural Studies along the route. This will contribute greatly to the information base of those types of studies in Phillips and Valley Counties, offering an overall positive effect.

Impacts under Alternative B

Fire Management and Ecology: Category B lands would be reduced to the west half of the planning area and Category C to the east. Prescribed fire would be utilized to reduce hazardous fuels in Category B lands and would receive higher priority for fire suppression than Category C lands. A total of 7,820 acres could receive mechanical fuels treatments and 26,660 acres could be treated by prescribed fire (less than 1% of the BLM land). Adverse effects from these activities would be mitigated under standard procedures. Prescribed fire and mechanical fuels treatments would be utilized to promote a healthy landscape and reduce the potential for the high severity of wildfire. A healthy landscape would also help protect historic properties from wildfire and fire suppression activities.

Fluid Minerals: The surface disturbance that can reasonably be predicted to occur from leasing subsurface fluid minerals includes well pad construction, drilling, road construction, pipeline construction, vehicular travel during construction, well maintenance, and reclamation. These types of surface-disturbing activities should not have adverse effects on historic properties if the properties are located, recorded, and either avoided or mitigated prior to construction.

A total of 3,173,637 acres would be closed to leasing under Alternative B, including 40 acres near the Bear Paw Battlefield. An NSO lease stipulation would be placed on 258,560 acres in the planning area including three areas containing historic properties: Big Bend of the Milk River ACEC (1,979 acres), Kevin Rim ACEC (4,564 acres), Sweet Grass Hills TCP (21,275 acres), Little Rocky Mountains TCP (38,102 acres), and 1,497 acres of National Register eligible properties. The remaining area available for leasing (59,253 acres) would require mitigation through Section 106 of the NHPA. Minor constraints such as timing limitations are not considered a beneficial effect to historic properties as drilling is only delayed for wildlife concerns. It is not anticipated that historic properties would be directly adversely affected because of mitigation through the Section 106 process.

Lands and Realty:

Access: Alternative B identifies access acquisition areas to Category 1 lands, including but not limited to ACECs. Increasing access to ACECs, particularly the Sweet Grass Hills ACEC, could be a beneficial effect for traditionalists. Traditional users of the Sweet Grass Hills for spiritual purposes would have legal access to those areas critical to their spiritual needs. Discussions with tribal elders from Rocky Boy's Reservation indicate that legal access would be beneficial to them for carrying out traditional religious practices. However, opening up public legal access to sensitive areas poses a potential adverse effect to sacred sites from vandalism and/or looting. The potential for an easement to the Sweet Grass Hills ACEC is low; access has been sought in the area for 17 years but an easement has not been granted.

Land Ownership Adjustment: Alternative B offers maximum protection to cultural resources as it places all Special Designation Areas as Category 1 for retention, which means that these lands would not be available for sale or exchange. Three areas have been designated as ACECs for cultural resource values: Big Bend of the Milk River ACEC, Kevin Rim ACEC, and the Sweet Grass Hills ACEC. Lands within these ACECs would be retained in public ownership. This alternative would also place lands adjacent to ACECs as high priority for acquisition. Newly acquired lands adjacent to ACECs would be placed into Category 1 as well. There are tracts adjacent to Big Bend of the Milk River ACEC, currently in private ownership, which contain historic properties that would contribute to the integrity of the sites within the ACEC.

OHV Use and Travel and Transportation Management: Alternative B offers the greatest protection for cultural resources with no open areas for OHV use. However, potential exists for the public to create illegal OHV areas if no designated legal areas are available for use.

Renewable Energy: Alternative B offers far more protection to ACECs and TCPs with these areas being excluded from wind energy rights-of-way. However, National Register eligible sites would still be open to wind energy. These sites would rely on the mitigation protection of Section 106 of the NHPA.

Solid Minerals: The Sweet Grass Hills and Little Rocky Mountains TCPs would be recommended for withdrawal for an additional 20 years. This would provide a maximum beneficial effect for the preservation of both the archaeological sites and the religious practices that currently occur in both areas. A withdrawal for locatable minerals would allow for traditional practitioners to conduct spiritual and/or ceremonial activities without visual and/or auditory intrusions. Physical historic properties that may or may not be directly related to those types of activities would be provided the most protection as well.

The Kevin Rim ACEC would be recommended for withdrawal from mineral entry for 20 years. By keeping this area off limits to mineral exploration and the potential surface disturbance from building roads, mineral extraction, and stockpiling of waste, the historic properties located in the ACEC would be protected. Historic properties would maintain their archaeological integrity and traditional users of these areas would be able to practice religious traditions without visual and audible disturbance from mining activities.

The Greater Sage-Grouse Protection Priority Area and Grassland Bird/Greater Sage-Grouse Priority Areas would be withdrawn for locatable minerals (1,514,137 acres) and closed to leasable and salable solid mineral exploration and development. This would be a beneficial effect to cultural resources as it would prohibit any surface disturbance in these areas, therefore leaving cultural resources intact.

Special Designations: An NSO lease stipulation would be applied to the three cultural ACECs: Sweet Grass Hills, Kevin Rim and Big Bend of the Milk River. The ACECs would be avoidance areas for certain realty actions such as transmission lines and new roads, and closed to renewable energy. The Big Bend of the Milk River ACEC would remain open to solid mineral sales (i.e., sand and gravel), which could have an adverse effect to archaeological sites. Sand and gravel extraction requires large open-pit type mining and these surface-disturbing activities could damage and/or destroy cultural resources. This type of activity would be mitigated through the Section 106 process. Providing special management for these ACECs would be a beneficial effect to the National Register eligible sites within.

The BLM would designate 6,153 acres as the Malta Geological ACEC. This ACEC would require a CSU stipulation for oil and gas leasing, a withdrawal for locatable minerals, closed to solid mineral leasing and sales, closed to renewable energy and would be an avoidance area for certain realty actions such as transmission lines and new roads. This would provide more protection to cultural resources by ensuring surface-disturbing activities are prohibited within the ACEC.

The BLM would designate 3,575 acres as the Zortman/Landusky Mine Reclamation ACEC. This ACEC is located in the Little Rocky Mountains, which is a TCP, and would protect the mine reclamation area. The area would be closed to solid mineral leasing and sales, NSO for oil and gas leasing, closed to renewable energy, an avoidance area for certain realty actions, and a withdrawal for locatable minerals would be recommended for 20 years. This would provide maximum benefits to cultural resources not directly, but indirectly in that the reclaimed site would contribute to the setting of the TCP.

Visual Resources: The effects would be similar to Alternative A, except most surface-disturbing activities would be prohibited with 90,032 acres of Class I and 977,396 acres of Class II lands. This would provide greater protection to cultural sites due to more stipulations affecting surface-disturbing activities in these areas. The remaining acreage still open to surface-disturbing activities would be Class III and IV lands, in which adverse effects would be mitigated with Section 106 of the NHPA.

Wilderness Characteristics: Alternative B identifies 26 areas (386,462 acres) that would be managed to protect wilderness characteristics; 373,442 acres of federal minerals would be closed to oil and gas leasing. Indirectly this would result in a diminished level of Class III cultural resource survey (associated with oil and gas development). Alternative B would also result in a diminished level of Class III Inventory due to the exclusion of wind energy within the boundaries of identified lands with wilderness characteristics.

Cultural resources within the Western Breaks and Badlands, Intact Sagebrush Grasslands, Intact Prairie Grasslands, and Eastern Breaks and Badlands areas would be afforded the same protective measures as Alternative A (standard protective measures such as mitigation and avoidance). Cultural resources within the Island Mountain Range also would mirror the current management but may have more restrictive measures placed on sites identified in the future as being of "Scientific Use" due to increased VRM Class I and surface disturbance restrictions.

Cultural resource preservation may also benefit through future travel management planning by limiting access and travel within identified lands with wilderness characteristics. These areas would be managed as semi-primitive nonmotorized (4,118 acres) and semi-primitive motorized (382,344 acres). These benefits would include a decreased potential for damage, alteration or destruction by vehicular traffic and human interaction. With decreased traffic the potential for deliberate vandalism or looting is also reduced.

Cumulative Impacts

The overall cumulative effects under Alternative B would be much lower due to more BLM land with special stipulations such as NSO and closed to leasing. These stipulations provide maximum protection for all cultural resources. However, it is assumed that with more BLM land prohibiting surface-disturbing activities from oil and gas development, energy companies would increase their drilling on private lands where potentially no Class III inventory could occur. It is assumed that in instances where no Class III inventory is performed the potential for damage and/or destruction to cultural sites is likely.

The withdrawal of the Sweet Grass Hills and Little Rocky Mountains TCPs would provide the most beneficial cumulative effect to those sensitive resources associated with the TCPs.

The TCPs and ACECs would be exclusion areas for wind energy rights-of-way. Overall, this would provide maximum protection for those areas from the adverse visual effects of wind farms, which can be seen several miles away and could potentially create an adverse visual intrusion to the natural landscape. Several wind energy projects are being proposed (none on BLM land) and several are under construction on private lands throughout the HiLine area. It is expected that wind energy development will continue across the planning area. The visual intrusion may result in some adverse visual effects to historic properties not yet recorded.

Cumulative effects from the Keystone XL pipeline are not expected to be adverse as Section 106 of the NHPA should mitigate all effects to sites through avoidance and/or excavation. Tribal consultation has been ongoing throughout the survey phase of the project and several tribes have opted for Traditional Cultural Studies along the route. This will contribute greatly to the information base of those types of studies in Phillips and Valley Counties, potentially providing an overall beneficial effect.

Impacts under Alternative C

Fire Management and Ecology: Impacts would be the same as under Alternative B.

Fluid Minerals: A total of 218,586 acres would be closed to leasing in Alternative C including 40 acres near the Bear Paw Battlefield. An NSO lease stipulation would be placed on 1,291,160 acres in the planning area including several areas containing known Eligible National Register of Historic Places (NRHP) Historic Properties. These areas include the Big Bend of the Milk River ACEC (1,979 acres), Kevin Rim ACEC (4,564 acres), the Sweet Grass Hills TCP (21,275 acres), the Little Rocky Mountains TCP (38,102 acres), and 1,497 acres of NRHP Eligible properties. The remaining area available for leasing (1,981,704 acres) would be subject to adequate levels of cultural resource review, inventory and mitigation (if applicable) as dictated by Section 106 of the NHPA.

Lands and Realty

Access: Impacts would be the same as under Alternative B.

Land Ownership Adjustment: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Similar to Alternative B, Alternative C would offer the greatest protection for cultural resources with no open areas for OHV use. However, potential exists for the public to create illegal OHV areas if no designated legal areas are available for use.

Motorized game retrieval off road in south Phillips and Valley Counties (387,118 acres) from 10:00 a.m. to 2:00 p.m. could lead to adverse effects to cultural resources. When vehicles are allowed to drive indiscriminately, archaeological features located on the prairie are vulnerable to damage and/or destruction. The sheer weight of a vehicle can pop stones from the ground and reveal buried archaeological material. When archaeological materials are removed from their original context, a significant amount of important information could potentially be lost.

Renewable Energy: Impacts would be the same as under Alternative B.

Solid Minerals: Impacts would be the same as described in Alternative A, except that the Little Rocky Mountains TCP would also be closed to leasable and salable solid minerals. This would provide additional beneficial effects to the TCP as less surface disturbance would occur from these resource uses.

The Greater Sage-Grouse Protection Priority Area and Grassland Bird/Greater Sage-Grouse Priority Areas would be closed to solid mineral locatable and salable (1,354,507 acres) exploration and development and closed to solid mineral leasing (1,386,913 acres). This would be a beneficial effect to cultural resources as it would prohibit any surface disturbance in these areas, therefore leaving cultural resources intact.

Special Designations: The impacts would be the same as Alternative B, except that the BLM would designate 22,411 acres as the Woody Island ACEC and 42,020 acres as the Frenchman ACEC. The areas would be closed to solid mineral leasing, withdrawn from locatable mineral entry, closed to solid mineral sales, closed to renewable energy, and avoidance areas for certain realty actions such as transmission lines and new roads.

Visual Resources: The effects would be similar to Alternative A except the 74,506 acres of Class I lands and 914,197 acres of Class II lands would prohibit most surface-disturbing activities. This would provide greater protection to cultural sites due to more stipulations affecting surface-disturbing activities in these areas. The remaining acreage still open to surface-disturbing activities would be Class III and IV lands, in which adverse effects would be mitigated with Section 106 of the NHPA.

Wilderness Characteristics: Alternative C identifies 12 areas (228,419 acres) that would be managed to protect wilderness characteristics; 143,794 acres of federal minerals would be closed to oil and gas leasing and 78,280 acres would include an NSO stipulation. Indirectly this would result in a diminished level of Class III cultural resource survey (associated with oil and gas development). Alternative C would also result in a diminished level of Class III Inventory due to the exclusion of wind energy within the boundaries of identified lands with wilderness characteristics.

Cultural resources would be afforded the same protective measures as Alternative A (standard protective measures such as mitigation and avoidance). Cultural resources within the Island Mountain Range also would mirror the current management but may have more restrictive measures placed on sites identified in the future as being of "Scientific Use" due to increased VRM Class I and surface disturbance restrictions.

Cultural resource preservation may also benefit through future travel management planning by limiting access and travel within identified lands with wilderness characteristics. These areas would be managed as semi-primitive nonmotorized (132,788 acres) and semi-primitive motorized (95,631 acres). These benefits would include a decreased potential for damage, alteration or destruction by vehicular traffic and human interaction. With decreased traffic the potential for deliberate vandalism or looting is also reduced.

Cumulative Impacts

The cumulative impacts under Alternative C are similar to Alternative A, except that off-road motorized game retrieval would be allowed in south Phillips and Valley Counties between 10:00 a.m. and 2:00 p.m. Indiscriminate OHV use can have adverse effects to cultural resources. When vehicles drive off designated roads, primitive roads and trails to retrieve game animals the tires can directly impact archaeological features on the ground such as popping stones up and displacing them. Buried archaeological remains can be uncovered and left susceptible to damage and/or destruction.

The intense use of the HiLine for hunting could create significant overall damage to cultural resources located on high ridges, as this is the best location to "scout" for game.

The TCPs and ACECs would be exclusion areas for wind energy rights-of-way. Overall, this would provide maximum protection for those areas from the adverse visual effects of wind farms, which can be seen from several miles away and could potentially create an adverse visual intrusion to the natural landscape. Several wind energy projects are being proposed (none on BLM land) and several are under construction on private lands throughout the HiLine area. It is expected that wind energy development would continue across the planning area. The visual intrusion caused by wind energy projects could have some adverse visual effects to cultural resources not yet recorded which may be eligible for the National Register.

Cumulative effects from the Keystone XL pipeline are not expected to be adverse as Section 106 of the National Historic Preservation Act (NHPA) should mitigate all negative impacts to sites through avoidance and/or excavation. Tribal consultation has been ongoing throughout the survey phase of the project and several tribes have opted for Traditional Cultural Studies along the route. This will contribute greatly to the information base of those types of studies in Phillips and Valley Counties, offering an overall positive effect.

Impacts under Alternative D

Fire Management and Ecology: Impacts would be the same as under Alternative B.

Fluid Minerals: A total of 74,674 acres would be closed to leasing in Alternative C. An NSO lease stipulation would be placed on 357,456 acres in the planning area including four areas containing historic properties: Big Bend of the Milk River ACEC (1,979 acres), Kevin Rim ACEC (4,564 acres), the Sweet Grass Hills TCP (21,275 acres) and the Little Rocky Mountains TCP (38,102 acres) along with 1,497 acres of National Register eligible properties. The remaining area available for leasing (3,059,320 acres) would require mitigation through Section 106 of the NHPA. Minor constraints such as timing limitations are not considered a beneficial effect to historic properties as drilling is only delayed for wildlife concerns. It is not anticipated that historic properties would be directly adversely affected because of mitigation through the Section 106 process.

Lands and Realty

Access: Impacts would be the same as under Alternative B.

Land Ownership Adjustment: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Opening the Thirty Mile OHV area could have an effect on cultural resources as there are several archaeological sites recorded within and adjacent to the OHV area. The surface disturbance from wheeled vehicles could damage and/or destroy those sites. Increasing public use of the area increases the potential for inadvertent discovery of historic properties and damage and/or destruction from looting or vandalism.

The Fresno OHV area is currently open to OHV use and has been in use for many years. A field inventory in 2011 determined that no significant cultural sites are located within the boundary of the Fresno OHV area or in the immediate vicinity. No adverse effects to cultural resources would occur from keeping the Fresno OHV area open.

The Glasgow OHV Area (40 acres) was also inventoried in 2011 and a determination was made that no significant cultural sites are located within the boundary of the OHV area or in the immediate vicinity. No adverse effects to cultural resources would occur from keeping the Glasgow OHV area open.

Opening the planning area to off-road motorized game retrieval during the hunting season (except for the Wilderness Study Areas (WSAs) and four ACECs) could potentially have adverse effects to cultural resources. Off-road driving for game retrieval on ridge tops could have adverse effects to archaeological features. Ridge tops would be traveled more heavily during hunting season for game retrieval. Archaeological features are more densely located upon ridge tops as this land feature was advantageous to prehistoric hunter/gatherers. However, archaeological features throughout the planning area would be vulnerable to adverse effects from off-road driving.

Renewable Energy: Impacts would be the same as under Alternative B.

Solid Minerals: Under Alternative D, 15,000 acres would be recommended for a mineral withdrawal in the Little Rocky Mountains ACEC. The withdrawal would provide the maximum beneficial effects to cultural resources. A mineral withdrawal would prevent the likelihood of hardrock mining. Hardrock mining can have adverse effects to cultural resources and spiritual practices. Surface-disturbing and disruptive activities would have an adverse effect on cultural resources and spiritual practices. This alternative would have the most beneficial effect to cultural resources in the Little Rocky Mountains.

Special Designations: Impacts would be the same as under Alternative C, except that the BLM would designate 63,482 acres as the Frenchman ACEC. This would provide a greater area the same protections described in Alternative C. In addition, the Kevin Rim, Big Bend of the Milk River and Sweet Grass Hills ACECs would be closed to solid mineral sales (i.e., sand and gravel). This would prevent the potential for surface-disturbing activities associated with extracting sand and/or gravel from occurring within these ACECs, which is a beneficial effect to cultural resources.

The BLM would also designate 27,163 acres as the Little Rocky Mountains ACEC. This would not, however, provide additional protection as those management prescriptions developed already for the Little Rocky Mountains would be in place with or without an ACEC designation.

The withdrawal for solid minerals in the Sweet Grass Hills ACEC would not be recommended to extend beyond 2017. This could be a direct adverse impact to a sacred spiritual area. At this time mining for gold or silver requires open-pit type mining, which could create visual intrusions for the traditional users of the area for religious practices and could potentially remove National Register eligible cultural sites.

Visual Resources: As in Alternative A, the effects would be similar except 74,506 acres of Class I lands and 127,439 acres of Class II lands prohibit most surface-disturbing activities. This would provide greater protection to cultural sites due to more stipulations affecting surface-disturbing activities in these areas. The remaining acreage still open to surface-disturbing activities would be Class III and IV lands, in which adverse effects would be mitigated with Section 106 of the NHPA.

Cumulative Impacts

Cumulative effects under Alternative D could have the greatest adverse effects to cultural resources. This is in large part due to the substantially increased BLM land open to oil and gas leasing without special stipulations such as NSO, closed to leasing or CSU. Oil and gas companies would not be performing large block inventories for a more holistic information base of cultural resources on the HiLine; rather, the small 10 acre block surveys would continue and the fragmenting of sites would also continue.

The TCPs and ACECs would be exclusion areas for wind energy rights-of-way. Overall, this would provide maximum protection for those areas from the adverse visual effects of wind farms, which can be seen from several miles away and could potentially create an adverse visual intrusion to the natural landscape. Several wind energy projects are being proposed (none on BLM land) and several are under construction on private lands throughout the HiLine area. It is expected that wind energy development will continue across the planning area. The visual intrusion caused by wind energy projects could have some adverse visual effects to cultural resources not yet recorded that may be eligible for the National Register.

Alternative D would provide the most beneficial effect to cultural resources in the Little Rocky Mountains with the withdrawal of locatable minerals. A withdrawal would prevent solid mineral mining in the Little Rocky Mountains. This would have a beneficial effect because solid mineral mining has a potentially adverse effect on archaeological sites and Native American spiritual practices.

Cumulative effects from the Keystone XL pipeline are not expected to be adverse as Section 106 of the NHPA should mitigate all negative impacts to sites through avoidance and/or excavation. Tribal consultation has been ongoing throughout the survey phase of the project and several tribes have opted for Traditional Cultural Studies along the route. This will contribute greatly to the information base of those types of studies in Phillips and Valley Counties, offering an overall positive effect.

Impacts under Alternative E (Preferred Alternative)

Fire Management and Ecology: Impacts would be the same as under Alternatives B, C, and D.

Fluid Minerals: A total of 152,702 acres would be closed to leasing in Alternative E including 21,275 acres in the Sweet Grass Hills TCP and 32,166 acres in the higher elevations of the Little Rocky Mountains TCP. An NSO lease stipulation would be placed on 1,711,378 acres in the planning area including three areas containing historic properties: The Big Bend of the Milk River ACEC (1,979 acres), Kevin Rim ACEC (4,564 acres), and the remaining lower elevations of the Little Rocky Mountains TCP (5,936 acres) along with 1,497 acres of National Register eligible properties. An NSO lease stipulation would be placed on the 40 acres near the Bear Paw Battlefield. The remaining area available for leasing (1,627,370 acres) would require mitigation through Section 106 of the NHPA. Minor constraints such as timing limitations are not considered a beneficial effect to historic properties as drilling is only delayed for wildlife concerns. It is not anticipated that historic properties would be directly adversely affected because of mitigation through the Section 106 process.

Lands and Realty

Access: Impacts would be the same as under Alternative B.

Land Ownership Adjustment: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Under Alternative E, the Fresno and Glasgow OHV areas would be open to OHV use. No significant cultural sites are located within the boundaries or in the immediate vicinities of the OHV areas. No adverse effects to cultural resources would occur from keeping the OHV areas open.

Renewable Energy: Impacts would be the same as under Alternative B.

Solid Minerals: The Sweet Grass Hills TCP would be recommended for withdrawal from mineral entry for an additional 20 years and would be closed to both leasable and salable mineral entry. By limiting the potential for mineral exploration and the potential surface disturbance from building roads, mineral extraction, and stockpiling of waste, the sensitive resources would be protected. Historic properties would maintain their archaeological integrity and traditional users of these areas would be able to practice religious traditions without visual and audible disturbance from mining activities.

The activities associated with potential solid mineral mining such as open pit mining for gold or silver would have an adverse impact to the visual, aural and physical qualities of the Little Rocky Mountains TCP. The preferred alternative in the 1996 Final Zortman and Landusky EIS (BLM and MDEQ 1996) described potential impacts to Native American cultural resources by stating, "… the existing high impacts would continue while there would be additional aural, physical and visual impacts to the Little Rocky Mountains TCP." These types of impacts are expected to occur if mining activities resume in the Little Rocky Mountains.

The Greater Sage-Grouse Protection Priority Area (1,028,661 acres) and Grassland Bird/Greater Sage-Grouse Priority Areas (318,526 acres) would require an NSO stipulation for oil and gas leasing. Both these areas would be closed to renewable energy development and would be avoidance areas for rights-of-way. This would be a beneficial impact to all cultural resources as it would provide greater protection from surface disturbance.

Special Designations: The three cultural ACECs, Sweet Grass Hills, Kevin Rim and Big Bend of the Milk River would be the same as Alternative B, except that Sweet Grass Hills ACEC would be closed to oil and gas leasing. This would ensure that no surface-disturbing activities associated with energy development would occur in the ACEC.

Under this alternative the Prairie Dog Towns within the 7km Complex ACEC would not be retained as an ACEC. Therefore, an NSO stipulation would not be applied to the 7km area, rather a 1/2 mile NSO would be applied to all black-tailed prairie dog habitat. Under Alternative E, additional constraints have been placed on solid mineral leasing and sales, prohibiting all mineral exploration and development.

The BLM would designate 32,869 acres as the Woody Island ACEC and 42,020 acres as the Frenchman ACEC. Both ACECs would be avoidance areas and closed to renewable energy. The two ACECs would be closed to solid mineral leasable and salables. These constraints would be a beneficial impact to all cultural resources as it would provide greater protection from surface disturbance.

The BLM would designate 2,656 acres as the Zortman/Landusky Mine Reclamation ACEC. The continuation of the reclamation activities would be a beneficial effect as it would contribute to the visual setting of the Little Rocky Mountains TCP.

The BLM would designate 6,153 acres the Malta Geological ACEC. The ACEC would be open to solid mineral entry but as there is no potential for gold or silver mining, there is a low potential for mining. It would be closed to solid mineral leasing and sales, an avoidance area, and closed to renewable energy.

The special management provided in each ACEC would certainly provide a beneficial effect for cultural resources by removing the potential for the surface-disturbing activities associated with certain types of actions. The potential that would remain could be mitigated through the Section 106 process.

Visual Resources: The effects would be similar to Alternative A except the 74,506 acres of Class I lands and 841,087 acres of Class II lands would prohibit most surface-disturbing activities. This would provide greater protection to cultural sites due to more stipulations on surface-disturbing activities allowable in these areas. The remaining acreage still open to surface-disturbing activities would be Class III and IV lands, in which adverse effects would be mitigated with Section 106 of the NHPA.

Wilderness Characteristics: Alternative E identifies 2 areas (10,714 acres) that would be managed to protect wilderness characteristics; 10,714 acres of federal minerals would include an NSO stipulation for oil and gas leasing. Indirectly this would result in a diminished level of Class III cultural resource survey (associated with oil and gas development). Alternative E would also result in a diminished level of Class III Inventory due to the exclusion of wind energy within the boundaries of identified lands with wilderness characteristics.

Cultural resources would be afforded the same protective measures as Alternative A (standard protective measures such as mitigation and avoidance).

Cultural resource preservation may also benefit through future travel management planning by limiting access and travel within identified lands with wilderness characteristics. These areas would be managed as semi-primitive motorized. These benefits would include a decreased potential for damage, alteration or destruction by vehicular traffic and human interaction. With decreased traffic the potential for deliberate vandalism or looting is also reduced.

Cumulative Impacts

Under this alternative the protections for cultural resources from surface-disturbing activities on BLM land offer more opportunity for the preservation of historic properties than Alternatives A, C and D. However, not providing a withdrawal for solid minerals in the Little Rocky Mountains TCP would have an overall adverse cumulative effect to the sensitive resources located there. The withdrawal associated with the Zortman/Landusky Mine Reclamation ACEC would have an overall beneficial effect to the contributing factors of the TCP, but would only provide a limited area with that protection.

The TCPs and ACECs would be exclusion areas for wind energy rights-of-way. Overall, this would provide maximum protection for those areas from the adverse visual effects from wind farms. Wind farms can be seen from several miles away and could potentially create an adverse visual intrusion to the natural landscape. Several wind energy projects are being proposed (none on BLM land) and several are under construction on private lands throughout the HiLine area. It is expected that wind energy development will continue across the planning area. The visual intrusion may result in some adverse visual effects to historic properties not yet recorded.

Cumulative effects from the Keystone XL pipeline are not expected to be adverse as Section 106 of the NHPA should mitigate all negative impacts to sites through avoidance and/or excavation. Tribal consultation has been ongoing

throughout the survey phase of the project and several tribes have opted for Traditional Cultural Studies along the route. This will contribute greatly to the information base of those types of studies in Phillips and Valley Counties, providing an overall positive effect.

Economics

Assumptions and Guidelines

- Potential economic impacts are assessed using the Forest Economic Analysis Spreadsheet Tool (FEAST) developed by the USDA Forest Service Inventory and Monitoring Institute (IMI) in Fort Collins, Colorado. This model uses a Microsoft Excel workbook as the interface between user inputs and data generated using the IMPLAN input-output modeling system.

- The FEAST analysis assesses the economic impacts of the resource outputs projected under each alternative. Resource outputs in this context are the amount of a resource (e.g., timber volume, AUMs, recreation visits, etc.) that would be available for use under each alternative. Average annual resource outputs were projected by resource specialists for each alternative for the 20 year planning period based on the best available information and professional judgment. Impacts to economic well-being are measured in terms of employment and labor income.

- Employment and labor income estimates developed for this analysis include direct, indirect, and induced economic effects. Direct employment would, for example, be generated in the cattle ranching and farming sectors. Additional employment would be generated as the affected cattle ranching operations purchase services and materials as inputs ("indirect" effects) and employees spend their earnings within the local economy ("induced" effects).

- The benefit transfer method was used to estimate non-market economic values related to recreation opportunities by transferring available information from studies already completed in other locations and/or context. Loomis (2005) summarizes more than 30 years of literature on net economic value of outdoor recreation on BLM land. The report provides average net willingness to pay or consumer surplus for 30 recreation activities at the national level. The estimated consumer surplus calculated from the average values in the Loomis report were updated from 2004 to 2009 dollars.

- Wildfire suppression costs are not provided by alternative because it is not possible to predict the level of non-prescribed wildfire that would occur under any of the alternatives.

- Sufficient funding and personnel would be available for implementation of any alternative. The actual changes in the economy would depend on individuals taking advantage of the resource-related opportunities that would be supported by each alternative. If market conditions or trends in resource use were not conducive to developing some opportunities, the impact on the economy would be different than estimated herein.

- Implementation of all alternatives would be in compliance with all valid existing rights, federal regulations, bureau policies, and other requirements.

- Appropriate maintenance would provide functional capability of all developments.

- Resource specialists' projected annual resource outputs are based on the best available information, professional judgment, and professionally accepted analysis methods. The economic analysis compares the relative impacts of the resource management alternatives and should not be viewed as absolute economic values.

- The estimated average annual level of authorized grazing use for all alternatives would be based on 1999-2009 use levels (BLM Rangeland Administration System). These levels are: cattle/calves (329,446 AUMs), sheep and goats (198 AUMs). Based on a BLM grazing fee of $1.35 per AUM, total federal revenues from livestock grazing would be $445,000 for each alternative. Approximately $80,000 would be distributed to the local counties. When bison grazing occurs, one AUM for bison is equivalent to one AUM of cattle grazing.

- It is assumed that all the federal minerals (450,287 acres) that have been nominated for oil and gas leasing but deferred from leasing pending completion of the RMP will be leased upon completion of the RMP.

- All sawtimber harvested within the analysis area would be logged by logging contractors, not households. The logs would be processed at mills outside of the planning area.

- The ratios of harvest to jobs and income used to assess the impacts of the alternatives are based on statewide ratios developed for Montana by the University of Montana.

- Projected recreation visits and expenditures are distributed among different types of visitors based on the results of National Visitor Use Monitoring surveys conducted for the Dakota Prairies National Grasslands.

- The ratios of recreation visits to jobs and income used to assess the impacts of the alternatives are based on national ratios developed through the Forest Service's National Visitor Use Monitoring program.

- Anticipated annual BLM expenditures for each alternative would be $9.466 million. The FY 2010 budget was $9.466 million ($4.164 million for labor and $5.302 million for non-labor expenditures (BLM 2011)). The number of permanent and other than permanent BLM employees would not vary by alternative. Each alternative would have 47 permanent and 3 other than permanent employees.

- Table 4.29 shows estimated average annual federal mineral production and activity by alternative and is the basis for estimating anticipated future actions that will also influence cumulative economic impacts.

No attempt has been made to assign monetary values to the ecosystem services (e.g., benefits associated with watershed processes, soil stabilization and erosion control, improved air quality, climate regulation and carbon sequestration, and biological diversity) that would be provided because these values are difficult to quantify at this analysis level. In addition to the difficulties involved in developing accurate estimates of these values, the impacts of project alternatives are rarely quantified in the type of units that would allow these values to be assigned. However, the fact that no monetary value is assigned to ecosystem services in this document does not lessen their importance in the decisionmaking process.

Different methods of ecosystem valuation were used in this analysis. One method of ecosystem valuation is the benefit transfer method which estimates economic values by transferring existing recreation benefit estimates from studies already completed for another location or issue. Estimated average net willingness to pay, or consumer surplus related to recreation on BLM land ranged from $5.19 million (Alternative A) to $5.51 million (Alternative B). Hedonic pricing method is another method of ecosystem valuation used. A study by BBC Research and Consulting (2001) concluded that the location of a well at the time of sale influences the selling price. Properties with wells nearby had an estimated 22% reduction in selling price. Results of this study are used to estimate the economic effects of surface-disturbing activities near residences, especially on split estate lands.

Impacts Common to All Alternatives

The potentially affected local economy is characterized for the planning area counties in the Affected Environment portion of this document (Chapter 3). None of the alternatives would be expected to affect economic diversity (the number of economic sectors) or economic dependency, which occurs when the local economy is dominated by a limited number of industries. While the alternatives have the potential to affect local businesses and individuals, the contribution of BLM HiLine District-related activities to the local economy and the relative differences between the alternatives would not be large enough to have measurable effects on economic diversity or dependency. This is also the case with respect to economic stability, which is typically assessed in terms of seasonal unemployment, sporadic

Table 4.29
Estimated Average Annual Federal Mineral Production and Activity by Alternative

Commodity/Activity	*Existing Level*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Existing acres leased	939,708	939,708	939,708	939,708	939,708	939,708
Deferred Acres available for lease pending completion of RMP	0	447,058	57,161	269,940	450,201	440,554
Total acres leased	939,708	1,386,766	996,869	1,209,648	1,389,909	1,380,262
Acres held by production	525,731	525,731	525,731	525,731	525,731	525,731
Acres subject to rent	413,977	861,035	471,138	683,917	864,178	854,531
Lease rental first 5 years ($1.50/acre)	310,483	645,776	353,354	512,938	648,134	640,898
Lease rental second 5 years ($2.00/acre)	413,977	861,035	471,138	683,917	864,178	854,531
Bonus bid (avg. $3.76/acre)	155,655	323,749	177,148	257,153	324,931	321,304
Total annual federal lease and rental revenue	880,115	1,830,560	1,001,639	1,454,008	1,837,242	1,816,733
Distribution to state/local government	376,337	782,748	428,301	621,734	785,605	776,835
Annual oil production (barrels)	122,657	140,058	127,515	137,044	140,264	138,891
Annual gas production (MCF)	17,128,509	21,408,854	7,103,972	18,278,203	21,639,476	20,097,721
Federal oil royalty (barrels x $91.79 x 0.125)	1,407,336	1,606,990	1,463,075	1,572,409	1,609,354	1,593,601
Federal gas royalty (barrels x $7.65 x 0.125)	16,379,137	20,472,217	6,793,173	17,478,532	20,692,749	19,218,446
Total annual federal oil and gas royalties	17,786,472	22,079,207	8,256,248	19,050,940	22,302,103	20,812,046
Distribution to state/local government	7,605,496	9,441,069	3,530,372	8,146,182	9,536,379	8,899,231
Total annual federal revenues	18,666,588	23,909,768	9,257,888	20,504,948	24,139,345	22,628,779
Total annual state/local revenues	7,981,833	10,223,817	3,958,673	8,767,916	10,321,984	9,676,066
Total annual revenue distributed to counties	2,905,454	3,721,555	1,440,990	3,191,595	3,757,289	3,522,169
Sand/gravel produced (short tons)	38,500	38,500	38,500	38,500	38,500	38,500
Bentonite (short tons)	0	27,625	27,625	27,625	27,625	27,625

population changes, and fluctuating income growth rates. BLM HiLine District-related activities include recreation, which is characterized by seasonal employment, but none of the alternatives would be expected to affect existing trends in this or other industries.

Those elements of management that would not change among the alternatives include mine reclamation/water treatments and invasive weed treatments. Annual management would continue to include mine reclamation and water treatment costs ($2.479 million). Mine reclamation and water treatment-related labor and proprietor's income would continue to account for less than 0.01% of total employment and income in the 8-county study area.

Fire Management and Ecology: Hazardous fuel treatment costs are included in the total BLM expenditures identified by alternative. Projected annual hazardous fuels treatment costs range from approximately $181,000 under Alternative A to approximately $1.26 million under Alternatives B, C, D, and E. Other potential wildfire-related costs (such as property loss, lost revenues, and increased suppression costs) are difficult to project and are unknown. It is commonly accepted that fire suppression costs and risk to life and property should be less on wildfires that occur where hazardous fuels have been treated with a combination of mechanical treatments, prescribed burns, etc. compared to areas where fuels have not been reduced. For example, fires generally burn hotter, flame length is higher, and fires in tree canopies are more likely in non-treated areas.

The relative cost of treating an average 6,860 acres per year with prescribed fire under Alternative A would trend along the 10-year average for fire suppression. The relative cost of treating 26,660 acres per year with prescribed fire under Alternatives B-E would tend to reduce suppression costs compared to Alternative A (continued current management).

Fluid Minerals: Mineral-related activities, especially oil and gas-related activities, would contribute more income and employment compared to other major land/mineral use categories. About 70% of the natural gas production from federal minerals would continue to occur in Phillips County and almost 70% of the oil production from federal minerals would continue to occur in Toole County.

Timber and Forest Products Production: Each of the alternatives would continue current federal government revenues, approximately $2,000-3,000 annually, from the timber and forest product sales within the 8-county area, as 4% of non-stewardship timber receipts are returned through the state to the counties where they are generated.

Government: HiLine District expenditures for BLM employee salaries and program operations would continue to be about $5.9 million annually. The BLM offices within the planning area would continue to employ about 50 employees. Non-salary expenditures are purchases made in support of resource programs and operations and include items such as contracts, gasoline, diesel, and computer equipment. Operations expenditures also include contracts and cooperative agreements for fire and fuels treatments, invasive weed treatments, and other activities related to ecosystem restoration such as Zortman/Landusky mine reclamation paid for by the BLM.

Lands and Realty: Existing use authorizations (e.g. rights-of-way, permits, and lease rentals) would continue to generate an estimated $80,000 of revenue annually for the federal government, and annual Payments in Lieu of Taxes (PILT) from the federal government to the eight counties would continue to be approximately $2.043 million with all the alternatives. Since no specific major land tenure adjustments within the planning area are pending, it is not possible to determine how PILT and local property taxes might be affected.

The BLM has received a preliminary application for a right-of-way grant for one 36 inch crude oil pipeline running from Canada to Texas. The nearly 1,400 mile crude oil pipeline is proposed to cross through the planning area, although less than 42 miles are expected on BLM land in Montana and it is assumed that about half of this would be in the planning area. It is assumed that local/regional economic impacts would be mostly related to local expenditures. These would be related to lodging, meals, and maybe some vehicle fuel purchases. Total local expenditures are assumed to include total number of labor days for surveys, inventories, and clearances. Total local expenditures would also include expenditures during construction. Some of the expenditures would occur in the existing communities; but some may also be tied to construction workers who may live in a temporary construction work camp. It is also assumed that about 27% of construction-related payroll would be local payroll associated with construction of 21 miles of pipeline across BLM lands in the planning area. This would be about $4.1 million spread over a two year construction period. Other labor expenditures (i.e., wages and salaries) would likely be nonlocal and would not be included in the local input/output analysis. Annual right-of-way rentals would amount to an estimated $1,000. Total estimated annual property taxes would be $18.2 million (Phillips County $5.824 million, and Valley County $12.413 million).

Livestock Grazing: Livestock grazing on BLM land in the 8-county planning area would continue to involve approximately the same number of operators. About 15% of the farms/ranches in the planning area would continue to hold grazing permits. The amount of livestock grazing would not change among the alternatives and the BLM would continue to provide about 7% of the total forage needed to feed livestock in the planning area. The dependency on BLM forage for each county would remain relatively unchanged from what is displayed in Chapter 3. The economic dependency of livestock producers on BLM forage would also remain unchanged. BLM forage often would continue to provide a critical element of some livestock producers' complement of grazing, forage, and hay production. All alternatives would continue to authorize average annual grazing of approximately 329,644 AUMs on BLM land. The livestock production that is supported by BLM forage would support an estimated 300 total jobs (not including family labor) to the local economy and $2.7 million in total wage and proprietor's income within the local economy. Annual federal revenues from livestock grazing fees would continue to be about $445,000 annually, of which about $80,000 would be distributed to the counties.

Noxious Weeds and Other Invasive Species: Invasive species treatments would occur on about 1,280 acres per year. About two-thirds of these treatments would be completed through agreements/contracts. The remaining weed treatments would be done by BLM employees. Other aspects of management would vary by alternative and are addressed below.

The alternatives involve different approaches to, and levels of, vegetation treatment, as well as different approaches to wildfire management. Generally, treating hazardous fuels would tend to reduce the threat to life and property nearby. It is not, however, possible to project the level of non-prescribed wildfire that would occur under any of the alternatives. Based on the level of hazardous fuels treatments for each alternative, total wildfire suppression costs for fires in the HiLine District would be higher for Alternative A and lower for Alternatives B, C, D, and E.

Recreation Use: Revenues from recreation use permits, campground receipts, and outfitter and guide receipts would be similar (approximately $8,000 per year) for all alternatives.

Solid Minerals: The average annual amount of sand/gravel produced (about 38,500 short tons per year) and royalties from this production (about $17,000) would remain relatively unchanged. Bentonite production (about 65,000 short tons/year for about eight years) would start up under all alternatives. Employment and income impacts displayed in Tables 4.30 and 4.31 under the minerals program include the effects of sand/gravel and bentonite production. Under all alternatives, minerals-related activities on federal minerals would also continue to be one of the largest contributors to local employment and income of all the major BLM land/mineral uses.

Table 4.30
Employment by Resource Use and Other Contributions to Local Economy by Alternative (Average Annual)*

Resource Use and Other Contributions to Local Economy	*Total Number of Jobs Contributed*					
	Existing Level	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Grazing	303	303	303	303	303	303
Minerals	1,048	1,350	496	1,164	1,363	1,271
Recreation (local and nonlocal)	84	84	90	90	90	90
BLM Expenditures**	113	113	113	113	113	113
Payments to Counties	64	74	45	68	75	72
Total BLM Management	1,612	1,924	1,047	1,738	1,944	1,849
Percent Change from Current		19.35%	-35.05%	7.82%	20.60%	14.70%

Source: FEAST/IMPLAN (2009).
* Does not include employment related to one-time construction projects of short duration such as construction of wind energy developments, pipelines, etc.
** Includes fire and fuels treatments, invasive weed treatments, and other activities related to ecosystem restoration such as Zortman/Landusky mine reclamation paid for by the BLM.

Other Impacts: The dependency of the local economy on the livestock industry, timber production, mining, and recreation activities would not be affected by BLM resource management. The influence of resource management on BLM land would not change local economic diversity (as indicated by the number of economic sectors), dependency

(i.e., where one or a few industries dominate the economy), or stability (as indicated by seasonal unemployment, sporadic population changes, and fluctuating income rates).

Employment and labor and proprietor's income by major industry are shown for each alternative in Tables 4.30 and 4.31, respectively. Public revenues by major BLM land/mineral use are shown in Table 4.32. The employment, income, and revenue effects of BLM resource management would be spread unequally among the counties and communities within the planning area.

Table 4.31
Income by Resource Use and Other Contributions to Local Economy by Alternative (Average Annual, $1,000)*

Resource Use and Other Contributions to Local Economy	*Existing Level*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Grazing	$2,705	$2,705	$2,705	$2,705	$2,705	$2,705
Minerals	$56,036	$71,809	$26,340	$61,895	$72,534	$67,633
Recreation (local and nonlocal)	$2,165	$2,165	$2,295	$2,295	$2,292	$2,296
BLM Expenditures**	$9,032	$9,032	$9,032	$9,032	$9,032	$9,032
Payments to Counties	$1,974	$2,294	$1,399	$2,086	$2,308	$2,216
Total BLM Management	$71,912	$88,005	$41,771	$78,013	$88,871	$83,882
Percent Change from Current		22.38%	-41.91%	8.48%	23.58%	16.65%

Source: FEAST/IMPLAN (2009)
* Does not include income related to one-time construction projects of short duration such as construction of wind energy developments, pipelines, etc.
** Includes fire and fuels treatments, invasive weed treatments, and other activities such as Zortman/Landusky mine reclamation related to ecosystem restoration paid for by the BLM

Table 4.32
Federal, State, and Local Revenues by Alternative ($1,000)

Resource Use	*Existing Level*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Federal						
Livestock grazing	445	445	445	445	445	445
Oil/gas leases, rents, royalties	18,667	23,910	9,258	20,505	24,139	22,629
Sand/gravel	16	16	16	16	16	16
Recreation use permits	8	8	8	8	8	8
Timber sales	2	2	3	3	3	3
Right-of-way rents	77	77	77	77	77	77
Wind energy rents	0	187	187	187	187	187
Total	19,215	24,645	9,994	21,241	24,875	23,365
State						
Livestock grazing	41	41	41	41	41	41
Oil/gas leases, rents, royalties	7,982	10,224	3,959	8,768	10,322	9,676
Total	8,023	10,265	4,000	8,809	10,363	9,717
Counties						
Livestock grazing	80	80	80	80	80	80
Oil/gas leases, rents, royalties	2,905	3,722	1,441	3,192	3,757	3,522
PILT	2,043	2,043	2,043	2,043	2,043	2,043
Total	5,028	5,845	3,564	5,315	5,880	5,645

Table 4.33 displays a comparison of estimated economic impacts by alternative.

Table 4.33
Comparison of Estimated Average Annual Economic Impacts from BLM Land and Mineral Uses

Economic Indicator (Change from current levels)	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Change in total local employment (full and part-time jobs)	312	-565	126	332	237
Change in total local income ($1,000)	$16,093	-$30,141	$6,101	$16,959	$11,970
Change in Federal revenue ($1,000)	$5,430	-$9,220	$2,027	$5,661	$4,151
Change in local revenue ($1,000)	$817	-$1,464	$287	$852	$617
Change in local population	512	-927	207	544	389
Change in number of households	190	-345	77	203	145

Cumulative Impacts

Most of the economic impacts from BLM management and land uses would continue to occur in Phillips, Valley, Hill, and Blaine Counties where most of the BLM land and minerals and associated uses are located. The demographic and economic trends that are described in Chapter 3 to provide context for impacts would be expected to continue. The description of the Affected Environment found in Chapter 3 summarizes the past and present activities that influenced cumulative economic conditions. The economic analysis takes into account past actions that eventually evolved to the present economic situation. The population density, number of industrial sectors, and average income per household would continue to be about the same as current levels. The largest employment and labor income effects would result from mineral activities (mostly oil and gas) on BLM land.

Lands and Realty: The BLM receives about $80,000 in right-of-way rental income and it is assumed that annual rental revenues would remain about the same with all alternatives.

The BLM has received an application for a right-of-way grant for one 36 inch crude oil pipeline running from Canada to Texas. The nearly 1,400 mile crude oil pipeline is proposed to cross through the planning area, although less than 42 miles are expected on BLM lands in Montana and it is assumed that about half of this would be in the planning area.

Renewable Energy: The basis for impact analysis also includes the development of wind energy on BLM land. No applications for rights-of-way related to wind energy development are pending on BLM land at this time. However, it is likely that some development would occur. The National Renewable Energy Laboratory developed a Jobs and Economic Development Impact (JEDI) Model to demonstrate economic impacts associated with energy development including wind energy development. It is assumed that two wind energy projects within the planning area would occur (Appendix O). These projects would include one smaller project with an estimated 63 towers (of which 9 towers would occur on BLM land) and a larger project consisting of 134 towers (with 20 towers on BLM land).

Economic impacts related to commercial wind energy development, as indicated by jobs and earnings, are displayed in Table 4.34.

Estimated economic impacts associated with commercial wind energy development would be the same for all alternatives. An estimated maximum total of 610 and 1,273 workers would be involved in the engineering and design, road and foundation preparation, substation and transmission line construction, wind turbine assembly and erection as well as the indirect and induced jobs during each of the two year construction periods for a 63-tower project and a 134-tower project respectively. Employment associated with the towers on BLM lands would be 115 jobs and 223 jobs respectively. Construction would be completed within a two-year period and it is unlikely that construction would occur on both projects at the same time. After construction is complete, total annual employment associated with the operation and maintenance of these wind energy developments would be 87 jobs and annual earnings (income) would be an estimated $2.04 million. For the towers on BLM lands, 16 operations jobs and $0.58 million in operations income would be generated. These developments would also generate an additional $187,000 annually in federal revenues from rights-

of-way rents. No federal royalty-type revenues are collected related to the amount of energy generated by wind turbines on BLM lands.

Table 4.34
Annual Economic Impacts Related to Commercial Wind Energy Development on BLM Land

Development	Employment (jobs)		Earnings (2008 $millions)	
	Total	BLM-Related	Total	BLM-Related
63-Tower (9 towers on BLM)				
Construction	610	115	22.81	4.37
Operation	29	5	1.06	0.18
134-Tower (20 towers on BLM)				
Construction	1,273	223	47.51	8.43
Operation	58	11	2.1	0.40
Total (29 towers on BLM)				
Construction	1,883	338	70.32	12.8
Operation	87	16	3.16	0.58

Source: National Renewable Energy Laboratory JEDI Model, 2011

Impacts under Alternative A (Current Management)

Estimates of employment and labor and proprietor's income that would be supported by Alternative A are based on anticipated land and mineral uses, resource outputs, and projected BLM expenditure levels. Estimated average annual employment and labor/proprietor's income are summarized by major resource use in Tables 4.30 and 4.31, respectively. Mineral exploration, development and production, and livestock grazing would be the BLM-related activities that contribute the most employment and income to the local economy. Total local employment, income, and revenues would increase over current levels.

***Ecosystem Restoration and Timber Harvest*:** Annual average ecosystem restoration and timber harvest would continue to include one major mine reclamation and water treatment project ($2.479 million/year), mechanical treatment/pre-commercial thinning of 237 acres of forest/woodlands, prescribed burning of 43 acres of forested areas, mechanical treatments and prescribed burning of 355 acres of grass/shrubs and treating 1,280 acres of invasive species. Mine reclamation, water treatment, 90% of pre-commercial thinning, and 63% of invasive species treatments are contracted out or paid for through cooperative agreements. Annual timber harvest performed by private businesses for hazardous fuels treatments and timber sales would continue to produce about 152 CCF of sawtimber. About 138 personal use permits (Christmas tree permits, firewood permits, etc.) would also be issued annually. Annual revenues from timber and salvage sales would be an estimated $2,000. Total employment and income generated by activities associated with ecosystem restoration and timber harvest (fuels treatments) are included as part of BLM expenditures in Tables 4.30 and 4.31.

Fluid Minerals and Solid Minerals: Upon completion of the RMP, an additional 447,000 acres would be leased for oil and gas development and production. An estimated 526,000 acres would have leases held by production and an estimated 861,000 acres would be subject to annual rents. Average annual oil and gas production would increase to 140,000 barrels and 21,409,000 MCF, respectively. Average annual bentonite production would increase to 27,625 short tons and average annual sand and gravel production would continue at about 38,500 short tons per year.

It is estimated that minerals exploration, development, and production on federal minerals would support about 1,350 local jobs and an estimated $71.8 million in local labor and proprietor's income (Tables 4.30 and 4.31). About 70% of the employment and 80% of labor and proprietor's income that would be supported by BLM land uses in the planning area would be directly or indirectly tied to mineral activities. Total average annual federal revenues associated with mineral leasing, rents, and production of federal minerals would increase from current estimated levels ($18.7 million) to an estimated $23.9 million. From this, annual average revenues distributed to the counties would be about $3.7 million, an increase by an estimated $817,000 (Table 4.32).

GIS analysis indicates there are currently about 514 residential structures within the planning area on lands with federal minerals that have high or moderate potential for oil and gas development. While standard lease terms can be used to limit occupancy within 200 meters of residences, the location of a well or a mine near any of these properties at the time of a residential sale could reduce the net value of that residential property by an average of 22%.

Government: It is estimated that BLM labor and non-labor expenditures would continue to support about 110 total jobs and $9.0 million in total income (Tables 4.30 and 4.31) in the local economies. BLM expenditures would account for about 6% of all the jobs and about 10% of total income contributed by BLM-related land uses and activities.

Livestock Grazing: Economic impacts associated with livestock grazing on BLM land are summarized above under Impacts Common to All Alternatives.

Recreation: An estimated 113,000 local and non-local recreation visits would support approximately 80 jobs and $2.2 million in labor income (Tables 4.30 and 4.31). This would account for about 4% of the total local jobs and about 2% of the total labor income that would be supported by BLM HiLine District activities. The willingness to pay for recreation opportunities would represent an estimated consumer surplus of $5.2 million annually.

Cumulative Impacts

Overall, the estimated total number of local jobs (direct, indirect, and induced) and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative A would be about 1,920 jobs and $88.0 million, respectively (Tables 4.30 and 4.31). BLM land and mineral uses as well as BLM operations would contribute about 5% of total area employment and 7% of total area income.

Average annual federal revenues from BLM land and mineral uses would increase by an estimated $5.4 million to about $24.6 million per year. Annual payments to counties would increase by an estimated $817,000 to approximately $5.8 million, most of which would be related to oil and gas production and PILT payments (Table 4.32).

Average annual employment would increase by about 310 jobs, and local population and number of households would increase by about 510 individuals and 190 households, respectively.

Impacts under Alternative B

Estimates of employment and labor income that would be supported by Alternative B are based on anticipated land and mineral uses, resource outputs, and projected BLM expenditure levels. Estimated average annual employment and labor/proprietor's income are summarized by resource area in Tables 4.30 and 4.31, respectively. There would be a dramatic decrease in employment and income related to mineral leasing, development, and production as well as federal revenues and payments to counties. There would be about a 35% decrease in total BLM contribution to local employment and income, almost a 42% decrease in federal revenues, and about a 30% decline in revenue distribution to the counties compared to current levels.

Ecosystem Restoration and Timber Harvest: Average annual management would continue to include one major mine reclamation and water treatment project and related costs ($2.479 million), mechanical treatments/pre-commercial thinning (391 acres), prescribed burning of forested areas (1,033 acres), mechanical treatments and prescribed burning of grass/shrubs (355 acres), and invasive species treatments (806 acres). Mine reclamation, water treatment, 90% of mechanical treatments, and 63% of invasive species treatments are contracted out or paid for by the BLM through cooperative agreements. Annual timber harvest performed by private businesses would produce an estimated 288 CCF of sawtimber. About 138 personal use permits (Christmas tree permits, firewood permits, etc.) would also be issued annually. Annual revenues from timber and salvage sales would be an estimated $2,000. Total employment and income generated by activities associated with ecosystem restoration and timber harvest (fuels treatments) are included as part of BLM expenditures in Tables 4.30 and 4.31.

Fluid Minerals and Solid Minerals: The annual average number of acres leased for oil and gas development would increase by about 60,000 acres and federal leasing revenues and related rents would increase by an estimated annual average of about $122,000 over current levels. However, the number of wells drilled and production from federal

mineral estate would be less than with any other alternative. Alternative B would result in the estimated average annual production of 7,104 MMCF of natural gas, 128,000 barrels of oil, 38,500 short tons of construction sand and gravel, and 27,625 short tons of bentonite from federal minerals (Table 4.29). Natural gas production would decline by an estimated 67%, oil production would decline by an estimated 9%, and the number of producing wells would decline by an estimated 67% compared to current levels.

Estimated total average annual federal revenues associated with oil and gas leasing and production-related activities on federal minerals would decrease from current estimated levels ($18.7 million) to an estimated $9.3 million. Annual leasing, rental, and royalty revenues distributed to the counties would decline from about $2.9 million to an estimated $1.4 million (Table 4.29).

It is estimated that minerals exploration, development, and production on federal minerals would support about 500 local jobs and an estimated $26.2 million in local labor and proprietor's income annually (Tables 4.30 and 4.31). Among all the alternatives, residential property sales would least likely be affected by the exploration, development, and production of federal oil or gas since the least number of wells would be drilled and produced and no federal wells on newly leased federal minerals would be drilled within 1/4 mile of residential buildings.

It is important to note that the economic impacts described in the previous two paragraphs are related to mineral leasing, exploration, development, and production on BLM minerals. Under this alternative, much of the oil and gas-related drilling and production would likely shift to private lands and offset some of the impacts previously described. The net effects are addressed in the cumulative impacts section below.

Government: BLM labor and non-labor expenditures would support approximately 110 total jobs and $9.0 million in total labor and proprietor's income in the local economy (Tables 4.30 and 4.31).

Livestock Grazing: Economic impacts associated with livestock grazing on BLM land are summarized above under Impacts Common to All Alternatives.

Recreation: It is estimated that about 120,000 recreation visits would contribute about 9% of all the jobs but only about 6% of the local income contributed by BLM land and mineral uses. Recreation use under Alternative B would contribute about 90 jobs and about $2.3 million in wage and proprietor's income (Tables 4.30 and 4.31). The willingness to pay for recreation opportunities would represent an estimated consumer surplus of $5.5 million annually.

Cumulative Impacts

Like Alternative A, there would be an increase in oil/gas leasing and bentonite mining. Overall, the estimated total number of local jobs (direct, indirect, and induced) and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative B would be about 1,050 total jobs and $41.8 million, respectively (Tables 4.30 and 4.31). BLM land uses and operations would contribute about 3% of employment and income within the local economy. These would be net decreases compared to current total employment and total income levels; i.e., total local employment would decline by about 570 jobs and total local income would decline by an estimated $30.1 million. Most of the decline in total employment and income would be associated with the decline in the number of producing federal wells and the associated decline in federal oil and gas production. All program revenues to the federal government would be about $10.0 million per year, a decline of an estimated $9.2 million. Annual payments to counties would be approximately $3.6 million, an estimated decline of $1.5 million. Most of the reductions in employment, income, and public revenues would be related to reductions in oil and gas drilling and production on BLM minerals.

Currently there are 1.64 people for every job in the planning area. If the same ratio is applied to the decrease in total jobs from current levels (-565), total population would be expected to decrease by about 930 people. The number of households would also decrease by about 350.

The previous two paragraphs describe the anticipated cumulative impacts associated with BLM land and mineral-related activities. It is important to note that many of these impacts would be offset by shifting the oil and gas exploration, development, and production from BLM minerals to private or state mineral estate with less restrictive stipulations. It is reasonable to assume that a similar relationship could occur for cumulative impacts to total local employment, income, population, and households.

Impacts under Alternative C

Estimates of employment and labor income that would be supported by Alternative C are based on anticipated land and mineral uses, resource outputs, and projected BLM expenditure levels. Estimated average annual employment and labor/proprietor's income are summarized by resource area in Tables 4.30 and 4.31, respectively. There would be about an 8% increase in employment and income related to BLM land uses and BLM management. There would also be an increase of about 11% in total federal revenues and about a 6% increase in local revenues compared to current levels.

Fluid Minerals and Solid Minerals: The annual average number of acres leased for oil and gas development would increase by about 270,000 acres and federal leasing revenues and related rents would increase by an estimated annual average of $574,000 compared to current levels; the number of wells drilled and production from federal mineral estate would also increase.

Alternative C would result in the estimated average annual production of 18,278 MMCF of natural gas, 137,000 barrels of oil, 38,500 short tons of construction sand and gravel, and 27,625 short tons of bentonite from federal minerals (Table 4.29). Annual federal revenues associated with oil and gas production-related activities on federal minerals would increase from current estimated levels ($18.7 million) to an estimated $20.5 million. Annual leasing, rental, and royalty revenues distributed to the counties would be an estimated $3.2 million.

It is estimated that minerals exploration, development, and production on federal minerals would support about 1,160 local jobs and an estimated $61.9 million in local labor and proprietor's income annually (Tables 4.30 and 4.31). Total annual federal revenues from mineral leasing, rents, production, and sales would be an estimated $20.5 million, of which an estimated total of about $3.2 million would be distributed to the counties (Table 4.29). Residential property sales would likely be affected by the exploration, development, and production of federal oil or gas about the same as with Alternative A.

Government, Ecosystem Restoration, and Timber Harvest: The anticipated levels of activity and the economic impacts associated with ecosystem restoration and timber harvest would be similar for Alternatives B, C, D, and E.

Livestock Grazing: Economic impacts associated with livestock grazing on BLM land are summarized above under Impacts Common to All Alternatives.

Recreation: The estimated 120,000 recreation visits would support approximately 90 total jobs and $2.3 million in labor income. The willingness to pay for recreation opportunities would represent an estimated consumer surplus of $5.50 million annually.

Cumulative Impacts

Like Alternatives A and B, there would be an increase in oil/gas leasing and bentonite mining. Overall, the estimated average annual total number of local jobs (direct, indirect, and induced) and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative C would be about 1,740 total jobs and $78.0 million, respectively (Tables 4.30 and 4.31). BLM land uses and operations would contribute about 5% of employment and 7% of income within the local economy. These figures would be net increases compared to current total employment and total income levels of about 8%. All program revenues to the federal government would be about $21.2 million per year. Annual payments to counties would be approximately $5.3 million, most of which would be related to oil and gas production and PILT payments (Table 4.32).

Currently there are 1.64 people for every job in the planning area. If the same ratio is applied to the increase in total jobs from current levels (126), total population would be expected to increase by about 210 people. The number of households would also increase by about 80.

Like Alternative B, some of the impacts caused by changing activity on BLM land and minerals would likely be offset as more mineral development-related activities shifted to private and/or state lands with less restrictive stipulations.

Impacts under Alternative D

Estimates of the levels of employment and labor income that would be supported by Alternative D are based on anticipated BLM land and mineral uses, resource outputs, and projected BLM expenditure levels. Estimated average annual employment and labor/proprietor's income are summarized by resource area in Tables 4.30 and 4.31, respectively. There would be about a 20% increase in employment and a 24% increase in income related to BLM land uses and BLM management. There would also be an increase of about 30% in total federal revenues and about a 17% increase in local revenues compared to current levels. More employment, income, and revenues would be generated by BLM land and mineral uses under Alternative D than with any of the other alternatives considered.

Fluid Minerals and Solid Minerals: The annual average number of acres leased for oil and gas development would increase by about 450,000 acres and federal leasing revenues and related leasing and rent revenues would increase by an estimated annual average of $957,000 compared to current levels. Alternative D would result in the estimated average annual production of 21,639 MMCF of natural gas, 140,000 barrels of oil, 38,500 short tons of construction sand and gravel, and 27,625 short tons of bentonite from federal minerals (Table 4.29). The levels of oil and gas production, as well as the number of producing wells would be expected to be more than with any of the other alternatives.

It is estimated that mineral exploration, development, and production on federal minerals would support about 1,360 local jobs and an estimated $72.5 million in local labor and proprietor's income annually (Tables 4. 30 and 4.31). Total annual federal revenues from mineral leasing, rents, production, and sales would be an estimated $24.1 million, of which an estimated total of about $3.8 million would be distributed to the counties (Table 4.30). Residential property sales would likely be affected by the exploration, development, and production of federal oil or gas about the same as with Alternative A because the number of wells drilled and the setbacks from occupied buildings would be similar.

Government, Ecosystem Restoration, and Timber Harvest: Economic impacts would be similar for Alternatives B, C, D, and E.

Livestock Grazing: Economic impacts associated with livestock grazing on BLM land are summarized above under Impacts Common to All Alternatives.

Recreation: The estimated 120,000 recreation visits on BLM lands would support approximately 90 jobs and $2.3 million in labor income (Tables 4.30 and 4.31). The willingness to pay for recreation opportunities would represent an estimated consumer surplus of $5.48 million annually.

Cumulative Impacts

Like Alternative A, B, and C, there would be an increase in oil/gas leasing and bentonite mining over current levels. Overall, the estimated average annual total number of local jobs (direct, indirect, and induced) and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative D would be about 1,940 total jobs and $88.9 million, respectively (Tables 4.30 and 4.31). BLM land uses and operations would contribute about 5% of employment and 7% of income within the local economy. Employment and income related to BLM land and mineral uses would increase by about 21% and 24% respectively. Recreation use, oil and gas leasing, gas production, bentonite mining, ecosystem restoration, and payments to counties would all cause the local employment and income to increase. All program revenues to the federal government would be about $24.9 million per year. Annual payments to counties would be approximately $5.9 million, most of which would be related to oil and gas production and PILT payments (Table 4.32).

Currently there are 1.64 people for every job in the planning area. If the same ratio is applied to the increase in total jobs from current levels (332), total population would be expected to increase by about 540 people. The number of households would also increase by about 200. The population density, number of industrial sectors, and average income per household would continue to be about the same as current levels.

Impacts under Alternative E (Preferred Alternative)

Estimates of employment and labor income that would be supported by Alternative E are based on anticipated land and mineral uses, resource outputs, and projected BLM expenditure levels. Estimated average annual employment and

labor/proprietor's income are summarized by resource area in Tables 4.30 and 4.31 respectively. There would be about a 15% increase in employment and a 17% increase in income related to BLM land uses and BLM management. There would also be an increase of about 22% in total federal revenues and a 12% increase in payments to counties compared to current levels.

Fluid Minerals and Solid Minerals: The annual average number of acres leased for oil and gas development would increase by about 441,000 acres. The number of wells drilled and the amount of federal oil and gas produced would increase compared to current levels. Alternative E would result in the estimated average annual production of 20,098 MMCF of natural gas, 139,000 barrels of oil, 38,500 short tons of construction sand and gravel, and 27,625 short tons of bentonite from federal minerals (Table 4.29).

Annual oil and gas leasing and related leasing and rental revenues would increase over current levels by an estimated $940,000. Annual federal revenues associated with oil and gas production-related activities on federal minerals would increase by about $2.8 million. It is estimated that minerals exploration, development, and production on federal minerals would support an average of about 1,270 local jobs and an estimated $67.6 million in local labor and proprietor's income annually (Tables 4.30 and 4.31). Total average annual federal revenues from mineral leasing, rents, production, and sales would be an estimated $22.6 million of which an estimated total of about $3.5 million would be distributed to the counties (Table 4.32). Residential property sales would likely be affected by the exploration, development, and production of federal oil or gas about the same as with Alternative A.

***Government, Ecosystem Restoration, and Timber Harvest*:** Economic impacts would be similar for Alternatives B, C, D, and E.

Livestock Grazing: Economic impacts associated with livestock grazing on BLM land are summarized above under Impacts Common to All Alternatives.

Recreation: The estimated 120,000 recreation visits would support approximately 90 jobs and $2.3 million in labor income (Tables 4.30 and 4.31). The average willingness to pay for recreation opportunities would represent an estimated consumer surplus of $5.49 million annually.

Cumulative Impacts

Oil and gas leasing and bentonite mining would increase over current levels. Overall, the estimated average annual total number of local jobs (direct, indirect, and induced) and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative E would be about 1,850 total jobs and $83.9 million, respectively (Tables 4.30 and 4.31). Average annual total employment and income contributed by BLM land and mineral uses would increase by about 15% and 17% respectively, compared to current management. All program revenues to the federal government would be about $23.4 million per year. Average annual payments to counties would be approximately $5.6 million, most of which would be related to oil and gas production and PILT payments (Table 4.32).

Currently there are 1.64 people for every job in the planning area. If the same ratio is applied to the increase in total jobs from current levels (237), total population would be expected to increase by about 390 people. The number of households would also increase by about 150. The population density, number of industrial sectors, and average income per household would continue to be about the same as current levels.

Fire Management and Ecology

The overriding priorities of fire and fuels management are to protect life and public safety, property, and to protect or enhance natural resources and values. Fire and fuels management strategies focus on these priorities, and encourage the use of vegetation treatments to accomplish them. This section discusses the potential impacts of the proposed management actions to fire and fuels management.

Assumptions and Guidelines

The natural or historical range of fire frequency/severity maintains vegetation structure, health, fuel loads, and fire size/behavior in all but the most severe weather and drought conditions. Fire and other vegetation treatments could improve, mimic, or maintain healthy disturbance regimes on the landscape, improve vegetation health, and decrease hazardous fuel loadings.

Vegetation treatments in forests, woodlands, and juniper shrublands alter fire behavior/severity by reducing ladder fuels and decreasing canopy cover, thereby inhibiting vertical fire spread and reducing the risk of crowning, spotting, and high intensity fire. These treatments are especially helpful in urban interface, rural intermix, or other developed areas. Treatments affect resources and fire management in the following ways:

- mitigate unnatural fire behavior and undesirable effects to resources;
- support fire suppression activities by adding a measure of safety and operational options;
- decrease adverse impacts to resources from suppression actions; and
- restore appropriate fire regimes.

Treatment acres analyzed for fire and fuels management include both mechanical treatments and prescribed fire treatments in all vegetation types across the planning area. Most mechanical treatments in forested areas would occur in the island mountain ranges, as addressed in the Forests and Woodlands section; but for fire and fuels analysis, forest treatments include acres in the breaks and prairie forests.

In areas with the highest departures from natural or historical disturbance regimes/conditions (such as fire frequency/severity), inaction or reduced actions could exacerbate or expand acres of undesirable conditions. Although fire regimes and condition classes have not been assessed for the entire planning area, recently available LANDFIRE data and Fire Regime Condition Class (FRCC) methodology will be used to develop baseline conditions for the planning area, and to monitor management actions during the life of this plan.

Impacts Common to All Alternatives

Resource issues in any alternative may require location and/or timing restrictions for vegetation treatments and implementation of treatments. However for any activity, interdisciplinary planning would consider constraints and long-term effects, and would identify mitigation measures or restrictions necessary for successful implementation.

Special Designations: ACECs managed for cultural, soils, paleontological, and/or wildlife objectives could conflict with vegetation treatments and fire regime/condition class goals because of location or timing restrictions. However, projects would likely be accomplished through mitigation measures.

Wildlife: Timing considerations for protection of wildlife and their habitat would be identified at the project planning level, and mitigation measures would be applied on a case-by-case basis if an onsite evaluation of the project area indicates the presence of important wildlife species. Exceptions may be granted by the field or district manager if an environmental review demonstrates there would be no adverse impacts, or habitat for the species is not present in the area, or portions of the area can be occupied without affecting a particular species. Exceptions may also be granted where the short-term effects are mitigated by the long-term benefits.

Specific timing considerations for mule deer, elk, bighorn sheep, and antelope winter range are addressed under each alternative.

Depending on location and evaluation of project areas, timing considerations for grouse leks and nesting habitat, and active raptor nests could constrain vegetation treatments, especially prescribed fire. Most timing restrictions apply to areas that range in distance from 1/4 mile to 1/2 mile from leks or nesting habitat, so depending on location and evaluations of project areas, implementation could be precluded from mid-March through June or July. More restrictive timing constraints are addressed by alternative.

Impacts under Alternative A (Current Management)

Fire Management and Ecology: Rangeland vegetation and forest health treatments could average about 580 acres per year within the entire planning area, where 237 acres could be treated mechanically and about 343 acres could be treated with prescribed fire. For the 20 year life of the plan, a total of about 11,600 acres could be treated, or about 0.5% of the BLM lands within the planning area.

Opportunities to improve fire regime condition classes at the landscape level are minimal in this alternative because mechanical and prescribed fire treatments would remain at current levels. Forested acres treated would continue to target developed areas in the wildland urban interface (WUI), with small-scale treatment opportunities in undeveloped areas for forest health, rangeland health, and wildlife habitat improvement or protection.

For forested areas alone, little gain would be made toward restoring landscape-level forest health and fire regimes, as only 4,740 forested acres in the planning area are estimated to be treated in 20 years, or about 10% of the BLM forests in the mountains, prairie forests, and breaks.

Most Fire Management Units (FMUs) in the planning area would remain as Category B, so use of wildfire for resource benefit could not be considered in those FMUs as a future management option. In fire management Category C areas there would be less opportunity to consider use of wildfire for resource benefit because vegetation treatments would likely not create adequate changes in forest structure and hazardous fuels at the landscape level.

Forests and Woodlands: For forest health treatments see Fire Management and Ecology.

Livestock Grazing: Resource reserve allotments and unallocated parcels which are available for livestock grazing could provide temporary, alternative grazing when rest periods are required elsewhere after vegetation treatments.

OHV Use and Travel and Transportation Management: Motorized game retrieval off road could be considered through travel management planning. If allowed in portions of the planning area, off-road travel could present more potential for human-caused fire starts because of hot exhaust systems coming in contact with dry grass.

Vegetation – Rangeland: For vegetation treatments see Fire Management and Ecology.

A minimum rest period of two growing seasons would be required after any major disturbance to vegetation communities, including treatments such as seeding, chiseling, and fire (wild or prescribed). In some circumstances this may unnecessarily postpone or constrain activities that benefit range, fire, and fuels management.

Land treatments would be done only to meet watershed, grazing management and wildlife objectives, and would not be done to achieve or maintain fire regimes.

Visual Resources: The Class II rating of the Bears Paw, Little Rocky Mountains, and Sweet Grass Hills may restrict forest health treatments at the landscape level. Prescribed treatments in the forested landscape likely include changes that would contradict the Class II rating objectives. The forests/woodlands that occur in the Class II rating area make up 100% of the available resource. Not treating or reduced levels of treatments on such a large percentage of forested ground would not adequately address ongoing forest health issues such as insects, disease, overstocking, and decreased wildlife habitat.

The Class II rating objectives in the Missouri Breaks, Bitter Creek, and Frenchman areas could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class.

Wildlife (Winter Range): Mule deer, elk, bighorn sheep, and antelope winter range covers most of the conifer vegetation types in the planning area. Because of the extent of the winter range habitats, most forest health activities including mechanical treatments and prescribed fire could have constraints from timing limits that occur from December 1 to May 15. Contracts may require multiple years to be completed. In some situations, prescribed fire may not be available as a treatment option because weather and fuel prescriptions could not be satisfied in forested settings during summer and fall.

Cumulative Impacts

Assuming location and/or timing constraints do not preclude most vegetation treatments, developed areas such as urban interface or rural intermix would likely have received hazardous fuels reduction treatments at least once during the life of the plan. Some areas may have been treated twice, or would be due for re-entry. This would create favorable conditions for fire suppression actions, which would increase the likelihood of early success at fire containment; or would increase the chances of saving more structures.

At the landscape level, Alternative A treatments would not keep pace with vegetation growth/disturbance cycles. The reduced treatments of Alternative A could exacerbate or expand poor forest health conditions. Only wildfire and other natural disturbances would change the vegetation. Compared to the other alternatives, at the end of the life of this plan there could be more areas with heavy fuel loads, which could increase the chances of extreme fire behavior, larger fire sizes, and the potential for large-scale undesirable fire effects.

Impacts under Alternative B

Fire Management and Ecology: Forest and fuels vegetation treatments could average about 1,724 acres per year, where 391 acres could be treated mechanically, and about 1,333 acres could be treated with prescribed fire. For the 20 year life of the plan, a total of about 34,480 acres could be treated.

This alternative, as well as Alternatives C, D, and E, would provide good opportunity to expand mechanical and prescribed fire treatments in forested settings. Acres treated would continue to target developed areas, but would also target more remote areas to improve forest health and improve or protect other resources. During the life of the plan a fair gain could be made toward restoring landscape forest health and fire regimes as 34,480 acres could be treated in the planning area. This is about 73% of the BLM forests in the mountains, prairie forests, and breaks. Grass/shrubland acres treated would be the same as Alternative A. In fire management Category C areas there may be more opportunity to consider use of wildfire for resource benefit as a future option after treatments have been done.

In the eastern half of the planning area, FMUs would be recategorized as fire management Category C, so use of wildfire for resource benefit could be considered as a future option in those FMUs.

Forests and Woodlands: For forest health treatments see Fire Management and Ecology.

Livestock Grazing: Newly acquired lands would be considered for resource reserve allotments and could be used for temporary grazing as needed to facilitate vegetation treatments in other areas. In addition, allotments within the Greater Sage-Grouse Protection Priority Area ACEC and the Grassland Bird/Greater Sage-Grouse Priority Areas ACEC where grazing preference is relinquished or cancelled would be designated as resource reserve allotments if analysis does not support closing the allotment to grazing for the benefit of sage-grouse. Allotments where grazing preference is relinquished or cancelled outside of priority sage-grouse habitat would remain available for livestock grazing and would be designated as resource reserve allotments. This could positively benefit fire and fuels management by providing alternative, temporary livestock grazing areas when rest periods are required elsewhere after vegetation treatments.

OHV Use and Travel and Transportation Management: Motorized game retrieval off road would not be allowed so there would be less potential for human-caused fire starts from hot exhaust systems coming in contact with dry grass.

Vegetation – Rangeland: For vegetation treatments see Fire Management and Ecology.

Rest periods from livestock grazing of less than two growing seasons in vegetation treatment areas may be allowed in some circumstances and would benefit fire and fuels management by facilitating implementation of vegetation treatments and enhancing site-specific management.

In addition to watershed, grazing management, and wildlife objectives, land treatments would be used to achieve and maintain fire regimes, which specifically benefits fire and fuels management.

Actively managing cheatgrass and annual bromes with use of the best available vegetation treatment, including early spring grazing and mid-summer prescribed fire, could benefit fire suppression efforts by reducing fuel load and the rate of fire spread in the event of wildfire.

Visual Resources: The Class I rating for the Kevin Rim ACEC, Sweet Grass Hills ACEC, Burnt Lodge WSA, and Bitter Creek WSA along with some adjacent lands would likely restrict landscape-level vegetation management opportunities on 90,032 acres. Likewise, the Class II ratings in the Little Rocky Mountains, the Frenchman area, areas with wilderness characteristics and the Missouri breaks (977,396 acres) could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class. Treatments at the landscape level may exceed the accepted level of change and objectives afforded a Class I or II rating.

Wilderness Characteristics: Most of the lands managed for wilderness characteristics (351,542 acres) would be within a fire management Category C where suppression strategies could be reevaluated to include use of wildfire for resource benefit (Table 4.35). About 34,920 acres are within fire management Category B. Wildfires would be suppressed in Category B areas, while Category C areas would be evaluated before suppression actions are taken.

Table 4.35
Areas with Wilderness Characteristics by Fire Management Category under Alternative B

	Fire Management Category	
	Category B	***Category C***
Eastern Breaks and Badlands		10,714
Island Mountain Range	4,118	
Prairie Grasslands	2,540	137,114
Sagebrush Grasslands		203,714
Western Breaks and Badlands	28,262	
Total	34,920	351,542

The VRM Class I rating for the Island Mountain Range would likely restrict landscape level vegetation management opportunities on 4,118 acres. The VRM Class II rating for the other areas managed for wilderness characteristics (382,344 acres) could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class.

Wildlife (Winter Range): Mule deer, elk, bighorn sheep, and antelope winter range covers most of the conifer vegetation types in the planning area. Timing or location considerations for protection of wildlife and their habitat would be evaluated at the project planning level and appropriate mitigations would be applied.

Depending on location and evaluation of project areas, timing considerations within 1 mile of active raptor nests could constrain vegetation treatments, especially prescribed fire because implementation could be precluded from March through September. There would be little opportunity to meet weather and fuel parameters during the remaining months of the year.

Depending on location and evaluation of project areas, timing considerations within 1 mile of sharp-tailed grouse leks (March 15 to June 30) and waterbird colonies (April 1 to July 15) could constrain vegetation treatments because implementation could be precluded from March through June and/or July, the key months most likely to meet weather and fuel parameters for prescribed burning.

Buried powerlines would benefit fire management activities by reducing hazards during fire and fuels activities.

Cumulative Impacts

Assuming location and/or timing constraints do not preclude most vegetation treatments, about 73% of the BLM forested landscape could be treated during the life of the plan. In time, treatments may create conditions where new suppression strategies in Category C areas could be considered.

The effects of climate change would be the same as under Alternative A.

Impacts under Alternative C

Fire Management and Ecology: Vegetation treatment opportunities would be the same as under Alternative B. Fire management strategies and options would be the same as under Alternative B.

Forests and Woodlands: Forest health treatment opportunities would be the same as under Alternative B.

Livestock Grazing: Newly acquired lands would be considered for resource reserve allotments and could be used for temporary grazing as needed to facilitate vegetation treatments in other areas. In addition, allotments where grazing preference is relinquished or cancelled would remain available for livestock grazing and would be evaluated to determine if they should be designated as resource reserve allotments. This could positively benefit fire and fuels management by providing alternative, temporary livestock grazing areas when rest periods are required elsewhere after vegetation treatments.

OHV Use and Travel and Transportation Management: Motorized game retrieval off road would be allowed in portions of the planning area which could present more potential for human-caused fire starts because of hot exhaust systems coming in contact with dry grass.

Vegetation – Rangeland: Vegetation treatment opportunities and other management actions would be the same as under Alternative B.

Visual Resources: The Sweet Grass Hills, Bears Paw Mountains, and Little Rocky Mountains would be assigned a Class III rating. This could allow increased landscape-level forest management opportunities on up to 38,037 acres (77% of the forested settings in the planning area). The Class I rating of the Burnt Lodge and Bitter Creek WSAs; and the Class II ratings in the Frenchman area, Woody Island ACEC, and the Missouri breaks (857,061 acres) could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class. Treatments at the landscape level may exceed the accepted level of change and objectives afforded a Class I or II rating.

Wilderness Characteristics: Most of the lands managed for wilderness characteristics (224,301 acres) would be within a fire management Category C where suppression strategies could be reevaluated to include use of wildfire for resource benefit (Table 4.36). About 4,118 acres are within fire management Category B. Wildfires would be suppressed in Category B areas, while Category C areas would be evaluated before suppression actions are taken.

The VRM Class II rating for the other areas managed for wilderness characteristics could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class.

Wildlife (Winter Range): Constraints from mule deer, elk, bighorn sheep, and antelope winter range would be the same as under Alternative A.

Buried powerlines would benefit fire management activities by reducing hazards during fire and fuels activities. In addition, this alternative includes managing sagebrush habitats so that mid-scale shrub cover includes a mix of height classes, which may positively benefit natural fire regimes.

Table 4.36
Areas with Wilderness Characteristics by Fire Management Category under Alternative C

	Fire Management Category	
	Category B	***Category C***
Eastern Breaks and Badlands		10,714
Island Mountain Range	4,118	
Prairie Grasslands		81,733
Sagebrush Grasslands		131,854
Total	4,118	224,301

Cumulative Impacts

Cumulative impacts would be the same as under Alternative B.

Impacts under Alternative D

Fire Management and Ecology: Vegetation treatment opportunities would be the same as under Alternative B. Fire management strategies and options would be the same as under Alternative B.

Forests and Woodlands: Forest health treatment opportunities would be the same as under Alternative B.

Livestock Grazing: Newly acquired lands would not be available for resource reserve allotments because they would be allocated. In addition, allotments where grazing preference is relinquished or cancelled would be reallocated. Therefore no new resource reserve allotments would be available for temporary, alternative livestock grazing areas when rest periods are required elsewhere after vegetation treatments.

OHV Use and Travel and Transportation Management: Extensive motorized game retrieval off road would be allowed in portions of the planning area which could present more potential for human-caused fire starts because of hot exhaust systems coming in contact with dry grass.

Vegetation – Rangeland: Vegetation treatment opportunities and other management actions would be the same as under Alternative B.

Visual Resources: All forested areas within the planning area with the exception of the WSAs would be rated as Class III. This could allow increased landscape-level forest and woodland management opportunities on up to 44,282 acres (91% of the forested settings in the planning area). All remaining forested acres in the planning area would fall within the more restrictive Class I and II ratings and may be impacted similar to that described under Alternative A. The minor acres of Class I rating in the Burnt Lodge and Bitter Creek WSAs, and the Class II ratings in the Frenchman area and the Woody Island and Little Rocky Mountains ACECs (127,439 acres) could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class. Treatments at the landscape level may exceed the accepted level of change and objectives afforded a Class I or II rating.

Wildlife (Winter Range): Constraints from mule deer, elk, bighorn sheep, and antelope winter range would be the same as Alternative A except that timing considerations would occur from December 1 to March 31, rather than to May 15. In most situations, prescribed fire could be implemented successfully because weather and fuel prescriptions/parameters could be satisfied during April.

Depending on location and evaluation of project areas, timing considerations within 1 mile of sage-grouse leks from March 1 to June 15 could constrain vegetation treatments, especially prescribed fire. Implementation could be precluded from March through mid-June, the months most likely to meet weather and fuel parameters for prescribed burning.

Buried powerlines would benefit fire management activities by reducing hazards during fire and fuels activities.

Cumulative Impacts

Cumulative impacts would be the same as under Alternative B.

The effects of climate change would be the same as under Alternative A.

Impacts under Alternative E (Preferred Alternative)

Fire Management and Ecology: In the eastern half of the planning area, the Malta Breaks and Malta Prairie Potholes FMUs would be categorized as fire management Category C, so use of wildfire for resource benefit could be considered as a future option in those FMUs.

Forests and Woodlands: Vegetation treatment opportunities would be the same as under Alternative B.

Livestock Grazing: Newly acquired lands would be considered for resource reserve allotments and could be used for temporary grazing as needed to facilitate vegetation treatments in other areas. In addition, allotments where grazing preference is relinquished or cancelled would remain available for livestock grazing and would be evaluated to determine if they should be designated as resource reserve allotments. This could positively benefit fire and fuels management by providing alternative, temporary livestock grazing areas when rest periods are required elsewhere after vegetation treatments.

OHV Use and Travel and Transportation Management: Motorized game retrieval off road would be considered through travel management planning. If allowed in portions of the planning area, off-road travel could present more potential for human-caused fire starts because of hot exhaust systems coming in contact with dry grass.

Vegetation – Rangeland: Vegetation treatment opportunities and other management actions would be the same as under Alternative B.

Visual Resources: The Sweet Grass Hills, Bears Paw Mountains, and Little Rocky Mountains would be assigned a Class III rating. This could allow increased landscape-level forest management opportunities on up to 38,037 acres (77% of the forested settings in the planning area). The Class I rating of the Burnt Lodge and Bitter Creek WSAs; and the Class II ratings in the Frenchman area, Woody Island area, and the Missouri Breaks (599,954 acres) could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class. Treatments at the landscape level may exceed the accepted level of change and objectives afforded a Class I or II rating.

Wilderness Characteristics: All of the lands managed for wilderness characteristics (10,714 acres) would be within a fire management Category C where suppression strategies could be reevaluated to include use of wildfire for resource benefit. Category C areas would be evaluated before suppression actions are taken.

The VRM Class II rating for areas managed for wilderness characteristics could conflict with vegetation treatment objectives that benefit rangeland vegetation, wildlife habitat, or fire regime condition class.

Wildlife (Winter Range): Constraints from mule deer, elk, bighorn sheep, and antelope winter range would be the same as Alternative A: mule deer, elk, bighorn sheep, and antelope winter range covers most of the conifer vegetation types in the planning area. Because of the extent of the winter range habitats, most forest health activities including mechanical treatments and prescribed fire could have constraints from timing limits that occur from December 1 to May 15. Contracts may require multiple years to be completed. In some situations, prescribed fire may not be available as a treatment option because weather and fuel prescriptions could not be satisfied in forested settings during summer and fall.

Depending on location and evaluation of project areas, timing considerations within 1 mile of waterbird colonies could constraint vegetation treatments because implementation could be precluded from March through June, the key months most likely to meet weather and fuel parameters for prescribed burning.

Buried powerlines would benefit fire management activities by reducing hazards during fire and fuels activities. In addition, this alternative includes managing sagebrush habitats so that mid-scale shrub cover includes a mix of height classes which may positively benefit natural fire regimes.

Cumulative Impacts

Assuming location and/or timing constraints do not preclude most vegetation treatments, about 73% of the BLM forested landscape could be treated during the life of the plan. In time, treatments may create conditions where new suppression strategies in Category C areas could be considered.

Fish

Actions that could occur through implementing each alternative could affect fish and their habitats. Effects may be direct, indirect, short-term, long-term, beneficial and/or adverse. Natural events and human activities that influence water quality and water quantity can produce beneficial or adverse effects on fisheries habitats. Direct effects can result from disturbances within fish habitats while indirect effects result from offsite activities that change water quality or quantity within fish habitats. Management actions which transport sediment to and through streams and reservoirs increase deposition and could adversely affect fish. Surface disturbance acreages were estimated by alternative, but effects on fish and fish habitats can be highly variable based more on soil types, slope, aspect, and amount and types of vegetative cover.

Species presence in fisheries reservoirs is determined by MFWP stocking programs, illegal stocking by unknown individuals, or natural dispersal by other wildlife (fish eggs carried in water bird feathers, etc.). The BLM has input into stocking programs, but has little means of influencing the other avenues of fish dispersal into reservoirs. Fish may occur in lakes and reservoirs without the BLM's knowledge, and there is no way of analyzing the effects of management actions on those fish and fish habitats. Actions are available for protecting shoreline vegetation and improving fish habitat conditions in known lake and reservoir fisheries.

Fish-bearing streams, however, are of utmost importance because of their connection to larger streams and rivers which provide corridors for fish movement, and because the stream courses may cross a variety of land ownerships and flow past various management actions. The BLM sensitive species pearl dace/northern redbelly dace/northern redbelly x finescale dace hybrid assemblage is representative of the various native fish species that occur in cool, small prairie streams with clear pool-type habitat. Analysis of the effects to the dace assemblage could also apply to all or most other fish species occupying the same limited habitat. Periods of long-term drought also influence fish occurrence in small prairie streams and recolonization of clear pool-type habitat may take years to occur.

Assumptions and Guidelines

Assumptions and guidelines used in this impact analysis include the following:

- The BLM is responsible for managing habitats, whereas Montana Fish, Wildlife and Parks (MFWP) and the U.S. Fish and Wildlife Service (USFWS) oversee management of fish species. Therefore, to analyze effects to fish habitats this discussion primarily relies on changes to riparian vegetation, stream banks, in-stream habitats, channel erosion, migration corridors, and water quality and quantity.

- Activities that cause substantial disturbance to soils and vegetation may adversely impact water quality and quantity, which adversely affects fisheries habitats.

- Surface disturbances accelerate runoff and sediment delivery to stream channels which, in turn, alters stream flows and reduces habitat quality for fish that require clear water, moderated stream flows, and clean substrates.

- Increased sedimentation adversely affects most fish species in the planning area. This analysis, therefore, focuses on the degree of surface disturbance anticipated to occur under each alternative.

- The potential for sedimentation of streams and rivers is minimized through use of Best Management Practices (BMPs) (Appendix C).

- Alternatives proposing to: (a) improve fish passage, (b) reduce fish mortality, (c) reduce surface disturbance, (d) improve riparian areas, (e) reduce erosion, (f) improve water quality and quantity, and (g) design survey and monitoring programs for aquatic habitats, are anticipated to have the most beneficial effects on aquatic species.

Proposed management of the following resources would have no anticipated effects on fisheries: air quality, cultural resources, fire management and ecology, forests and woodlands, geology, lands and realty, non-native invasive species, OHV use and travel management areas, paleontological resources, recreation, renewable energy, soils, special designations, visual resources, and wilderness characteristics.

Management actions potentially affecting fish and fish habitats include surface-disturbing activities (e.g., mineral extraction, right-of-way grants, roads), livestock grazing and riparian vegetation, and fish and wildlife management activities. Potential effects on fisheries generally occur in two categories – water quality and water quantity – due to the limited number of fish-bearing stream segments occurring on BLM lands.

The spatial relationship of the disturbance to the fish-bearing streams is critical because a large acreage of disturbance farther from a stream would be less critical than a small acreage of disturbance closer to a stream. Also, a natural gas company drilling one well in a section of land may need to hit a precise point adjacent to a stream with more effects on aquatic resources than the situation where the company is drilling four wells in a section with no need to hit four precise points in the formation. Likewise, a stream crossing that deposits sediments in the stream is dependent upon snowmelt and peak spring flows to flush the system and the number of gas wells or stream crossings has little to do with the overall effects. The largest effect could come from a minor stream crossing followed by an open winter with no flushing of downstream spawning/riffle areas the following spring. For these reasons, comparisons between alternatives will be made in general terms rather than by comparisons of effects by acres.

Impacts Common to All Alternatives

Aquatic Resources

The extent of the activities affecting aquatic resources (fish, aquatic invertebrates and fish habitat) and the dispersed distribution of BLM lands limit the ability of BLM management decisions to substantially improve aquatic resources throughout the planning area. Rivers and streams are linear habitats that pass through multiple land ownerships. Therefore, areas where interagency or interdisciplinary management plans or cooperative agreements have been or would be implemented have the greatest potential to substantially improve aquatic resource conditions over time.

Past planning efforts have resulted in the implementation of standard operating procedures, habitat improvement projects, and more consistent and intensive monitoring programs throughout the planning area. This approach is expected to continue to substantially improve aquatic resources over time.

Aquatic resources are directly or indirectly affected by a multitude of land use activities throughout the planning area, particularly activities that affect water quality/quantity and erosion/sedimentation. Some of these activities include livestock grazing, agricultural practices, water withdrawal or diversion, road construction and maintenance, soil disturbances during land development activities, logging, off-road vehicle use, mining, and oil/gas exploration and development activities. Impacts could include loss of habitat, disturbance during critical life cycle periods (i.e., breeding/spawning), and degradation of water quality conditions. Management actions to improve vegetation, soils, and riparian areas would likely have positive effects on adjacent aquatic resources.

Aquatic habitat associated with the other resource management issues would benefit from increased efforts to implement recovery plans, State of Montana management plans, and conservation strategies for special status species. Conservation and protection of habitat for special status fish species would likely benefit all aquatic species. Improvements in watershed level habitat management would likely benefit fish and other aquatic species.

Fire and fuels management has mandatory setbacks from fish-bearing streams for prescribed fire activities, and effects of wildfire are usually short-term in nature and managed under fire rehabilitation plans.

Rights-of-way in the lands and realty program are covered under surface-disturbing activities, and land ownership adjustment under the various alternatives requires site-specific evaluations of proposals for disposal of BLM land parcels. Any proposal to dispose of a small parcel of BLM land along a fish-bearing stream would be evaluated by the appropriate specialists and it is highly likely that the proposal would be denied. These actions with no effects will not be analyzed further.

The potential direct and indirect effects to aquatics under all alternatives deal with water quality, water quantity, aquatic habitat, direct mortality issues, and special status species as discussed in the next sections. The degree of the effects would be dependent upon the amount of the various actions identified in each alternative.

Water Quality

Changes in water quality can occur through increased erosion, changes in water chemistry (i.e., temperature, salinity, dissolved O_2, and pH), and from hazardous chemical spills (i.e., oil, gas, fertilizer, etc.) causing direct and indirect effects to aquatic species.

Increased Erosion: Potential effects from increased erosion can cause mortality or reductions in population numbers of aquatic species through increasing turbidity, changing channel substrate composition, filling in pools, degrading aquatic cover, and degrading rearing and spawning habitats. BMPs mitigate a large portion of the erosion concerns. Management practices that promote increased riparian vegetation, improved streambank stability, decreased soil disturbance and compaction, improved road drainage, limited off-road, all-terrain vehicle (ATV) use, and rehabilitation of disturbed lines/sites would decrease erosion potential and improve fish populations and habitats.

Water Chemistry: Potential effects from changes in water chemistry include direct mortality, habitat avoidance, migration barriers, altered forage availability, and reduced species diversity. Typically, the effects occur through changes in water temperature, salinity, dissolved oxygen, nutrient loading, and pH. BMPs mitigate a large portion of the water chemistry concerns and agricultural discharge is typically outside the control of BLM management. Management practices that promote project improvements, avoidance of sensitive areas, and active restoration/ enhancement of habitats would decrease potential effects from changes in water chemistry.

Water Quantity

Changes in water quantity can occur through changes in stream flows, reservoir construction in uplands, and irrigation withdrawal.

Changes in Stream Flows: Aquatic species can be affected by changes in stream flows. Effects of flooding are noticeable through increased erosion, removal of riparian vegetation, and changes in streambed substrate. Decreased flows can affect habitat availability, forage, and water chemistry. In both stream flow cases, direct mortality can also be a result.

Reservoir Construction: Large reservoirs on large rivers and streams and numerous small reservoirs in uplands can influence stream flows. Reservoirs on large rivers and streams are typically outside the control of BLM management. It is estimated that numerous small reservoirs in upland drainages could be causing decreased stream flows in downstream fish-bearing streams. It is hard to quantify the effect of these reservoirs on stream flow downstream, but it is estimated that stream flow is affected due to the reservoir water holding capacity. In addition, a large part of the land area with these types of reservoirs is outside of the planning area.

Aquatic Habitat

Aquatic habitat is essential for healthy populations of native and game fishes. Quantity and quality of pools, adequacy of fish cover, quality of spawning substrate, structure of overhanging banks (if applicable), and placement of large woody debris (if applicable) are all important habitat components influencing the size and diversity of fish populations. Accelerated erosion can fill in pools and fishing reservoirs and destroy spawning substrate. Riparian vegetation removal can decrease fish cover and destroy overhanging banks. Increased peak flows can change the complexity of large woody debris and damage streambanks and riparian vegetation. Management actions that mitigate or prevent these effects increase the size and diversity of game and native fish species. The BLM can promote fisheries through habitat restoration and enhancement, improvements in water quality and quantity, improvements in fish passage devices, screening of water diversions, aggressive access programs (signs, easements, etc.), and increased public education and interagency coordination.

Direct Mortality Issues

Direct mortality to aquatic species occurs from (a) sport fishing, (b) changes in species composition, (c) irrigation ditch shut-downs, (d) human-caused migration barriers, (e) natural food chains, and (f) disease.

Sport fishing is managed by MFWP and is outside the control of BLM management.

Changes in species composition are often the result of MFWP management, illegal and inadvertent public stocking, natural augmentation such as when fish eggs are transported in birds' feathers, or by changes in water quality or aquatic habitat. Changes in water quality and/or aquatic habitat when caused, for example, by increased turbidity and water temperature, could cause direct mortality of one species or create more favorable conditions for one species over another.

Human-caused barriers are typically barriers that prevent fish migration up or down stream. This can result in loss of habitat, blocking of fish movements to spawning areas, and loss of foraging and rearing areas. Mortality can occur to several life stages of fish dependent on habitats excluded from fish migration corridors. Typical barriers are culverts and fords.

Natural food chains lead to mortality of smaller fish when preyed upon by larger fish.

Undesirable spreading of disease can be reduced through implementation of BMPs for aquatic invasive species containment protocols.

Special Status Species Fish

Effects to special status fish species would be similar to those effects projected for other fish species described above.

BLM management decisions would not jeopardize the continued existence of species that are listed, officially proposed for listing, or are candidates for listing as threatened and/or endangered species by the Endangered Species Act (ESA). Section 7 consultation would occur with USFWS before approving or implementing any action that might affect listed species or designated critical habitat for listed species. Habitat for candidate species would be managed for protections from actions that would contribute to the species being listed under the ESA. Habitat for other special status species would be managed as necessary to protect them and their habitats from loss in accordance with guidance provided by federal, state and local regulations, with particular emphasis placed on maintaining, restoring, and enhancing habitat for all special status species. Assumptions for special status fish are the same as those under the Aquatic Resources and Aquatic Habitat sections above. Conservation measures to improve and secure habitat would continue to receive special consideration during activity planning efforts.

Pallid Sturgeon: The distribution of pallid sturgeon in the planning area is limited to the larger main stem rivers with turbid water and swift currents. Management decisions on the dispersed BLM parcels would likely have limited influence on these habitat areas, and recovery of a self-sustaining population would require restoration of the river flows, temperatures, turbidity and habitats in these main stem areas. Therefore, the implementation of the RMP and typical BLM management decisions are not expected to substantially affect or benefit pallid sturgeon. However, pallid sturgeon would also receive protection as an endangered species under the ESA and continuing efforts resulting from the pallid sturgeon recovery plan (USFWS 1993). This will require the BLM to complete ESA consultation with the USFWS for specific land management actions within the planning area which could affect this species. The most likely action would be the leasing of federal minerals in split estate in lots adjacent to the Milk River.

Paddlefish: The distribution of the paddlefish in the planning area is limited to the larger mainstem rivers where management decisions on dispersed BLM parcels would likely have limited influence. This is expected to minimize the potential effects or benefits occurring as a result of BLM management decisions. As a result, implementation of the RMP is not expected to affect paddlefish. The paddlefish population currently supports a limited fishery, and the future management is expected to focus on monitoring and inventory activities to prevent over-harvest and to insure a sustainable wild fishery (MFWP 2007). This information is expected to provide additional protection for the species when making land use management decisions.

Sauger: The sauger is heavily dependent throughout its life history on unimpeded access to a wide diversity of physical habitats that are present in large river systems. Activities that block migration, or change the natural hydrograph, are expected to have effects on the sauger. This includes water diversion and river impoundment facilities. Management decisions on the dispersed BLM parcels have limited potential to affect this species because the sauger occurs primarily in large river habitat areas. One way that BLM activities could affect sauger is by affecting populations of forage fish (minnows, etc.) of tributary streams into the Missouri River. Actions that result in the loss of population diversity and

density include those identified in the northern redbelly-finescale dace hybrid and pearl dace assemblage described below. However, because of the dispersed BLM land ownership within the planning area, BMPs, mitigation measures, and activities that decrease mortality would limit effects on forage fish populations. As a result, the RMP is not expected to substantially affect sauger. Management of this species is expected to be facilitated by the MFWP through a memorandum of understanding and conservation agreement (MFWP 2004).

Sturgeon Chub: The distribution of the sturgeon chub is limited to large mainstem areas of the Missouri River, where typical BLM management decisions are expected to have limited influence. There is no reason to further analyze this species within this RMP.

Northern Redbelly x Finescale Dace Hybrid and Pearl Dace: The northern redbelly x finescale dace hybrid and the pearl dace are typically found in cool, small prairie streams. Changes in stream temperature, sedimentation, stream flow, and water quality could cause effects to the pearl dace and the northern redbelly x finescale dace hybrid. Livestock grazing, oil and gas development activities, agricultural practices, water withdrawal or diversion, road construction and maintenance, surface-disturbing activities, fire and fuels treatments, off-road vehicle use, and mining could cause loss of habitat, disturbance during critical life cycle periods (i.e., breeding), and degradation of water quality conditions for these species. Management actions to improve riparian vegetation, stream flows, stream channel and bank stability, erosion control, and floodplain functionality would likely have positive effects on adjacent aquatic resources. Further analysis will be done by alternative for the entire northern redbelly/finescale/ pearl dace assemblage.

Impacts under Alternative A (Current Management)

Current management under Alternative A would require surface disturbances to be rehabilitated when greater than 1/4 acre in size. This contrasts with the other alternatives which would require rehabilitation on 1/10 acre or greater in size. Total acres of surface disturbance in Alternative A is estimated to be lower than in Alternatives C, D, and E due to less potential for development (Tables 4.4 through 4.12), but the larger minimum size per instance could allow for more sedimentation in any nearby fish-bearing streams. Effects would be similar whether the stream flowed into a river or a deep reservoir that also contained fish habitat.

Surface-disturbing activities contribute to decreased water quality through increased erosion potential, increased riparian disturbance potential, increased vegetation removal, transportation drainage concerns, decreased aquatic monitoring, increased potential for sedimentation, and a higher potential for high severity fire.

Solid Minerals: The withdrawal from mineral entry in the Little Rocky Mountains would expire in 2015 which could lead to mining and associated surface disturbance. This could affect streams originating in that small mountain range.

Fluid Minerals: A CSU stipulation within 500 feet for oil and gas development would apply in riparian areas. This could have an effect on fish and fish habitat through potential erosion in highly erodible areas as discussed in the Soil Resources and Vegetation – Rangeland section.

Livestock Grazing and Vegetation – Riparian: All manageable riparian areas would have management plans developed to maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition or Proper Functioning Condition (PFC) for maximum long-term benefits and values within site capability. Riparian habitats may require site-specific management strategies including riparian pastures, stream corridor fencing, specialized grazing methods, winter grazing use, or different classes of livestock in order to protect riparian habitat. Most or all of these strategies could improve fish-bearing stream habitat if selected.

Rights-of-Way: Riparian and wetland areas would be avoidance areas for rights-of-way.

Fish and Wildlife: Alternative A has no specific actions to reduce effects of the culverts and stream crossings on fisheries resources. Fish passage in culverts and stream crossings (new and old) and use of BMPs are brought forward in the other Alternatives.

Alternative A has the potential for effects to northern redbelly x finescale dace hybrid and pearl dace populations and habitat. Both of these species reside in smaller tributary streams that depend on water quality/quantity and appropriate

habitat that has the potential to be affected by BLM management activities. A lack of fish passage through culverts and crossings in Alternative A would result in loss of upstream populations of the dace assemblage if colonization is no longer possible after a period of prolonged drought and/or loss of discharge from natural springs.

Cumulative Impacts

Surface disturbance acreage, because of the 1/4 acre minimum disturbance threshold in Alternative A, would lead to greater effects when added to surface disturbance activities on other lands. Cumulative impacts would also result from a combination of BLM resource uses that include transportation, oil and gas production, recreation, livestock grazing, rights-of-way, OHV use, and high intensity wildfire. The majority of the miles of fish-bearing streams are on private land because the water source was a reason for homesteading those parcels of land. The BLM has little influence on resource values and uses of that land. The influence of private activities would be far greater, even when small parcels of BLM land adjoin the private stream beds. These cumulative impacts, when combined with the existing condition (which includes natural environmental conditions, private land ownership and other private activities, and past activities on federal lands) could cause potential effects to aquatic species.

Impacts under Alternative B

More acres would be managed for NSO under Alternative B than in any of the other alternatives. NSO would be required on soils with a severe erosion hazard, and in areas with badlands, rock outcrops, or slopes susceptible to mass failure. NSO would also be required within 1/4 mile of lentic or lotic riparian areas, which is more restrictive than in Alternative A. Alternative B also requires rehabilitation on surface disturbances of 1/10 acre or greater in size, as in Alternatives C, D, and E. Stipulations would greatly reduce the likelihood of large amounts of sediment flowing into either fish-bearing streams or fisheries reservoirs. The Sweet Grass Hills withdrawal from location and entry under mining laws would be recommended for an extension of 20 years (longer than in Alternatives A and D), thus protecting streams in that area. A Little Rocky Mountains 20-year withdrawal from settlement, sale, location and/or entry for reclamation and water treatment would be proposed. Newly constructed road/trail crossings would have fish passage on fish-bearing streams (this also applies to Alternatives C, D, and E).

Livestock Grazing and Vegetation - Riparian: All manageable riparian areas would have management plans developed to maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition or PFC for maximum long-term benefits and values within site capability. Riparian habitats may require site-specific management strategies including riparian pastures, stream corridor fencing, specialized grazing methods, winter grazing use, different classes of livestock, and rehabilitative protective measures.

Rights-of-Way: Riparian areas with unique values would be treated as avoidance areas. The use of avoidance areas provides protection for fish-bearing streams.

Fish and Wildlife: Under Alternative B, all culverts and stream crossings would be fish passable as opportunities arise. This would prevent fish mortality.

Alternative B would have decreased effects (compared with Alternative A) in relation to mortality, specifically with changes in species composition, irrigation ditch management (when flows are shut off), and removal of human-caused migration barriers. Alternative B also has provisions for fish passage. In addition, this alternative has decreased potential for increased effects to water quality, quantity and aquatic habitat, which can influence aquatic species composition.

Improvements in water quality, water quantity, aquatic habitat, and decreased fish mortality in Alternative B reduce effects to northern redbelly x finescale dace hybrid and pearl dace populations and habitat. Both of these species reside in smaller tributary streams that depend on water quality/quantity and appropriate habitat that has the potential to be affected by BLM management activities. Fish passage through culverts and crossings would allow for colonization of upstream areas if populations were to be lost during extended periods of drought when pools dried up. Protections for riparian habitat also would improve aquatic habitat for the dace assemblage due to slowed stream flow and shaded, cooler water lacking sediment.

Wilderness Characteristics: Managing all 26 areas to protect wilderness characteristics as a priority over other multiple uses would have minimal effects on the fisheries resource. Small prairie streams are already protected by mandatory setbacks in all alternatives in order to protect water quality and quantity. Developments would be minimized near streams and any required stream crossings would be mitigated to protect aquatic resources. Records exist for sensitive fish species in Frenchman Creek, and in Cottonwood Creek in Phillips County where Black Coulee and Woody Island Coulee converge to form Cottonwood Creek. These areas of sensitive fish habitat occur in the Prairie Grasslands group for northern Blaine, Phillips and Valley Counties. It is likely that similar habitat for sensitive fish species occurs in the other four groups, but there are no known records of sensitive species in those streams. Managing the 26 areas to protect wilderness characteristics would enhance the aesthetics of the watersheds for the prairie streams by limiting man-made sights and sounds and by eliminating most development in the areas.

Cumulative Impacts

Resource protection measures in Alternative B reduce the cumulative impacts resulting from a combination of BLM resource uses that include transportation, oil and gas production, recreation, livestock grazing, rights-of-way, OHV use, and high intensity wildfire. Alternative B has proposed mitigation, habitat monitoring, and protection measures that help reduce the effects from resource uses and activities. These cumulative impacts, when combined with natural environmental conditions, private land ownership and private activities, and past activities on federal lands, are less than in the other alternatives, but could still cause potential effects to aquatic species. Existing gas well development on BLM land built under less constraints and combined with gas well development on private land with almost no constraints and any future such actions on private land still may cause problems for aquatic resources.

Impacts under Alternative C

Alternative C, with moderate resource development, would have more acres managed for NSO than Alternative D. NSO would be required on soils with a severe erosion hazard, and in areas with badlands, rock outcrops, or slopes susceptible to mass failure. The Sweet Grass Hills withdrawal from location and entry under mining laws would be recommended for extension for 20 years, as in Alternatives B and E, thus protecting streams in that area. A Little Rocky Mountains 20-year withdrawal from settlement, sale, location and/or entry for reclamation and water treatment would be proposed, thus protecting streams originating in that small mountain range. Oil and gas activities would have a 500 foot NSO near riparian areas which would protect fish-bearing streams. Surface disturbances of 1/10 acre or greater would have to be rehabilitated, thereby reducing sediment runoff to adjacent streams. However, there would be no avoidance area designations. This would be same as in Alternative D.

Livestock Grazing and Vegetation – Riparian: All manageable riparian areas would have management plans developed to maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition or PFC for maximum long-term benefits and values within site capability. Activity planning would also utilize the same strategies of riparian pastures, stream corridor fencing, specialized grazing methods, winter grazing use and different classes of livestock.

Rights-of-Way: Alternative C does not consider unique values such as special status species habitat as avoidance areas, and habitat for sensitive fish species could be compromised in this alternative.

Fish and Wildlife: Alternative C would provide the same protections for fish passage and fish screening. These actions would have positive effects on aquatic resources by improving habitat and decreasing direct fish mortality.

Management measures would have decreased effects to northern redbelly x finescale dace hybrid and pearl dace populations and habitat in Alternative C. Culverts and crossings would be made fish passable.

Wilderness Characteristics: Managing 12 areas to protect wilderness characteristics as a priority over other multiple uses would have minimal effects on the fisheries resource. Small prairie streams are already protected by mandatory setbacks in all alternatives in order to protect water quality and quantity. Developments would be minimized near streams and any required stream crossings would be mitigated to protect aquatic resources. Records exist for sensitive fish species in Frenchman Creek, and in Cottonwood Creek in Phillips County where Black Coulee and Woody Island Coulee converge to form Cottonwood Creek. These areas of sensitive fish habitat occur in the Prairie Grasslands group

for northern Blaine, Phillips and Valley Counties. It is likely that similar habitat for sensitive fish species occurs in the other four groups, but there are no known records of sensitive species in those streams. Managing the 12 areas to protect wilderness characteristics would enhance the aesthetics of the watersheds for the prairie streams by limiting man-made sights and sounds and by eliminating most development in the areas

Cumulative Impacts

Alternative C allows a moderate amount of development combined with moderate levels of resource protection. Cumulative effects resulting from a combination of BLM permitted activities that include transportation, oil and gas production, recreation, livestock grazing, rights-of-way, OHV use, and high intensity wildfire would add to past natural gas production which was less constrained on BLM land. Alternative C has proposed mitigation, habitat monitoring, and protection measures that would help reduce the effects from these activities in the future.

Impacts under Alternative D

Alternative D emphasizes active management to produce commodities and develop resources. It has more oil and gas surface-disturbing acres than the other alternatives. The Sweet Grass Hills and Zortman/Landusky mine reclamation withdrawals would expire in 2017 and 2015 respectively. Damage to fish-bearing streams could result from surface disturbance. Oil and gas development would have a 300 foot CSU stipulation, the least restrictive for any of the alternatives. Fish-bearing streams could be affected in areas with unstable soils or steeper slopes. There would be no riparian avoidance areas, but disturbances of 1/10 acre or more would be rehabilitated. Fish-bearing streams and ditches would receive management protection actions, but the greater acreage of disturbance would have the potential for more effects on fish-bearing streams from sediment inflows.

Livestock Grazing and Vegetation – Riparian: All manageable riparian areas would have management plans developed to maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition or PFC for maximum long-term benefits and values within site capability. Activity planning would be similar to Alternative C, but Alternative D also does not consider unique values such as special status species habitat as avoidance areas, as in Alternatives A, B, and E. Alternative D's use of strategies such as riparian pastures, stream corridor fencing, specialized grazing methods, winter grazing use, and different classes of livestock would be similar to other alternatives, and would benefit fish-bearing stream habitat for sensitive species.

Fish and Wildlife: Alternative D provides for maximum development with less resource protection. All new and old culverts and stream crossings would be made fish passable and fish screens would be installed.

Management measures would have slightly decreased effects to northern redbelly x finescale dace hybrid and pearl dace populations and habitats. Riparian areas would be restored or improved. With more development and activity, however, more damage could occur to fish-bearing streams. Culverts and crossings would be made fish passable and fish screens installed. Overall, Alternative D would have longer-term adverse effects on the dace assemblage.

Cumulative Impacts

Cumulative impacts resulting from a combination of BLM resource uses that include transportation, oil and gas production, recreation, livestock grazing, rights-of-way, OHV use, and high intensity wildfire could add greatly to those present from past natural gas development that was less constrained. Alternative D has proposed mitigation, habitat management practices, and protection measures that would help reduce the effects from these activities. These cumulative impacts, when combined with natural environmental conditions, private land ownership and private activities, and past activities on federal lands, are slightly less than in Alternative A, but more than in Alternatives B, C and E. This alternative would still cause considerable potential effects to aquatic species.

Impacts under Alternative E (Preferred Alternative)

Surface disturbances of greater than 1/10 acre would be rehabilitated. Alternative E has an NSO stipulation for lentic and lotic areas and a 300 foot CSU stipulation for oil and gas development near riparian and/or wetland areas. The Sweet Grass Hills would be closed to oil and gas leasing and withdrawn from mineral entry for 20 years. Unique

riparian avoidance areas would be designated as in Alternative B. Fish management protective actions for stream crossings and fish screening would occur as in Alternatives B, C, and D.

Livestock Grazing and Vegetation – Riparian: All manageable riparian areas would have management plans developed to maintain, restore, or improve riparian areas to achieve a healthy and productive ecological condition or PFC for maximum long-term benefits and values within site capability. Riparian areas would be restored or improved using tools such as establishing riparian pastures, stream corridor fencing, specialized grazing methods, winter grazing, or use of different classes of livestock and rehabilitation protective measures, with additional protection for avoidance areas with unique values such as habitat for special status species or water quality.

Fish and Wildlife: Alternative E would have culverts and stream crossings made fish passable and fish screens installed. Protections would have positive effects on fish-bearing stream habitat.

The management measures would have decreased effects to northern redbelly x finescale dace hybrid and pearl dace populations and habitat. All new culverts and stream crossings would be made fish passable. Some upstream dace populations would be lost during prolonged periods of drought when pools dry up and passage is not available past barriers. Management actions such as the creation of riparian pastures, stream corridor fencing, specialized grazing methods, winter grazing use, and different classes of livestock would improve aquatic habitat in fish-bearing streams.

A CSU stipulation prior to surface-disturbing or disruptive activities in identified pallid sturgeon habitat within 1/2 mile of the Milk River would maintain pallid sturgeon habitat through the development of a mitigation plan prepared by the project proponent.

Wilderness Characteristics: Managing two areas to protect wilderness characteristics as a priority over other multiple uses would have minimal effects on the fisheries resource. Small prairie streams are already protected by mandatory setbacks in all alternatives in order to protect water quality and quantity. Developments would be minimized near streams and any required stream crossings would be mitigated to protect aquatic resources. Managing the two areas to protect wilderness characteristics would enhance the aesthetics of the watersheds for the prairie streams by limiting man-made sights and sounds and by eliminating most development in the areas.

Cumulative Impacts

Alternative E reflects a balanced level of resource development with conservation of sensitive finite resources and long-term productivity of renewable resources. Alternative E has proposed mitigation, habitat management practices, and protection measures that would help reduce the effects from these activities. These cumulative impacts, when combined with natural environmental conditions, private land ownership and private activities, and past activities on federal lands, are less than in Alternatives A and D, but more than in Alternative B. This alternative could still cause potential effects to aquatic species similar to those in Alternative C.

Fluid Minerals

Assumptions and Guidelines

The overall goal of the BLM minerals program is to make mineral resources available from federal mineral estate while minimizing any resultant adverse impacts to the environment, public health and safety, and other resource values and uses. This section discusses the potential impacts that the proposed management actions for other resources will impose upon developing the mineral resource – specifically fluid minerals.

The impact that the planning process results have upon the fluid minerals program can be measured directly in terms of the reduction of federal subsurface acreage available for lease as well as the acreage subject to major (NSO) and minor (timing and CSU) leasing constraints. These values can then be used to project the ensuing reduction in the number of wells that will be drilled, the reduction in federal oil and gas production, and ultimately, the reduction in realized federal royalty.

Prior to the process of alternative formulation, a baseline RFD scenario was prepared (available on the internet at http://blm.gov/8qkd) to provide a reasonable prediction of future oil and gas development activity within the planning area. Once the proposed alternatives were in place, an RFD scenario was created for each one in an attempt to quantify predicted development activity levels per alternative. The thought process is that each proposed protective measure can affect oil and gas development activities by not allowing leasing, restricting surface occupancy, controlling surface use, or adding restrictive mitigation to Conditions of Approval (COAs) on federal Applications for Permit to Drill (APDs). The result is an RFD by alternative that utilizes the proposed stipulations in order to calculate a percent reduction in total well numbers and total surface disturbance.

After the projected wells/surface disturbance per alternative have been quantified, the interdisciplinary team can use this information to estimate the potential impacts that fluid mineral development may have upon the different resources. From a resource perspective, well disturbances (versus well numbers) are an indicator of human presence and are considered a disruptive activity. Another component that must be considered by the RFD scenario is the amount of surface disturbance that is related to the construction of exploratory and development wells along with any associated infrastructure.

Surface disturbance may vary by type of well (conventional versus CBNG) due to the fact that the size of the required drilling equipment may vary and also because multiple wells may be drilled from one surface location. The amount of surface disturbance needed for a well may also vary by the surface topography and soil type. The estimate of surface disturbance by alternative is included in the final RFD report and in Appendix E.1.

In addition to the number of oil and gas wells and the surface disturbance estimated for the various alternatives, the location of the predicted oil and gas activity is equally as important to the analysis of impacts to the other resources. Most future development is projected to occur in areas that are already experiencing oil and gas development, with the exception of the development predicted for the Bears Paw South and North Blaine areas. For more specific information about development potential, please refer to the final RFD.

Many different circumstances could increase or decrease the level of drilling activity and the associated surface disturbance acreage throughout the life of the RMP. If the projections in the RFD prove to be grossly inaccurate, the BLM will revisit the RFD to determine if a plan amendment or revision is necessary.

The impact analysis is based on the following assumptions:

- The RFD scenario that was prepared for the HiLine RMP reviewed and analyzed past, present, and potential future exploratory, development, and production operations and activities. It should be emphasized that the RFD projections are reasonable and science-based projections of the anticipated oil and gas activity.

- The number of new oil and gas wells in the planning area (both federal and non-federal mineral estate) projected under each alternative to be drilled over the next 20 years are shown in Table 4.37. Also, Tables 4.2 and 4.3 at the beginning of Chapter 4 provide a more detailed look at the projected well counts.

Table 4.37
Projected New Oil and Gas Wells in the Planning Area
(includes Federal and Non-Federal Mineral Estate)

	Federal Mineral Estate	***Planning Area Total***
Alternative A (Current Management)	1,874	6,014
Alternative B	647	4,787
Alternative C	1,617	5,756
Alternative D	1,894	6,034
Alternative E (Preferred Alternative)	1,756	5,896

- For the purpose of quantifying associated surface disturbance with the drilling of the above-mentioned wells, the following assumptions were made:

Coalbed Natural Gas (CBNG)

- There are no existing CBNG wells in the planning area.
- New exploratory and development CBNG wells drilled in the planning area would have short-term disturbance figures of 1.85 acres for the access road/pipeline and 1 acre for the well pad, which equates to a total of 2.85 acres of short-term disturbance for a new CBNG well.
- New exploratory and development CBNG wells drilled in the planning area would have long-term disturbance figures of 0.25 acres for the access road/pipeline and 0.5 acres for the well pad, which equates to a total of 0.75 acres of long-term disturbance for a new CBNG well.

Bowdoin Natural Gas Project Area (BNGPA)

- Existing wells in the BNGPA have disturbed 0.75 acres per well.
- New exploratory and development wells drilled in the BNGPA would have short-term disturbance figures of 1.85 acres for the access road/pipeline and 1 acre for the well pad, which equates to a total of 2.85 acres of short-term disturbance for a new well drilled in the BNGPA.
- New exploratory and development wells drilled in the BNGPA would have long-term disturbance figures of 0.25 acres for the access road/pipeline and 0.5 acres for the well pad, which equates to a total of 0.75 acres of long-term disturbance for a new well drilled in the BNGPA.

Non-BNGPA

- Existing wells in the planning area, exclusive of the BNGPA, have disturbed 0.92 acres per well.
- New exploratory and development wells drilled in the planning area, exclusive of the BNGPA, would have short-term disturbance figures of 3.1 acres for the access road/pipeline and 2.1 acres for the well pad, which equates to a total of 5.2 acres of short-term disturbance for a new well drilled outside of the BNGPA.
- New exploratory and development wells drilled in the planning area, exclusive of the BNGPA, would have long-term disturbance figures of 0.78 acres for the access road/pipeline and 0.14 acres for the well pad, which equates to a total of 0.92 acres of long-term disturbance for a new well drilled outside of the BNGPA.

- Planning decisions also apply to BLM-administered federal minerals that underlie non-federal lands (split estate). If applicable, the BLM would consult the surface management agency.
- Reasonable measures would be required by the authorized officer to minimize adverse impacts to other resource values, land uses, or uses not addressed in the lease stipulations at the time that operations are proposed. Reasonable measures could include modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. These modifications might occur only through site-specific post-lease actions (e.g., APDs and rights-of-way) that are supported by onsite conditions and/or project-specific NEPA analysis. Modification and/or waivers to lease terms and stipulations can be accomplished in accordance with applicable regulatory guidelines. Surface-disturbing and other disruptive activities could occur at existing authorized facilities.
- In the absence of quantitative data, best professional judgment was used.
- Effects to fluid minerals would be considered significant if the management actions caused a substantial reduction in federal leasing and development activities.

Changes in anticipated oil and gas production levels associated with each alternative are discussed in the following sections.

Impacts Common to All Alternatives

Following is some basic information to be kept in mind when reviewing the following description of impacts. The RMP process allows the BLM to decide what lands are suitable for fluid mineral leasing; and if they are deemed suitable, what kind of stipulations, if any, should be placed upon the lease. The stipulations that are proposed to be applied to lands for future leasing are categorized as NSO, CSU, and timing. No new oil and gas leases may be issued in WSAs (BLM Manual H-8550-1, Interim Management Policy for Lands under Wilderness Review). Finally, there are also lands that are leased without any specific lease stipulations.

The NSO stipulation is considered the most restrictive and is generally thought of as a major constraint for fluid mineral leasing. While an NSO stipulation would not entirely preclude a lease from being developed, the restriction of surface occupancy would require that any wells and associated facilities be located on adjacent lands. Directional and horizontal drilling technology may allow an operator to effectively reach out and develop some of the smaller blocks of NSO-leased lands; however, larger contiguous blocks of NSO would very likely be precluded from any future development.

The CSU and timing stipulations are less restrictive than NSO and are generally considered as minor constraints for leasing. Specifically, the CSU stipulation requires an appropriate plan to be submitted and approved prior to the BLM authorizing any oil and gas projects in these areas. The timing stipulation specifies certain dates throughout the year that oil and gas projects will be allowed to commence in the stipulated area. While these two types of stipulations do not preclude development, they may delay, limit, and possibly relocate oil and gas activities within the stipulated areas. Also, the CSU stipulation may place more scrutiny upon monitoring oil and gas projects in a given area.

It is important to note that the above-mentioned surface use stipulations (including timing, CSU, and NSO) cannot be retroactively applied to existing oil and gas leases or other existing valid use authorizations such as rights-of-way. Site-specific actions such as APDs and new rights-of-way in areas with existing leases will be allowed, subject to surface use stipulations, COAs, and BMPs; however, these stipulations must be reasonable and consistent with existing lease rights. As each lease expires, the corresponding area that was previously under lease will come under the management guidelines of the approved resource management plan.

Of the 3,491,450 subsurface mineral acres that are currently administered by the BLM for oil and gas, approximately 941,664 acres (or 27% of the federal subsurface estate) are currently held by lease. These acreages can be further broken down and described as follows:

- BNGPA includes 435,944 acres of federal subsurface estate, of which 405,027 acres are currently under lease.
- Bears Paw South includes 177,091 acres of federal subsurface estate, of which 149,214 acres are currently under lease.
- North Blaine includes 82,687 acres of federal subsurface estate, of which 60,585 acres are currently under lease.

Appendix E.2 includes a list of general COAs that may be considered for use at the time of site-specific lease operations. While this list should not be considered all-inclusive, it does represent typical mitigation measures that may be used to reduce impacts to resource values that are identified at an onsite inspection or during the review of a proposed plan. The COAs may also be utilized to protect important resource values that were not identified at the time of lease issuance. It is important to reiterate that any conditions imposed on an existing lease must be consistent with the existing lease rights.

Therefore, all of the above factors must be kept in mind when reviewing the following resource stipulations and the effect that they may have on fluid mineral leasing and development. It also bears mentioning that the NSO, CSU and timing stipulations that are applied because of wildlife concerns will also apply to surface-disturbing or disruptive activities (e.g., the reworking of a well or the setting of a pump jack). These additional delays that will apply to the typical maintenance of an oil and gas project will also have an adverse effect on the fluid mineral development. Appendix E.4 describes the waivers, exceptions, and modifications criteria that could be applied to the lease stipulations; therefore, the predicted effects to fluid mineral leasing may be lessened.

Finally, all acreage figures represent federal mineral acres and are approximations based on GIS analysis that have been rounded to the nearest whole acre. The acreages represent a single stipulation's areal extent; although there may be areas

where multiple stipulations overlap. In the instances where there is overlap, the most restrictive stipulation would be employed to ensure proper resource protection.

Air Quality: The goal for air resources across all alternatives in the planning area is to ensure that BLM authorizations and management activities protect the local quality of life and sustain economic benefits by complying with tribal, local, state, and federal air quality regulations, requirements and implementation plans. This would be accomplished by employing the use of BMPs in conjunction with evaluating the impacts to air quality at the planning level and implementing the appropriate monitoring and mitigation plans. These activities could potentially limit oil and gas exploration and development activities in certain areas. An easy example to cite would be an operator submitting a proposal to install an artificial lift mechanism (i.e., pumpjack) on a low-pressure gas well in an isolated location. In order to power the lift mechanism in the remote location, a generator would need to be brought in. The resulting exhaust from the generator could potentially become an issue to air quality. This, in turn, could equate to the operator's proposal being denied.

Cultural Resources: The management of cultural resources could potentially affect the timing, location and size of oil and gas disturbances and facilities but would rarely prevent the development or completion of oil and gas activities. However, some specific areas have been identified as NSO. The degree of effect that this restriction imposes on fluid mineral development will be described quantitatively under each proposed alternative. As is the case with existing management, any future oil and gas facilities could be relocated to avoid disturbance to cultural resources. In all cases of federally permitted surface-disturbing activities, a cultural inventory and subsequent cultural clearance is required prior to approval.

Fire Management and Ecology: Fire and fuels management assigns top priority to areas with high resource or human values when it comes to fire suppression. Oil and gas development areas and associated infrastructure would be included on this list. Wildfires generally cause minimal indirect effects on the development and production of oil and gas resources, but they can be devastating when they occur. Health and safety impacts for oil and gas personnel can be significant. Fuel treatments that are designed to reduce fuels and meet other multiple use resource objectives would benefit oil and gas production by reducing wildfire size and intensity, thereby reducing the threat of loss of oil and gas facilities to wildfire where the potential exists.

Lands and Realty: Lands and realty management actions rarely have an effect on oil and gas operations. Corridors that are established for utility/transportation systems and rights-of-way for existing linear transmission facilities would be avoided where possible for the placement of oil and gas development activities and infrastructure. This may relocate, but rarely preclude, any oil and gas facility. Rights-of-way granted for wind energy development may influence oil and gas development in areas where project proposals would occupy the same area. In that case, the conflicts and necessary mitigation would be worked out on an individual case-by-case basis.

Livestock Grazing: Livestock grazing mitigation measures applied to the fluid minerals program would increase the operational complexity in order to provide for the protection of livestock watering facilities, upkeep and repair of fences/gates and cattle guards affected by oil and gas activities, control of invasive (noxious) weeds, minimization of forage loss, and prevention of mortality or injury to livestock. While these measures could potentially affect the feasibility of an oil and gas operation on a lease, they do not preclude development.

OHV Use and Travel and Transportation Management: Effective transportation and travel management for maintenance of the BLM transportation system would benefit fluid mineral development by providing for public safety and adequate access for mineral development tasks. In most cases, industry would use the existing road network for initial access to potential oil and gas exploration sites, access for geophysical exploration, etc. Once oil and gas exploration moves into the developmental phase, industry would be required to improve and maintain existing BLM roads or develop new roads and routes as appropriate. Conversely, a BLM decision to close a specific road may adversely affect an oil and gas operator if it historically had been used as part of their lease operation.

Paleontological Resources: Avoidance of important paleontological resources could relocate oil and gas facilities or delay facility placement until the paleontological resources are collected and removed. Also, some specific areas have been identified as NSO. The degree of effect that this restriction imposes on fluid mineral development will be described quantitatively under each proposed alternative.

Recreation: Existing recreation sites and management areas would preclude oil and gas development activities within a relatively small area that make up each individual recreation site. Only minor relocation or avoidance of developed and undeveloped recreation sites would be required because of NSO stipulations. The degree of effect that this restriction imposes on fluid mineral development will be described quantitatively under each proposed alternative.

Social: Avoidance of residential areas, such as occupied residences and city limits, could relocate oil and gas facilities. The degree of effect that this restriction imposes on fluid mineral development will be described quantitatively under each proposed alternative.

Soils: Management actions for soils could impact oil and gas development by directing avoidance of areas with sensitive soils. This mitigation would apply to all proposed well sites and associated surface-disturbing activity including infrastructure. Although this action does pose a restriction upon oil and gas development, it does not preclude the ability to explore for and develop fluid minerals in most areas. The BLM also has the option of applying various BMPs, other measures such as conditions of approval attached to the APD, or a progressive reclamation plan that could mitigate the impacts to the soil resource. In the case that protected soil resources cannot be adequately avoided, an alternative site would need to be proposed.

Solid Minerals: Fluid mineral resource management effects associated with the development of other minerals would be minimal. If this situation were to arise, the conflict between the fluid mineral development and other mineral development (usually locatable minerals) would generally be addressed on a case-by-case basis. If the conflict cannot be easily resolved and ends up in litigation, the entity with the senior (first) right will usually prevail.

Special Designations: The establishment of special designation management areas (e.g., ACECs) would require the intensive management of surface-disturbing and disruptive activities attributed to fluid mineral development in an attempt to reduce the effects in areas that have been identified as having critical resource characteristics. The extent to which these management actions would affect oil and gas development varies across the range of alternatives.

Vegetation – Rangeland: Vegetation management would require reclamation and weed control mitigation measures for surface-disturbing activities in order to help reestablish native plant species on disturbed areas and eliminate weeds. Native habitat that contains special status plant species would potentially limit the location of fluid mineral development activities within any oil and gas lease, although the proposed plan has no existing or planned stipulations related to vegetation management.

Vegetation – Riparian and Wetland: Management actions for riparian areas could affect oil and gas development by controlling and/or prohibiting surface use associated with oil and gas development in identified riparian/wetland areas. This mitigation would apply to all proposed well sites and associated surface-disturbing activity including infrastructure. Although this action does pose a substantial restriction upon oil and gas development, it does not preclude the ability to explore for and develop fluid minerals in most areas. The degree of effect that this restriction imposes on fluid mineral development will be described quantitatively under each proposed alternative. The BLM also has the option of applying various BMPs or other measures such as conditions of approval attached to the APD that could mitigate the impacts to the riparian resource. If protected riparian resources cannot be adequately avoided, an alternative site would need to be proposed.

Visual Resources: Visual resource management would affect the placement of oil and gas facilities on BLM land and could exert a definite influence on finding acceptable locations where development might occur, as well as the size and coloration of facilities depending on the visual class and location. While the requirements of VRM vary by classification, with Class I being the most restrictive and Class IV the least restrictive, VRM requirements do not preclude development.

Wilderness Study Areas: Two WSAs are located within the planning area: the Burnt Lodge WSA (13,773 acres of mineral estate) and Bitter Creek WSA (60,717 acres of mineral estate). Both of these WSAs have been closed to federal oil and gas leasing; therefore, oil and gas exploration and development would be precluded in these two areas.

Wildlife: Avoidance of important wildlife resources/habitat could relocate oil and gas facilities or delay facility placement. Also, specific areas have been identified where surface use and occupancy associated with oil and gas development will be prohibited, in addition to areas that have been deemed as inappropriate for leasing because of

valuable wildlife characteristics. The degree of effect that each restriction imposes on fluid mineral development will be described quantitatively under each proposed alternative.

Impacts under Alternative A (Current Management)

The effects from the management of air quality, fire management and ecology, lands and realty, livestock grazing, OHV use and travel management areas, solid minerals, transportation, vegetation, visual resources, and WSAs are all discussed above in the Impacts Common to All Alternatives section. Table 4.38 summarizes the Alternative A stipulations in relation to where they fall within the oil and gas potential categories.

Cultural Resources: An NSO stipulation would be specified for any federal oil and gas acreage that underlies sites or areas designated for conservation use, public use, or sociocultural use including traditional cultural properties. This would affect 23,282 acres, of which 4,706 acres (20%) are currently leased. In all cases of federally permitted surface-disturbing activities, a cultural inventory and subsequent cultural clearance is required prior to approval. If small NRHP Eligible cultural resource sites are found to be present, access roads, drill pads, and any associated infrastructure would be relocated to avoid any adverse impacts to the cultural resource.

Table 4.38
Stipulation Acres by Development Potential under Alternative A (Current Management)

	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Closed	0	0	0	102,298	102,298
NSO	3,938	9,199	22,614	246,310	282,062
CSU/Timing	137,116	233,907	277,051	2,001,094	2,649,242
Standard Terms Only	5,206	94,336	111,916	246,323	457,849

Paleontological Resources: An NSO stipulation would be specified within the boundaries of designated paleontological sites. This would affect 3 acres that are not currently leased.

Recreation Sites/Trails: An NSO stipulation would be specified within 300 feet of recreation sites/trails. This would affect 2,261 acres, of which 530 acres (23%) are currently leased.

Structures: An NSO stipulation would be specified within 300 feet of occupied buildings. This would affect 1,958 acres, of which 834 acres (43%) are currently leased.

Soils: A CSU stipulation would be specified for slopes over 30%, or 20% on extremely erodible or slumping soils. This would affect 891,308 acres, of which 261,957 acres (32%) are currently leased.

Special Designations: The planning area currently contains seven existing ACECs:

- Azure Cave (143 acres, none of which have been leased),
- Big Bend of the Milk River (1,979 acres, of which 1,151 acres are currently leased),
- Bitter Creek (60,717 acres, of which 10 acres are currently leased),
- Mountain Plover (24,672 acres, none of which have been leased),
- Kevin Rim (4,564 acres, of which 3,651 acres are currently leased),
- Sweet Grass Hills (6,248 acres, of which 116 acres are currently leased), and
- Prairie Dog Towns within the 7km Complex (16,403 acres, of which 3,083 acres are currently leased).

Each ACEC has identified an NSO stipulation within the boundaries of the ACEC to protect the critical resource(s). Alternative A would continue the current management of the ACECs; therefore, the NSO avoidance measure would require establishment of facilities in adjacent areas, which would delay and possibly limit oil and gas activities within

these areas. Since these ACECs typically consist of continuous blocks of lands, the minerals within the interior of the ACECs would most likely not be developed without further advances in directional drilling technology coupled with energy product prices being high enough to make the advanced drilling costs economically feasible.

Vegetation – Riparian and Wetland: A CSU stipulation would be specified for any area within 500 feet of the 25-year floodplain of reservoirs, lakes, ponds, and intermittent, ephemeral, and small perennial streams; and any area within 1,000 feet of the 100-year floodplain of larger perennial streams, rivers, and domestic water supplies. This would affect 545,305 acres, of which 161,970 acres (30%) are currently leased.

The boundaries of the Dibbler and Whitewater reservoirs along with the area identified as the Lonesome Lake wetlands have been identified as NSO for fluid mineral development. This would affect 171 acres, of which 67 acres (39%) are currently leased. Also, 347 additional acres of CSU, of which 298 acres (86%) are currently leased, have been identified in the Dibbler and Whitewater reservoir area.

Wildlife: Because of the number of different wildlife species, which leads to a variety of wildlife stipulations, this section will be described by species/habitat type. Also, the stipulation is simply categorized as NSO, CSU or timing. The distances for all of these stipulations are described in detail in Chapter 2, Table 2.3.

- *Black-footed ferret:* An NSO stipulation would be applied in black-footed ferret habitat. This would affect 103,357 acres, of which 8,680 acres (8%) are currently leased.

- *Black-tailed prairie dog:* An NSO stipulation would be applied in black-tailed prairie dog habitat. This would affect 103,357 acres, of which 8,680 acres (8%) are currently leased.

- *Elk:* An NSO stipulation would be specified for areas identified as crucial elk winter range. This would affect 23,730 acres, none of which are currently leased. Lands that have been identified as elk calving grounds would be leased with a timing stipulation. This would affect 472,065 acres, of which 106,808 acres (23%) are currently leased.

- *Greater sage-grouse:* An NSO stipulation would be applied to greater sage-grouse leks. This would affect 21,187 acres, of which 4,724 acres (22%) are currently leased. Greater sage-grouse habitat would require a timing stipulation. This would affect 1,426,864 acres, of which 279,895 acres (20%) are currently leased.

- *Interior least tern:* Lands that have been identified as having an active least tern colony would be stipulated as NSO. No least tern colonies have been identified in the planning area.

- *Mountain plover:* An NSO stipulation would be applied in mountain plover habitat. This would affect 372,921 acres, of which 9,752 acres (3%) are currently leased.

- *Piping plover:* An NSO stipulation would be applied in piping plover habitat. This would affect 893 acres, of which 447 acres (50%) are currently leased.

- *Raptor:* An NSO stipulation would be specified for areas identified as raptor habitat including, but not limited to, bald eagle, ferruginous hawk, Swainson's hawk, northern goshawk, golden eagle and peregrine falcon. This would affect 24,910 acres, of which 15,319 acres (61%) are currently leased.

- *Sharp-tailed grouse:* An NSO stipulation would be applied to sharp-tailed grouse leks. This would affect 4,412 acres, of which 1,125 acres (25%) are currently leased.

- *Winter range:* A timing stipulation would be specified for areas identified as winter range. This would affect 2,109,949 acres, of which 524,902 acres (25%) are currently leased.

Cumulative Impacts

Stipulations create an effect to oil and gas leasing and subsequent development, ranging from a minor restriction such as a timing stipulation to the most restrictive measure of completely preventing development in a given area. In turn,

stipulations lead to less federal acreage being leased, which equates to a reduction in oil and gas exploration and development on federal minerals, a reduction in federal wells drilled, and ultimately a reduction in federal oil and gas produced.

Approximately 6,014 additional oil and gas wells would be drilled during the life of the plan (20 years); of these, 1,874 wells would access federal minerals. The predicted number of federal wells would equate to a short-term disturbance of approximately 9,564 acres, compared to 36,574 acres that would be disturbed by all wells drilled in the planning area. The long-term disturbance of these additional wells would total 11,227 acres with 2,422 acres occurring on BLM land. The HiLine RFD scenario determined the percent reduction in projected oil and gas production by alternative and established a baseline for assessing the impacts to oil and gas associated with the proposed stipulations. From baseline (unconstrained) conditions, (1) total oil production would be 0.6% less; and (2) total gas production would be 4.4% less. The decrease in coalbed gas production is negligible as the predicted total CBNG well count is only 149 for the life of the plan and no CBNG wells are currently in the planning area.

Impacts under Alternative B

The effects from the management of air quality, fire management and ecology, livestock grazing, lands and realty, other minerals, OHV use and travel management areas, transportation, vegetation, visual resources, and WSAs are all discussed above in the Impacts Common to All Alternatives section. Table 4.39 summarizes the Alternative B stipulations in relation to where they fall within the oil and gas potential categories.

Table 4.39
Stipulation Acres by Development Potential under Alternative B

	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Closed	138,489	283,347	324,728	2,427,013	3,173,637
NSO	6,889	45,247	72,412	133,968	258,560
CSU/Timing	0	778	423	2,090	3,291
Standard Terms Only	883	8,070	14,019	32,956	55,962

Cultural Resources: An NSO stipulation will be attached to any federal acreage that underlies NRHP Eligible Properties/Districts. Under Alternative B, this would affect 304 acres, of which 196 acres (64%) are currently leased. Also, the Bear Paw Battlefield has been identified as an area not suitable for fluid mineral leasing (closed) because of its archaeological value. This would affect 40 acres, none of which have been leased. In all cases of federally permitted surface-disturbing activities, a cultural inventory and subsequent cultural clearance is required prior to approval. If small NRHP Eligible cultural resource sites are found to be present, access roads, drill pads, and any associated infrastructure would be relocated to avoid any adverse impacts to the cultural resource.

Paleontological Resources: An NSO stipulation would be specified within the boundaries of known paleontological sites. Additionally, a CSU stipulation would require that a paleontological inventory be conducted in Class 4 and 5 areas that were identified in accordance with the guidance provided in Washington Office Instruction Memorandum No. 2008-009. However, the stipulations for paleontological resources in Alternative B underlie other resource values, primarily wildlife habitats, which are being proposed as closed to leasing. Therefore, there is no effect to fluid mineral leasing from paleontological resources under Alternative B.

Recreation Sites/Trails: An NSO stipulation would be specified within 1/4 mile of recreation sites/trails. This would affect 1,461 acres, of which only 1 acre is currently leased.

Residential Structures: An NSO stipulation would be specified within 1/4 mile of city limits or occupied residential structures. This would affect 16,667 acres, of which 7,441 acres (45%) are currently leased.

Soils: An NSO stipulation would be specified on areas that contain soils with severe erosion hazard, badlands, rock outcrop, or on slopes susceptible to mass failure. This would affect 78,465 acres, of which 16,321 acres (21%) are currently leased.

Special Designations: Six of the seven existing ACECs within the planning area would be retained (Azure Cave, Big Bend of the Milk River, Bitter Creek, Mountain Plover, Kevin Rim, and Sweet Grass Hills) while the Prairie Dog Towns within the 7km Complex ACEC would be eliminated. The following additional ACECs would be proposed:

- Grassland Bird/Greater Sage-Grouse Priority Areas ACEC (461,220 acres, of which 146,224 acres have currently been leased);
- Greater Sage-Grouse Protection Priority Area ACEC (930,265 acres, of which 8,889 acres have currently been leased);
- Malta Geological ACEC (6,152 acres, all of which have currently been leased); and
- Zortman/Landusky Mine Reclamation ACEC (3,505 acres, none of which have been leased).

The retained ACECs and the Zortman/Landusky Mine Reclamation ACEC have identified an NSO stipulation within the boundaries of the ACEC to protect the critical resource(s). The NSO avoidance measure would require establishment of facilities in adjacent areas, which would delay and possibly limit oil and gas activities within these areas. Since these ACECs typically consist of continuous blocks of lands, the minerals within the interior of the ACECs would most likely not be developed without further advances in directional drilling technology coupled with energy product prices being high enough to make the advanced drilling costs economically feasible. The Grassland Bird/Greater Sage-Grouse Priority Areas ACEC and Greater Sage-Grouse Protection Priority Area ACEC would be closed to oil and gas leasing, which would maintain high quality habitat for greater sage-grouse and other sagebrush-dependent species and protect the areas from fragmentation. The proposed Malta Geological ACEC has identified a CSU stipulation within the boundaries of the ACEC to protect the critical paleontological resource. The CSU stipulation would equate to intensive management of surface-disturbing activities within the ACEC and would potentially change the location and/or design of some projects. It would not, however, preclude the ability to explore for and develop fluid minerals.

Vegetation – Riparian and Wetland: An NSO stipulation would be specified within 1/4 mile of lentic or lotic riparian areas. This would affect 245,167 acres, of which 95,929 acres (39%) are currently leased.

Wilderness Characteristics: Lands managed for wilderness characteristics would be closed to leasing. This would affect 373,442 acres, of which 70,172 acres (19%) are currently leased. About 92% of the areas affected (344,687 acres) are within a very low development potential for oil and gas. However, within the Western Breaks and Badlands area 48% (13,697 acres) are within a high development potential for oil and gas (Table 4.40). Most of the Western Breaks and Badlands area is also currently leased for oil and gas (79% or 22,441 acres) (Table 4.41).

Table 4.40
Areas with Wilderness Characteristics by Development Potential under Alternative B (Acres)

	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Eastern Breaks and Badlands				10,714	10,714
Island Mountain Range			2,808		2,808
Prairie Grasslands				130,616	130,616
Sagebrush Grasslands				201,043	201,043
Western Breaks and Badlands	13,697		12,250	2,314	28,261
Total	13,697	0	15,058	344,687	373,442

Table 4.41 Areas with Wilderness Characteristics Leased for Oil and Gas under Alternative B (Acres)		
	Oil and Gas Leases	
	Leased	***Unleased***
Eastern Breaks and Badlands		10,714
Island Mountain Range		2,808
Prairie Grasslands	47,731	82,885
Sagebrush Grasslands		201,043
Western Breaks and Badlands	22,441	5,820
Total	70,172	303,270

Wildlife: Because of the number of different wildlife species, which leads to a variety of wildlife stipulations, this section will be described by species/habitat type. Also, the stipulation is simply categorized as NSO, CSU or timing. The distances for all of these stipulations are described in detail in Chapter 2, Table 2.3.

- *Bald eagle:* Lands that have been identified as having an active bald eagle nest within the past seven years would be closed to leasing. This would affect 361 acres, none of which are currently leased.

- *Bighorn sheep:* Lands that have been identified as bighorn sheep habitat would be closed to leasing. This would affect 39,422 acres, of which 2,195 acres (6%) are currently leased. Lands that have been identified as bighorn sheep lambing areas would also be closed to leasing. This would affect 14,263 acres, of which 344 acres (2%) are currently leased.

- *Black-footed ferret:* Lands identified as having black-footed ferret habitat would be closed to leasing. This would affect 212,450 acres, of which 21,224 acres (10%) are currently leased.

- *Black-tailed prairie dog:* Lands identified as having black-tailed prairie dog habitat would be closed to leasing. This would affect 212,450 acres, of which 21,224 acres (10%) are currently leased.

- *Colonial waterbird:* Lands that have been identified as having an active waterbird colony would be closed to leasing. This would affect 5,303 acres, of which 1,780 acres (34%) are currently leased. Additionally, a timing stipulation would be stipulated for areas surrounding the closures for the waterbird colonies. This would affect an additional 8 acres that are currently leased.

- *Crucial winter range:* Lands that have been identified as crucial winter range would be closed to leasing. This would affect 128,622 acres, of which 7,435 acres (6%) are currently leased.

- *Elk:* Lands that have been identified as elk calving grounds would be closed to leasing. This would affect 724,849 acres, of which 109,179 acres (15%) are currently leased.

- *Grassland Bird/Greater Sage-Grouse Priority Areas:* Grassland Bird/Greater Sage-Grouse Priority Areas managed as a single ACEC is being proposed under Alternative B, which identifies 474,035 acres as closed to fluid mineral leasing, of which 461,220 acres are BLM land. Currently, 146,224 acres (31%) are leased in this area. Although the closure represents a large amount of acreage that cannot be leased, the entire priority area has been identified as having low to very low potential for oil and gas development.

- *Greater sage-grouse:* Lands identified as having greater sage-grouse leks would be closed to leasing. This would affect 903,150 acres, of which 176,228 acres (20%) are currently leased.

- *Greater Sage-Grouse Protection Priority Area:* A Greater Sage-Grouse Protection Priority Area managed as an ACEC is being proposed under Alternative B, which identifies 1,028,661 acres as closed to fluid mineral leasing, of which 930,265 acres are BLM land. Currently, 8,889 acres (1%) are leased in this area. Although

this closure represents a large amount of acreage that cannot be leased, the entire protection priority area has been identified as having low to very low potential for oil and gas development.

- *Interior least tern:* Lands that have been identified as having an active least tern colony would be closed to leasing. No least tern colonies have been identified in the planning area.
- *Mountain plover:* Lands that have been identified as mountain plover habitat would be closed to leasing. This would affect 373,344 acres, of which 9,752 acres (3%) are currently leased. Additionally, a timing stipulation would be stipulated for areas surrounding the closures for the mountain plover habitat. This would affect an additional 55 acres, none of which have been leased.
- *Piping plover:* Lands that have been identified as having piping plover habitat would be closed to leasing. This would affect 2,138 acres, of which 1,185 acres (55%) are currently leased.
- *Raptor:* Lands that have been identified as having an active raptor nest within the past seven years would be closed to leasing. This would affect 30,236 acres, of which 17,901 acres (59%) are currently leased. Additionally, a timing stipulation would be stipulated for areas surrounding the closures for the raptor nests. This would affect an additional 1,532 acres, of which 432 acres (28%) are currently leased.
- *Sharp-tailed grouse:* Lands that have been identified as having sharp-tailed grouse leks would be closed to leasing. This would affect 120,964 acres, of which 33,123 acres (27%) are currently leased. Sharp-tailed grouse nesting habitat would have a timing stipulation. This would affect 1,932 acres, of which 1,256 acres (27%) are currently leased.
- *Winter range:* Lands that have been identified as winter range would be closed to leasing. This would affect 2,647,032 acres, of which 541,401 acres (20%) are currently leased.

Cumulative Impacts

Stipulations create an effect to oil and gas leasing and subsequent development, ranging from a minor restriction such as a timing stipulation to the most restrictive measure of completely preventing development in a given area. In turn, stipulations lead to less federal acreage being leased which equates to a reduction in oil and gas exploration and development on federal minerals, a reduction in federal wells drilled, and ultimately a reduction in federal oil and gas produced.

Approximately 4,787 additional oil and gas wells would be drilled during the life of the plan (20 years), of which 647 wells would access federal minerals. The predicted number of federal wells would equate to a short-term disturbance of approximately 4,440 acres compared to 31,445 acres that would be disturbed by all wells drilled in the planning area. The long-term disturbance of these additional wells would total 10,348 acres with 1,544 acres occurring on BLM land. The HiLine RFD scenario determined the percent reduction in projected oil and gas production by alternative and established a baseline for assessing the impacts to oil and gas associated with the proposed stipulations. From baseline (unconstrained) conditions, (1) total oil production would be 9.5% less; and (2) total gas production would be 68.3% less. The decrease in coalbed gas production is negligible as the predicted total CBNG well count is only 137 for the life of the plan.

Impacts under Alternative C

The effects from the management of air quality, fire management and ecology, livestock grazing, lands and realty, other minerals, OHV use and travel management areas, transportation, vegetation, visual resources, and WSAs are all discussed above in the Impacts Common to All Alternatives section. Table 4.42 summarizes the Alternative C stipulations in relation to where they fall within the oil and gas potential categories.

Table 4.42 Stipulation Acres by Development Potential under Alternative C					
	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Closed	0	0	2,841	215,745	218,586
NSO	50,521	154,468	169,265	916,833	1,291,160
CSU/Timing	89,832	126,822	143,928	1,321,410	1,681,990
Standard Terms Only	5,908	56,153	95,550	142,038	299,713

Cultural Resources: An NSO stipulation will be attached to any federal acreage that underlies NRHP Eligible Properties/Districts as well as any TCPs. Under Alternative C, this would affect 74,756 acres, of which 7,766 acres (10%) are currently leased. Also, the Bear Paw Battlefield has been identified as an area not suitable for fluid mineral leasing (closed) because of its historical value. This would affect 40 acres, none of which have been leased. In all cases of federally permitted surface-disturbing activities, a cultural inventory and subsequent cultural clearance is required prior to approval. If small NRHP Eligible cultural resource sites are found to be present, access roads, drill pads, and any associated infrastructure would be relocated to avoid any adverse impacts to the cultural resource.

Paleontological Resources: An NSO stipulation would be specified within the boundaries of known paleontological sites. This would affect 118 acres that are currently leased. Additionally, a CSU stipulation would require that a paleontological inventory be conducted in Class 4 and 5 areas that were identified in accordance with the guidance provided in Washington Office Instruction Memorandum No. 2008-009. This would affect 1,157 acres that are currently leased. Avoidance of important paleontological resources could relocate oil and gas facilities or delay facility placement until the paleontological resources are collected and removed. A further discussion of additional requirements imposed by the Malta Geological ACEC, which is proposed to protect the paleontological resource, is located in the Special Designations section below.

Recreation Sites/Trails: An NSO stipulation would be specified within 500 feet of recreation sites/trails. This would affect 5,896 acres, of which 1,809 acres (31%) are currently leased.

Residential Structures: An NSO stipulation would be specified within 500 feet of city limits or occupied residential structures. This would affect 5,684 acres, of which 2,487 acres (44%) are currently leased.

Soils: The effects from the soils resource would be similar to those listed in Alternative B; except that a CSU stipulation would be specified for soils with a severe erosion hazard instead of being NSO. The CSU stipulation would affect 774,408 acres, of which 201,961 acres (37%) are currently leased. Soils with badlands, rock outcrop, or slopes susceptible to mass failure would still be stipulated with NSO. The NSO would apply to 99,982 acres, of which 17,903 acres (29%) are currently leased.

Special Designations: The effects from special designations management would be similar to those listed in Alternative B; except that there would be two additional designated ACECs: the Woody Island ACEC (15,804 acres, none of which have been leased) and the Frenchman ACEC (39,700 acres, of which 3,163 acres are currently leased). Both of these proposed ACECs would stipulate NSO within their boundaries.

Vegetation – Riparian and Wetland: The effects from the vegetation – riparian and wetland resource would be similar to those listed in Alternative B; except that the NSO stipulation would be specified within 500 feet of lentic or lotic riparian areas. This would affect 751,156 acres, of which 312,573 acres (42%) are currently leased.

Wilderness Characteristics: Some of the lands managed for wilderness characteristics (143,794 acres) would be closed to leasing. Another 78,280 acres would be available for leasing with an NSO stipulation. About 99% of the areas affected (219,266 acres) are within a very low development potential for oil and gas (Table 4.43) and less than 1% is currently leased (Table 4.44)

Table 4.43 Areas with Wilderness Characteristics by Development Potential under Alternative C (Acres)					
	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Eastern Breaks and Badlands				10,714	10,714
Island Mountain Range			2,808		2,808
Prairie Grasslands				78,280	78,280
Sagebrush Grasslands				130,272	130,272
Total	0	0	2,808	219,266	222,074

Table 4.44 Areas with Wilderness Characteristics Leased for Oil and Gas under Alternative C (Acres)		
	Oil and Gas Leases	
	Leased	***Unleased***
Eastern Breaks and Badlands		10,714
Island Mountain Range		2,808
Prairie Grasslands	766	77,514
Sagebrush Grasslands		130,272
Total	766	221,308

Wildlife: Because of the number of different wildlife species, which leads to a variety of wildlife stipulations, this section will be described by species/habitat type. Also, the stipulation is simply categorized as NSO, CSU or timing. The distances for all of these stipulations are described in detail in Chapter 2, Table 2.3.

- *Bald eagle:* Lands within 1/4 mile of bald eagle nest sites that have been active within the past seven years would be stipulated as NSO. This would affect 49 acres, none of which have been leased.

- *Bighorn sheep:* Lands that have been identified as bighorn sheep habitat would be stipulated as CSU. This would affect 6,719 acres, of which 1,131 acres are currently leased. Lands that have been identified as bighorn sheep lambing areas would be stipulated as NSO. This would affect 8,496 acres, of which 343 acres (4%) are currently leased.

- *Black-footed ferret:* Lands within 1/4 mile of black-footed ferret habitat would be stipulated as NSO. This would affect 47,307 acres, of which 8,680 acres (18%) are currently leased.

- *Black-tailed prairie dog:* Lands within 1/4 mile of black-tailed prairie dog habitat would be stipulated as NSO. This would affect 47,307 acres, of which 8,680 acres (18%) are currently leased.

- *Colonial waterbird:* Lands within 1/2 mile of a waterbird nesting colony would be stipulated as NSO. This would affect 5,303 acres, of which 1,780 acres (34%) are currently leased. Additionally, a timing stipulation would be stipulated for lands within 1 mile of waterbird nesting colonies. This would affect an additional 3,495 acres, of which 1,689 acres (48%) are currently leased.

- *Crucial winter range:* Lands that have been identified as crucial winter range would be stipulated as NSO. This would affect 84,591 acres, of which 7,435 acres (9%) are currently leased.

- *Grassland Bird/Greater Sage-Grouse Priority Areas:* Lands within Grassland Bird/Greater Sage-Grouse Priority Areas would be stipulated as CSU. Prior to surface-disturbing or disruptive activities a plan to maintain

functionality of grassland bird/greater sage-grouse habitat will be prepared by the proponent and implemented upon approval by the authorized officer. Within the priority areas surface-disturbing or disruptive activities will be restricted or prohibited within 6/10 of a mile from any existing surface-disturbing or disruptive activity. The plan shall address how short-term and long-term direct and indirect effects to important breeding (leks), nesting, brood-rearing, and wintering areas will be mitigated based on current science and research. This would affect 318,526 acres, of which 54,678 acres (17%) are currently leased.

- *Greater sage-grouse leks:* Lands within 1 mile of greater sage-grouse leks would be stipulated as NSO. This would affect 151,113 acres, of which 58,206 acres (39%) are currently leased. Greater sage-grouse nesting habitat would be stipulated with a CSU. This would affect 541,544 acres, of which 168,674 acres (31%) are currently leased.

- *Greater Sage-Grouse Protection Priority Area:* Lands that have been identified as the Greater Sage-Grouse Protection Priority Area would be stipulated as CSU. Prior to surface-disturbing or disruptive activities a plan to maintain functionality of greater sage-grouse habitat will be prepared by the proponent and implemented upon approval by the authorized officer. Within the protection priority area surface-disturbing or disruptive activities will be restricted or prohibited within 6/10 of a mile from any existing surface-disturbing or disruptive activity. The plan shall address how short-term and long-term direct and indirect effects to important breeding (leks), nesting, brood-rearing, and wintering areas will be mitigated based on current science and research. This would affect 1,028,661 acres, of which 1,954 acres (less than 1%) are currently leased.

- *Interior least tern:* Lands within 1/2 mile of occupied interior least tern habitat would be stipulated as NSO. No least tern colonies have been identified in the planning area.

- *Mountain plover:* Lands that have been identified as mountain plover habitat would be stipulated as NSO. This would affect 97,617 acres, of which 2,144 acres (2%) are currently leased. Additionally, a timing stipulation would be stipulated for areas within 1/4 mile of mountain plover habitat. This would affect an additional 6,088 acres, of which 178 acres (3%) are currently leased.

- Peregrine falcon: Lands within 1/4 mile of peregrine falcon nest sites that were active within the past seven years would be stipulated as NSO.

- *Piping plover:* Lands within 1/4 mile of piping plover habitat would be stipulated as NSO. This would affect 893 acres, of which 447 acres (50%) are currently leased.

- *Raptor:* Lands within 1/4 mile raptor nest sites active within the past seven years would be stipulated as NSO. This would affect 9,054 acres, of which 5,668 acres (63%) are currently leased. Additionally, a timing stipulation would be applied to areas within 1/2 mile of active raptor nest sites. This would affect an additional 11,380 acres, of which 6,332 acres (56%) are currently leased.

- *Sharp-tailed grouse:* Lands within 1/4 mile of sharp-tailed grouse leks would be stipulated as NSO. This would affect 25,658 acres, of which 7,982 acres (31%) are currently leased. Sharp-tailed grouse nesting habitat would have a timing stipulation for lands within 1/2 mile of sharp-tailed grouse leks. This would affect 49,399 acres, of which 16,346 acres (33%) are currently leased.

- *Special status species:* Lands within 1/4 mile of essential habitat of special status species would be stipulated as NSO unless other species-specific stipulations apply.

- *Winter range:* Lands that have been identified as big game and greater sage-grouse winter range would be stipulated with a timing stipulation. This would affect 995,610 acres, of which 339,538 acres (34%) are currently leased.

Cumulative Impacts

Stipulations create an effect to oil and gas leasing and subsequent development, ranging from a minor restriction such as a timing stipulation to the most restrictive measure of completely preventing development in a given area. In turn,

stipulations lead to less federal acreage being leased which equates to a reduction in oil and gas exploration and development on federal minerals, a reduction in federal wells drilled, and ultimately a reduction in federal oil and gas produced.

Approximately 5,756 additional oil and gas wells would be drilled during the life of the plan (20 years), of which 1,617 wells would access federal minerals. The predicted number of federal wells would equate to a short-term disturbance of approximately 8,547 acres compared to 35,557 acres that would be disturbed by all wells drilled in the planning area. The long-term disturbance would be 11,042 acres total with 2,238 acres occurring on BLM land. The HiLine RFD scenario determined the percent reduction in projected oil and gas production by alternative and established a baseline for assessing the impacts to oil and gas associated with the proposed stipulations. From baseline (unconstrained) conditions, (1) total oil production would be 2.8% less; and (2) total gas production would be 18.4% less. The decrease in coalbed gas production would be negligible as the predicted total CBNG well count is only 146 for the life of the plan.

Impacts under Alternative D

The effects from the management of air quality, fire management and ecology, livestock grazing, lands and realty, other minerals, OHV use and travel management areas, transportation, vegetation, visual resources, and WSAs are all discussed in the Impacts Common to All Alternatives section above. Table 4.45 summarizes the Alternative D stipulations in relation to where they fall within the oil and gas potential categories.

Table 4.45
Stipulation Acres by Development Potential under Alternative D

	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Closed	0	0	0	74,674	74,674
NSO	13,094	10,742	31,297	302,323	357,456
CSU/Timing	107,298	219,021	211,988	1,923,287	2,461,653
Standard Terms Only	25,867	107,680	168,297	295,744	597,668

Cultural Resources: An NSO stipulation would be attached to any federal acreage that underlies NRHP Eligible Properties/Districts, the Bear Paw Battlefield, and TCPs. Under Alternative D, this would affect 75,844 acres, of which 7,766 acres (10%) are leased. In all cases of federally permitted surface-disturbing activities, a cultural inventory and subsequent cultural clearance is required prior to approval. If small NRHP Eligible cultural resource sites are found to be present, access roads, drill pads, and any associated infrastructure would be relocated to avoid any adverse impacts to the cultural resource.

Paleontological Resources: An NSO stipulation would be specified within the boundaries of known paleontological sites. This would affect 193 acres, none of which are leased. Additionally, a CSU stipulation would require that a paleontological inventory be conducted in Class 4 and 5 areas that were identified in accordance with the guidance provided in Washington Office Instruction Memorandum No. 2008-009. This would affect 1,157 acres that are already leased. Avoidance of important paleontological resources could relocate oil and gas facilities or delay facility placement until the paleontological resources are collected and removed. A further discussion of additional requirements imposed by the Malta Geological ACEC, which is proposed to protect the paleontological resource, is located in the Special Designations section below.

Recreation Sites/Trails: An NSO stipulation would be specified within 300 feet of recreation sites/trails. This would affect 5,226 acres, of which 1,233 acres (24%) are already leased.

Residential Structures: An NSO stipulation would be specified within 300 feet of occupied buildings. This would affect 2,062 acres, of which 837 acres (41%) are already leased.

Soils: The effects from the soils resource would be the least restrictive under Alternative D as standard lease terms would be all that applied. As a point of clarification, standard lease terms allow the authorized officer to move a proposed project a distance of up to 200 linear meters and/or to delay a project for up to 60 days.

Special Designations: The effects from special designations management would be similar to those listed in Alternative B; except that the Zortman/Landusky Mine Reclamation ACEC would not be designated. Two additional ACECs would be designated: the Woody Island ACEC (15,804 acres, none of which have been leased) and the Frenchman ACEC (57,784 acres, of which 14,874 acres are already leased). Both of these proposed ACECs would stipulate NSO within their boundaries.

Vegetation – Riparian and Wetland: The effects from the vegetation – riparian and wetland resource would be similar to those listed in Alternative B; except that the NSO would be replaced by a CSU stipulation within 300 feet of lentic or lotic riparian areas. This would affect 477,265 acres, of which 192,911 acres (40%) are already leased.

Wildlife: Because of the number of different wildlife species, which leads to a variety of wildlife stipulations, this section will be described by species/habitat type. Also, the stipulation is simply categorized as NSO, CSU or timing. The distances for all of these stipulations are described in detail in Chapter 2.

- *Bald eagle:* Lands within 1/2 mile of bald eagle nest sites active within the past seven years would be stipulated with a timing stipulation. This would affect 358 acres, none of which is leased.

- *Bighorn sheep:* Lands that have been identified as bighorn sheep lambing areas would be stipulated with a timing stipulation. This would affect 2,364 acres, of which 344 acres (15%) are already leased.

- *Black-footed ferret:* Lands identified as having black-footed ferret habitat would be stipulated as NSO. This would affect 23,590 acres, of which 1,245 acres (5%) are already leased.

- *Black-tailed prairie dog:* Lands identified as having black-tailed prairie dog habitat would be stipulated as NSO. This would affect 23,590 acres, of which 1,245 acres (5%) are already leased.

- *Colonial waterbird:* Lands within 1/4 mile of a waterbird nesting colony would be stipulated as NSO. This would affect 1,357 acres, of which 381 acres (28%) are already leased. Additionally, a timing stipulation would be stipulated for areas within 1/2 mile of waterbird nesting colonies. This would affect an additional 2,285 acres, of which 1,283 acres (56%) are already leased.

- *Crucial winter range:* Lands that have been identified as crucial winter range would be stipulated as CSU. This would affect 36,199 acres, of which 7,426 acres (21%) are already leased.

- *Greater sage-grouse leks:* Lands within 6/10 of a mile from greater sage-grouse leks would be stipulated as NSO. This would affect 111,504 acres, of which 24,077 acres (22%) are already leased. Additionally, lands within one mile of greater sage-grouse nesting habitat would be stipulated with a timing stipulation. This would affect 137,939 acres, of which 34,948 acres (25%) are already leased.

- *Greater sage-grouse winter range:* Lands identified as greater sage-grouse winter range would be stipulated with a timing stipulation.

- *Interior least tern:* Lands within 1/4 mile of interior least tern occupied habitat would be stipulated as NSO. No least tern colonies have been identified in the planning area.

- *Mountain plover:* Lands that have been identified as mountain plover habitat would be stipulated as NSO. This would affect 309,054 acres, of which 2,144 acres (1%) are already leased.

- *Peregrine falcon:* Lands within 1/4 mile of peregrine falcon nest sites active within the past seven years would be stipulated with a timing stipulation.

- *Piping plover:* Lands within 1/4 mile of piping plover habitat would be stipulated with a timing stipulation. This would affect 844 acres, of which 414 acres (49%) are already leased.

- *Raptor:* Lands within 1/4 mile of raptor nests active within the past seven years would be stipulated as CSU. This would affect 8,586 acres, of which 5,572 acres are already leased. Additionally, a timing stipulation would be stipulated for areas within 1/4 mile of active raptor nest sites. This would affect an additional 7,465 acres, of which 4,248 acres (57%) are already leased.

- *Sharp-tailed grouse:* Lands within 1/4 mile of sharp-tailed grouse leks would be stipulated as CSU. This would affect 27,640 acres, of which 7,754 acres (28%) are already leased. Sharp-tailed grouse nesting habitat would have a timing stipulation for lands within 1/4 mile of sharp-tailed grouse leks. This would affect 27,640 acres, of which 7,754 acres (28%) are already leased.

- *Special status species:* Lands within 1/4 mile of essential habitat of special status species would be stipulated as NSO unless other species-specific stipulations apply.

- *Winter range:* Lands that have been identified as big game and greater sage-grouse winter range would be stipulated with a timing stipulation. This would affect 2,050,597 acres, of which 511,867 acres (25%) are already leased.

Cumulative Impacts

Stipulations create an effect to oil and gas leasing and subsequent development ranging from a minor restriction such as a timing stipulation to the most restrictive measure of completely preventing development in a given area. In turn, stipulations lead to less federal acreage being leased which equates to a reduction in oil and gas exploration and development on federal minerals, a reduction in federal wells drilled, and ultimately a reduction in federal oil and gas produced.

Approximately 6,034 additional oil and gas wells would be drilled during the life of the plan (20 years), of which 1,894 wells would access federal minerals. The predicted number of federal wells would equate to a short-term disturbance of approximately 9,663 acres compared to 36,673 acres that would be disturbed by all wells drilled in the planning area. The long-term disturbance of these additional wells would be 11,240 acres total with 2,436 acres occurring on BLM land. The HiLine RFD scenario determined the percent reduction in projected oil and gas production by alternative and established a baseline for assessing the impacts to oil and gas associated with the proposed stipulations. From baseline (unconstrained) conditions, (1) total oil production would be 0.5% less; and (2) total gas production would be 3.4% less. The decrease in coalbed gas production would be negligible as the predicted total CBNG well count is only 149 for the life of the plan.

Impacts under Alternative E (Preferred Alternative)

The effects from the management of air quality, fire management and ecology, livestock grazing, lands and realty, other minerals, OHV use and travel management areas, transportation, vegetation – rangeland, visual resources, and WSAs are all discussed in the Impacts Common to All Alternatives section above. Table 4.46 summarizes the Alternative E stipulations in relation to where they fall within the oil and gas potential categories.

Table 4.46
Stipulation Acres by Development Potential under Alternative E (Preferred Alternative)

	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Closed	0	0	21,271	131,431	152,702
NSO	35,654	59,753	55,328	1,560,614	1,711,378
CSU/Timing	106,803	251,155	286,720	815,388	1,460,096
Standard Terms Only	3,802	26,535	48,263	88,594	167,274

Cultural Resources: An NSO stipulation would be attached to any federal acreage that underlies NRHP Eligible Properties/Districts as well as TCPs. Under Alternative E, this would affect 16,212 acres, of which 4,987 acres (31%) are already leased. Also, the Bear Paw Battlefield has been identified as an area not suitable for fluid mineral leasing (closed) because of its archaeological value. This would affect 40 acres, none of which have been leased. In all cases of federally permitted surface-disturbing activities, a cultural inventory and subsequent cultural clearance is required prior to approval. If small NRHP Eligible cultural resource sites are found to be present, access roads, drill pads, and any associated infrastructure would be relocated to avoid any adverse impacts to the cultural resource.

Paleontological Resources: An NSO stipulation would be specified within the boundaries of known paleontological sites. This would affect 199 acres, of which 5 acres (3%) are already leased. Additionally, a CSU stipulation would require that a paleontological inventory be conducted in Class 4 and 5 areas that were identified in accordance with the guidance provided in Washington Office Instruction Memorandum No. 2008-009. This would affect 1,157 acres that are already leased. Avoidance of important paleontological resources could relocate oil and gas facilities or delay facility placement until the paleontological resources are collected and removed. A further discussion of additional requirements imposed by the Malta Geological ACEC, which is proposed to protect the paleontological resource, is located in the Special Designations section below.

Recreation Sites/Trails: An NSO stipulation would be specified within 500 feet of recreation sites/trails. This would affect 12,223 acres, of which 2,834 acres (23%) are already leased.

Residential Structures: An NSO stipulation would be specified within 500 feet of city limits or occupied residential structures. This would affect 5,076 acres, of which 2,156 acres (42%) are already leased.

Soils: The effects from the soils resource would be similar to those listed in Alternative B; except that a CSU stipulation would be specified for soils with a severe erosion hazard instead of being NSO. The CSU stipulation would affect 563,749 acres, of which 238,703 acres (27%) are already leased. Soils with badlands, rock outcrop, or slopes susceptible to mass failure would still be stipulated with NSO. The NSO would apply to 131,428 acres, of which 17,931 acres (14%) are already leased.

Special Designations: Six of the seven existing ACECs within the planning area would be retained:

- Azure Cave (143 acres, none of which have been leased),
- Big Bend of the Milk River (1,979 acres, of which 1,151 acres are already leased),
- Bitter Creek (60,717 acres, of which 10 acres are already leased),
- Mountain Plover (24,7 acres, none of which have been leased),
- Kevin Rim (4,564 acres, of which 3,651 acres are already leased), and
- Sweet Grass Hills (6,248 acres, of which 116 acres are already leased).

The Prairie Dog Towns within the 7km Complex ACEC would be eliminated. The following additional ACECs would be proposed:

- Frenchman ACEC (39,700 acres, of which 3,163 acres are already leased),
- Malta Geological ACEC (6,152 acres, all of which have already been leased),
- Woody Island ACEC (24,083 acres, of which 7,759 acres are already leased), and
- Zortman/Landusky Mine Reclamation ACEC (3,505 acres, none of which have been leased).

Apart from the Sweet Grass Hills and Malta Geological ACECs, all of the ACECs recommended in Alternative E have been identified with an NSO stipulation within the boundaries of each ACEC to protect the critical resource(s). The NSO avoidance measure would require establishment of facilities in adjacent areas, which would delay and possibly limit oil and gas activities within these areas. Since these ACECs typically consist of continuous blocks of lands, the minerals within the interior of the ACECs would most likely not be developed without further advances in directional drilling technology coupled with energy product prices being high enough to make the advanced drilling costs economically feasible. The Sweet Grass Hills ACEC would be closed to leasing under this alternative and the proposed Malta Geological ACEC would specify a CSU stipulation within the boundaries of the ACEC to protect the critical paleontological resource. The CSU stipulation would equate to intensive management of surface-disturbing activities

within the ACEC and would potentially change the location and/or design of some projects. It would not, however, preclude the ability to explore for and develop fluid minerals.

Vegetation – Riparian and Wetland: The effects from the vegetation – riparian and wetland resource would be similar to those listed in Alternative C; except that the CSU stipulation would be specified within 500 feet of lentic or lotic riparian areas. This would affect 815,857 acres, of which 432,124 acres are already leased.

Wilderness Characteristics: Lands managed for wilderness characteristics would be available for leasing with an NSO stipulation. This would affect 10,714 acres. All of the areas affected are within a very low development potential for oil and gas (Table 4.47) and are currently unleased (Table 4.48).

Table 4.47
Areas with Wilderness Characteristics by Development Potential under Alternative E (Preferred Alternative)
(Acres)

	Development Potential				
	High	***Moderate***	***Low***	***Very Low***	***Total***
Eastern Breaks and Badlands				10,714	10,714
Total	0	0	0	10,714	10,714

Table 4.48
Areas with Wilderness Characteristics Leased for Oil and Gas under Alternative E (Preferred Alternative)
(Acres)

	Oil and Gas Leases	
	Leased	***Unleased***
Eastern Breaks and Badlands		10,714
Total	0	10,714

Wildlife: Because of the number of different wildlife species, which leads to a variety of wildlife stipulations, this section will be described by species/habitat type. Also, the stipulation is simply categorized as NSO, CSU or timing. The distances for all of these stipulations are described in detail in Chapter 2.

- *Bald eagle:* Lands within 1/2 mile of bald eagle nest sites active within the preceding five breeding season would be stipulated as NSO. This would affect 361 acres, none of which are leased.

- *Bighorn sheep:* Lands that have been identified as bighorn sheep habitat would be stipulated as CSU. This would affect 7,792 acres, of which 1,248 acres (16%) are already leased. Lands that have been identified as bighorn sheep lambing areas would be stipulated as NSO. This would affect 2,364 acres, of which 343 acres (15%) are already leased.

- *Black-footed ferret:* Lands within 1/4 mile of black-footed ferret habitat would be stipulated as NSO. This would affect 103,351 acres, of which 8,680 acres (8%) are already leased.

- *Black-tailed prairie dog:* Lands within 1/4 mile of black-tailed prairie dog habitat would be stipulated as NSO. This would affect 103,351 acres, of which 8,680 acres (8%) are already leased.

- *Colonial waterbird:* Lands within 1/4 mile of a waterbird nesting colony would be stipulated as NSO. This would affect 5,303 acres, of which 1,780 acres (34%) are already leased. Additionally, a timing stipulation

would be stipulated for areas within 1/2 mile of waterbird nesting colonies. This would affect an additional 8,863 acres, of which 4,259 acres (48%) are already leased.

- *Crucial winter range:* Lands that have been identified as crucial winter range for big game and/or greater sage-grouse would be stipulated as CSU. This would affect 44,720 acres, of which 7,154 acres (16%) are already leased.

- *Grassland Bird/Greater Sage-Grouse Priority Areas:* Lands that have been identified as Grassland Bird/Greater Sage-Grouse Priority Areas would be stipulated as NSO. This would affect 318,526 total acres, of which 54,746 acres (17%) are already leased.

- *Greater sage-grouse:* Lands within one mile of greater sage-grouse leks would be stipulated as NSO. This would affect 107,494 acres, of which 58,085 acres (54%) are already leased. Greater sage-grouse nesting habitat would be stipulated with a CSU stipulation. This would affect 1,212,152 acres, of which 221,385 acres (18%) are already leased. Areas that fall within the boundaries of the Greater Sage-Grouse Protection Priority Area would be subject to that stipulation.

- *Greater Sage-Grouse Protection Priority Area:* Lands that have been identified as within the Greater Sage-Grouse Protection Priority Area would be stipulated as NSO. This would affect 1,028,661 acres, of which 7,169 acres (1%) are already leased.

- *Greater sage-grouse winter range:* Lands that have been identified as greater sage-grouse winter range would have a timing stipulation.

- *Interior least tern:* Lands within 1/4 mile of interior least tern occupied habitat would be stipulated as NSO. No least tern colonies have been identified in the planning area.

- *Mountain plover:* Lands that have been identified as mountain plover habitat would be stipulated as NSO. This would affect 285,170 acres, of which 2,144 acres (1%) are already leased. Additionally, a timing stipulation would be stipulated for areas within 1/4 mile of mountain plover habitat. This would affect an additional 23,186 acres, of which 346 acres (1%) are already leased.

- *Pallid sturgeon:* Lands within 1/2 mile of river or stream shorelines identified as pallid sturgeon habitat would be stipulated as CSU.

- *Peregrine falcon:* Lands within one mile of peregrine falcon nest sites active within the preceding seven breeding seasons would be stipulated as NSO.

- *Piping plover*: Lands within 1/4 mile of piping plover habitat would be stipulated as NSO. This would affect 893 acres, of which 447 acres (50%) are already leased.

- *Raptor:* Lands within 1/4 mile of raptor nest sites active within the past seven years would be stipulated as NSO. This would affect 9,162 acres, of which 5,668 acres (62%) are already leased. Additionally, a timing stipulation would be stipulated for areas within 1/2 mile of active raptor nest sites. This would affect an additional 16,890 acres, of which 9,477 acres (56%) are already leased.

- *Sharp-tailed grouse leks:* Lands within 1/4 mile of sharp-tailed grouse leks would be stipulated as NSO. This would affect 30,491 acres, of which 7,982 acres (26%) are already leased. Additionally, Sharp-tailed grouse nesting habitat would have a timing stipulation for lands within 1/2 mile of sharp-tailed grouse leks. This would affect 77,770 acres, of which 22,353 acres (29%) are already leased.

- *Sprague's pipit:* Lands within Sprague's pipit habitat would be stipulated with a timing stipulation.

- *Winter range:* Lands that have been identified as big game winter range would be stipulated with a timing stipulation. This would affect 723,752 acres, of which 442,694 acres (61%) are already leased.

Cumulative Impacts

Stipulations create an effect to oil and gas leasing and subsequent development ranging from a minor restriction such as a timing stipulation to the most restrictive measure of completely preventing development in a given area. In turn, stipulations lead to less federal acreage being leased which equates to a reduction in oil and gas exploration and development on federal minerals, a reduction in federal wells drilled, and ultimately a reduction in federal oil and gas produced.

Approximately 5,896 additional oil and gas wells would be drilled during the life of the plan (20 years), of which 1,756 wells would access federal minerals. The predicted number of federal wells would equate to a short-term disturbance of approximately 9,068 acres compared to 36,077 acres that would be disturbed by all wells drilled in the planning area. The long-term disturbance of these additional wells would be 11,142 acres total with 2,337 acres occurring on BLM land. The HiLine RFD scenario determined the percent reduction in projected oil and gas production by alternative and established a baseline for assessing the impacts to oil and gas associated with the proposed stipulations. From baseline (unconstrained) conditions, (1) total oil production would be 1.5% less; and (2) total gas production would be 10.3% less. The decrease in coalbed gas production would be negligible as the predicted total CBNG well count is only 144 for the life of the plan.

Forests and Woodlands

This section describes the impacts each alternative has on forest health, woodlands and products in terms of direct, indirect, short-term, and long-term impacts; as appropriate, impacts are described as beneficial or adverse.

Actions within each alternative could affect forests, woodlands, and sales of forest products. Actions (or inaction) that restricts forest health and the availability, quality, and quantity of forest products are considered adverse impacts. Indirect impacts may include any change in the forest and woodland species, vigor, health, site quality, and vegetative community type as a result of natural forces (e.g., insect and disease, fire, and drought conditions), management actions from other resources, or failure to implement management actions. Conversely, beneficial effects include actions that improve health, and protect and restore forests and woodlands as well as provide a variety of forest products in the planning area.

Forests and woodlands within the planning area are, for the most part, fire dependent. These forests naturally maintained themselves through frequent, low severity fires (i.e., ponderosa pine forests) or through less frequent, high severity, stand replacing events (i.e., lodgepole pine forests). Many of the forests and woodlands within the planning area have not seen a natural fire event in several decades. Only recently has there been any attempt at prescribed fire and mechanical treatments that mimicked natural events. Continued inaction (or reduced action) will only add to the negative impact of overstocked and undesirable forest conditions.

Allowable uses and management actions potentially impacting forests, woodlands, and forest products primarily include surface-disturbing activities and proactive management actions. As forest health resources are impacted by the alternatives, they can impact other resources. The impacts of forest health treatments on other resource topics (i.e., physical, biological, fire management and ecology, etc.) are discussed under the appropriate impacted resource section in this chapter.

Assumptions and Guidelines

Assumptions and guidelines used in this analysis include the following:

- A healthy forest is more stable and much more resilient to natural and widespread wildfires.
- The need to manage forests and woodlands will increase to accommodate other multiple uses.
- Forest health (including restoration and hazardous fuels reduction) objectives will be the major determining factor in forest management activities.
- The planning area contains approximately 83 million board feet of commercial wood products on about 39,100 acres of available forested land, mostly located in the three island mountain ranges (Sweet Grass Hills, Bears Paw and Little Rocky Mountains).

- The Probable Sale Quantity (PSQ) is estimated to be 664,000 board feet yearly along with up to 4,000 tons of biomass.
- Old growth stands or those to be managed for old growth will follow the Healthy Forests Restoration Act (HFRA) (2003) Section 102 for maintaining and managing these stands. The principle guiding document will be provided by the "Old-Growth Forest Types of the Northern Region" (USFS 1992).
- The sale of minor amounts of personal use wood products such as Christmas trees, fuelwood and post/poles would have no appreciable effect on the overall forest resource.
- Other natural processes such as insect and disease infestations will continue to contribute to losses within the forested resource.
- Limited access to some isolated parcels restricts the ability to manage forested lands on a long-term basis.

Impacts Common to All Alternatives

Resource issues in any alternative may require location and/or timing restrictions for implementing vegetation treatments or using wildfire for resource benefit. However, for any activity, interdisciplinary planning would consider constraints and long-term effects, and would identify mitigation measures or restrictions necessary for successful implementation.

Special Designations: The Sweet Grass Hills ACEC likely conflicts with forest health objectives. The objective of the Sweet Grass Hills ACEC is to protect the diverse archeological (cultural and traditional) resource values. Mechanical vegetation treatments that would be proposed in the Sweet Grass Hills would involve some level of surface disturbance and change in the landscape that would be perceived as not offering protection to archeological resources. A total of 6,248 acres of forests (13%) may not be available for meaningful treatments.

Wildlife: Timing considerations for protection of wildlife and their habitat would be identified at the project planning level, and mitigation measures would be applied on a case-by-case basis if an onsite evaluation of the project area indicates the presence of important wildlife species. Exceptions may be granted by the authorized officer if an environmental review demonstrates there would be no adverse impacts, or habitat for the species is not present in the area, or portions of the area can be occupied without affecting a particular species. Exceptions may also be granted where the short-term effects are mitigated by the long-term benefits.

Specific timing considerations for mule deer, elk, bighorn sheep, and antelope winter range are addressed under each alternative.

Timing considerations for active raptor nests could constrain vegetation treatments, especially prescribed fire. Most timing restrictions apply to areas that range in distance from 1/4 mile to 1/2 mile from nesting habitat, so depending on location and evaluations of project areas, implementation could be precluded from mid-March through July.

Impacts under Alternative A (Current Management)

Fire Management and Ecology: FMUs would remain as Category B, so using wildfire for resource benefit would not be considered as a management option. Therefore, full fire suppression (as a management strategy) would continue to contribute to the decline of forest health. Fire is one of the disturbances necessary to maintain and improve forest health. Fire (natural or introduced) helps facilitate healthy forests by rejuvenating fire-dependent species such as aspen, chokecherry and lodgepole pine. In addition, the reintroduction of fire helps maintain fuel loadings at a level that helps prevent unwanted high intensity fires which detrimentally alter soil properties and wildlife habitat. Without fire in the forest development cycle, rejuvenation of critical wildlife species and forest health would continue to stagnate or decline.

Forests and Woodlands: Forest health treatments would continue to focus more on quantity and value of commercial products sold rather than treating acres. With the focus of treatments being on not exceeding the Allowable Sale Quantity (ASQ) of 3.5 MMBF (Million Board Feet) per decade the treatments would not allow management initiated actions to "catch up" with the rate of decline of acres of forest health. There would continue to be no guidance for old growth management. Old growth forests are a critical component in maintaining a healthy forest ecosystem. Old growth has value as habitat for dependent or associated wildlife species as well as playing an important role in multiple resource management. Additionally, old growth is a critical element of the total diversity that should be found in a healthy forest landscape.

Vegetation – Rangeland: Mandatory rest following disturbance may continue to be a deterrent to reintroducing fire on the forested landscape. Fire is one of the disturbances necessary to maintain and improve forest health. Fire (natural or introduced) helps facilitate healthy forests by rejuvenating fire-dependent species such as aspen, chokecherry and lodgepole pine. In addition, the reintroduction of fire helps maintain fuel loadings at a level that helps prevent unwanted high intensity fires which detrimentally alter soil properties and wildlife habitat.

Visual Resources: The Class II rating of the Bears Paw and Little Rocky Mountains and the Sweet Grass Hills may restrict forest health treatments at the landscape level. Prescribed treatments in the forested landscape likely include changes that would contradict the Class II rating objectives. The forests/woodlands that occur in the Class II rating area make up 100% of the available resource. Not treating or reduced levels of treatments on such a large percentage of forested ground would not adequately address ongoing forest health issues such as insects, disease, overstocking, and decreased wildlife habitat.

Wildlife (Winter Range): Mule deer, elk, bighorn sheep, and antelope winter range covers most of the conifer vegetation types in the planning area. Because of the extent of the winter range habitats, most forest health activities including mechanical treatments and prescribed fire could have constraints from timing limits that would occur from December 1 to May 15. Contracts may require multiple years to be completed. In some situations, prescribed fire may not be available as a treatment option because weather and fuel prescriptions could not be satisfied in forested settings during summer and fall.

Cumulative Impacts

During the life of the plan minimal gain on restoring forest health would be made. Volume-driven treatments would not likely accomplish landscape-level forest health objectives due to ASQ limitations. Opportunities for projects would largely be dictated by market conditions and finding a willing purchaser.

Natural fire would not be considered as a management tool for the benefit of the resource. The ASQ would inhibit the ability to treat at the landscape level. Without landscape-level treatments, using wildfire for resource benefit becomes less practical. Treatments would most likely be too small to consider any suppression response other than full suppression.

Short-term impacts to soil may occur through ground-based mechanical equipment. Exposure of bare mineral soil would provide a seed bed for non-native and exotic plant species.

The continued small projects would provide a small quantity of wood products to the local industry as well as provide some work opportunities and boost to the local economy.

Impacts under Alternative B

Fire Management and Ecology: In the eastern half of the planning area (including the 30,949 acres of forested land in the Little Rocky Mountains), FMUs would be recategorized as fire management Category C. Wildfire for resource benefit therefore could be considered in those FMUs as a management strategy. Fire suppression strategies other than full fire suppression could be applied as a management tool for improving forest health. Fire is a necessary disturbance that helps maintain and improve forest health by rejuvenating fire-dependent species such as aspen, chokecherry and lodgepole pine. In addition, the reintroduction of fire helps maintain fuel loadings at a level that helps prevent unwanted high intensity fires that detrimentally alter soil properties and wildlife habitat.

Forests and Woodlands: Forest health treatments could average approximately 390 acres per year and focus more on landscape-level treatments rather than quantity of commercial products sold. Landscape-level projects that focus on forest health rather than product quantity would allow for a greater array of silvicultural treatments that mimic ecological processes. Additionally, silvicultural treatments would address old growth in guidance provided through the document "Old-Growth Forest Types of the Northern Region" (USFS 1992). Managing for old growth helps to provide habitat for dependent or associated wildlife species as well as playing an important role in multiple resource management. Additionally, old growth is a critical element of the total diversity that should be found in a healthy forest landscape.

Visual Resources: The VRM Class I rating for the Sweet Grass Hills would likely restrict landscape-level forest management opportunities on 6,248 acres. Treatments at the landscape level would likely exceed the accepted level of change and objectives afforded a Class I rating. Conversely, the entire Little Rocky Mountains would have the less restrictive Class III rating applied, which would allow much more flexibility to do landscape-level treatments on up to 30,949 acres. All remaining forested acres in the planning area would fall within the Class II ratings and may be impacted similar to that described in Alternative A.

Wilderness Characteristics: The VRM Class I rating for the Island Mountain Range would likely restrict landscape level management opportunities on 4,118 acres. Treatments at the landscape level would likely exceed the accepted level of change and objectives afforded a Class I rating. This area may not be available for meaningful treatments.

Wildlife (Winter Range): Mule deer, elk, bighorn sheep, and antelope winter range covers most of the conifer vegetation types in the planning area. Timing or location considerations for protection of wildlife and their habitat would be evaluated at the project planning level and appropriate mitigations would be applied.

Depending on location and evaluation of project areas, timing considerations within 1 mile of active raptor nests could constrain vegetation treatments, especially prescribed fire because implementation could be precluded from March through September. There would be little opportunity to meet weather and fuel parameters during the remaining months of the year.

Cumulative Impacts

During the life of the plan a more significant gain on restoring forest health would be made. Treating an estimated 390 acres per year (7,800 acres over the life of the plan) equates to 20% of the available forest and woodland landscape.

The PSQ would not inhibit the ability to treat at the landscape level. Without landscape-level treatments, using wildfire for resource benefit becomes less practical. Wildfire for resource benefit could now be considered as a tool for managing forest health in the Little Rocky Mountains (30,949 acres). Larger landscape-level treatments would provide a greater opportunity to utilize fire for resource benefit because fire management would be less restricted by boundaries.

Short-term impacts to soil may occur through ground-based mechanical equipment. Exposure of bare mineral soil would provide a seed bed for non-native and exotic plant species.

Forest health projects would continue to provide wood products and work opportunities to the local industry and help boost the local economy.

Impacts under Alternative C

Fire Management and Ecology: In the eastern half of the planning area, (including the 30,949 acres of forested land in the Little Rocky Mountains) FMUs would be recategorized as fire management Category C. Wildfire for resource benefit therefore could be considered in those FMUs as a management strategy. Fire suppression strategies other than full fire suppression could be applied as a management tool for improving forest health. Fire is a necessary disturbance that helps maintain and improve forest health by rejuvenating fire-dependent species such as aspen, chokecherry and lodgepole pine. In addition, the reintroduction of fire helps maintain fuel loadings at a level that helps prevent unwanted high intensity fires that detrimentally alter soil properties and wildlife habitat.

Forests and Woodlands: Forest health treatments could average approximately 390 acres per year and focus more on landscape-level treatments rather than quantity of commercial products sold. Guidance for Old Growth Management now exists. Landscape-level projects that focus on forest health rather than product quantity allows for a greater array of silvicultural treatments that mimic ecological processes. Additionally, silvicultural treatments would address old growth in guidance provided through the document "Old-Growth Forest Types of the Northern Region" (USFS 1992). Managing for old growth helps to provide habitat for dependent or associated wildlife species as well as playing an important role in multiple resource management. Additionally, old growth is a critical element of the total diversity that should be found in a healthy forest landscape.

Visual Resources: The Sweet Grass Hills and the Bears Paw and Little Rocky Mountains would be assigned a Class III rating. This would result in increased landscape-level forest management opportunities on up to 38,037 acres (77% of the planning area). All remaining forested acres in the planning area would fall within the more restrictive Class II ratings and may be impacted similar to that described under Alternative A.

Wilderness Characteristics: The VRM Class I rating for the Island Mountain Range would likely restrict landscape level management opportunities on 4,118 acres. Treatments at the landscape level would likely exceed the accepted level of change and objectives afforded a Class I rating. This area may not be available for meaningful treatments.

Wildlife (Winter Range): Constraints from mule deer, elk, bighorn sheep, and antelope winter range would be the same as under Alternative A.

Cumulative Impacts

During the life of the plan a more significant gain on restoring forest health would be made. Treating an estimated 390 acres per year (7,800 acres over the life of the plan) equates to 20% of the available forest and woodland landscape.

The PSQ would not inhibit the ability to treat at the landscape level. Without landscape-level treatments, using wildfire for resource benefit becomes less practical. Wildfire for resource benefit could now be considered as a tool for managing forest health in the Little Rocky Mountains (30,949 acres). Larger landscape-level treatments would provide a greater opportunity to utilize fire for resource benefit because fire management would be less restricted by boundaries.

Short-term impacts to soil may occur through ground-based mechanical equipment. Exposure of bare mineral soil would provide a seed bed for non-native and exotic plant species.

Forest health projects would continue to provide wood products and work opportunities to the local industry and help boost the local economy.

Impacts under Alternative D

Fire Management and Ecology: In the eastern half of the planning area, (including the 30,949 acres of forested land in the Little Rocky Mountains) FMUs would be recategorized as fire management Category C. Wildfire for resource benefit therefore could be considered in those FMUs as a management strategy. Fire suppression strategies other than full fire suppression could be applied as a management tool for improving forest health. Fire is a necessary disturbance that helps maintain and improve forest health by rejuvenating fire-dependent species such as aspen, chokecherry and lodgepole pine. In addition, the reintroduction of fire helps maintain fuel loadings at a level that helps prevent unwanted high intensity fires that detrimentally alter soil properties and wildlife habitat.

Forests and Woodlands: Forest health treatments could average approximately 390 acres per year and focus more on landscape-level treatments rather than quantity of commercial products sold. Guidance for old growth management now exists. Landscape-level projects that focus on forest health rather than product quantity would allow for a greater array of silvicultural treatments that mimic ecological processes. Additionally, silvicultural treatments would address old growth in guidance provided through the document "Old-Growth Forest Types of the Northern Region" (USFS 1992). Managing for old growth helps to provide habitat for dependent or associated wildlife species as well as playing an important role in multiple resource management. Additionally, old growth is a critical element of the total diversity that should be found in a healthy forest landscape.

Visual Resources: All forested areas within the planning area with the exception of the WSAs would be rated as Class III. This would result in increased landscape-level forest and woodland management opportunities on up to 44,282 acres (91% of the planning area). All remaining forested acres in the planning area would fall within the more restrictive Class I and II ratings and may be impacted similar to that described under Alternative A.

Wildlife (Winter Range): Constraints from mule deer, elk, bighorn sheep, and antelope winter range would be the same as Alternative A except that timing considerations would occur from December 1 to March 31, rather than to May 15. In

most situations, prescribed fire could be implemented successfully because weather and fuel prescriptions/parameters could be satisfied during April.

Cumulative Impacts

During the life of the plan a more significant gain on restoring forest health would be made. Treating an estimated 390 acres per year (7,800 acres over the life of the plan) equates to 20% of the available forest and woodland landscape.

The PSQ would not inhibit the ability to treat at the landscape level. Without landscape-level treatments, using wildfire for resource benefit becomes less practical. Wildfire for resource benefit could now be considered as a tool for managing forest health in the Little Rocky Mountains (30,949 acres). Larger landscape-level treatments would provide a greater opportunity to utilize fire for resource benefit because fire management would be less restricted by boundaries.

Short-term impacts to soil may occur through ground-based mechanical equipment. Exposure of bare mineral soil would provide a seed bed for non-native and exotic plant species.

Forest Health projects would continue to provide wood products and work opportunities to the local industry and help boost the local economy.

Impacts under Alternative E (Preferred Alternative)

Fire Management and Ecology: A majority of the FMUs would remain as Category B, so using wildfire for resource benefit would not be considered as a management option as unplanned fire is likely to cause negative effects. However, the Malta Prairie Potholes and Malta Breaks FMUs would be recategorized as Category C, where fire is desired to manage ecosystems; but ecological, social, or political conditions create constraints on use of wildfire for resource benefit. If these constraints exist, fire suppression may be required in these FMUs. Fire is one of the disturbances necessary to maintain and improve forest health in these fire management units. Fire (natural or introduced) helps facilitate healthy forests by rejuvenating fire-dependent species such as aspen, chokecherry and lodgepole pine. In addition, the reintroduction of fire helps maintain fuel loadings at a level that helps prevent unwanted high intensity fires which detrimentally alter soil properties and wildlife habitat. Without fire in the forest development cycle, rejuvenation of critical wildlife species and forest health would continue to stagnate or decline.

Forests and Woodlands: Forest health treatments could average approximately 390 acres per year and focus more on landscape-level treatments rather than quantity of commercial products sold. Guidance for old growth management now exists. Landscape-level projects that focus on forest health rather than product quantity allow for a greater array of silvicultural treatments that mimic ecological processes. Additionally, silvicultural treatments would address old growth in guidance provided through the document "Old-Growth Forest Types of the Northern Region" (USFS 1992). Managing for old growth helps to provide habitat for dependent or associated wildlife species as well as playing an important role in multiple resource management. Additionally, old growth is a critical element of the total diversity that should be found in a healthy forest landscape.

Visual Resources: The Sweet Grass Hills and the Bears Paw and Little Rocky Mountains would be assigned a Class III rating. This would result in increased landscape-level forest management opportunities on up to 38,037 acres (77% of the planning area). All remaining forested acres in the planning area would fall within the more restrictive Class II ratings and may be impacted similar to that described under Alternative A.

Wildlife (Winter Range): Constraints from mule deer, elk, bighorn sheep, and antelope winter range would be the same as Alternative A. Mule deer, elk, bighorn sheep, and antelope winter range covers most of the conifer vegetation types in the planning area. Because of the extent of the winter range habitats, most forest health activities including mechanical treatments and prescribed fire could have constraints from timing limits that would occur from December 1 to May 15. Contracts may require multiple years to be completed. In some situations, prescribed fire may not be available as a treatment option because weather and fuel prescriptions could not be satisfied in forested settings during summer and fall.

Cumulative Impacts

During the life of the plan a more significant gain on restoring forest health would be made. Treating an estimated 390 acres per year (7,800 acres over the life of the plan) equates to 20% of the available forest and woodland landscape.

The PSQ would not inhibit the ability to treat at the landscape level. Without landscape-level treatments, using wildfire for resource benefit becomes less practical. Wildfire for resource benefit could now be considered as a tool for managing forest health in the Little Rocky Mountains (30,949 acres). Larger landscape-level treatments would provide a greater opportunity to utilize fire for resource benefit because fire management would be less restricted by boundaries.

Short-term impacts to soil may occur through ground-based mechanical equipment. Exposure of bare mineral soil would provide a seed bed for non-native and exotic plant species.

Forest health projects would continue to provide wood products and work opportunities to the local industry and help boost the local economy.

Lands and Realty

This section describes potential effects to lands and realty from management actions by other resource programs. Lands and realty addresses management of rights-of-way, leases and permits; administration of withdrawals; and land ownership adjustments.

Lands and Realty responds to requests for land use authorizations (e.g., rights-of-way, permits, or leases), as well as land ownership adjustments from outside entities or other programs. This analysis addresses how the implementation of management actions may modify the location, size, or design of a given proposal, such as for a right-of-way or a land exchange. Such effects would primarily occur from the implementation of management actions designed to protect natural resources and limit impacts on those resources from surface-disturbing activities and may even preclude approval of a proposal. Therefore, the type and degree of limitations or restrictions placed on a given proposal depends on the location of sensitive or high-value resources and the potential for environmental impacts on those resources.

Assumptions and Guidelines

- Demand for land use authorizations will continue. It is assumed that the demand for these authorizations would fluctuate directly with the degree of economic growth and development occurring within and adjacent to the planning area.

- Applications for rights-of-way may increase to accommodate energy development, especially oil and gas, communication site usage for public safety and homeland security, and utilities in support of community expansions/needs. However, the number of authorizations for rights-of-way has remained steady at around 22-23 grants over the last three years. Surface disturbance resulting from 2007 authorizations can be broken down as follows:

  - 4 temporary use permits for 6.38 acres of disturbance;
  - 7 road rights-of-way for 16.15 acres of disturbance;
  - 2 powerline rights-of-way for 1.58 acres of disturbance;
  - 3 buried telecommunications rights-of-way for 32.8 disturbed acres; and
  - 7 oil and gas pipeline rights-of-way for 7.42 acres of disturbance;
  - A total of 64.33 acres of surface disturbance.

- The need to protect sensitive resources could result in construction delays or the need to relocate proposed rights-of-way. The need to relocate could result in an increase to acres of surface disturbance; it is assumed this increase would not exceed 10%.

Land Ownership Adjustment

- It is expected that proposals for land ownership adjustments to improve the manageability of federal and non-federal lands will continue to be brought forth on an occasional basis. Land exchange would continue to be the preferred method of land ownership adjustment.
- Due to differences in appraised values, it is expected that there would be a net loss in acres of BLM lands in most exchange transactions.

Access

- Demand for adequate public access is expected to exceed access acquisition opportunities. Easement acquisition and land exchange is likely to be the primary means of acquiring access when opportunities arise.

Withdrawal

- It is assumed withdrawal will continue to be used to protect critical resources.

Impacts Common to All Alternatives

Cultural Resources: The management of cultural resources could affect several aspects of the lands and realty program including land use authorizations, land ownership adjustments, and the acquisition of legal and physical access to BLM land. These lands and realty actions are considered federal undertakings and must avoid inadvertent damage to federal and non-federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. Cultural inventories would need to be completed prior to these federal undertakings and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery. This could result in rerouting a proposed right-of-way or road easement, or restructuring or abandoning a proposed land exchange or sale, in whole or in part. These measures can increase processing costs and processing time for both the federal and non-federal parties.

Paleontological Resources: The impacts from the management of paleontological resources would be very similar to those of cultural resources. Lands and realty projects occurring in known fossiliferous areas would require that adequate time and resources be allocated to conduct an inventory of these resources. The discovery of scientifically important paleontological resources could result in the rerouting or redesign of proposed right-of-way and easement facilities; it could also lead to the restructuring or abandoning of land exchanges or sales, in whole or in part. Such actions can increase processing costs and time for both the federal and non-federal parties.

Vegetation: The management of vegetation, including special status species, would have several environmental consequences. The need to protect riparian and wetland vegetation and/or special status species would impact land use authorizations, land ownership adjustments, and acquisition of legal and physical access to BLM land. Facilities proposed for construction under various land use authorizations or access easements in areas where these types of vegetation are present may need to be mitigated, constructed in alternate locations, or in extreme cases, dropped from consideration. The need to protect certain vegetation types could also result in the restructuring or elimination of a land ownership adjustment proposal such as an exchange or sale.

Fire Management and Ecology: Fire management under all alternatives to manipulate/enhance vegetative composition would generally help protect facilities authorized under the lands and realty program by reducing fuel loads and suppressing fires. However, there is always a slight possibility of losing control of prescribed fire and damaging above-ground right-of-way facilities.

Solid Minerals: The management of leasable, salable, and locatable minerals under all alternatives may result in requests for rights-of-way for utilities and access.

Transportation and Facilities: Transportation and facilities management could require that easements be acquired for any BLM roads or other types of facilities to be located on non-federal lands. Right-of-way reservations may be needed for BLM roads or other types of facilities, such as recreation, to be located on BLM land.

Fish and Wildlife: The management of wildlife and fisheries, including special status species, would have several environmental consequences. The need to protect special status species as well as certain other species of fish and wildlife could impact land use authorizations, land ownership adjustments, and the acquisition of legal and physical access to BLM land. Facilities proposed for construction under various land use authorizations or access easements in areas that could adversely affect wildlife or fisheries may need to be mitigated, relocated, or in some cases, dropped from consideration. Land ownership adjustments such as exchanges or sales proposed in areas where wildlife or fisheries could be adversely affected may need to be restructured or eliminated from consideration. These types of actions could increase processing costs and time for both the federal and non-federal parties.

Lands and Realty: Reviewing existing withdrawals and revoking or modifying those that are no longer serving their intended purpose would ensure that the BLM land is not unnecessarily encumbered and are open to the widest possible array of public land uses consistent with other portions of the plan. Such a review would also ensure that withdrawals and classifications still serving their intended purpose would remain in place. Management proposed for recommended new withdrawals under all alternatives would also ensure that such actions encumber the minimum area necessary to achieve the intended purpose.

In terms of health and safety, land use authorizations for uses involving the disposal or storage of materials which could contaminate the land would not be issued. Lands proposed for acquisition or disposal would need to be inventoried for the presence of hazardous materials. The presence of contaminants may lead to actions such as the modification or abandonment of a land exchange proposal, or remediation in the form of cleanup and removal of the contaminants.

All land use authorizations require follow-up. This may be in the form of monitoring a year or two after authorization to ensure a right-of-way was constructed and the surface disturbance reclaimed according to the stipulations attached to the right-of-way grant. Or it may be monitoring to determine that no resource impacts are being caused by the right-of-way, or that the right-of-way itself is not being impacted. As more rights-of-way are authorized, the monitoring workload increases.

Renewable Energy: Any renewable energy development proposed for BLM land could result in requests for site, utility and access rights-of-way.

Special Designations: The need to manage national trails to protect the values for which they were designated could impact applicants for rights-of-way as well as BLM actions to obtain legal and physical access across non-federal lands to BLM lands. Proposed facilities such as powerlines may need to be mitigated (e.g., burial of the line) or rerouted in order to protect the trail values. Land ownership adjustments such as sales or exchanges may need to be restructured or eliminated from consideration in order to avoid disposing of BLM lands containing important trail segments.

Management of any BLM lands that may be designated as ACECs could impose stipulations on the use of these areas for land use authorizations and would preclude realty-related disposals of these lands.

Impacts under Alternative B

Wilderness Characteristics: The 386,462 acres of lands managed for wilderness characteristics would be avoidance areas for rights-of-way, leases, permits, and other land use authorizations. Applications and inquires would be analyzed on a case-by-case basis. If potential impacts can be mitigated and those actions do not affect any of the wilderness characteristic of that area, the action may be granted. A small portion of the Prairie Grasslands area (Area 84) includes about 1,500 acres of the Northern Border Corridor (an existing corridor in the HiLine District).

Lands with wilderness characteristics are identified as Category 1 (retention) and would not be available for sale or disposal.

Impacts under Alternative C

Wilderness Characteristics: A total of 4,118 acres of land managed for wilderness characteristics in Area 1 (Island Mountain Range) and 46,937 acres of land in Areas 20B and 55 (Sagebrush Grasslands), would be managed as exclusion areas for rights-of-way, permits, and other land use authorizations.

The remaining 177,364 acres of lands managed for wilderness characteristics would be avoidance areas for rights-of-way, leases, permits, and other land use authorizations. Applications and inquiries would be analyzed on a case-by-case basis. If potential impacts can be mitigated and those actions do not affect any of the wilderness characteristic of that area, the action may be granted. At a minimum, the following mitigation measures would be applied to all rights-of-way, leases, permits, and other land use authorizations granted in areas directly adjacent to or in areas managed for wilderness characteristics:

1. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment/vehicles create ruts in excess of 3 inches deep, the soil shall be deemed too wet to adequately support construction equipment/vehicles.

2. All surface disturbances resulting from construction or maintenance (as determined by the authorized officer) shall be rehabilitated. Surface disturbances shall be defined as areas having a lack of living plant tissue either above and/or beneath the soil surface as a result of the construction activity.

3. All vehicles and equipment should be pressure washed or otherwise thoroughly cleaned prior to entering public lands. The holder is responsible for the management of noxious and invasive plants. The holder must contact the authorized officer to ensure planned management of invasive plants conforms to BLM policy and federal/state laws.

4. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation, and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

5. The holder is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts.

6. The holder shall conduct all activities associated with the construction, operation, and maintenance of the facility within the limits of this right-of-way. If areas outside the right-of-way are needed, the grantee shall obtain a separate authorization for that use. Addition of any permanent or long-term, above-ground structures or other disturbances within the right-of-way may require separate authorization.

7. If an above-ground structure is required and authorized, the structure will be painted a BLM-approved color as directed by the authorized officer.

Lands with wilderness characteristics are identified as Category 1 (retention) and would not be available for sale or disposal.

Impacts under Alternative E (Preferred Alternative)

The 10,714 acres managed for wilderness characteristics would avoidance areas for rights-of-way, leases, permits, and other land use authorizations. Applications and inquiries would be analyzed on a case-by-case basis. If potential impacts can be mitigated and those actions do not affect any of the wilderness characteristics of that area, the action may be granted. At a minimum, the following mitigation measures would be applied to all rights-of-way, leases, permits, and other land use authorizations granted in areas directly adjacent to or in areas found to have wilderness characteristics.

1. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment/vehicles create ruts in excess of 3 inches deep, the soil shall be deemed too wet to adequately support construction equipment/vehicles.

2. All surface disturbances resulting from construction or maintenance (as determined by the authorized officer) shall be rehabilitated. Surface disturbances shall be defined as areas having a lack of living plant tissue either above and/or beneath the soil surface as a result of the construction activity.

3. All vehicles and equipment should be pressure washed or otherwise thoroughly cleaned prior to entering public lands. The holder is responsible for the management of noxious and invasive plants. The holder must contact the authorized officer to ensure planned management of invasive plants conforms to BLM policy and federal/state laws.

4. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation, and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

5. The holder is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts.

6. The holder shall conduct all activities associated with the construction, operation, and maintenance of the facility within the limits of this right-of-way. If areas outside the right-of-way are needed, the grantee shall obtain a separate authorization for that use. Addition of any permanent or long-term, above-ground structures or other disturbances within the right-of-way may require separate authorization.

7. If an above-ground structure is required and authorized, the structure will be painted a BLM-approved color as directed by the authorized officer.

Lands with wilderness characteristics are identified as Category 2 (retention-limited disposal) and would not be available for sale. The BLM land is these areas would not be disposed of other than by exchange and only when necessary to further protect or enhance the wilderness characteristics.

Cumulative Impacts

As the population continues to shift from urban areas to a more rural setting, more land is subdivided. This will result in an increasing demand for rights-of-way to address access needs, enhanced telecommunications capacity, and increased demands for power. As more private lands are closed to recreational use, the public will turn their attention to available open lands (i.e., BLM land, block management areas, and private land where access is allowed). Consequently, there will be an increased demand for recreational access, whether through access easements, conservation easements that provide access, or land exchange proposals that enhance access.

Livestock Grazing

This section describes potential impacts to livestock grazing from the implementation of management actions for other resource programs. Impacts to livestock grazing activities are generally the result of activities that affect forage levels, land use restrictions that affect the ability to construct range improvements, and human disturbance/harassment of livestock within grazing allotments. Activities that result in surface disturbance (e.g., mineral development, right-of-way construction, and recreation) or management of resources that results in limiting surface disturbance (e.g., fish and wildlife, vegetation, water resources, soil resources, and visual resources) also would impact livestock grazing by

affecting forage levels. Management of fire and forest and woodland products would affect livestock grazing by either preserving or increasing available forage for livestock over the long term.

Assumptions and Guidelines

Allowable uses and management actions that limit, reduce, or prohibit livestock grazing or animal unit months (AUMs) in the planning area are considered adverse impacts. Deterioration in rangeland health also is considered adverse to livestock grazing. For example, restrictions on livestock grazing or AUMs from other resources are considered adverse impacts. Conversely, beneficial impacts to livestock grazing include those allowable uses or actions that improve rangeland health, increase AUMs, or decrease restrictions and costs to graze livestock.

Direct impacts to livestock grazing result from actions that change AUM allocations, rangeland health, or restrict livestock grazing. Indirect impacts result from actions that alter livestock grazing management on BLM land within the planning area.

For the purpose of this analysis, short-term impacts include activities that affect livestock grazing within five years of when the activity occurs. Long-term impacts are those remaining or occurring after five years.

- Livestock grazing would occur throughout most of the planning area, and the type of grazing use would remain about the same.
- Livestock grazing is not considered a surface-disturbing activity.
- Range improvement projects would continue to be used to achieve rangeland management goals.
- Livestock grazing allocations would not change because of ACEC or special management area designations.

Impact analyses and conclusions are based on interdisciplinary team knowledge of rangeland resources within the planning area, existing rangeland health and range monitoring data, reviews of existing literature, the Rangeland Administration System, and information provided by other agencies. Effects are quantified where possible. In the absence of quantitative data, best professional judgment was used. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

Impacts Common to All Alternatives

Cultural Resources: Managing cultural resources can restrict the location and design of rangeland improvement projects and consequently grazing systems. For example, avoidance of cultural resource sites, limitations on activities located within 1/4 mile of historic trails, and activities impacting the historic landscape may limit the BLM's ability to construct rangeland improvement projects in an allotment aimed at better management of livestock. In addition, cultural resource management can delay construction of range improvement projects by requiring additional surveys and changes in project designs to avoid cultural sites.

Fire Management and Ecology: Fire can have both beneficial and adverse impacts to livestock grazing. In the short term, fire burns forage that livestock depend on and can damage facilities such as fences. This damage can have a substantial adverse economic impact on grazing operations by requiring leasing of additional pasture, feeding livestock for longer periods of time, repairing or building more fences, and reducing herd size. In the long term, fire may improve the quality and quantity of forage, thereby improving flexibility in managing livestock.

Both wildfire and prescribed fires can increase the extent of invasive non-native plant species (INPS) found on an allotment. The extent that fire degrades rangeland health through propagation of INPS typically depends on the proximity to a source of INPS seed, the type of vegetation community burned, and fire severity. Fire management using prescribed fire can benefit livestock grazing by improving the quality, quantity, and availability of forage for livestock. Prescribed fire also can help meet specific management objectives, such as improving distribution of livestock or removing dense stands of brush. Fire suppression activities can limit the loss of livestock, short-term loss of forage, and in some cases, the long-term damage to vegetation caused by fire, but it can also increase the likelihood of INPS introduction and/or spread into an allotment. The long-term impact of repeated fire suppression is the buildup of hazardous fuels and the increased risk of severe or high severity wildfire. The long-term impact of fire suppression can

also lead to a decline in rangeland health, especially in those ecosystems that evolved under a naturally occurring frequent fire return interval.

Fluid Minerals: Fluid mineral development on BLM land can result in the direct removal of forage available to livestock. Rangeland health and forage production can be indirectly affected by mineral development through the introduction and spread of INPS and soil loss. Both the direct and indirect impacts of mineral development are associated with surface disturbance caused by constructing road networks; drilling; installing well pads, pumps, pipelines, and water detention facilities; other associated infrastructure; and ongoing maintenance. When compared to other minerals, oil and gas development is anticipated to cause the most surface disturbance and hence, the most adverse impact on livestock grazing in the planning area. Of a total of 969 allotments administered by the HiLine District, 185 allotments are in areas considered to have a high-to-moderate potential for oil and gas development. All or portions of these 185 allotments would likely be affected by oil and gas development. Both short-term and long-term impacts to AUM allocations may occur, of which the long-term impacts are of greater concern to livestock grazing. The degree of impact would depend on the rate of development, production success, and how quickly disturbed areas are reclaimed. For example, it is expected that disturbed areas associated with nonproducing wells would be reclaimed fairly quickly and AUMs taken out of production restored. This would be considered a short-term impact. On the other hand, for producing wells, it may take many years before disturbed areas are reclaimed and made available for grazing use. This would be a long-term impact. Reducing AUMs would be local in nature since development is unlikely to occur simultaneously across the entire area (e.g., all wells developed at the same time). The impact on AUM allocations could be substantial for individual allotments, but the overall impact of disturbance from oil and gas development on AUMs in the planning area is expected to be negligible.

Lands and Realty: Land disposal could occur throughout the planning area. The majority of land disposed of would likely continue to be grazed under different (e.g., private) ownership; however, grazing fees would no longer be collected by the BLM for these areas. Land disposal is frequently tied to land exchanges, resulting in no net change in AUMs, or only a slight increase or decrease in AUMs. Land exchanges between the BLM and private entities typically result in the BLM acquiring fewer acres of higher overall quality than the acreage disposed, resulting in a reduction in the number of acres managed by the BLM. However, the impact on overall AUMs in the planning area cannot be predicted due to the differences in forage production among sites. Land disposal and acquisition may or may not occur in the same allotment. Consequently, land exchange frequently has a more dramatic impact on specific allotments than on the total number of AUMs in the planning area.

Subdividing base property for recreation or housing developments could potentially impact the BLM's ability to effectively manage adjacent BLM land for grazing. Subdividing would primarily impact individual grazing allotments and could result in breaking allotments into smaller units or in canceling the grazing lease entirely. In addition to structures, subdivisions generally result in more roads, fences, powerlines, and other facilities – all of which can fragment habitat and increase the opportunity for introduction or spread of INPS. The long-term impact could result in loss of AUMs and degradation of rangeland health.

Livestock Grazing: Livestock grazing would continue to occur within the majority of the planning area under all alternatives; however, 47,000 acres would be not available for livestock grazing. Standards and Guidelines (BLM 1997a) would be applied, regardless of the alternative. Vegetation treatment projects designed to benefit rangeland health also are anticipated to occur under all alternatives. Prescribed burning is anticipated to be a higher priority than it has been in the past.

The analysis of alternatives is based on existing conditions and the assumption that over the last 40 to 50 years, an overall improvement in range conditions has occurred. Such improvement is due largely to improved grazing management practices, development of range improvement projects (e.g., fences and water developments), and in some cases, reduction in livestock numbers or change in kind of livestock.

Rangeland improvement projects, such as fencing and water development, also occur under all alternatives. Impacts associated with fencing and water pipelines generally are considered to be short-term and typically regeneration occurs within two to three growing seasons. While impacts associated with the construction of these facilities are short-term, the indirect impacts of these actions can be long-term. For example, new fences and new water developments are expected to change livestock grazing patterns and distribution within the allotment. Moreover, congregation of livestock and wildlife around the water source and trailing patterns also are expected to change as a result of constructing these

facilities. Overall, the long-term impacts from these facilities are anticipated to be a beneficial improvement of rangeland health. Rangeland improvement projects allow livestock managers and permittees to better implement grazing management practices and manage the distribution and movement of livestock within allotments.

AUM allocations within the planning area are not expected to change. Any changes in AUM allocations would be handled through the watershed planning process or on an individual allotment basis and may occur for several reasons, but generally would be limited to specific allotments. Any potential changes to AUM allocations would be based on the amount of available forage in an allotment as determined through monitoring or other means. The number of AUMs permitted in an allotment may be adjusted permanently, or placed into suspended use for the short-term (three to five years). Changes in AUM allocations have more impact on individual allotments and lessees than they do to AUM allocations in the entire planning area.

Noxious Weeds and Other Non-Native Invasive Species: One of the primary indirect impacts of surface disturbance affecting rangeland health and productivity is the introduction and spread of INPS. INPS displace native vegetation and, because they typically are unpalatable to livestock and wildlife, remain ungrazed. This places more strain on remaining native vegetation to support grazers, giving INPS an additional advantage over native vegetation in their competition for water, nutrients, and light. Invasion of some weed species (e.g., cheatgrass) can alter the fire regime of an area, causing long-term adverse impacts to livestock grazing. Surface-disturbing activities typically include mechanized or mechanical disturbance, such as construction of well pads, roads, pits, reservoirs, pipelines, and powerlines; mining; and vegetation treatments. Although typically reclaimed, these activities can increase INPS infestations and soil erosion within allotments in both the short and long-term. Land reclaimed from oil and gas or other activities generally has a short-term beneficial impact on rangeland productivity due to the reseeding and subsequent growth of native grasses.

Wilderness Characteristics: Lands managed for wilderness characteristics would have minimal indirect impacts to livestock grazing potentially affecting approximately 99 individual allotments under Alternative B, 46 allotments under Alternative C, and four allotments under Alternative E. Impacts would mostly be limited to restrictions in surface-disturbing activities like new range improvements or through changes to VRM class that could result in restrictions to preserve or retain the existing character of the landscape. About 4,118 acres would be managed as VRM Class I and 382,344 acres as VRM Class II under Alternative B, 228,419 acres as VRM Class II under Alternative C, and 10,714 acres as VRM Class II under Alternative E.

No changes to livestock grazing or grazing allocations would occur on any lands managed for wilderness characteristics, and all agreements and provisions for maintenance and upkeep of existing range improvements would continue to remain in effect including access to and complete reconstruction of existing range improvements provided such is kept within the original footprint of the project. New range improvements and land treatments could be allowed provided they meet with the objective of enhancing or restoring those wilderness characteristics being managed for and meet with the requirements of the VRM class.

Impacts to primitive recreation could occur if cattle are allowed to congregate in recreation areas which would create conflict between recreation users and cattle. Achieving or maintaining Standards for Rangeland Health and Guidelines for Livestock Grazing Management would benefit wilderness characteristics by maintaining and enhancing natural environments.

Any new range improvements would be built to VRM Class II specifications and may help livestock operators meet the standards for rangeland health and proper functioning condition. This would improve or maintain natural conditions in areas with wilderness characteristics and therefore have no effect. Natural conditions would be expected to remain similar to those present now.

Wildlife and T&E Species: Management for plant and wildlife species designated as threatened or endangered under the Endangered Species Act or considered to be sensitive species by the BLM in the planning area can affect livestock grazing in allotments where these special status species occur. Specifically, restrictions on the type, location, or time period the activity is allowed could limit livestock management options in allotments where sensitive species occur. In addition, special status species management can increase costs to livestock grazing operations by requiring additional surveys and design changes to projects. In sagebrush habitats where greater sage-grouse or other sagebrush-dependent species may occur, the placement of range improvement projects, season of grazing use, level of grazing use, use of prescribed fire, adjustments in grazing preference, and seasonal restrictions all may be affected; however, because

livestock grazing is not a surface-disturbing activity, those stipulations applying specifically to surface-disturbing activities and timing restrictions on such would not apply to livestock grazing and would minimize the direct impacts to livestock grazing from wildlife stipulations as they apply to surface-disturbing activities. Prairie dogs are another species that may affect livestock grazing. Although the black-tailed prairie dog is not listed as threatened or endangered, it is a BLM sensitive species, an important food source for several raptors, and provides habitat for the burrowing owl and the black-footed ferret. The agricultural community in the planning area is concerned about large towns of prairie dogs and how they could affect the forage base, as well as how managing these species affects their grazing operations.

Cumulative Impacts

Management on the adjoining Charles M. Russell National Wildlife Refuge (CMR) and UL Bend National Wildlife Refuge has the potential to impact livestock grazing on BLM land in the planning area, particularly on those allotments bordering the refuge system where operators have both CMR and BLM grazing permits.

Prior to the mid-1970s, refuge lands were administered by the BLM. During the 1960s and 1970s many allotment management plans (AMPs) and grazing systems were developed and put into practice. Many of these were developed by Gus Hormay who is considered by many to be the "father of rest-rotation grazing." Many of these were four pasture, rest-rotation grazing systems. When the refuge system adopted a wildlife management emphasis in the mid-1970s, these AMPs and grazing systems were abandoned, historical grazing use on the refuge lands was dramatically reduced, and the grazing season was greatly restricted. In most instances, this change effectively divided these management units in half. This, in turn, served to limit grazing use on the remaining portions of the BLM allotments to the spring and fall seasons as the refuge system only permitted summer use.

Grazing on the refuge system is currently administered through a permit process; however, the refuge units still being permitted are grazed at rates approximately half those of comparable BLM units. Grazing seasons are also generally restricted to the summer season only. Changes to the refuge permitting system may affect BLM allotments which adjoin the refuge. This could create more intensive management of the BLM grazing allotments including an increased number of fences and range improvements. However, no change in BLM AUMs would be anticipated.

Impacts Common to Alternatives B, C, D, and E (Preferred Alternative)

Newly acquired lands that are designated as reserve common allotments or allocated to livestock grazing would have no effect to livestock grazing although it may affect local operators. Any newly acquired lands, relinquished allotments, or cancelled permits designated as unavailable for livestock grazing would potentially reduce the amount of forage available locally. Relinquishments and cancellations have historically been rare in the planning area, and there is currently little demand for creating reserve common allotments.

Transferring and renewing grazing permits/leases without further site-specific environmental analysis in those cases where a site-specific environmental analysis had previously been done, the grazing allotment(s) has been documented to be meeting land health standards, and the use in the new grazing permit/lease would be consistent with that specified on the previous permit/lease, would greatly reduce duplicative time and expense in administering grazing permits/leases. These actions would still require environmental review, likely through a Determination of NEPA Adequacy, indicating that no other change in the management circumstances or land health standards has occurred, any of which would necessitate a new site-specific analysis before a transfer or renewal of a grazing permit/lease could occur.

Use of yearling factors for establishing stocking rate and calculating AUM usage would have no impact on livestock grazing. Yearling factors are already in widespread use throughout the planning area, although this procedure has never been standardized which has resulted in a great deal of variability in use.

The changes to visual resources under each alternative would have no effect to livestock grazing or the construction/ maintenance of range improvements needed to manage livestock grazing.

Changes to OHV use and travel management areas would likely not affect livestock grazing as permittees would continue to be allowed an exception for the management of their animals and permit.

Commercial wind energy development could indirectly affect livestock grazing similar to those effects described under fluid mineral development.

Cumulative Impacts

Cumulative impacts would be the same as under Impacts Common to All Alternatives, Cumulative Impacts.

Noxious Weeds and Other Invasive Non-Native Species

Assumptions and Guidelines

Actions that contribute to increases in abundance and distribution of invasive species are considered adverse impacts. Beneficial impacts include actions that protect, restore, or otherwise aid existing communities in resisting invasion.

Direct impacts to invasive species result from actions that disperse reproductive plant material to areas not invaded, cause surface disturbance in or around infested areas, or a combination of both. Indirect impacts to invasive species are those actions that cause surface disturbance or otherwise change the function or structure of existing systems that either favor or discourage invasion without providing invading plant material.

Direct impacts from invasive species include direct effects on the system being invaded which can be beneficial and/or adverse. For example, some invasive species can act to bind soil and contribute to stability while others are capable of increasing bare soil and the probability of erosion. Indirect impacts from invasive species are those impacts that are secondary to the impacts to system functionality. An example of indirect impacts from invasive species would be loss of carrying capacity for livestock and its associated economic impact due to loss of desirable vegetation caused by invasive species encroachment.

The introduction of invasive invertebrates, vertebrates, microorganisms, plants and pathogens can threaten the stability of ecosystems, create serious human health consequences, and cause substantial economic burdens. Large majorities of native and non-native species do not pose a threat to natural or human systems. However, if any of these species were to become a concern, the BLM would cooperate and coordinate with appropriate government agencies, private industry, and other interested parties involved in public education efforts and control, management, and research of invasive species.

The following assumptions are made for this impacts analysis:

- Increases in invasive species would reduce habitat quality and quantity, reduce livestock forage quality and quantity, reduce soil/site stability, and affect hydrologic function and biotic integrity.
- The expansion of invasive species will most likely continue at its present rate.
- Surface disturbances substantially increase the probability of introduction and establishment of invasive plant species.
- The primary pathways for introduction of invasive and noxious plant seed and reproductive plant material are the road network and waterways.
- Invasive species can be impacted by actions and act as an impact to other resource and resource uses.
- Management of existing invasive and noxious plants will be long-term (over 10 years) and in many instances perpetual.
- Integrated Pest Management will be the management strategy for all invasive species-related issues.
- Mitigation measures developed for surface-disturbing activities will be followed when these activities are implemented.

Impacts Common to All Alternatives

Although potential exists for the introduction and establishment of noxious weeds and other invasive non-native species from many of the current and proposed actions throughout the range of alternatives, mitigation measures are already in

place for these types of activities which decrease any potential or real spread of noxious weeds and other invasive non-native species, regardless of the variation in acres disturbed across the alternatives.

Fire Management and Ecology, Forests and Woodlands, Soil Resources, and Vegetation – Riparian: Actions that conserve soil by mitigating surface-disturbing activities and retaining vegetative cover would complement the prevention and control of noxious weeds and invasive species. Proper road maintenance and conditions placed on land use authorizations and surface-disturbing activities would limit the spread of noxious weeds and other invasive non-native species. Implementation of these mitigation measures would decrease any potential or real spread of noxious weeds and other invasive non-native species regardless of the variation in acres disturbed across the proposed alternatives.

Crested wheatgrass is a non-native species that has been used a great deal over the past century to stabilize soils and as forage. Renovating current stands of crested wheatgrass mechanically, adding fertilizer, and seeding new areas would encourage its expansion. This disturbance and changes in soil nutrients also would encourage other invasive species to the detriment of native plants. Large areas of these activities may contribute to unintended species shifts outside the renovated area. These effects may be undesirable and inconsistent with rangeland objectives. However, controlling existing crested wheatgrass stands in the attempt to convert them to native species may be difficult and take more than 3 years of treatments to accomplish. Disturbance from this type of effort would open up areas to invasion from other undesirable plant species.

Livestock Grazing and Wildlife: Continued efforts to manage noxious weeds and other invasive species would improve biodiversity, watershed function and rangeland health. Management actions to improve ecological function and rangeland health would have a positive effect on preventing or reducing INPS, including noxious weeds. Habitats that exhibit better health and function are more resistant to the colonization and establishment of invasive species.

Wildlife and livestock would contribute to the spread of weeds. Weed seeds could either become attached to the animal or be ingested and transported to other areas. Areas where animals concentrate and disturb the soil would be particularly vulnerable to infestations of weeds. Range improvements for both wildlife and livestock management objectives that disturb the soil surface would provide locations for undesirable plants to become established. Overutilization of native and desirable vegetation in areas could increase the susceptibility of an area to weed infestation. However, grazing plans that promote healthy rangelands and vegetation would create conditions resistant to the spread of weeds.

Currently, the use of domestic sheep and goats as a control measure is limited to the west end of the planning area, and does not occur in bighorn sheep habitat. There is a potential effect to the management of noxious weeds and other invasive plants via non-classical biological control in proximity to bighorn sheep populations in that this method of control would be made unavailable for future projects. However, current information indicates that there would be little, if any, conflict because treatable infestations and bighorn sheep habitat do not overlap.

Treatments to control invasive species in sage-grouse habitat would include timing and treatment stipulations to minimize temporary effects to sage-grouse from treatments. Grasshopper/Mormon cricket treatments, if conducted, would not be applied to critical sage-grouse habitat.

***Noxious Weeds and other Invasive Non-Native Species*:** Continued implementation of current management of noxious weeds would help prevent new invasions of these species from becoming established in the area. Widely distributed species such as leafy spurge, field bindweed, Russian olive, and Canada thistle would continue to persist. Containment efforts for these species would be perpetual and would require the cooperation of other landowners to accomplish this goal.

Any pesticides or toxicants proposed for use that are not covered by the Vegetation Treatments on BLM Lands in 17 Western States Programmatic EIS (BLM 2007c) would require a detailed environmental and risk analysis.

Recreation, and OHV Use and Travel and Transportation Management: Special recreation management areas are, or have the potential to become, destination areas for visitors from outside the region. The potential for introduction of new invasive species introductions would be higher in these areas. These areas are easier to monitor for new infestations because they are defined. Conversely, extensive recreation would be difficult to monitor and introductions due to these activities would more likely be of invasive species already known to occur locally. Areas that are designated for OHV use would be monitored regularly for new introductions similar to other special recreation management areas.

Fluid Minerals and Solid Minerals: Surface-disturbing activities would impact invasive species to varying degrees depending on the amount, location, and type of disturbance. Surface-disturbing activities remove protective vegetative cover and can alter soil physical, chemical, and biological properties; resulting in increased susceptibility to water and wind erosion, and decreased soil quality and site productivity. This alteration favors invasive species colonization and establishment. These activities are mitigated through Conditions of Approval, Standard Operating Procedures, BMPs and stipulations. Implementation of these mitigation measures would decrease any potential or real spread of noxious weeds and other invasive non-native species regardless of the variation in acres disturbed across the proposed alternatives.

Lands and Realty: Any new acquisition of lands or easements would need to be inventoried for invasive species to determine the impact and cost of management of that parcel.

Any disposal lands would have to be inventoried for the presence of noxious weeds in order to disclose this information according to Montana law.

Invasive species effects on rights-of-way would be mitigated by stipulating that the responsibility for weed control and prevention be on the holder until the right-of-way is abandoned and successfully rehabilitated.

Cumulative Impacts

Integrated Pest Management Practices (IPM) implemented by the BLM have been conducted to the extent time and resources allowed since the mid-1980s. Although more emphasis was placed on integrated weed management through the 1990s and into the 2000s, adequate resources have not yet been available to meet the challenge of reducing invasive plant populations. Cooperation with county weed districts and private landowners has helped to address invasive species challenges on a broader level. Although management has been inadequate to prevent the spread of invasive species, the management actions have slowed their expansion and in localized areas been able to contain and eradicate certain species and infestations.

The present and future goal is to prevent the introduction and spread of noxious weeds and invasive species through cooperative IPM. Through these means, the BLM hopes to prevent the introduction and establishment of invasive species new or unknown to the planning area, lower the rate of spread for those species currently well established, and manage invaded systems so that they regain or maintain function to the extent practicable.

The use of herbicides on BLM lands since 2000 has been relatively consistent. This can be said generally about each county weed district's activities. There is no reasonable way to determine the use of herbicides by private individuals. Little information is available to determine the cumulative impact of repeated applications of herbicides across the planning area other than factors that are already monitored for rangeland and riparian health. Mitigations applied from the Vegetation Treatment EIS (BLM 2007c) and the pesticide labels are designed to mitigate and avoid these perceived impacts. Foreseeable future use of herbicides should remain consistent unless resources and priorities change above the scope of this analysis.

Classical biological control has been used across the planning area by the BLM since the late 1980s; however, there may be some instances where local weed districts have made releases prior to that. This form of biological control impacts target plant species over a longer time span as they have to establish a viable population from a small number of individuals. Given time and supplemental population enhancements through continued releases, some areas have shown that biological control is a useful tool for invasive species management. These populations have not yet been given adequate time to reach an equilibrium where the interaction between the plant and insect has stabilized. It is not known to what extent these agents will control a specific target plant.

Past and present actions that affect and have affected invasive species include mineral/energy exploration and development, overutilization of vegetation by wildlife and livestock, recreational uses (including OHVs, nonmotorized recreation, etc.), and vegetation treatments (including those for fire management and forest health). In general, these actions have all had cumulatively adverse impacts on other resources due to the introduction of invasive species by causing surface disturbance. It is reasonably foreseeable that these actions will continue to occur and could continue to affect the invasive species populations in these areas. However, mitigations designed and implemented for each of these activities should minimize these effects.

Surface disturbance would increase the potential for proliferation of noxious and invasive species, which would increase the need for monitoring and control activities. Vegetation treatments would cause short-term impacts on vegetation by decreasing vegetation production and increasing establishment of early successional species. However, long-term effects would include increased production and diversity of vegetation communities.

Off-Highway Vehicle Use and Travel and Transportation Management

The following section describes the effects of each alternative on OHV use and management in terms of short-term and long-term effects. Refer to Map 2.6 in Chapter 2 for OHV use designations in the planning area by alternative.

Assumptions and Guidelines

Methods and assumptions used in this analysis include the following:

- Visitor use and demand is likely to continue to increase for both motorized and nonmotorized users.
- Demand for adequate public and agency access to BLM land will remain high.
- OHV use is motor vehicle use of the non-highway road and trail network on BLM land. It includes all resource-related activities, including recreation and those associated with livestock grazing and mineral development.
- Recreational OHV use is highest within large blocks of BLM land with public access and with special resource values such as those associated with hunting and fishing.

Within all travel management areas, off-road vehicle area designations will be designated as limited to existing roads, primitive roads and trails unless otherwise classified as open or closed to meet land use plan objectives (43 CFR 8340).

Until travel management plans are developed, area designations will guide where and how motorized vehicle use will occur. In the event that certain roads or areas designated as open cause the following concerns, signs and barriers will be utilized to close those specific roads or areas:

- significant adverse effects on public land resources;
- considerable nuisance or threats to public safety;
- conflicts of use.

Travel management areas are identified in this RMP and prioritized as high, moderate and low, but no site-specific route designations will be made; therefore, travel and transportation management plans will need to be developed after the completion of this RMP that define designated motorized and nonmotorized transportation networks.
The following assumptions are made before any site-specific travel management planning can occur:

- Inventory and road condition assessments will be completed for each travel management area prior to travel management planning.
- Recorded easements will be reviewed to identify the need to secure legal access to BLM lands.
- Baseline road inventory maps will be printed and made available to the general public for their review utilizing open houses, etc.

Allowable uses and management actions with the potential to affect OHV use primarily include land use designations and restrictions. Effects are described in two ways: the effect a particular designation has on OHV use, and the effect OHV use has on lands due to a particular designation.

All alternatives designate areas within the planning area as open, closed, limited to existing roads, primitive roads and trails, or limited to designated roads, primitive roads and trails.

Effects from the Designation "Open to All Motor Vehicles" – This designation would be of great benefit to users of all-terrain vehicles, motorcycles, and other strictly off-road vehicles. The effect is that such designations benefit OHV users and the community by providing an appropriate, managed place for a kind of OHV recreation considered inappropriate in most areas.

Effects from the Designation "Limited to Existing Roads, Primitive Roads and Trails" – Under this designation, user-created roads, primitive roads and trails could add to the number and miles of motor vehicle routes currently in existence on BLM land. No complete inventory of roads exists, making it difficult for the BLM to determine what existed at the time of the RMP decision. A new set of vehicle tracks is often confused with an existing road and as these tracks attract use, new roads are made. Accordingly, the road system continues to grow. Neither public access nor OHV opportunities would be diminished by this designation.

Effects from the Designation "Limited to Designated Roads, Primitive Roads and Trails" – Under this designation, the incremental growth of user-created roads, primitive roads and trails would be curtailed. OHV use would be limited to a specific, designated network of roads, primitive roads and trails. Such a limitation would be beneficial to soils and limit the spread of INPS, but would have no effect on commercial or industrial uses of BLM land because roads necessary to facilitate those uses are handled under permits or authorizations. This designation would not affect public access, nor would it diminish OHV opportunities. Further, it would have no effect on other resource uses such as mineral development, because under such a designation, access roads are authorized as needed.

Effects from the Designation "Closed to All Motor Vehicle Use" – This designation eliminates motor vehicle access from closed areas, limiting access to nonmotorized means (e.g., foot or horseback). However, no alternative proposes more than 7,553 acres of land to be closed, so the effect is minor. This designation would be beneficial to the resources and resource uses, (wildlife habitats, etc.) it earmarks for protection.

Impacts Common to All Alternatives

The following effects to OHV use are common to all alternatives and most likely would occur from implementing travel management planning decisions. However, some of these effects may occur prior to travel management planning if significant adverse effects on public land resources occur.

Cultural Resources, Paleontological Resources, and Traditional Uses: Protection of important cultural and/or paleontological sites and the preservation of traditional uses may cause the relocation or closure of roads, thereby affecting OHV use.

Fish and Wildlife: Actions conducted for fish and wildlife management could affect OHV use. These actions may include habitat restoration and relocating or closing roads or trails, which may temporarily or permanently affect routes available for OHV use.

Recreation: Recreation management actions could affect OHV use and management. Promoting use and visitation could increase OHV use and could affect road, trail, and open area conditions.

Special Status Species: Protection of critical habitat for special status animal and plant species may permanently or seasonally affect the location and use of roads, primitive roads and trails, thereby affecting OHV use.

Water Resources: Water resource management calls for the use of BMPs and proper floodplain management and/or function to protect water quality. Water resource management may limit or restrict OHV use where water quality could be impaired by runoff from roads, primitive roads and trails.

Wilderness Study Areas: WSA management would be the same in all alternatives. The Bitter Creek WSA (60,701 acres) and the Burnt Lodge WSA (13,727 acres) would be managed as limited to designated primitive routes.

Impacts under Alternative A (Current Management)

Fluid Minerals: Under Alternative A, the amount of oil and gas development would be the second highest authorized on BLM lands of all the alternatives. With development, new roads are constructed to access new oil and gas well sites and could affect vehicle use patterns. Increased road construction would create more OHV access to BLM land but users may avoid these areas when operations were occurring, displacing them to other areas. These effects would occur mostly within the high and moderate potential areas for oil and gas development in Blaine and Phillips Counties and would continue in the future.

Lands and Realty

Land Ownership: Approximately 90,000 acres comprised of small, isolated tracts of BLM land throughout the planning area have been identified for disposal either through land exchange or by sale. Exchanging BLM land for other lands most likely would have a beneficial effect on OHV use by blocking up existing BLM land, which would make available a larger area for OHV use and/or possibly increase legal access to resource-valued isolated BLM land. The sale of BLM land with legal public access would result in the loss of OHV use associated with the specific BLM land sold.

Access: BLM land in the Kevin Rim ACEC, Sweet Grass Hills ACEC and in and around the Marias River have been identified for gaining additional legal access with acquisition of easements from private landowners. Although the Sweet Grass Hills ACEC would remain closed to OHV use, gaining legal access to resource-valued BLM land would make available more public land for OHV use for the recreating public, especially during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving and viewing wildlife.

Rights-of-Way, Leases and Permits: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. No acres are projected to be disturbed in the long term because of implementation of reclamation activities. Rights-of-way, leases and permits would be granted for development of surface-disturbing actions such as utility lines, communications sites, oil and natural gas development, and wind farms. These surface-disturbing actions associated with rights-of-way, leases and permits would create new roads and thereby may increase OHV access to BLM land. These effects would occur throughout the planning area and make available more public land for OHV use during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, pleasure driving, and viewing wildlife.

OHV Use and Travel and Transportation Management: Alternative A continues current OHV use designations as per the OHV Record of Decision (BLM 2003c), including 84 acres open to OHV use off roads, primitive roads and trails within the Fresno OHV area north of Havre and 40 acres open just north of the town of Glasgow, designates 2,429,885 acres as limited to existing roads, primitive roads and trails, and designates 7,429 acres in the Sweet Grass Hills ACEC as closed to OHV use.

This alternative would have little effect on the volume of OHV use in either the short or long-term. Because of the designation's nature, some degree of unauthorized road proliferation would continue, primarily in areas limited to existing roads, primitive roads and trails. The two open OHV areas would have a beneficial effect to those motorized recreational users who enjoy utilizing their specialized off-road vehicle equipment (ATVs, motorcycles, etc.) in a designated off-road open area. Closing the Sweet Grass Hills ACEC to motorized travel protects the traditional uses but adversely affects OHV use in the area.

Currently, as per the OHV Record of Decision (BLM 2003c), motorized wheeled cross-country travel for big game retrieval is not allowed, but through subsequent site-specific travel management planning, options for big game retrieval could be considered.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. Fourteen travel management areas were prioritized into the following priorities for subsequent travel management planning:

High:

- An area north of the town Glasgow (80 acres) (includes the 40 acre OHV area plus additional BLM lands in the vicinity)
- Little Rocky Mountains area in southwest Phillips County (27,449 acres)

Moderate:

- Bears Paw to Breaks area in South Blaine County (89,369 acres)
- Kevin Rim area north of the town of Shelby (16,325 acres)
- Missouri Breaks area north of the Charles M. Russell Wildlife Refuge boundary (402,349 acres)
- Northwest Blaine County area (170,420 acres)
- Sweet Grass Hills area north of the town of Chester (7,879 acres)
- Vimy area just west of the town of Fort Benton (8,182 acres)

Low:

- Lonesome Lake area northwest of the town of Big Sandy (121 acres)
- Lower Marias River area (12,014 acres)
- Northeast Bears Paw Breaks area in south Blaine County (4,351 acres)
- Upper Marias River area (8,908 acres)
- Wayne Creek area in northeast Blaine County (29,792 acres)
- Woody Island area in northeast Blaine County (53,436 acres)
- Remaining lands in Phillips and Valley Counties (1,606,688 acres)

Cumulative Impacts

Past and present management actions affecting OHV use include mineral exploration and development, lands and realty surface-disturbing rights-of-way, cultural and paleontological resource protection, and protection for traditional uses. These management actions would cumulatively affect OHV use and users within the planning area.

Future management actions in the planning area and on federal, state, private, and other lands relating to the protection of potential threatened, endangered, and/or sensitive plant and animal species, and protection for cultural resources, paleontological resources, and traditional uses have a high potential for affecting motorized recreation uses. However, the degree or level of the effects would be unknown at this time.

Actions that restrict access and/or numbers of OHV users result in users looking elsewhere for recreation opportunities. This leads to increased use of the other areas and may result in increased degradation of resources and conflicts of use. Protection of resources dictates increased management, which inevitably requires stricter controls on access and user numbers.

Impacts under Alternative B

Fluid Minerals: Under Alternative B, the amount of oil and gas development would be the lowest authorized on BLM lands of all the alternatives. With development, new roads are constructed to access new oil and gas well sites and could affect vehicle use patterns. Increased road construction would create more OHV access to BLM land but users may avoid these areas when operations were occurring, displacing them to other areas. These effects would occur mostly within the high and moderate potential areas for oil and gas development in Blaine and Phillips Counties and would continue in the future.

Lands and Realty

Land Ownership: Approximately 14,129 acres comprised of small, isolated tracts of BLM land have been identified for disposal either through land exchange or by sale. Exchanging BLM land for other lands most likely would have a beneficial effect on OHV use by blocking up existing BLM land, which would make available a larger area for

OHV use and/or possibly increase legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of OHV use associated with those specific BLM lands sold.

Access: The BLM would seek to acquire public access easements to Category 1 and 2 land ownership adjustment lands where no legal public access exists or where additional access is needed to meet management objectives. Gaining legal access to resource-valued BLM land would make available more public land for OHV use for the recreating public, especially during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving and viewing wildlife.

Rights-of-Way, Leases and Permits: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. No long-term acres are projected to be disturbed because of implementation of reclamation activities. Rights-of-way, leases and permits would be granted for development of surface-disturbing actions such as utility lines, communication sites, oil and natural gas development, and wind farms. These surface-disturbing actions associated with rights-of-way, leases and permits would create new roads and thereby may increase OHV access to BLM land. These effects would occur throughout the planning area and make available more public land for OHV use during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, pleasure driving, and viewing wildlife.

OHV Use and Travel and Transportation Management: Alternative B has no areas designated open to off-road travel; designates 2,429,925 acres as limited to existing roads, primitive roads and trails; and designates 7,513 acres as closed to OHV use.

The primary change in designations from Alternative A to Alternative B is that no areas have been designated as open to off-road travel. The increase in the closed acreage is a result of closing the Fresno OHV area (84 acres) for protection of resources and changing the designation of the Glasgow OHV area (40 acres) to limited to existing roads, primitive roads and trails. Not providing a designated off-road travel area would have an adverse effect on OHV users who wish to ride their specialized vehicles in a designated open area. As a consequence, some OHV users may find other areas unauthorized for off-road driving, and possibly create more damage to sensitive resources than if a managed area with less sensitive resources was provided.

No motorized game retrieval off road is allowed or would be considered during travel management planning under this alternative, which would enhance the hunting opportunity for those who are seeking a more primitive, nonmotorized hunting experience. Encountering motorized vehicles away from existing routes may diminish the quality of their experience. Conversely, those who may not have the means or ability to retrieve their down big game by nonmotorized use may experience limitations or restrict their hunting opportunities.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. The following travel management areas are prioritized for travel management planning after the Record of Decision for this RMP:

High:

- Grassland Bird/Greater Sage-Grouse Priority Areas ACEC and Frenchman (490,477 acres)
- Greater Sage-Grouse Protection Priority Area ACEC (997,338 acres)
- Little Rocky Mountains area in southwest Phillips County (27,668 acres)

Moderate:

- Marias River area north of the town of Fort Benton (19,032 acres)
- North Missouri Breaks, north of the Upper Missouri River Breaks National Monument (101,523 acres)
- Prairie Grasslands area (149,681 acres)

Low:

- Remaining BLM land in the planning area (651,661 acres)

Wilderness Characteristics: Under Alternative B, approximately 386,462 acres of BLM land would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics) in the area. Areas with wilderness characteristics would be managed as semi-primitive motorized except the Island Mountain Range, which would be managed as semi-primitive nonmotorized. The goal of semi-primitive classifications is to provide some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Visitors would have the opportunity for a high degree of interaction with the natural environment with moderate challenge and risk and the chance to use outdoor skills.

Travel management planning for these areas will include identification of existing routes and analysis to determine needs for changes in route maintenance, signage and monitoring or potential need for route closures. New roads would not be developed in areas with wilderness characteristics. Route development and maintenance activities would be limited to the minimum necessary to provide for public safety and access to private lands. Deterioration of existing vehicular routes could lead to increased use of OHV-type vehicles on those routes and possible abandonment of some routes. Overall density of motor vehicle use would be less in these areas and would lead to increased vehicular use of remaining routes. This alternative would potentially have the greatest adverse impact to motorized vehicle access but would lead to the greatest increase in opportunities for primitive and unconfined recreation as well as the least amount of new route and trail development.

The Eastern Breaks and Badlands (Areas 49B and 53) along with the majority of the Prairie Grasslands in Phillips and Valley Counties (all of Areas 90, 91A, 91B, and 93 and most of Areas 32A, 32B, 33, and 84) and the majority of the Sagebrush Grasslands (all of Areas 19A, 19C, 20B, 49A, 49C, 54, 55, 56, 62, and 94 and most of Areas 19B and 20A) would be included in the high priority areas for travel management planning. The Western Breaks and Badlands (Areas 3A, 3B, and 4) as well as the remaining Prairie Grasslands (part of Areas 32A, 32B, 33, and 84) and the remaining portions of Sagebrush Grasslands (Areas 19B and 20A) would be moderate priority for travel management planning. The Island Mountain Range (Area 1) would be low priority for travel management planning.

Cumulative Impacts

Past and present management actions that affect and have affected OHV use include mineral exploration and development, lands and realty surface-disturbing rights-of-way, cultural and paleontological resource protection, and protection for traditional use areas. These management actions would cumulatively affect OHV use and users within the planning area.

Future management actions in the planning area and on federal, state, private, and other lands relating to the protection of wilderness characteristics, potential threatened, endangered, and/or sensitive plant and animal species, and protection for cultural resources, paleontological resources, and traditional uses have a high potential for affecting motorized recreation uses. However, the degree or level of effects is unknown at this time.

Actions that restrict access and/or numbers of OHV users result in users looking elsewhere for recreation opportunities. This leads to increased use of the other areas and may result in increased impacts to sensitive resource areas and conflicts of use. Protection of resources dictates increased management, which inevitably requires stricter controls on access and user numbers. Because the established protection measures for natural and cultural resources are greater in Alternative B than any other alternative, the total cumulative impact to OHV use would be the greatest of all alternatives.

Impacts under Alternative C

Fluid Minerals: The amount of oil and gas development would be the second lowest authorized on BLM lands of all the alternatives. With development, new roads are constructed to access new oil and gas well sites and could affect vehicle use patterns. Increased road construction would create more OHV access to BLM land but users may avoid these areas when operations are occurring, displacing them to other areas. These effects would occur mostly within the high and moderate potential areas for oil and gas development in Blaine and Phillips Counties and would continue in the future.

Lands and Realty

Land Ownership: Approximately 14,129 acres comprised of small, isolated tracts of BLM land have been identified for disposal either through land exchange or by sale throughout the planning area. Exchanging BLM land for

other lands most likely would have a beneficial effect on OHV use by blocking up existing BLM land, which would make available a larger area for OHV use and/or possibly increase legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of OHV use associated with those specific BLM lands sold.

Access, and Rights-of-Way, Leases and Permits: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Alternative C has no areas designated open to off-road travel; designates 2,429,885 acres as limited to existing roads, primitive roads and trails, and designates 7,553 acres as closed to OHV use.

Management of off-highway vehicle use is similar to Alternative B in that there would be no areas designated as open to off-road travel. This would create an adverse effect on users of all-terrain vehicles, motorcycles, and other specialized off-road vehicles. As a consequence of not designating an off-road travel area, some OHV users may find other areas unauthorized for off-road travel, and possibly create more damage to sensitive resources than if a managed area with less sensitive resources was provided.

Overall, the impacts under this alternative are similar to Alternative B except an additional 40 acres at the Glasgow OHV recreation area would be closed to off-road use and this alternative allows for big game retrieval. Motorized game retrieval off road would be allowed during the big game hunting season on BLM lands east of Highway 191 and south of the Dry Fork Road in Phillips County and south of the Willow Creek Road in South Valley County, except for in the Burnt Lodge WSA (see Figure 2.2 in Chapter 2 for the location of the game retrieval area, 387,118 acres). Game retrieval would occur between the hours of 10:00 a.m. and 2:00 p.m. and in a minimum timeframe utilizing the shortest route, and avoiding resource damage. This is considered a benefit to some who would like to be able to drive off road to retrieve their big game animal. However, some recreating publics believe off-road big game retrieval would be an adverse effect because of soil erosion and vegetation loss from off-road vehicle use, and the effect to the hunting experience from motorized use nearby someone hunting by nonmotorized means.

The large area proposed for designation as limited to existing roads, primitive roads and trails would see some degree of continued unauthorized road and trail proliferation.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. The following travel management areas are prioritized for travel management planning after the Record of Decision for this RMP:

High:

- Frenchman/Rock Creek area in northeast Phillips County (190,174 acres)
- Little Rocky Mountains area in southwest Phillips County (27,688 acres)
- Marias River area north of the town of Fort Benton (19,032 acres)

Moderate:

- North Missouri Breaks, north of the Upper Missouri River Breaks National Monument (101,523 acres)
- South Phillips County, south of Highway 2 (575,917 acres)
- South Valley County, south of Highway 2 (584,820 acres)

Low:

- Remaining BLM land in the planning area (938,246 acres)

Wilderness Characteristics: Under Alternative C, approximately 228,419 acres of BLM land (9% of BLM lands in the District) would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics) in the area. Areas 49C, 54, 62, 49B and 53 (95,631 acres) would be managed as semi-primitive motorized while Areas 1, 20B, 55, 90, 91A, 91B and 93 (132,788 acres) would be managed as semi-primitive nonmotorized. The goal of semi-primitive classifications is to provide some

opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Visitors will have the opportunity for a high degree of interaction with the natural environment with moderate challenge and risk and the chance to use outdoor skills.

The Prairie Grasslands in northeast Phillips and northwest Valley Counties (Areas 90, 91A, 91B, and 93) would be included in the high priority areas for travel management planning. The Eastern Breaks and Badlands (Areas 49B and 53) would be included in the moderate priority travel management planning areas while the Island Mountain Range (Area 1) would remain a low priority area for travel management planning.

This alternative would have less impact to OHV users than Alternative B but more than Alternative A.

Cumulative Impacts

Past and present management actions that affect and have affected OHV use include mineral exploration and development, lands and realty surface-disturbing rights-of-way, cultural and paleontological resource protection, and protection for traditional uses. These management actions would cumulatively affect OHV use and users within the planning area.

Future management actions in the planning area and on federal, state, private, and other lands relating to the protection of wilderness characteristics, potential threatened, endangered, and/or sensitive plant and animal species, and protection for cultural resources, paleontological resources, and traditional uses have a high potential for affecting motorized recreation uses. However, the degree or level of effects is unknown at this time.

Actions that restrict access and/or numbers of OHV users result in users looking elsewhere for recreation opportunities. This leads to increased use of the other areas and may result in increased impacts to sensitive resource areas and conflicts of use. Protection of resources dictates increased management, which inevitably requires stricter controls on access and user numbers. Because the established protection measures for natural and cultural resources are similar to those in Alternative B but relaxed some, Alternative C would have a similar total cumulative impact to OHV use.

Impacts under Alternative D

Fluid Minerals: Under Alternative D, the amount of oil and gas development would be the highest authorized on BLM lands of all the alternatives. With development, new roads are constructed to access new oil and gas well sites and could affect vehicle use patterns. Increased road construction would create more OHV access to BLM land but users may avoid these areas when operations were occurring, displacing them to other areas. These effects would occur mostly within the high and moderate potential areas for oil and gas development in Blaine and Phillips Counties and would continue in the future.

Lands and Realty

Land Ownership: Approximately 30,310 acres comprised of small, isolated tracts of BLM land have been identified for disposal either through land exchange or by sale throughout the planning area. Exchanging BLM land for other lands would likely have a beneficial effect on OHV use by blocking up existing BLM land, which would make available a larger area for OHV use and/or possibly increase legal access to resource-valued isolated BLM land. The sale of BLM land with legal public access would result in the loss of OHV use associated with the specific BLM land sold.

Access, and Rights-of-Way, Leases and Permits: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Alternative D designates three areas as open to OHV use off roads, primitive roads and trails: the 40 acre parcel north of Glasgow, the Fresno OHV area north of Havre (84 acres), and the Thirty Mile OHV area northwest of the town of Harlem (181 acres); designates 2,437,133 acres as limited to existing roads, primitive roads and trails; and does not designate any acres closed to OHV use.

Of all the alternatives, Alternative D offers the most areas and acreage open to OHV use off roads, primitive roads and trails for users of all-terrain vehicles, motorcycles, and other specialized off-road vehicles, which would benefit those specific OHV users. Alternative D also has no areas closed to OHV use and is the only alternative that allows for OHV use in the Sweet Grass Hills area including the ACEC, which could result in adverse impacts to other resources (wilderness characteristics, traditional uses, wildlife habitat, soil erosion, and vegetation loss), but would have a beneficial effect to OHV users.

Motorized game retrieval off road would be allowed during the big game hunting season on all BLM lands in the planning area (see Figure 2.2 in Chapter 2) except in the following areas:

- Big Bend of the Milk River ACEC (1,979 acres)
- Bitter Creek WSA and Burnt Lodge WSA (74,428)
- Frenchman ACEC (63,482 acres)
- Kevin Rim ACEC (4,557 acres)
- Malta Geological ACEC (6,153 acres)

Game retrieval would occur between the hours of 10:00 a.m. and 2:00 p.m. and in a minimum timeframe utilizing the shortest route and avoiding resource damage. Allowing game retrieval in nearly the entire planning area would benefit those motorized recreational users who may not have the means or ability to retrieve their down big game by nonmotorized use, by continuing this recreational opportunity and experience for them on BLM land. However, for the nonmotorized big game hunter, the encounter of off-road motorized use during their hunt may degrade their hunting opportunity and the quality of that experience. Allowing off-road game retrieval within the Sweet Grass Hills ACEC, which is designated limited to motorized use under this alternative, would lead to additional adverse impacts within this relatively small area (7,952 acres) and threaten the resources for which the ACEC was established. Effects from game retrieval in almost the entire planning area (2,290,669 acres) would be much greater than in Alternative C (387,118 acres) where the acreage for game retrieval is much smaller.

Impacts for travel management areas and prioritization would be the same as under Alternatives B and C.

Cumulative Impacts

Past and present management actions affecting OHV use include mineral exploration and development, lands and realty surface-disturbing rights-of-way, cultural and paleontological resource protection, and protection for traditional uses. These management actions would cumulatively affect OHV use and users within the planning area.

Future management actions in the planning area and on federal, state, private, and other lands relating to the protection of potential threatened, endangered, and/or sensitive plant and animal species, and protection for cultural resources, paleontological resources, and traditional uses have a high potential for affecting motorized recreation uses. However, the degree or level of the effects is unknown at this time.

Actions that restrict access and/or numbers of OHV users result in users looking elsewhere for recreation opportunities. This leads to increased use of the other areas and may result in increased impacts to sensitive resource areas and conflicts of use. Protection of resources dictates increased management, which inevitably requires stricter controls on access and user numbers. Because the established protection measures for natural and cultural resources are the lowest in Alternative D, the total cumulative impact to OHV use would be the lowest of all alternatives.

Impacts under Alternative E (Preferred Alternative)

Fluid Minerals: The amount of oil and gas development would be the third lowest authorized on BLM lands of all the alternatives. With development, new roads are constructed to access new oil and gas well sites and could affect vehicle use patterns. Increased road construction would create more OHV access to BLM land but users may avoid these areas when operations are occurring, displacing them to other areas. These effects would occur mostly within the high and moderate potential areas for oil and gas development in Blaine and Phillips Counties and would continue in the future.

Lands and Realty

Land Ownership: Approximately 14,129 acres comprised of small, isolated tracts of BLM land have been identified for disposal either through land exchange or by sale throughout the planning area. Exchanging BLM land for other lands most likely will have a beneficial effect on OHV use by blocking up existing BLM land, which would make available a larger area for OHV use and/or possibly increase legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of OHV use associated with those specific BLM lands sold.

Access: The BLM would seek to acquire public access easements to Category 1 and 2 land ownership adjustment lands where no legal public access exists or where additional access is needed to meet management objectives. Gaining legal access to resource-valued BLM land would make available more public land for OHV use for the recreating public, especially during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving and viewing wildlife.

Rights-of-Way, Leases and Permits: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. No long-term acres are projected to be disturbed because of implementation of reclamation activities. Rights-of-way, leases and permits would be granted for surface-disturbing actions such as utility lines, communication sites, oil and natural gas development, and wind farms. These surface-disturbing actions associated with rights-of-way, leases and permits would create new roads and thereby may increase OHV access to BLM land. These effects would occur throughout the planning area and make available more public land for OHV use during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, pleasure driving, and viewing wildlife.

OHV Use and Travel and Transportation Management: The Glasgow OHV area (40 acres) and Fresno OHV area (125 acres) would remain designated as open to OHV use off roads, primitive roads and trails. As needed, subsequent travel management planning could address seasonal restrictions and/or boundary adjustment to address resource values and conflicts of use. The Sweet Grass Hills ACEC (7,429 acres) would be closed to OHV use. A total of 2,429,885 acres would be designated as limited.

This alternative would have little effect on the volume of OHV use in either the short or long term. Because of the designation's nature, some degree of unauthorized road proliferation would continue, primarily in areas limited to existing roads, primitive roads and trails. The two open OHV areas would have a beneficial effect to those motorized recreational users who enjoy their specialized off-road vehicle equipment (ATVs, motorcycles, etc.) in a designated open off-road area. Closing the Sweet Grass Hills ACEC to motorized travel protects the traditional uses but would adversely affect OHV use in the area.

Motorized wheeled cross-country travel for big game retrieval would not be allowed; however, through subsequent site-specific travel management planning, options for big game retrieval could be considered.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. Seven travel management areas were prioritized into the following priorities for subsequent travel management planning:

High:

- Grassland Bird/Greater Sage-Grouse Priority Areas and Frenchman (415,875 acres)
- Greater Sage-Grouse Protection Priority Area and Eastern Breaks and Badlands (997,338 acres)
- Little Rocky Mountains area in southwest Phillips County (27,688 acres)

Moderate:

- Fresno area (885 acres) (includes the 84 acre OHV area plus additional BLM lands in the vicinity)
- Marias River area north of the town of Fort Benton (19,032 acres)
- North Missouri Breaks, north of the Upper Missouri River Breaks National Monument (101,523 acres)

Low:

- Remaining BLM land in the planning area (875,059 acres)

Wilderness Characteristics: Under Alternative E, approximately 10,714 acres of BLM land (less than 1% of BLM lands within the District) adjacent to the Burnt Lodge WSA would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics) in the area. Under this alternative, Areas 49B and 53 would be managed as semi-primitive motorized. The goal of semi-primitive classifications is to provide some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Visitors would have the opportunity for a high degree of interaction with the natural environment with moderate challenge and risk and the chance to use outdoor skills. Motorized travel would be limited to the few existing routes within these areas.

The Eastern Breaks and Badlands (Areas 49B and 53) would be included in the high priority areas for travel management planning. Travel management planning for these areas will include identification of existing routes and analysis to determine needs for changes in route maintenance, signage and monitoring or potential need for route closures. New roads would not be constructed in areas managed for wilderness characteristics. Route development and maintenance activities would be limited to the minimum necessary to provide for public safety and access to private lands. Deterioration of existing vehicular routes within these units could lead to increased use of OHV type vehicles on those routes and possible abandonment of some routes. Overall density of motor vehicle could become less in the area but vehicular use of remaining routes would likely increase.

Although this alternative would provide fewer nonmotorized use acres than Alternatives B and C and would have less adverse impact to motorized vehicle access within the planning area, the opportunities for primitive and unconfined recreation would be similar to Alternatives B and C because management for other resources such as grasslands birds, soils and priority protection areas is expected to maintain or enhance the wilderness characteristic within most other areas throughout the district that currently possess wilderness characteristics.

Cumulative Impacts

Past and present management actions affecting OHV use include mineral exploration and development, lands and realty surface-disturbing rights-of-way, cultural and paleontological resource protection, and protection for traditional uses. These management actions would cumulatively affect OHV use and users within the planning area.

Future management actions in the planning area and on federal, state, private, and other lands relating to the protection of wilderness characteristics, potential threatened, endangered, and/or sensitive plant and animal species, and protection for cultural resources, paleontological resources, and traditional uses have a high potential for affecting motorized recreation uses. However, the degree or level of the effects would be unknown at this time.

Actions that restrict access and/or numbers of OHV users result in users looking elsewhere for recreation opportunities. This leads to increased use of the other areas and may result in increased degradation of resources and conflicts of use. Protection of resources dictates increased management, which inevitably requires stricter controls on access and user numbers.

Paleontological Resources

Direct effects to paleontological resources typically result from actions that physically alter, damage, or destroy fossils or their contexts. Surface-disturbing activities in an area containing important fossil resources could affect paleontological features. These activities may also have an indirect effect by providing greater access to the area which may result in the discovery of important fossils, and could also result in their loss through unauthorized collection or disturbance. Activities that result in data collection and preservation can be considered beneficial effects.

Assumptions and Guidelines

The analysis is based on the following assumptions:

- Vertebrate fossils will continue to be found throughout the lower Tertiary and Upper Cretaceous units (Fort Union, Hell Creek, Judith River, and Two Medicine) exposed in the planning area. The Judith River Formation is the most prevalent geologic formation in the planning area, although all four units are known to contain relatively large quantities of significant paleontological resources.

- The number of paleontological resources that could be impacted by various actions is directly correlated with the degree, nature, and quantity of surface-disturbing activities within the planning area.

- Paleontological resources are most typically associated with bedrock exposures. Areas of deep soils, alluvium, or colluvium rarely contain significant fossils. Therefore, the main areas of concern for impacts on paleontological resources are where fossil-bearing bedrock is at or near the surface, such as badlands, hill slopes, or areas with thin soils over bedrock.

Impacts Common to All Alternatives

Mitigation measures would be applied to all surface-disturbing activities, but the level of mitigation could vary on a case-by-case basis, depending primarily on the potential for effects to significant paleontological resources, the degree of planned disturbance, and topography. These procedures would not change under the various alternatives.

Mitigation efforts applied to surface disturbance in areas known or suspected to contain significant paleontological resources would result in the identification and evaluation of previously undiscovered resources. In addition, continuing scientific research within the planning area will identify new paleontological resources. The BLM would then manage these newly discovered resources accordingly.

Fire Management and Ecology: Damage to paleontological resources would most likely not occur as a direct result of surface disturbances caused by wildfire suppression activities (e.g., construction of fire lines, bulldozing access roads, and general movement of heavy equipment) due to the low potential of paleontological resources in areas of deeper soils. Areas of high potential for paleontological resources such as exposed bedrock would act as natural fire breaks as vegetation generally does not grow in these areas. Therefore, construction activities would not occur in exposed bedrock. Fire itself has nearly no effect to paleontological resources; however, new exposure of bedrock could occur if thinner soils are subject to erosion after a fire. Because of the unplanned nature of wildfires, the effects on paleontological resources from wildfire suppression activities would generally be unmitigated due to the emergency nature of wildfire. Surface-disturbing activities during firefighting actions and post-fire rehabilitation activities could damage or destroy known and unknown significant paleontological resources. With increased accessibility (fire breaks, roads, etc.), the potential for vandalism and looting increases.

Fire management actions that minimize the potential for unplanned wildfires or lessen suppression activities would indirectly protect paleontological resources. Increased erosion from loss of vegetation following wildfires could accelerate exposure and deterioration of paleontological resources. Identification of known localities and sensitive areas during fire planning efforts would allow for possible avoidance or modification of fire suppression activities, such as reducing the use of heavy equipment in paleontologically sensitive areas.

Fluid Minerals: The BLM manages 372,270 acres that have a high potential for paleontological resources. About 15,600 acres of high potential paleontological areas fall within the area considered having a high potential for oil and gas development; and another 82,200 acres are within the area considered to have a moderate potential for oil and gas development. Paleontological resources are not considered a mineral resource and are part of the surface estate. In some areas where the subsurface is federally owned and the surface is privately owned the mitigation efforts described in Impacts Common to All Alternatives would not apply.

The development of fluid minerals has a potential to affect paleontological resources due to the surface-disturbing activities associated with energy exploration and development. The potential for effects would increase with the amount of land made available for mineral leasing and development in high potential paleontological areas.

Project proposals on BLM land with high potential geologic units may be subject to a paleontological inventory. Mitigation measures would be implemented as necessary to protect significant paleontological resources.

North Blaine Field Development Area: The North Blaine area has a total land area of 276,364 acres. Of these acres, 1,403 acres (.05%) are located within high potential for paleontological resources. This development would be expected to have little to no effect on significant paleontological resources.

Bears Paw South Field Development Area: The Bears Paw South area has a total land area of 374,523 acres. Of these acres, 26,739 acres (7%) are located within high potential for paleontological resources. This development would be expected to have little or no effect on significant paleontological resources.

Forests and Woodlands: Based upon the current vegetation distribution along the HiLine, the effects of forestry driven projects would be negligible. Paleontological resources could be affected during projects proposed in south Phillips and south Valley Counties, within the Sweet Grass Hills (except under Alternative A), in the Larb Hills, and along the western edge of the Bears Paw Mountains. However, the anticipated effects would be minimal through avoidance and mitigation actions.

Lands and Realty: The acquisition of lands that contain paleontological resources could result in a beneficial impact to paleontological resources due to the protective measures offered under BLM ownership and the gain of public fossils.

Prior to transfer or disposal of BLM land, a paleontological inventory may be required for Potential Fossil Yield Classification (PFYC) system Classes 3, 4 and 5. In addition, if surveys identify significant paleontological resources, the realty action could be adjusted to retain the associated parcels containing the resources. Given these conditions, the potential for effects would be minimal.

Increased access in areas of high potential for paleontological resource occurrence may enhance research opportunities for authorized paleontologists by allowing them to travel to areas otherwise inaccessible. Conversely, improved access may also increase the likelihood of unauthorized collection of paleontological resources.

Livestock Grazing: Due to the general localities of paleontological resources (i.e., exposed bedrock, badlands) effects are not anticipated from livestock grazing.

OHV Use and Travel and Transportation Management: Roads, primitive roads and trails have the potential to decrease vegetative cover and increase erosion, leading to potential exposure, damage, or destruction of paleontological resources. Trails that are created in badlands areas, particularly in areas with steep slopes, increase the potential for effects since fossil materials are often exposed in these areas. Routes can lead to easier access to sensitive areas and increased potential for looting and/or vandalism. The significance of these effects would depend on the location of travel and/or OHV use in relation to the occurrence of paleontological resources.

The majority of the high potential areas for paleontological resources fall within the limited OHV use designation. However, most paleontological localities are not generally in areas where most vehicular travel is expected such as in areas where the soil levels are very deep which could have direct effects to paleontological resources. Paleontological localities are generally located in areas of steep slopes (i.e., exposed bedrock, badlands) and damage and/or destruction to paleontological resources is not anticipated from OHV use. Increased OHV use can provide better accessibility to areas containing fossils, particularly if these routes pass through significant localities or areas with a high probability for paleontological resources.

Recreation: Dispersed recreational activities in the planning area have the potential to affect paleontological resources through inadvertent discovery, removal, damage, and/or destruction.

Management actions for SRMAs that encourage recreation and development of facilities may impact paleontological resources directly through surface-disturbing activities. However, direct impacts from surface-disturbing actions would be mitigated by resource assessments, avoidance restrictions, and data recovery procedures. Indirect impacts may result from the increase in human activity and associated disturbance.

Renewable Energy: Within the planning area, 372,270 BLM surface acres are considered to have a high potential for paleontological resources. Of this acreage; 57,600 acres (15%) are high wind potential development areas, 279,400 acres (75%) are moderate wind potential, and 37,000 acres (10%) are considered low wind potential acres.

Renewable energy has the potential to affect paleontological resources because of the surface disturbance that is required during construction; however, the anticipated effects could be minimized or eliminated through avoidance and mitigation actions.

Soils: Soil management activities which reduce erosion may indirectly benefit paleontological resources by preventing their exposure and possible loss or damage.

Solid Minerals: Solid mineral development has the potential to affect paleontological resources because of the surface disturbance that is required to remove the minerals from the ground. Based on the location of existing mining claims, there would be virtually no effect upon paleontological resources. All but a very small percentage of the claims are located in low to moderate potential areas for paleontological areas.

Special Designations: Special designation areas may indirectly benefit paleontological resources by limiting other uses which may result in effects to these resources. Six of the special designation areas contain high potential paleontological areas (Table 4.49).

Table 4.49
Special Designation Areas with High Potential Paleontological Resources (Acres)

Name	***High Potential Paleontological Resources***
Bitter Creek WSA	2,756
Frenchman ACEC	
Alternatives C and E	2,912
Alternative D	3,155
Kevin Rim ACEC	480
Malta Geological ACEC	5,422
Prairie Dog Towns within the 7km Complex ACEC	1,624
Sweet Grass Hills ACEC	156

Cumulative Impacts

Potential cumulative impacts to paleontological resources could result from surface-disturbing activities that cause erosion, soil compaction, and landscape alteration.

The policies associated with the paleontological resource management program, which require identification and mitigation of paleontological resources prior to surface-disturbing activities, would help to reduce potential impacts. Implementation of these requirements would also increase the potential for identification, recordation, and collection of paleontological resources. However, even with identification and mitigation requirements the potential exists for damage or destruction of previously unknown paleontological resources discovered during construction. In addition, OHV use and dispersed recreation could result in exposure and loss of paleontological resources.

Impacts under Alternative A (Current Management)

Mitigation of surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) may indirectly benefit paleontological resources. For example, an NSO for wildlife resources may indirectly benefit paleontological resources.

Fluid Minerals: Under Alternative A, fluid mineral development, as with other surface-disturbing activities, has the potential to affect significant paleontological resources; however, standard permitting procedures per Washington Office IM Nos. 2008-009 and 2009-011 would minimize the effects of the permitted activities. Table 4.50 shows the high potential paleontological areas that would be affected by fluid mineral development stipulations. Under Alternative A, about 23,400 acres (6%) of the high potential paleontological areas would be closed or under an NSO stipulation for oil and gas leasing. About 348,900 acres (94%) would be within areas that would be leased with CSU and/or timing stipulations, or standard lease terms only.

OHV Use and Travel and Transportation Management: OHV use on BLM land may inadvertently impact paleontological resources as a result of vehicles driving over fossil exposures. They may also contribute to erosion which would result in exposure and loss of paleontological specimens.

The Fresno OHV area (84 acres) is within a PFYC Class 5 area with extremely high potential for paleontological resources. However, there are no known sites within the area. Indirect impacts to unknown paleontological sites could occur through inadvertent discovery and possible loss.

The Glasgow OHV area (40 acres) has low to moderate potential for paleontological resources with no known paleontological localities in the area. No effects to paleontological resources are anticipated in the Glasgow OHV area.

Renewable Energy: Under Alternative A, commercial wind energy development has the potential to affect paleontological resources because of the surface disturbance that is required during construction. Most of the planning area would be open to commercial wind energy development (Table 4.51). Under Alternative A, about 32,100 acres (9%) of the high potential paleontological areas would be exclusion areas for wind energy rights-of-way. About 340,200 acres (91%) would be open/avoidance areas for wind energy rights-of-way, but only 52,400 acres (14%) are within high potential wind energy development areas.

Cumulative Impacts

Under Alternative A, inadvertent discoveries near the Fresno OHV area could have an overall adverse effect to paleontological resources as the area is located in high potential for paleontological resources. Also, cumulatively small and large wind farm scenarios could have adverse effects to paleontological resources as there are no protection measures in place. Alternative A provides the least protection to paleontological resources as all areas are open to commercial wind energy development.

Impacts under Alternative B

Mitigation of surface-disturbing activities for the protection of other resources may indirectly benefit paleontological resources (e.g., an NSO for wildlife resources).

Fluid Minerals: Under Alternative B fluid mineral development would have less potential to affect significant paleontological resources; however, standard permitting procedures per Washington Office IM Nos. 2008-009 and 2009-011 would minimize the effects of the permitted activities. Table 4.50 shows the high potential paleontological areas that would be affected by fluid mineral development stipulations. Under Alternative B, about 369,700 acres (99%) of the high potential paleontological areas would be closed or under an NSO stipulation for oil and gas leasing. About 2,600 acres (1%) would be within areas that would be leased with CSU and/or timing stipulations, or standard lease terms only

OHV Use and Travel and Transportation Management: The types of impacts from OHV use under Alternative B would be the same as those identified under Alternative A but less intensive. Alternative B would eliminate both of the existing OHV open areas; thus there will be no OHV open areas. Also, 7,513 acres (Sweet Grass Hills and Fresno) would be closed to OHV use.

Table 4.50
Paleontological Areas (High and Moderate Potential) Affected by Fluid Mineral Development Stipulations (Acres)

	Alternative A (Current Management)		*Alternative B*		*Alternative C*		*Alternative D*		*Alternative E (Preferred Alternative)*	
Fluid Mineral Development Stipulation	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***
Open/Standard	86,810	131,320	1,904	3,004	35,270	59,501	73,241	121,935	10,597	10,606
Leased	51,773	72,460	1,136	710	21,059	28,575	43,646	60,024	5,559	3,649
Unleased	35,037	58,860	768	2,294	14,211	30,926	29,595	61,911	5,038	6,957
CSU/Timing	262,096	991,827	648	350	132,506	322,520	278,208	988,708	294,761	978,217
Leased	73,921	187,157	465	113	39,454	111,221	81,081	199,975	101,959	219,075
Unleased	188,175	804,670	183	237	93,052	211,299	197,127	788,733	192,802	759,142
NSO	12,733	356,602	32,012	22,764	138,286	413,756	10,190	370,866	55,856	463,336
Leased	2,273	13,129	12,088	7,748	67,454	131,356	3,240	12,747	20,372	49,980
Unleased	10,460	343,473	19,924	15,016	70,832	282,400	6,950	358,119	35,484	413,356
Closed	10,631	6,557	337,706	1,460,188	66,208	690,529	10,631	4,797	11,056	34,147
Leased	0	0	114,278	264,175	0	1,594	0	0	77	43
Unleased	10,631	6,557	223,428	1,196,013	66,208	688,935	10,631	4,797	10,979	34,104

Table 4.51
Paleontological Areas (High and Moderate Potential) Available for Commercial Wind Energy Development (Acres)

Commercial Wind Energy Development Potential	*Alternative A (Current Management)*		*Alternative B*		*Alternative C*		*Alternative D*		*Alternative E (Preferred Alternative)*	
	High Potential	***Moderate Potential***	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***	***High Potential***	***Moderate Potential***
High	56,672	196,751	56,672	196,751	56,672	196,751	56,672	196,751	56,672	196,751
Open/Avoidance Areas	52,444	183,073	4,642	22,921	34,498	111,511	51,229	164,802	33,979	106,587
Exclusion Areas	4,228	13,678	52,030	173,830	22,174	85,240	5,443	31,949	22,693	90,164
Moderate	278,488	1,150,186	278,488	1,150,186	278,488	1,150,186	278,488	1,150,186	278,488	1,150,186
Open/Avoidance Areas	257,880	1,097,078	90,892	78,382	203,262	519,733	257,953	1,101,738	201,566	364,043
Exclusion Areas	20,608	53,108	187,596	1,071,804	75,226	630,453	20,535	48,448	76,922	786,143
Low	37,110	139,369	37,110	139,369	37,110	139,369	37,110	139,369	37,110	139,369
Open/Avoidance Areas	29,846	123,455	10,377	4,628	25,378	73,180	28,750	122,235	22,731	26,440
Exclusion Areas	7,264	15,914	26,733	134,741	11,732	66,189	8,360	17,134	14,379	112,929

Renewable Energy: Under Alternative B, commercial wind energy development has little to no potential to affect paleontological resources because of the surface disturbance that is required during construction. The high potential paleontological areas that would be available for commercial wind energy development are shown in Table 4.51. Under Alternative B, about 266,400 acres (72%) of the high potential paleontological areas would be exclusion areas for wind energy rights-of-way. About 105,900 acres (28%) would be open/avoidance areas for wind energy rights-of way, but only 4,600 acres (1%) are within high potential wind energy development areas.

Cumulative Impacts

The small and large wind farm development scenarios would have little to no effect on significant paleontological resources. Project proposals located in areas with high potential geologic units would be subject to a paleontological inventory.

Impacts under Alternative C

Mitigation of surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, special designations) would provide additional protection for paleontological resources. For example, authorization denial would occur on areas where erosion cannot effectively be controlled or mitigated and reclamation to BLM standards is likely to be unsuccessful. This could limit surface disturbance in areas that are likely to contain fossil-bearing strata.

Fluid Minerals: Alternative C has the most acres open for leasing with NSO and the second most acres closed to leasing; these surface limitations could decrease adverse effects to paleontological resources. With moderate oil and gas development, roads would be created when necessary which could increase the possibility for inadvertent discovery. Table 4.50 shows the high potential paleontological areas that would be affected by fluid mineral development stipulations. Under Alternative C, about 204,500 acres (55%) of the high potential paleontological areas would be closed or under an NSO stipulation for oil and gas leasing. About 167,800 acres (45%) would be within areas that would be leased with CSU and/or timing stipulations, or standard lease terms only.

OHV Use and Travel and Transportation Management: The type of impacts from OHV use under Alternative C would be the same as those identified under Alternative A. Alternative C designates the third highest acreage to OHV use limited to existing and designated roads, primitive roads and trails (2,429,885 acres).

Under Alternative C, motorized game retrieval off road would be allowed under the condition that it be completed in a minimum timeframe utilizing the shortest route and minimizing resource damage. This could increase the number of inadvertent discoveries which, in turn, could lead to damage/destruction and/or theft of paleontological resources. Motorized game retrieval off road under Alternative C would have greater impacts to paleontological resources than all the other alternatives.

Renewable Energy: Under Alternative C, commercial wind energy development has the second least potential to affect paleontological resources because of the surface disturbance that is required during construction. Under Alternative C, about 109,100 acres (29%) of the high potential paleontological areas would be exclusion areas for wind energy rights-of-way. About 263,100 acres (71%) would be open/avoidance areas for wind energy rights-of-way but only 34,500 acres (9%) are within high potential wind energy development areas.

Cumulative Impacts

The cumulative impacts of Alternative C would be the same as under Alternative B.

Impacts under Alternative D

The impacts to paleontological resources from surface-disturbing activities under Alternative D are anticipated to be similar in type to Alternative A but more intensive. Under Alternative D, the projected short-term disturbance acreage from BLM actions would result in the highest disturbance acreage of all the alternatives.

Since more BLM land would be open to surface disturbance, there may be more disturbance to paleontological resources, however, a paleontological inventory in areas of high potential and steep terrain may mitigate those disturbances.

Fluid Minerals: Under Alternative D, fewer acres would have surface limitations placed upon them which could increase adverse effects to paleontological resources. With increased oil and gas development more roads would be created thus increasing the possibility for inadvertent discovery. Table 4.50 shows the high potential paleontological areas that would be affected by fluid mineral development stipulations. Under Alternative D, about 20,800 acres (6%) of the high potential paleontological areas would be closed or under an NSO stipulation for oil and gas leasing. About 351,400 acres (94%) would be within areas that would be leased with CSU and/or timing stipulations, or standard lease terms only.

OHV Use and Travel and Transportation Management: The types of impacts anticipated to occur from development and OHV use under Alternative D are the same as those identified under Alternative A. Alternative D proposes an increase in development compared to Alternative A and the highest level of development of all alternatives. The Fresno OHV area (84 acres) and Glasgow OHV area (40 acres) would remain designated open, and the Thirty Mile OHV area (181 acres) would be designated open. The Fresno OHV area is a high potential area for paleontological resources and indirect effects from OHV use could occur. Indirect impacts from accelerated erosion and degradation due to exposure also could provide increased opportunities for damage and/or looting.

Alternative D would allow motorized game retrieval off road during big game hunting season between the hours of 10:00 a.m. and 2:00 p.m., with the same conditions as under Alternative C. Four ACECs (Big Bend of the Milk, Kevin Rim, Frenchman, and Malta Geological) would be closed to motorized game retrieval off road under this alternative. Motorized game retrieval off road under Alternative D would decrease the number of inadvertent discoveries that could lead to damage, destruction, and/or theft of paleontological resources. Alternative D would have the third least damaging effect on paleontological resources.

Renewable Energy: Under Alternative D, renewable energy development has the second most potential to affect paleontological resources because of the surface disturbance that is required during construction. Under Alternative D, about 34,300 acres (9%) of the high potential paleontological areas would be exclusion areas for wind energy rights-of-way. About 337,900 acres (91%) would be open/avoidance areas for wind energy rights-of-way, but only 51,200 acres (14%) are within high potential wind energy development areas.

Cumulative Impacts

The cumulative impacts of Alternative D would be the same as under Alternative B.

Impacts under Alternative E (Preferred Alternative)

The impacts to paleontological resources from surface-disturbing activities under Alternative E are anticipated to be adverse and similar in type to Alternative A but less intensive. Under Alternative E, the projected short-term disturbance acreage from BLM actions results in the second least amount of disturbance acreage of all the alternatives.

Moderate stipulations for surface-disturbing activities to protect other resources (e.g., soil, water, biological resources, special designations) would be provided under Alternative E; therefore, additional protection for paleontological resources under Alternative E would be more than under Alternatives A and D, less than under Alternative B, and approximately the same as under Alternative C. For example, under Alternative E, authorization denial would occur on areas where erosion cannot effectively be controlled or mitigated and reclamation to BLM standards is likely to be unsuccessful. This type of restriction could limit surface disturbance in areas that are likely to contain fossil-bearing strata. Under Alternative E, this management action would result in fewer adverse effects to paleontological resources than Alternatives A and D because it would reduce the effects of surface-disturbing activities occurring on BLM lands by limiting some resource uses.

Fluid Minerals: Alternative E has the second most acres open for leasing with NSO and the second most acres closed to leasing; these surface limitations could decrease adverse effects to paleontological resources. With moderate oil and gas

development, roads would be created when necessary which could increase the possibility for inadvertent discovery. Table 4.50 shows the high potential paleontological areas that would be affected by fluid mineral development stipulations. Under Alternative E, about 66,900 acres (18%) of the high potential paleontological areas would be closed or under an NSO stipulation for oil and gas leasing. About 305,400 acres (82%) would be within areas that would be leased with CSU and/or timing stipulations, or standard lease terms only.

OHV Use and Travel and Transportation Management: OHV use on BLM land may inadvertently impact paleontological resources as a result of vehicles driving over fossil exposures. They may also contribute to erosion which would result in exposure and loss of paleontological specimens.

The Fresno OHV area (125 acres) is within a PFYC Class 5 area with extremely high potential for paleontological resources. However, there are no known sites within the area. Indirect impacts to unknown paleontological sites could occur through inadvertent discovery and possible loss.

The Glasgow OHV area (40 acres) has low to moderate potential for paleontological resources with no known paleontological localities in the area. No effects to paleontological resources are anticipated in the Glasgow OHV area.

Renewable Energy: Under Alternative E, renewable energy development has the second least potential (along with Alternative C) to affect paleontological resources because of the surface disturbance that is required during construction. Under Alternative E, about 114,000 acres (31%) of the high potential paleontological areas would be exclusion areas for wind energy rights-of-way. About 258,300 acres (69%) would be open/avoidance areas for wind energy rights-of-way but only 34,000 acres (9%) are within high potential wind energy development areas.

Cumulative Impacts

The small and large wind farm development scenarios would have little to no effect on significant paleontological resources. Project proposals located in areas with high potential geologic units would be subject to a paleontological inventory and subsequent monitoring during construction activities.

Recreation

Assumptions and Guidelines

Assumptions used in this impact analysis include the following:

- Demand for recreational use of BLM land is expected to increase.
- Under existing management, total visitor days would increase about one-half of one percent per year over the next 20 years.
- Increases are expected in hunting, fishing, hiking, wildlife viewing, and other dispersed recreational uses.
- Land for dispersed recreation is in more demand than for developed recreation areas.

Under all alternatives, activities related to resource development (e.g., construction of facilities, land clearing, and drilling activities related to minerals exploration and development; rights-of-way; and transportation) may result in adverse effects or the displacement of recreational opportunities and the degradation of recreational experiences. Conversely, some development activities may present opportunities to improve legal access to BLM land and improve roads. In addition, management actions limiting development activities, such as stipulations and mineral withdrawals may benefit recreation by protecting recreational facilities (e.g., campgrounds) and providing long-term assurance that areas traditionally used for recreational purposes would not be affected by future development activities.

Table 2.11 in the Recreation section of Chapter 2 shows the Special Recreation Management Areas (SRMAs) proposed under the alternatives. By identifying SRMAs, the respective areas become a higher priority for recreation management. Recreational management in SRMAs identifies the primary market strategy, niche, recreation management objective, primary recreation activities, and the prescribed setting characteristics for each proposed SRMA. Accordingly, the BLM would be able to respond to the need for more intensive management efforts. SRMAs are eligible for construction

funding, while Extensive Recreation Management Areas (ERMAs) normally receive less attention for funding. Without identifying SRMAs, recreational management would be a lower priority, and management actions custodial in nature.

The recreation opportunity spectrum (ROS) classes and their descriptions (Chapter 2, Recreation section) characterize the recreation opportunities in each class in terms of setting, activity, and experience. The spectrum contains seven classes: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, roaded modified, rural, and urban. The planning area does not include any lands in the primitive or urban classes. Management actions associated primarily from oil and gas production in moderate and high development areas in the reasonable foreseeable future could change the ROS classification of an area by creating more roads, increasing soil and vegetation disturbance, and constructing facilities such as gas well sheds and compressor stations. OHV areas that are open to off-road travel and areas that are closed to all motorized travel can also change a ROS classification of an area by creating more roads and increasing soil and vegetation disturbance or the opposite, respectively. Table 4.52 below shows the ROS class acreages by alternative.

Table 4.52
Recreation Opportunity Spectrum (ROS) Classes by Alternative
(BLM Acres)

ROS Class	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Semi-Primitive Nonmotorized	7,481	7,566	136,276	0	7,481
Semi-Primitive motorized	91,872	474,216	187,503	91,872	102,586
Roaded Natural	2,336,726	1,916,069	2,060,374	2,095,590	2,111,276
Roaded Modified	125	38,353	52,051	248,742	214,861
Rural	1,234	1,234	1,234	1,234	1,234

Effects to Recreation Visitation

Recreational visitation is affected by population growth and the relative attractiveness of recreational opportunities. Alternatives promoting industrial development encourage population growth in both the short and long-term, resulting in an increase in the demand for recreational use of BLM land. Alternatives enhancing recreational resources increase their relative attractiveness, thereby increasing recreational demand. Recreational visitation would increase accordingly.

Fish and wildlife-dependent recreational opportunities would increase or decrease in proportion to the overall productivity of habitats. Habitat management resulting in fish and wildlife population increases would increase recreational visitation. Habitat loss in response to allocation of lands and resources to competing industrial development could cause population decreases that, in turn, would decrease recreational visitation.

Working cooperatively with other agencies to identify and sign BLM lands would facilitate visitor use and enjoyment.

Impacts Common to All Alternatives

Livestock Grazing: Approximately 670 to 800 acres of BLM land are projected to be disturbed in the short term by range improvement projects. In the long term, 157 to 210 acres are projected to be disturbed due to reclamation activities. These surface disturbances are primarily associated with rangeland improvement projects such as constructing fences, wells, and small reservoirs. Construction of these range improvements could increase soil and vegetation disturbance and possibly fragment the landscape by constructing barriers (fences) to the recreating public. New roads may be created to access the range improvements during construction. These effects would have low potential to degrade the recreational opportunities and experiences where rangeland improvements are constructed. Some reservoirs could increase fishing opportunities where habitat will support stocking fish. These effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer.

Solid Minerals – Locatable: Approximately 115 to 150 acres of BLM land are projected to be disturbed in the short term by locatable solid mineral actions associated with bentonite. No long-term acres are projected to be disturbed

because of implementation of reclamation activities. These surface-disturbing actions are associated with extracting bentonite and would most likely leave small to moderate open pits on the landscape. This activity would create new roads to access these pits, which would cause dust and noise from increased traffic. The only known specific locations for bentonite extractions are in south Phillips and south Valley Counties. Where these pits and other disturbances may occur there would be a loss of recreational opportunities, along with a decline in the quality of the recreational experience for the surrounding BLM land. These recreational effects would primarily occur during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking and fishing. After mineral extraction and reclamation of these pits are complete the described effect to the recreational opportunities and experiences would be reduced dramatically.

Approximately 210 to 240 acres of BLM land are projected to be disturbed in the short term by locatable solid mineral actions associated with hardrock mining. In the long term, 185 acres to 2,345 acres are projected to be disturbed with the potential for mining in the Little Rocky Mountains under Alternative A. These surface-disturbing actions are associated with extracting hardrock minerals and would leave open pits on the landscape, with new roads to access these pits. Where these pits and other disturbances may occur there would be a loss of recreational opportunities, along with a decline in the quality of the recreational experience for the surrounding BLM land. These recreational effects would primarily occur during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking and fishing. After mineral extraction and reclamation of these pits are complete the described effect to the recreational opportunities and experiences would be reduced dramatically.

Solid Minerals – Salable: **A**pproximately 80 acres of BLM land are projected to be disturbed in the short term and long-term by salable solid mineral actions. These surface-disturbing acres are primarily associated with excavating and processing gravel from small open pits throughout the planning area. In addition to extracting and processing gravel in these pits new roads would be created to access them, which would create dust and noise from increased traffic. Although these pits would be smaller than those described for locatable minerals, the effect would be the same on the recreating public, but to a lesser degree. Where the pits exist there would be a loss of recreational opportunities along with a decline in the quality of the recreational experience for the surrounding BLM land. The effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites.

Vegetation – Rangeland: Approximately 10,000 acres of BLM land are projected to be disturbed in the short term by mechanical treatment actions. No long-term acres are projected to be disturbed because of implementation of reclamation activities. These surface-disturbing acres are associated with the vegetation treatment action of chisel plowing (10,000 acres) throughout the planning area. This actual vegetation treatment of plowing the ground to remove undesirable vegetation would be temporary and only increase soil and vegetation disturbance until the more desirable vegetation regrows. These effects would have a very low potential to degrade the recreational opportunities and experiences where chisel plowing occurs. The effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites.

Cumulative Impacts

It is anticipated that a right-of-way will be issued for the Keystone X/L Pipeline to construct a 36 inch oil pipeline in the next 3 years on BLM land in northeast Phillips County and through Valley County. Approximately 1,186 acres of BLM land are projected to be disturbed in the short term. These surface-disturbing acres are associated with excavating and burying the 36 inch pipeline, which would create new roads to access the pipeline construction and cause soil erosion and vegetation loss. Increased traffic, dust and noise would occur during construction and degrade the recreational opportunities and the quality of the recreational experiences in and around the pipeline construction area. These effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer.

Impacts under Alternative A (Current Management)

Under Alternative A, approximately 35,541 acres of BLM land are expected to be disturbed in the short term by BLM actions and 2,581 acres in the long term. These management actions could cause direct and indirect effects to recreation

resources as conflicts between recreational use and development occur in developed areas. The quality of dispersed recreation would diminish over time in areas where large-scale development occurs.

The effects to recreation from surface-disturbing activities under Alternative A, while minor, are anticipated to be similar in type to all other alternatives; however, the intensity of effects varies by alternative. Alternative A projects the second highest acreage of surface disturbance among the alternatives.

Fire Management and Ecology: Approximately 6,860 acres of BLM land are projected to be disturbed in the short term by prescribed fire actions and approximately 4,740 acres by mechanical treatment actions. No long-term disturbance acres are projected from reclamation activities and the regrowth of vegetation.

Prescribed fire actions would burn vegetation to improve the health of the land but would leave a blackened landscape, increase soil erosion, produce smoke, and add many temporary two-track suppression roads throughout the treated area. Although this land treatment would have a short-term effect in reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land and the associated improved recreational opportunities and experiences would far outweigh the smaller negative effects from the initial prescribed burn. Generally, the long-term benefits to improving the health of the land would include improved vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Mechanical treatment actions include thinning dense stands of timber trees, and would have the same effects as prescribed fire except the short-term period of time would be a little longer due to the time needed for the thinned trees to dry before underburning. Prescribed fire could be used throughout the planning area but more would occur in Phillips and Valley Counties. Mechanical thinning would occur primarily in timbered areas of the Little Rocky Mountains. Prescribed fire would occur during spring, summer, and fall when fuels are within acceptable burning standards.

Fluid Minerals: Approximately 9,564 acres of BLM land are projected to be disturbed in the short term and 2,422 acres in the long term by oil and natural gas development actions. Surface-disturbing actions associated with development of new oil and gas wells may include the creation of new roads, natural gas sheds and compressor stations, and cause dust and noise from increased traffic, which would reduce recreational opportunities and the quality of the recreational experience. This would occur mostly within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties, primarily during the fall hunting season and to a lesser degree during the spring and summer. These recreational effects would continue throughout the life of the plan or term of the leased wells.

Approximately 102,298 acres would be closed to fluid mineral leasing, and 282,062 acres would be open subject to NSO. Within these areas existing recreational opportunities and their respective experiences would not be affected by natural gas development. The effects would be the greatest for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer.

Forests and Woodlands: Approximately 4,740 acres of BLM land are projected to be disturbed in the short term by silviculture treatments, fuels management, and forest product harvesting actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation. Short-term surface disturbance from harvesting timber and underburning the slash and vegetation left after the harvest would produce smoke, remove vegetation, increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect of reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land and the associated improved recreational opportunities and experiences would far outweigh the smaller negative effects from harvesting the timber and underburning. Generally, the long-term benefits to improving the health of the land would include improved vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Lands and Realty

Land Ownership: Approximately 90,000 acres comprised of small, isolated tracts of BLM land throughout the planning area have been identified for disposal through land exchange or sale. Exchanging BLM land for other lands most likely would have a beneficial effect on recreational opportunities by blocking up existing BLM land or possibly

gaining legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of recreational opportunities associated with the specific BLM land.

Access: Gaining legal access to resource-valued BLM land would increase the dispersed recreational opportunities for the recreating public, especially during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, fishing, and viewing wildlife.

Rights-of-Way, Leases and Permits: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. In the long term, 360 acres are projected to be disturbed due to reclamation activities. Rights-of-way, leases and permits would be granted to develop surface-disturbing actions such as utility lines, communication sites, and oil and natural gas development. These surface-disturbing actions associated with right-of-way leases and permits would create new roads, visual intrusions from powerlines, and communication sites, and cause dust and noise from increased traffic, which would reduce recreational opportunities and the quality of recreational experiences. These effects would occur throughout the planning area during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, fishing, pleasure driving, and wildlife viewing.

OHV Use and Travel and Transportation Management: Approximately 124 acres of BLM land are projected to be disturbed in the short term and 124 acres in the long term by off-road vehicle use. These surface-disturbing actions are associated with off-road vehicle use at the two designated OHV open areas, the Fresno 84 acre OHV area north of Havre and the Glasgow 40 acre OHV area. Although vegetation is lost and soil erosion occurs from off-road vehicle use, there is a beneficial effect to motorized recreational users from designating an open area for use of their specialized equipment (ATVs, motorcycles, etc.). Off-road vehicle use is prohibited throughout the planning area except at these two locations. Recreational users who enjoy hiking and horseback riding benefit from the 7,429 acres closed to motorized use in the Sweet Grass Hills.

The remaining BLM lands available to motorized use within the planning area are categorized into either 74,428 acres limited to designated primitive routes (Burnt Lodge and Bitter Creek WSAs), or 2,359,287 acres limited to existing roads, primitive roads and trails. This designation benefits the motorized recreational user more than the nonmotorized user because of the extensive public land area accessible by motorized use for enjoying dispersed recreational opportunities such as hunting, fishing, pleasure driving, and viewing wildlife. Although small to moderate blocks of BLM land between primitive two-track roads afford the nonmotorized recreational user opportunities for solitude from hiking, backpacking and horseback use, those recreational experiences can be diminished from dust, noise and vehicle movement caused by nearby motorized use.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. The Little Rocky Mountains area (27,449 acres) and an area northwest of Glasgow (80 acres), which includes the 40 acre OHV open area near Glasgow plus additional BLM lands in the vicinity, have been identified as a high priority for travel management planning.

Recreation

Special Recreation Management Areas: Under Alternative A, the following five existing SRMAs would continue (see Table 2.10 and Map 2.9 in Chapter 2 for their locations):

- Little Rocky Mountains
- North Missouri Breaks
- South Phillips
- South Valley
- Sweet Grass Hills

The Little Rocky Mountains SRMA (27,750 acres) is primarily a roaded natural ROS area situated in a ponderosa pine setting which also includes two smaller rural ROS recreation management zones associated with the Camp Creek and Montana Gulch campgrounds. As an area of longstanding interest to recreationists from the local and regional area of Montana, it has and would continue to benefit by identification as a SRMA. Problems associated with high OHV use in the area adversely affecting the setting (increased user-created roads, primitive roads and trails) have a much better chance of being addressed if the area is identified as a SRMA. Additionally, the SRMA designation would help to

develop and maintain new facilities at and nearby the established campgrounds, which would increase recreation opportunities and enhance the visitor experience as recreation demand increases over the life of this plan.

The North Missouri Breaks SRMA is primarily classified as a roaded natural ROS area and is a large area made up of mostly private land with intermingled BLM lands (110,069 acres). It is located north of the Upper Missouri River Breaks National Monument. Identifying the area as a SRMA allows for priority funding to occur that will help with directional signing and road improvements for ingress and egress to this national destination area from Highway 87 and Highway 2, if needed. This SRMA also includes the Lower Marias River recreation management zone (RMZ) which is increasing in popularity for floating and fishing within this semi-primitive motorized ROS area. The SRMA designation could allow for development of new facilities and road upgrades to enhance river-related activities and user experiences.

The South Phillips SRMA is a roaded natural ROS area with many moderate-size blocks of BLM land within its boundary (576, 252 acres) that are intermingled with private land. This area contains 20 dispersed fishing reservoirs that could enhance user experiences by developing additional facilities at each site with a SRMA designation. This SRMA also includes a portion of the Burnt Lodge WSA (13,727 acres), which is classified as a semi-primitive motorized ROS area with very limited motorized access. This SRMA is directly north of the Charles M. Russell National Wildlife Refuge and identifying it as a SRMA allows for priority funding to occur that will enhance the motorized recreational users' experience by constructing directional signing and road improvements for ingress and egress to this national destination area from Highway 191 and Highway 2, if needed.

The South Valley SRMA is a roaded natural ROS area with large blocks of BLM land within its boundary (582,187 acres) and small blocks of intermingled private land. This area contains seven dispersed fishing reservoirs that could enhance user experiences by developing additional facilities at each site with a SRMA designation. This SRMA also includes a portion of the Burnt Lodge WSA (13,727 acres), which is classified as a semi-primitive motorized ROS area with very limited motorized access. This SRMA is directly north of the Charles M. Russell National Wildlife Refuge and identifying it as a SRMA allows for priority funding to occur that will enhance the motorized recreational users experience by constructing directional signing and road improvements for ingress and egress to this national destination area from Highway 2, if needed.

The Sweet Grass Hills SRMA is a semi-primitive, nonmotorized ROS area with small blocks of BLM land (9,335 acres) that are closed to mineral leasing, which protects the recreational values of this SRMA. It is also closed to motorized use, which benefits the nonmotorized recreational users' experience and opportunity, and generally improves the wildlife habitat and its associated populations. Closing the area to motorized use adversely affects the motorized recreational users' opportunities to the area.

The remaining lands would be managed as an ERMA (1,131,845 acres) that are primarily classified as a roaded natural ROS area with the following exceptions:

- The Bitter Creek WSA would be managed as a semi-primitive motorized ROS area.
- The Fresno OHV area would be managed as a roaded modified ROS area and an open OHV area available for off-road travel. This is a benefit to the motorized recreating publics who enjoy the opportunity and experience of an off-road motorized open area.
- The 40 acre parcel of BLM land north of Glasgow would be managed as a roaded modified ROS area and an open OHV area available for off-road travel. This would benefit the motorized recreating publics who enjoy the opportunity and experience of an off-road motorized open area.

Recreational Use: Consolidating land ownership and additional public access to lands within the planning area increases recreational opportunities for recreational users seeking both primitive and more developed recreational experiences.

Managing certain resources could influence recreational use patterns, opportunities, and preferences within the planning area to a limited extent. For example, current management actions for oil and gas development affect vegetation, water, and soils, and are anticipated to influence the distribution of fish and wildlife throughout the planning area, thereby influencing recreational use. Increases in fish and wildlife populations from stipulating protective measures on their

habitats for oil and natural gas development translates to increased recreational opportunities, such as hunting, fishing, and viewing wildlife.

Under Alternative A, the established protection measures benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, and photography) related to these resources. Under this alternative current annual visitation is estimated at 90,241 with the greatest amount of visitation occurring during the fall hunting season. OHV use occurs throughout the year and especially during the fall hunting season, and is also high during the spring and summer when camping, hiking and viewing wildlife occurs.

Cumulative Impacts

Past and present actions that affect and have affected recreational opportunities and the quality of the recreational experience include mineral exploration and development, lands and realty surface-disturbing rights-of-way, livestock grazing, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse impacts on recreational opportunities and experiences by creating new roads and visual intrusions on the landscape, which causes soil erosion and vegetation loss. Reasonably foreseeable future actions in the planning area and on federal, state, private, and other lands within and adjacent to the planning area that could adversely impact recreation opportunities and experiences include: ongoing mineral exploration, development, and production; renewable energy development; and vegetation treatments for fire management and forest health.

Surface-disturbing actions associated with the construction of the two wind energy proposals would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines. Additionally, increased traffic to maintain these facilities would cause dust and noise to dispersed recreational users. These effects would reduce the recreational opportunities and the quality of the recreational experience in areas of high potential and available (329,652 acres) for development of wind farms during the spring, summer, and fall for most dispersed opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Impacts under Alternative B

Under Alternative B, approximately 62,837 acres of BLM land are expected to be disturbed in the short term by BLM actions and 2,576 acres in the long term. These management actions could result in direct and indirect effects to recreation resources as conflicts between recreational use and development may occur in all disturbed areas. The quality of the dispersed recreational experience and opportunities would diminish over time, but only in areas where large-scale development occurs. Potential effects to recreation resources from surface-disturbing activities under Alternative B would be less than those identified under any other alternative because Alternative B projects the lowest acreage of surface disturbance among the alternatives.

Fire Management and Ecology: Approximately 26,660 acres of BLM land are projected to be disturbed in the short term by prescribed fire actions and approximately 7,820 acres by mechanical treatment actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation.

Prescribed fire actions would burn vegetation to improve the health of the land but would leave a blackened landscape, increase soil erosion, produce smoke, and add many temporary two-track suppression roads throughout the treated area. Although this land treatment would have a short-term effect in reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land and its associated improved recreational opportunities and experiences, far outweigh the smaller negative effects from the initial prescribed burn. Generally, the long-term benefits to improving the health of the land would include improved vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Mechanical treatments actions include thinning dense stands of timber trees, and would have the same effects as prescribed fire except the short-term period of time would be a little longer due to the time needed for the thinned trees to dry before underburning. Prescribed fire could be used throughout the planning area but more would occur in Phillips and Valley Counties. Mechanical thinning would occur primarily in timbered areas of the Little Rocky Mountains. Prescribed fire could occur during spring, summer, and fall when fuels are within acceptable burning standards.

Fluid Minerals: Approximately 4,440 acres of BLM land are projected to be disturbed in the short term and 1,544 acres in the long term by oil and natural gas development actions. Surface-disturbing actions associated with the development of new oil and gas wells would create new roads, visual intrusions from natural gas sheds and compressor stations, and cause dust and noise from increased traffic, which would reduce recreational opportunities and the quality of the recreational experience. This would occur mostly within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties, primarily during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites. These recreational effects would continue throughout the life of the plan or term of the leased wells.

Approximately 3,173,637 acres would be closed to fluid mineral leasing, and 258,560 acres would be open subject to NSO. Existing recreational opportunities and their respective experiences would be protected from natural gas development surface-disturbing actions throughout the planning area. The effects would be greatest for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites.

Forests and Woodlands: Approximately 7,820 acres of BLM land are projected to be disturbed in the short term by silviculture treatments, fuels management, and forest product harvesting actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation. Short-term surface disturbance from harvesting timber and underburning the slash and vegetation left after the harvest would produce smoke, remove vegetation, increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect in reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land and the associated improved recreational opportunities and experiences far outweigh the smaller negative effects from harvesting the timber and underburning. Generally, the long-term benefits to improving the health of the land would include improved vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking and hunting.

Lands and Realty

Land Ownership: Approximately 14,129 acres comprised of small, isolated tracts of BLM land throughout the planning area have been identified for disposal through land exchange or sale. Exchanging BLM land for other lands most likely would have a beneficial effect on recreational opportunities by blocking up existing BLM land or possibly gaining legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of recreational opportunities associated with the specific BLM land.

Access: The BLM would seek to acquire public access easements to Category 1 and 2 Land Ownership Adjustment lands where no legal public access exists or where additional access is needed to meet management objectives. Gaining legal access to resource-valued BLM land would increase dispersed recreational opportunities for the public, especially during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, fishing, and viewing wildlife.

Rights-of-Way, Leases and Permits: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. In the long term, 360 acres are projected to be disturbed because of implementation of reclamation activities. Rights-of-way, leases and permits would be granted to develop surface-disturbing actions such as utility lines, communication sites, and oil and natural gas development. These surface-disturbing actions associated with right-of-way leases and permits would create new roads, visual intrusions from powerlines and communication sites, and cause dust and noise from increased traffic, which would reduce recreational opportunities and the quality of the recreational experience. These effects would occur throughout the planning area during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

OHV Use and Travel and Transportation Management: No open areas would be available as a designated off-road open area. Although vegetation is lost and soil erosion occurs from off-road vehicle use there is a beneficial effect to motorized recreational users from designating an open area for use of their specialized equipment (ATVs, motorcycles, etc.). Not designating an off-road open area would deny this opportunity to recreational users wanting to utilize their specialized equipment on BLM land. Nonmotorized recreational users who enjoy hiking and horseback riding benefit

from the 7,429 acres closed to motorized use area in the Sweet Grass Hills. Additionally, the existing 84 acre Fresno OHV area would be closed to motorized use.

No off-road big game retrieval by motorized vehicles would be allowed and would not be considered in future travel management planning. Not allowing off-road big game retrieval would enhance the hunting opportunity for those who are seeking a more primitive, nonmotorized hunting experience. Encountering motorized vehicles away from existing routes may diminish the quality of their experience. Conversely, those who may not have the means or ability to retrieve their down big game by nonmotorized use may experience limitations or restriction of their hunting opportunities.

The remaining BLM lands available to motorized use within the planning area are categorized into either 74,428 acres limited to designated primitive routes (Burnt Lodge and Bitter Creek WSAs), or 2,355,497 acres limited to existing roads, primitive roads and trails. This designation benefits the motorized recreational user more than the nonmotorized user because of the extensive public land area accessible by motorized use for enjoying dispersed recreational opportunities such as hunting, fishing, pleasure driving, and viewing wildlife. Although small to moderate blocks of BLM land between primitive two-track roads afford the nonmotorized recreational user opportunities for solitude from hiking, backpacking, and horseback use, those recreational experiences can be diminished from dust, noise and vehicle movement from nearby motorized use.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. The Grassland Bird/Greater Sage-Grouse Priority Areas ACEC and Frenchman area (490,477 acres); Greater Sage-Grouse Protection Priority Area ACEC (997,338 acres); and Little Rocky Mountains area in southwest Phillips County (27,668 acres) have been identified as a high priority for travel management planning.

Recreation

Recreation Management Areas: Under Alternative B, no SRMAs or ERMAs would be designated and the entire planning area would be managed as an LND (2,437,399 acres) which would result in an adverse impact to facility-based recreation resources within the SRMAs identified under current management (Alternative A). Although most recreation facilities (campgrounds, picnic areas, fishing reservoirs, etc.) would be maintained for public use and safety, developing new recreation facilities under this alternative would be at a lower priority and at a lesser degree. Some of the existing fishing reservoir recreation sites in Alternative A would not be managed as recreation sites in Alternatives B, C, and D due to poor habitat and/or insufficient water capacity. Those sites are noted in Chapter 2, Table 2.12. The location of the existing recreation sites are displayed on Map 2.10. Dispersed recreation opportunities and their associated experiences would be the greatest under this alternative.

The planning area is primarily a roaded natural ROS class (1,916,069 acres), which is the least acreage in this class of all the alternatives. Changes from Alternative A include the following:

- Roaded modified ROS class acreage increased 38,229 acres due to the reasonable foreseeable development of the high natural gas production areas in Blaine County. Management actions associated primarily with natural gas production in these high development areas in the reasonably foreseeable future could change the ROS classification of this area and impact the recreational opportunities and experiences by creating more roads, increasing soil and vegetation disturbance, and constructing facilities such as gas well sheds and compressor stations.

- Semi-primitive motorized ROS class acreage increased 382,344 acres due to management of specific areas to preserve and enhance their wilderness characteristics.

- Semi-primitive nonmotorized ROS class acreage increased 84 acres due to the Fresno OHV open area changing to a closed OHV area. This would have an adverse impact on the motorized recreating publics by eliminating the opportunity and experience of a designated off-road motorized open area.

Recreational Use: Consolidating land ownership and additional public access to lands within the planning area increases opportunities for recreational users seeking both primitive and more-developed recreational experiences.

Managing certain resources could influence recreational use patterns, opportunities, and preferences within the planning area to a limited extent. For example, current management actions for oil and gas development affect vegetation, water, and soils, and are anticipated to influence the distribution of fish and wildlife throughout the planning area, thereby influencing recreational use. Increases in fish and wildlife populations from stipulating protective measures on their habitats for oil and natural gas development translates to increased recreational opportunities, such as hunting, fishing, and viewing wildlife.

Additionally, management actions concerning vegetation, water, soil, and fire would enhance fish and wildlife habitats throughout the planning area and preserve the landscape aesthetics for recreation to a greater extent than under any other alternative. The increased stipulations would further protect resources of interest to the recreating public. Because BLM land would be managed for watershed stability, wildlife habitat, and dispersed recreational considerations, beneficial long-term impacts to recreation would occur.

Under Alternative B, the established protection measures would benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, etc.) related to these resources. Since these protection measures are greater in Alternative B than in any other alternative, annual visitation is expected to increase, primarily in dispersed recreational opportunities and experiences associated with fish and wildlife-related recreation. Disturbance from development of recreational facilities would be the least under this alternative.

Wilderness Characteristics: Approximately 386,462 acres of BLM land would be managed to preserve and enhance their wilderness characteristics.

The ROS classification for most of these lands would be changed to semi-primitive motorized which means the on-site managerial controls would be subtle and, while motorized use is allowed, vehicle routes would receive only the minimum maintenance required to ensure resource protection and safety of users. Visitors would have prospects for a high degree of interaction with the natural environment, with moderate challenge and risk, and opportunities to use outdoor skills. This Island Mountain Range in north Liberty County, which is currently closed to motorized travel, would be classified as semi-primitive nonmotorized.

Under Alternative B, the opportunities for outstanding primitive and unconfined recreation would increase. Restrictions on development of new vehicular routes and limitations on maintenance or improvement of existing routes would reduce opportunities for those seeking more developed or motorized recreation.

Wildlife: Approximately 1,500,000 acres would be closed to not only oil and gas development, but also to locatable, leasable and salable minerals, wind and renewable energy developments, and new rights-of-way for transmission lines for the purpose of protecting sage-grouse and grassland bird habitat areas in Phillips and Valley Counties. The acres closed would eliminate surface-disturbing actions and infrastructure developments (roads, wind turbines, powerlines, etc.) from the above activities, which would maintain and/or enhance wildlife habitat and provide a beneficial effect on dispersed recreational opportunities and the quality of the recreational experience. Eliminating these surface-disturbing actions would maintain the existing condition of the soil and vegetation resources and protect the existing scenic quality. Protective measures that enhance wildlife habitat would increase populations of wildlife and improve the dispersed recreation opportunities. These effects would occur throughout the planning area during the spring, summer, and fall for most dispersed recreation opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Cumulative Impacts

Past and present actions that affect and have affected recreational opportunities and the quality of the recreational experience include mineral exploration and development, lands and realty surface-disturbing rights-of- way, livestock grazing, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse impacts on recreational opportunities and experiences by creating new roads and visual intrusions on the landscape, which causes soil erosion and vegetation loss. Reasonably foreseeable future actions in the planning area and on federal, state, private, and other lands within and adjacent to the planning area that could adversely impact recreation opportunities and experiences include: ongoing mineral exploration, development, and production: lands and realty surface-disturbing rights-of-way; livestock grazing; and vegetation treatments for fire management and forest health.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within a high wind energy potential area: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres, with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with the construction of the two wind energy proposals would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines. Additionally, increased traffic to maintain these facilities would cause dust and noise to dispersed recreational users. These effects would reduce the recreational opportunities and the quality of the recreational experience in areas of high potential and available (35,165 acres) for development of wind farms during the spring, summer, and fall for most dispersed opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Because the established protection measures for wilderness characteristics, soil, water, vegetation and wildlife resources are the greatest in Alternative B compared to the other alternatives, the total cumulative impact to recreation opportunities and experiences would be the lowest of all alternatives.

Impacts under Alternative C

Under Alternative C, approximately 63,404 acres of BLM land are expected to be disturbed in the short term by BLM actions and 2,734 acres in the long term. These management actions could result in direct and indirect effects to recreation resources as conflicts between recreational use and development may occur in disturbed areas. The quality of the dispersed recreational experience and opportunities would diminish over time in areas where large-scale development occurs. Potential effects to recreation resources from surface-disturbing activities under Alternative C are less than any other alternative except those identified under Alternative B.

Fire Management and Ecology: The impacts would be the same as under Alternative B.

Fluid Minerals: Approximately 8,547 acres of BLM land are projected to be disturbed in the short term and 2,238 acres in the long term by oil and natural gas development actions. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads, visual intrusions from natural gas sheds and compressor stations, and dust and noise caused by increased traffic, which would reduce recreational opportunities and the quality of the recreational experience. This would occur mostly within the high and moderate potential areas for oil and gas development in Blaine, Hill and Phillips Counties primarily during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites. These recreational effects would continue throughout the life of the plan or term of the leased wells.

Approximately 218,586 acres would be closed to fluid mineral leasing, and 1,291,160 acres would be open subject to NSO. Existing recreational opportunities and their respective experiences would be protected from natural gas development surface-disturbing actions throughout the planning area. The effects would be greatest for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites.

Forests and Woodlands: The impacts would be the same as under Alternative B.

Lands and Realty

Land Ownership: Approximately 14,129 acres comprised of small, isolated tracts of BLM land throughout the planning area have been identified for disposal through land exchange or sale. Exchanging BLM land for other lands most likely would have a beneficial effect on recreational opportunities by blocking up existing BLM land or possibly gaining legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of recreational opportunities associated with the specific BLM land.

Access, and Rights-of-Way, Leases and Permits: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: This alternative is similar to Alternative B except that a big game hunting retrieval area would be established in southern Phillips and Valley Counties.

Motorized game retrieval off road would be allowed during the big game hunting season on BLM lands east of Highway 191 and south of the Dry Fork Road in south Phillips County and south of the Willow Creek Road in south Valley County except for in the Burnt Lodge WSA (see Chapter 2, Figure 2.2 for the location of the game retrieval area, 387,118 acres). Game retrieval would occur between the hours of 10:00 a.m. and 2:00 p.m., in a minimum timeframe utilizing the shortest route and avoiding resource damage. Allowing game retrieval in this area would benefit those motorized recreational users who may not have the means or ability to retrieve their down big game by nonmotorized means. However, for the nonmotorized big game hunter, the encounter of off-road motorized use during their hunt may degrade their hunting opportunity and the quality of that experience.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. The Frenchman/Rock Creek area (190,174 acres); Little Rocky Mountains (27,688 acres); and Marias River area (19,032 acres) have been identified as high priority for travel management planning.

Recreation

Recreation Management Areas: The effects from recreation management actions under Alternative C are the same as those identified under Alternative B, except for the following:

- The Little Rocky Mountains would be designated a SRMA (27,688 acres) and is primarily a roaded natural ROS area situated in a ponderosa pine setting which also includes two smaller rural ROS recreation management zones associated with the Camp Creek and Montana Gulch campgrounds. As an area of longstanding interest to recreationists from the local and regional area of Montana, it has and would continue to benefit by identification as a SRMA. Problems associated with high OHV use in the area adversely affecting the setting (increased user-created roads, primitive roads and trails) have a much better chance of being addressed if the area is identified as a SRMA. Additionally, the SRMA designation would help to develop and maintain new facilities at and nearby the established campgrounds, which would increase recreation opportunities and enhance the visitor experience as recreation demand increases over the life of this plan.

- Nine sites (61,800 acres) throughout the planning area would be managed as an ERMA. These designations would protect facilities and recreational uses that have already been developed in those areas, as well as help focus future resources to enhancing or expanding those sites if public demand warranted such development. ERMAs would be a lower priority for resources and development than SRMAs and some recreational uses may be limited if they are not compatible with other uses or resources, but their recreation resources would be less impacted by other resource issues than LNDs.

- Semi-primitive nonmotorized ROS class acreage would increase by 40 acres from Alternative B due to the Glasgow 40 acre OHV open area changing to a closed OHV area. This would have an adverse impact on the motorized recreating public by eliminating the opportunity and experience of a designated off-road motorized open area.

Recreational Use: Under Alternative C, the established protection measures would benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, etc.) related to these resources. Since these protection measures are second to those in Alternative B but greater than in any other Alternative and with the designation of the Little Rocky Mountains SRMA, annual visitation is projected to result in a slight increase to 96,287. Visitation is slightly higher in Alternative C than in Alternative B because of the Little Rocky Mountains SRMA designation and increased visitation due to potential increases with outcome-focused management and facility-based recreation development.

Wilderness Characteristics: Under Alternative C, approximately 228,419 acres of BLM land (9% of BLM lands in the District) would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and

primitive and unconfined recreation (wilderness characteristics) in the area. Areas 49C, 54, 62, 49B and 53 would be managed as semi-primitive motorized while Areas 1, 20B, 55, 90, 91A, 91B and 93 would be managed as semi-primitive nonmotorized. The goal of both semi-primitive classifications is to provide some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Visitors will have the opportunity for a high degree of interaction with the natural environment with moderate challenge and risk and the chance to use outdoor skills.

Existing routes within the semi-primitive nonmotorized areas would be closed and motor vehicle use would no longer be allowed. The routes would be reclaimed or allowed to revert back to native grasses over time, thus adding to the overall scenic quality and opportunities for solitude and unconfined primitive recreation.

Areas designated as semi-primitive motorized would allow motorized access on existing or designated routes. New roads would not be constructed and some existing routes could potentially be closed or further limited (i.e. seasonal or time restrictions) to motorized travel, maintaining the minimum routes necessary to provide for public safety and access to private lands. Deterioration of existing vehicular routes within these units could lead to increased use of OHV type vehicles on those routes and possible abandonment of some routes. Overall density of motor vehicle use would be less in the semi-primitive motorized use areas and would lead to increased vehicular use of the remaining routes.

This alternative would provide the greatest number of nonmotorized use acres and potentially have the greatest adverse impact to visitors who prefer developed types of recreation. Alternative C would provide the most opportunities for solitude and primitive and unconfined recreation.

Wildlife: Approximately 820,000 acres would include a NSO stipulation for oil and gas leasing, and closed to locatable, leasable and salable minerals, wind and renewable energy developments, and new rights-of-way for transmission lines for the purpose of protecting sage-grouse habitat areas in south Phillips and south Valley Counties. The acres closed would eliminate surface-disturbing actions and infrastructure developments (roads, wind turbines, powerlines, etc.) from the above activities, which would maintain and/or enhance wildlife habitat and provide a beneficial effect on dispersed recreational opportunities and the quality of the recreational experience. Eliminating these surface-disturbing actions would maintain the existing condition of the soil and vegetation resources and protect the existing scenic quality. Protective measures that enhance wildlife habitat would increase populations of wildlife and improve the dispersed recreational opportunities. These effects would occur throughout the planning area during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Cumulative Impacts

Past and present actions that affect and have affected recreational opportunities and the quality of the recreational experience include mineral exploration and development, lands and realty surface-disturbing rights-of- way, livestock grazing, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse impacts on recreational opportunities and experiences by creating new roads and visual intrusions on the landscape, which causes soil erosion and vegetation loss. Reasonably foreseeable future actions in the planning area and on federal, state, private, and other lands within and adjacent to the planning area that could adversely impact recreation opportunities and experiences include: ongoing mineral exploration, development, and production; lands and realty surface-disturbing rights-of-way; livestock grazing; and vegetation treatments for fire management and forest health.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within a high wind energy potential area: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with the construction of the two wind energy proposals would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind

turbines and powerlines. Additionally, increased traffic to maintain these facilities would cause dust and noise to dispersed recreational users. These effects would reduce the recreational opportunities and the quality of the recreational experience in areas of high potential and available (178,622 acres) for development of wind farms during the spring, summer, and fall for most dispersed opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Because the established protection measures for soil, water, vegetation and wildlife resources are similar but somewhat more relaxed than in Alternative B, the total cumulative impact to recreation opportunities and experiences would be the second lowest of all alternatives.

Impacts under Alternative D

Under Alternative D, approximately 63,945 acres of BLM land are expected to be disturbed in the short term and 2,979 acres in the long term by resource development actions. These actions would result in direct and indirect effects to recreation resources as conflicts between recreational use and other resource development occurs. The quality of the dispersed recreational experience and opportunities would diminish over time in areas where intensive development occurs. Potential effects to recreation resources from surface-disturbing activities under Alternative D are greater than any other alternative.

Fire Management and Ecology: Impacts would be the same as under Alternative B.

Fluid Minerals: Approximately 9,663 acres of BLM land are projected to be disturbed in the short term and 2,436 acres in the long term by oil and natural gas development actions. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads, visual intrusions from natural gas sheds and compressor stations, and dust and noise caused by increased traffic, which would reduce recreational opportunities and the quality of the recreational experience. This would occur mostly within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties, primarily during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites. These recreational effects would continue throughout the life of the plan or term of the leased wells.

Approximately 74,674 acres would be closed to fluid mineral leasing, and 357,456 acres would be open subject to NSO. Existing recreational opportunities and their respective experiences would be protected from natural gas development surface-disturbing actions throughout the planning area. The effects would be the greatest for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and fishing at developed reservoir sites.

Forests and Woodlands: Impacts would be the same as under Alternative B.

Lands and Realty

Land Ownership: Approximately 30,310 acres comprised of small, isolated tracts of BLM land throughout the planning area have been identified for disposal through land exchange or sale. Exchanging BLM land for other lands most likely would have a beneficial effect on recreational opportunities by blocking up existing BLM land or possibly gaining legal access to resource-valued isolated BLM land. The sale of BLM land with legal access would result in the loss of recreational opportunities associated with the specific BLM land.

Access, and Rights-of-Way, Leases and Permits: Impacts would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Approximately 305 acres of BLM land are projected to be disturbed in the short term and 305 acres in the long term by off-road vehicle use. Surface-disturbing actions are associated with off-road vehicle use at three designated open OHV open areas: Thirty Mile 181 acre OHV area north of Harlem; Fresno 84 acre OHV area north of Havre; and Glasgow 40 acre OHV area. Although vegetation is lost and soil erosion occurs from off-road vehicle use, there is a beneficial effect to motorized recreational users from designating an open area for use of their specialized equipment (ATVs, motorcycles, etc.). Off-road vehicle use is prohibited throughout the planning area except at these three locations. The Sweet Grass Hills area that is closed to motorized use under all alternatives except this alternative would be open to motorized use and limited to existing roads, primitive

roads and trails. There would be no areas closed to motorized use within this alternative, which would benefit motorized recreational users but adversely affect nonmotorized recreational users.

Motorized game retrieval off road would be allowed during the big game hunting season on all BLM lands within the planning area except for in the Burnt Lodge and Bitter Creek WSAs, Big Bend of the Milk River ACEC, Kevin Rim ACEC, Frenchman ACEC, and Malta Geological ACEC (see Figure 2.2 in Chapter 2 for the exact location of the game retrieval area, 2,290,669 acres). Game retrieval would occur between the hours of 10:00 a.m. and 2:00 p.m., in a minimum timeframe utilizing the shortest route and avoiding resource damage. Allowing game retrieval in this area would benefit those motorized recreational users who may not have the means or ability to retrieve their down big game by nonmotorized use which allows this recreational opportunity and experience to continue for them on the specific BLM land. However, for the nonmotorized big game hunter, the encounter of off-road motorized use during their hunt may degrade their hunting opportunity and the quality of that experience.

The remaining BLM lands available to motorized use within the planning area are categorized into either 74,428 acres limited to designated primitive routes (Burnt Lodge and Bitter Creek WSAs) or 2,362,705 acres limited to existing, primitive roads and trails. This designation benefits the motorized recreational user more than the nonmotorized user because of the extensive public land area accessible by motorized use for enjoying dispersed recreational opportunities such as hunting, fishing, pleasure driving and viewing wildlife. Although small to moderate blocks of BLM land between primitive two-track roads afford the nonmotorized recreational user opportunities for solitude from hiking, backpacking, and horseback use, those recreational experiences can be diminished from dust, noise and vehicle movement from nearby motorized use.

Impacts for travel management areas and prioritization would be the same as under Alternative C.

Recreation

Recreation Management Areas: Under Alternative D, twelve SRMAs (97,088 acres) and two ERMAs (244 acres) are identified. The remaining lands in the planning area would be LNDs. This would be the most SRMA acreage and the second least ERMA acreage of all the alternatives. Map W.7, which is available on the internet at http://blm.gov/8qkd, shows the location of the SRMAs and ERMAs.

The Little Rocky Mountains would be designated a SRMA (27,750 acres) and is primarily a roaded natural ROS area situated in a ponderosa pine setting which also includes two smaller rural ROS recreation management zones associated with the Camp Creek and Montana Gulch campgrounds. As an area of longstanding interest to recreationists from the local and regional area of Montana the area has and will benefit by being identified as a SRMA. Problems associated with high OHV use in the area that are adversely affecting the setting (increase of user-created roads, primitive roads and trails) have a much better chance of being addressed if the area is identified as a SRMA. Additionally, the SRMA designation will help to maintain and develop new facilities at and nearby the established campgrounds to increase the recreational opportunities and enhance the visitor experience as recreation demand increases over the life of this plan.

The Marias River Corridor would be designated a SRMA (19,309 acres) with three RMZs within it. The Upper Marias River RMZ and the Lower Marias River RMZ are classified as a semi-primitive motorized ROS area with no recreational facilities available. The Middle Marias River RMZ is a roaded natural ROS area with limited recreational facilities such as restrooms, camping sites and boat launch and take out areas. As visitation increases over the life of this plan, designation of this area as a SRMA will afford development of new facilities, road upgrades, and reclamation of heavily impacted areas, which will enhance river-related recreational opportunities and user experiences. Developing recreational facilities would mitigate environmental impacts related to recreational use by concentrating high-impact activities in developed areas.

The following Recreation Management Areas would also be designated SRMAs:

- The Fresno OHV area would be managed as a roaded modified ROS area and an open OHV area available for off-road travel. This is a benefit to the motorized recreating publics who enjoy the opportunity and experience of an off-road motorized open area.

- The 40 acre parcel of BLM land north of Glasgow would be managed as a roaded modified ROS area and an open OHV area available for off-road travel. This would also benefit the motorized recreating publics who enjoy the opportunity and experience of an off-road motorized open area.

- The Sweet Grass Hills ACEC (7,419 acres) would be changed from a closed OHV area to a limited OHV area and motorized travel would be restricted to existing roads, primitive roads and trails. This area would be managed as a roaded natural ROS area.

- BR-12 (246 acres), South Phillips Recreation Complex (42,217 acres), Cottonwood Riparian Area (42 acres), Faraasen Park (10 acres), Paulo (74 acres), and Troika (56 acres) would all be managed as roaded natural ROS. This would benefit the current recreational uses and focus management prioritize recreation outcomes over other resources in the area.

While SRMAs may incorporate management actions to enhance and protect recreational values, they do not preclude development of other, often competing resources. Since this alternative emphasizes resource use over resource conservation, it can be expected that recreation uses would be in more direct competition with other resource use opportunities. This alternative would be the most protective of all alternatives for recreation resources in the planning area but could lead to the most recreation-related disturbance to other resources.

Under Alternative D, only two Recreation Management Areas would be identified as ERMAs. The Wards Dam Watchable Wildlife Area (177 acres) and Timber Creek Ridge (67 acres) would be managed to protect and promote the recreational activities that take place there unless they are incompatible with other recreation or priority resource management focus of the area. Except for Alternative B, this would be the least amount of acreage managed as an ERMA.

The remaining lands would be managed as an LND (2,340,066 acres) and are primarily classified as a roaded natural ROS area with the following exceptions:

- The Bitter Creek and Burnt Lodge WSAs would be managed as a semi-primitive motorized ROS area.

- The Thirty Mile OHV area northwest of the town of Harlem (181 acres) would be managed as a roaded modified ROS area and an open OHV area available for off-road travel. This would also benefit the motorized recreating publics who enjoy the opportunity and experience of an off-road motorized open area.

- Roaded modified ROS class acreage increased to 248,742 acres due to the reasonable foreseeable development of the high and moderate natural gas production areas in Blaine, Hill, and Phillips Counties. Management actions associated primarily with natural gas production in these high and moderate development areas in the reasonable foreseeable future could change the ROS classification of this area and impact the recreational opportunities and experiences by creating more roads, increasing soil and vegetation disturbance, and constructing facilities such as gas well sheds and compressor stations.

Recreational Use: Management actions and related impacts under Alternative D are similar to, but would be a little more restrictive than those described for Alternative A with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources, yet less restrictive than Alternatives B and C.

Generally, wildlife management actions afford the least protection to wildlife resources under this alternative. Alternative D would have the greatest potential for outcome-based recreation development which could lead to an overall degradation to the wildlife resource, which could adversely impact recreational users relying on wildlife resources. At the same time, relaxation of protective measures provide minor benefits to recreational users seeking a more rural and/or motorized recreational experience, since this alternative affords the least restriction to access.

Under Alternative D, the established protection measures benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, etc.) related to these resources. Since these protection measures afford the least protection to wildlife resources of all the alternatives there would be a slight decline in the projected visitation associated with fish and wildlife-related recreation. However, with the addition of the Marias River SRMA to

this alternative there would be a slight increase in river-related and facility-based recreation visitation over Alternative C resulting in a projected visitation of 96,052.

Cumulative Impacts

Past and present actions that affect and have affected recreational opportunities and the quality of the recreational experience include mineral exploration and development, lands and realty surface-disturbing rights-of- way, livestock grazing, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse impacts on recreational opportunities and experiences by creating new roads and visual intrusions on the landscape, which causes soil erosion and vegetation loss. Reasonably foreseeable future actions in the planning area and on federal, state, private, and other lands within and adjacent to the planning area that could adversely impact recreation opportunities and experiences include: ongoing mineral exploration, development, and production; lands and realty surface-disturbing rights-of-way; livestock grazing; and vegetation treatments for fire management and forest health.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within a high wind energy potential area: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with the construction of the two wind energy proposals would include the creation of new roads, increase soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines. Additionally, increased traffic to maintain these facilities would cause dust and noise to dispersed recreational users. These effects would reduce the recreational opportunities and the quality of the recreational experience in areas of high potential and available (286,488 acres) for development of wind farms during the spring, summer, and fall for most dispersed opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Because the established protection measures for soil, water, vegetation and wildlife resources are less than any other alternative except for Alternative A, the total cumulative impact to recreation opportunities and experiences would be the highest of all alternatives.

Impacts under Alternative E (Preferred Alternative)

Under Alternative E, approximately 63,404 acres of BLM land are expected to be disturbed in the short term by resource development actions and 2,734 acres in the long term. These actions would result in direct and indirect effects to recreation resources as conflicts between recreational use and other resource development occurs. The quality of the dispersed recreational experience and opportunities would diminish over time in areas where intensive development occurs. Potential effects to recreation resources from surface-disturbing activities under Alternative E are similar to Alternative C.

Fire Management and Ecology: Approximately 26,660 acres of BLM land are projected to be disturbed in the short term by prescribed fire actions. In addition, approximately 7,820 acres of BLM land are projected to be disturbed in the short term by mechanical treatment actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation.

Surface disturbance from management ignited prescribed fire actions would burn vegetation to improve the health of the land but would leave a blackened landscape, increase soil erosion, produce smoke, and add many temporary two track suppression roads throughout the treated area. Although this land treatment would have a short-term effect in reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land and its associated improved recreational opportunities and experiences, far outweigh the smaller negative effects from the initial prescribed burn. Generally, the long-term benefits to improving the health of the

land would include improving vegetation composition and wildlife habitat which in turn may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking and hunting.

Surface disturbance from mechanical treatments includes the action of thinning dense stands of timber trees, and would have the same effects as prescribed fire except the short-term period of time would be a little longer due to the time needed for the thinned trees to dry before under burning. Prescribed fire could be used throughout the planning area but more would occur in Phillips and Valley Counties. Mechanical thinning would occur primarily in timbered areas of the Little Rocky Mountains. Prescribed fire could occur during spring, summer and fall when fuels are within acceptable burning standards.

Fluid Minerals: Approximately 9,068 acres of BLM land are projected to be disturbed in the short term by oil and natural gas development actions and 2,337 acres in the long term. These surface-disturbing actions associated with development of new oil and gas wells would create new roads, visual intrusions from natural gas sheds and compressor stations, and cause dust and noise from increased traffic, which in turn would reduce recreational opportunities and the quality of the recreational experience. This would occur mostly within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties and primarily during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, horseback riding and fishing at developed reservoir sites. These recreational effects would continue throughout the life of the plan or term of the leased wells.

Approximately 152,702 acres would be closed to fluid mineral leasing, and 1,711,378 acres would be open subject to NSO. Existing recreational opportunities and their respective experiences would be protected from natural gas development surface-disturbing actions throughout the planning area. The effects would be greatest for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, horseback riding and fishing at developed reservoir sites.

Forests and Woodlands: Approximately 7,820 acres of BLM land are projected to be disturbed in the short term by silviculture treatments, fuels management, and forest product harvesting actions. No long-term acres are projected to be disturbed because of reclamation activities and re-growth of vegetation. Short-term surface disturbance from harvesting timber and under burning the slash and vegetation left after the harvest would produce smoke, remove vegetation, increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect in reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land, and its associated improved recreational opportunities and experiences, far outweigh the smaller negative effects from harvesting the timber and under burning. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat which in turn may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking and hunting.

Lands and Realty

Land Ownership: Approximately 14,129 acres, comprised of small isolated tracts of BLM land have been identified for disposal either through land exchange or by sale throughout the planning area. Exchanging BLM land for other lands most likely will have a beneficial effect on recreational opportunities by blocking up existing BLM land or possibly gaining legal access to resource valued isolated BLM land. The sale of BLM land with legal access would result in the loss of recreational opportunities associated with the specific BLM land.

Access: The BLM would seek to acquire public access easements to Category 1 and 2 Land Ownership Adjustment lands where no legal public access exists or where additional access is needed to meet management objectives. Gaining legal access to resource valued BLM land will increase the dispersed recreational opportunities for the recreating public, especially during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, fishing, and viewing wildlife.

Rights-of-Way, Leases and Permits: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by rights-of-way authorizations. In the long term, 360 acres are projected to be disturbed because of implementation of reclamation activities. Rights-of-ways, leases and permits would be granted to development of surface-disturbing actions such as utility lines, communications sites, and oil and natural gas development. These surface-disturbing actions associated with rights-of-way leases and permits would create new roads, visual intrusions from powerlines, and communications sites, and cause dust and noise from increased traffic, which in turn would reduce

recreational opportunities and the quality of the recreational experience. These effects would occur throughout the planning area and during the spring, summer, and fall for most dispersed recreational opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

OHV Use and Travel and Transportation Management: Approximately 124 acres of BLM land are projected to be disturbed in the short term and 124 acres in the long term by off-road vehicle use. These surface-disturbing actions are associated with off-road vehicle use at two designated open OHV open areas: the Fresno 84 acre OHV area north of Havre and the Glasgow 40 acre OHV area. Although vegetation is lost and soil erosion occurs from off-road vehicle use there is a beneficial effect to motorized recreational users from designating an open area for use of their specialized equipment (ATVs, motorcycles, etc.). Off-road vehicle use would be prohibited throughout the planning area except at these two locations. Nonmotorized recreational users who enjoy hiking and horseback riding benefit from the 7,429 acres closed to motorized use in the Sweet Grass Hills.

No off-road big game retrieval would be allowed. However, options for off-road big game retrieval could be considered during subsequent site-specific travel management planning. Not allowing off-road big game retrieval would enhance the hunting opportunity for those who are seeking a more primitive, nonmotorized hunting experience. Encountering motorized vehicles away from existing routes may diminish the quality of their experience. Conversely, those who may not have the means or ability to retrieve their down big game by nonmotorized use may experience limitations or restrict their hunting opportunities.

The remaining BLM land available to motorized use within the planning area are categorized into either 74,428 acres limited to designated primitive routes (Burnt Lodge and Bitter Creek WSAs) or 2,355,457 acres limited to existing roads, primitive roads and trails. This designation benefits the motorized recreational user more than the nonmotorized user because of the extensive public land area accessible by motorized use for enjoying dispersed recreational opportunities such as hunting, fishing, pleasure driving and viewing wildlife. Although there are small to moderate blocks of BLM land in between primitive two track roads that afford the nonmotorized recreational user opportunities for solitude from hiking, backpacking and horseback use, those recreational experiences can be diminished from dust, noise and vehicle movement from nearby motorized use.

Travel management planning designates as high priority those areas with conflicts occurring between motorized and nonmotorized users, or where recreational users are creating natural resource concerns. The Grassland Bird/Greater Sage-Grouse Priority Areas and Frenchman area in northeast Phillips County (415,875 acres); Greater Sage-Grouse Protection Priority Area and Eastern Breaks and Badlands area (997,338 acres); and Little Rocky Mountains area in southwest Phillips County (27,688 acres) have been identified as a high priority for travel management planning.

Recreation

Recreation Management Areas: The effects from recreation management actions under Alternative E are the same as those identified under Alternative B, except for the following:

- The Little Rocky Mountains would be designated a SRMA (27,750 acres) and is primarily a roaded natural ROS area situated in a ponderosa pine setting which includes two smaller rural ROS recreation management zones associated with the Camp Creek and Montana Gulch campgrounds. As an area of longstanding interest to recreationists from the local and regional area of Montana, this area has and will continue to benefit by being identified as a SRMA. Problems associated with high OHV use in the area that are adversely affecting the setting (increased user-created roads, primitive roads and trails) have a much better chance of being addressed if identified as a SRMA. Additionally, the SRMA designation will help to develop and maintain new facilities at and nearby the established campgrounds to increase the recreational opportunities and enhance the visitor experience as recreation demand increases over the life of this plan.

- The Glasgow OHV would also be designated a SRMA (40 acres) and open to OHV use. This would benefit the motorized recreational user and prioritize management resources to this type of recreation outcome over other resource issues.

- Ten RMAs would be managed as ERMAs to protect the recreation facilities and uses that currently take place in those areas. Recreation outcomes would be a high priority but may be limited if they conflict with other

resource management priorities within the ERMA. Under Alternative E, the following would be managed as ERMAs: BR-12 (246 acres), Cottonwood Riparian Area (42 acres) Faraasen Park (10 acres), Fresno OHV (125 acres), Marias River (19,032 acres), Paulo (74 acres),South Phillips Recreation Complex (42,217 acres), Sweet Grass Hills ACEC (7,414 acres), Timber Creek Ridge (67 acres), and Troika (56 acres).

The remaining lands within the planning area would be managed as LND (2,340,266 acres) where dispersed recreation activities would continue as long as they do not conflict with other priority resource management in those areas.

Under this alternative, more outcomes-focused recreation management would take place than all other alternatives except D but would result in less recreation-caused disturbance from development and concentrated uses than Alternative D.

Recreational Use: Under Alternative E, the established protection measures benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, etc.) related to these resources. Since these protection measures are second to those in Alternative B but greater than in any other alternative, and with the designation of the Little Rocky Mountains SRMA, annual visitation is projected to result in a slight increase. Visitation is slightly higher in Alternative E than in Alternative B because of the Little Rocky Mountains SRMA designation and increased visitation due to potential increases in facility-based recreation development.

Wilderness Characteristics: Under Alternative E, approximately 10,714 acres of BLM land (less than 1% of BLM lands within the District) adjacent to the Burnt Lodge WSA would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics) in the area. Under this alternative, Areas 49B and 53 would be managed as ROS class semi-primitive motorized. The goal of semi-primitive classifications is to provide some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment.

Under the ROS classification of semi-primitive motorized, the on-site managerial controls would be subtle and, while motorized use would be allowed on the few existing routes, these routes would receive only the minimum maintenance required to ensure resource protection and safety of users. Visitors would have prospects for a high degree of interaction with the natural environment, with moderate challenge and risk, and opportunities to use outdoor skills.

Although under Alternative E, fewer acres would be managed for wilderness characteristics than Alternatives B and C, the opportunities for outstanding primitive and unconfined recreation would be similar because management for other resources such as grassland birds, soils and priority protections areas is expected to maintain or enhance the wilderness characteristics within those areas. Restrictions on development of new vehicular routes and limitations on maintenance or improvement of existing routes within areas managed for wilderness characteristics would decrease opportunities for those seeking more developed or motorized recreation.

Cumulative Impacts

Past and present actions that affect and have affected recreational opportunities and the quality of the recreational experience include mineral exploration and development, lands and realty surface-disturbing rights-of- way, livestock grazing, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse impacts on recreational opportunities and experiences by creating new roads and visual intrusions on the landscape which cause soil erosion and vegetation loss. Reasonably foreseeable future actions in the planning area and on federal, state, private, and other lands within and adjacent to the planning area that could adversely impact recreation opportunities and experiences include: ongoing mineral exploration, development, and production; lands and realty surface-disturbing rights-of-way; livestock grazing; and vegetation treatments for fire management and forest health.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within a high wind energy potential area: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind

turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with the construction of the two wind energy proposals would include the creation of new roads, increase soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines. Additionally, increased traffic to maintain these facilities would cause dust and noise to dispersed recreational users. These effects would reduce the recreational opportunities and the quality of the recreational experience in areas of high potential and available (173,127 acres) for development of wind farms during the spring, summer, and fall for most dispersed opportunities such as hunting, fishing, pleasure driving, and viewing wildlife.

Because the established protection measures for soil, water, vegetation, and wildlife resources are similar but somewhat more relaxed than in Alternative B, the total cumulative impact to recreation opportunities and experiences would be the second lowest of all alternatives.

Renewable Energy Resources

This section describes potential effects to renewable energy from management actions by other resource programs. Lands and Realty addresses management of renewable-energy specific rights-of-way, leases, and permits.

Lands and Realty responds to requests for land use authorizations (e.g., rights-of-way, permits, or leases), for renewable energy from outside entities or other programs. This analysis addresses how the implementation of management actions may modify the location, size, or design of a given proposal, such as for a right-of-way or a permit. Such effects would primarily occur from the implementation of management actions designed to protect natural resources and limit impacts on those resources from surface-disturbing activities, and may even preclude approval of a proposal. Therefore, the type and degree of limitations or restrictions placed on a given proposal depends on the location of sensitive or high-value resources and the potential for environmental impacts on those resources.

Assumptions and Guidelines

- Any renewable energy developments proposed for public lands managed by the BLM could result in requests for land use authorizations such as rights-of-way and permits.
- Applications for renewable energy will be processed on a case-by-case basis as are all other Lands and Realty projects.
- The need to protect sensitive resources could result in construction delays or the need to relocate proposed rights-of-way. The need to relocate could result in an increase to acres of surface disturbance; it is assumed this increase would not exceed 10%.

Impacts Common to All Alternatives

Cultural Resources: The management of cultural resources could affect several aspects of the renewable energy program's land use authorizations. These actions are considered federal undertakings and must avoid inadvertent damage to federal and non-federal cultural resources through compliance with Section 106 of the National Historic Preservation Act. Cultural inventories would need to be completed prior to these federal undertakings and impacts to important cultural sites would need to be avoided by project redesign, project abandonment, and/or mitigation of adverse impacts through data recovery. This could result in rerouting a proposed project, in whole or in part. These measures can increase processing costs and processing time for both the federal and non-federal parties.

Fire Management and Ecology: Fire management under all alternatives to manipulate/enhance vegetative composition would generally help protect facilities authorized under the renewable energy program by reducing fuel loads and suppressing fires. However, there is always a slight possibility of losing control of prescribed fire and damaging above-ground right-of-way facilities.

Fish and Wildlife: The management of wildlife and fisheries, including special status species, would have several environmental consequences. The need to protect special status species as well as certain other species of fish and wildlife could impact land use authorizations. Facilities proposed for construction under various land use authorizations in areas that could adversely affect wildlife or fisheries may need to be mitigated, relocated, or in some cases, dropped from consideration. These types of actions could increase processing costs and time for both the federal and non-federal parties.

Lands and Realty: The Lands and Realty program will manage all applications and inquiries for renewable energy and axillary projects. All applications will be processed on a case-by-case basis, taking into consideration the impacts to all resource values. Mitigation measures, alternate locations, or denial of the project may ensue due to the potential undue degradation of such resource values.

Paleontological Resources: The impacts from the management of paleontological resources would be very similar to those of cultural resources. Renewable energy projects occurring in known fossiliferous areas would require that adequate time and resources be allocated to conduct an inventory of these resources. The discovery of scientifically important paleontological resources could result in the rerouting or redesign of a proposed project. Such actions can increase processing costs and time for both the federal and non-federal parties.

Solid Minerals: The management of leasable, salable, and locatable minerals under all alternatives may result in requests for rights-of-way for utilities and access.

Special Designations: The need to manage national trails to protect the values for which they were designated could impact applications for rights-of-way as well as BLM actions to obtain legal and physical access across non-federal lands to BLM lands. Proposed axillary facilities may need to be mitigated (e.g., burial of the line) or rerouted in order to protect the trail values.

Management of any BLM lands that may be designated as ACECs could impose stipulations on the use of these areas for land use authorizations.

Transportation and Facilities: Transportation and facilities management could require that easements be acquired for any BLM roads or other types of facilities to be located on non-federal lands. Right-of-way reservations may be needed for BLM roads or other types of facilities to be located on BLM land.

Vegetation: The management of vegetation, including special status species, would have several environmental consequences. The need to protect riparian and wetland vegetation and/or special status species would impact land use authorizations. Facilities proposed for construction where these types of vegetation are present may need to be mitigated, constructed in alternate locations, or in extreme cases, dropped from consideration.

Wilderness Characteristics: BLM lands managed for wilderness characteristics under Alternatives B, C and E would be exclusion areas for wind energy development. This does not include potential axillary projects. Applications and inquires would be analyzed on a case-by-case basis. If potential impacts can be mitigated and those actions do not affect any of the wilderness characteristic of that area, the action may be granted. At a minimum, the following mitigation measures would be applied to all rights-of-way, leases, permits, and other land use authorizations granted in areas directly adjacent to or in areas managed for wilderness characteristics:

1. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment/vehicles create ruts in excess of 3 inches deep, the soil shall be deemed too wet to adequately support construction equipment/vehicles.

2. All surface disturbances resulting from construction or maintenance (as determined by the authorized officer) shall be rehabilitated. Surface disturbances shall be defined as areas having a lack of living plant tissue either above and/or beneath the soil surface as a result of the construction activity.

3. All vehicles and equipment should be pressure washed or otherwise thoroughly cleaned prior to entering BLM lands. The holder is responsible for the management of noxious and invasive plants. The holder must contact

the authorized officer to ensure planned management of invasive plants conforms to BLM policy and federal/state laws.

4. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on BLM land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation, and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.

5. The holder is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts.

6. The holder shall conduct all activities associated with the construction, operation, and maintenance of the facility within the limits of this right-of-way. If areas outside the right-of-way are needed, the grantee shall obtain a separate authorization for that use. Addition of any permanent or long-term, above-ground structures or other disturbances within the right-of-way may require separate authorization.

7. If an above-ground structure is required and authorized, the structure will be painted a BLM-approved color as directed by the authorized officer.

Impacts under Alternative A (Current Management)

Under Alternative A, about 189,000 acres of BLM land would be exclusion areas for wind energy rights-of-way, and as a result would be closed to commercial wind energy development. This includes about 36,000 acres of high potential areas for wind energy and 125,000 acres of moderate potential areas. About 90% of the high and 93% of the moderate development potential areas on BLM land would be available for wind energy rights-of-way. Table 4.53 shows the acres of wind energy development potential that would be open with minor constraints (standard terms/conditions and BMPs), avoidance areas, and exclusion areas for wind energy.

Table 4.53
Wind Energy Development Potential under Alternative A (Current Management)
(BLM Acres)

	Management Category			
Development Potential	***Open Areas***	***Avoidance Areas***	***Exclusion Areas***	***Total***
High	329,652	0	35,883	365,535
Moderate	1,711,895	0	125,418	1,837,313
Low	207,020	0	27,570	234,590
Total	2,248,567	0	188,871	2,437,438

About 13% of the BLM land within two qualified resource areas (QRAs) would be exclusion areas for wind energy rights-of-way. Table 4.54 shows 27,190 acres of BLM land within the QRAs would be open and 3,934 acres would be exclusion areas.

Qualified Resource Areas

Qualified resource areas (QRAs) represent those lands with the greatest energy density within a contiguous area (WGA and DOE 2009).

Table 4.54 Qualified Resource Areas under Alternative A (Current Management) (BLM Acres)				
Qualified Resource Area	***Management Category***			
	Open Areas	***Avoidance Areas***	***Exclusion Areas***	***Total***
MT_NE	12,738	0	2,387	15,125
MT_NW	14,452	0	1,547	15,999
Total	27,190	0	3,934	31,124

Cumulative Impacts

Under Alternative A, most of the BLM land (92%) would be available for wind energy rights-of-way.

This alternative would provide the greatest number of open acres for potential siting of wind energy development on BLM land. This would also provide the potential for wind energy development on adjacent lands where the use of BLM land is necessary for technical or economic reasons.

Impacts under Alternative B

Under Alternative B about 2,188,000 acres of BLM land would be exclusion areas for wind energy rights-of-way, and as a result would be closed to commercial wind energy development. This includes about 327,000 acres of high potential areas for wind energy and 1,646,000 acres of moderate potential areas. Only about 10% of the high and 10% of the moderate development potential areas on BLM land would be available for wind energy rights-of-way. Table 4.55 shows the acres of wind energy development potential that would be open with minor constraints (standard terms/conditions and BMPs), avoidance areas, and exclusion areas for wind energy.

Table 4.55 Wind Energy Development Potential under Alternative B (BLM Acres)				
Development Potential	***Management Category***			
	Open Areas	***Avoidance Areas***	***Exclusion Areas***	***Total***
High	1,490	36,960	327,085	365,535
Moderate	5,938	185,811	1,645,564	1,837,313
Low	582	18,269	215,739	234,590
Total	8,010	241,040	2,188,388	2,437,438

About 91% of the BLM land within the qualified resource areas (QRAs) would be exclusion areas for wind energy rights-of-way. Table 4.56 shows 354 acres of BLM land within the QRAs would be open with minor constraints (standard terms/conditions and BMPs), 2,589 acres would be avoidance areas, and 28,181 acres would be exclusion areas.

Table 4.56 Qualified Resource Areas under Alternative B (BLM Acres)				
Qualified Resource Area	***Management Category***			
	Open Areas	***Avoidance Areas***	***Exclusion Areas***	***Total***
MT_NE	354	2,508	12,263	15,125
MT_NW	0	81	15,918	15,999
Total	354	2,589	28,181	31,124

Cumulative Impacts

Under Alternative B, only about 10% of the BLM land would be available for wind energy rights-of-way.

The closure of BLM land to wind energy rights-of-way to the greatest degree under this alternative (90% of the BLM land) could potentially limit development options on adjacent land if the use of BLM land is necessary for technical or economic reasons.

Impacts under Alternative C

Under Alternative C about 1,325,000 acres of BLM land would be exclusion areas for wind energy rights-of-way, and as a result would be closed to commercial wind energy development. This includes about 188,000 acres of high potential areas for wind energy and 1,018,000 acres of moderate potential areas. About 49% of the high and 45% of the moderate development potential areas on BLM land would be available for wind energy rights-of-way. Table 4.57 shows the acres of wind energy development potential that would be open with minor constraints (standard terms/conditions and BMPs), avoidance areas, and exclusion areas for wind energy.

Table 4.57
Wind Energy Development Potential under Alternative C
(BLM Acres)

Development Potential	*Management Category*			
	Open Areas	*Avoidance Areas*	*Exclusion Areas*	*Total*
High	12,981	164,111	188,443	365,535
Moderate	88,567	730,992	1,017,754	1,837,313
Low	10,560	105,270	118,760	234,590
Total	112,108	1,000,373	1,324,957	2,437,438

About 79% of the BLM land within the qualified resource areas (QRAs) would be exclusion areas for wind energy rights-of-way. Table 4.58 shows 2,811 acres of BLM land within the QRAs would be open with minor constraints (standard terms/conditions and BMPs), 3,702 acres would be avoidance areas, and 24,611 acres would be exclusion areas.

Table 4.58
Qualified Resource Areas under Alternative C
(BLM Acres)

Qualified Resource Area	*Management Category*			
	Open Areas	*Avoidance Areas*	*Exclusion Areas*	*Total*
MT_NE	1,255	2,866	11,004	15,125
MT_NW	1,556	836	13,607	15,999
Total	2,811	3,702	24,611	31,124

Cumulative Impacts

Under Alternative C, about 46% of the BLM land would be available for wind energy rights-of-way.

The closure of 54% of the BLM land to wind energy rights-of-way under this alternative could potentially limit development options on adjacent land in some areas, if the use of BLM land is necessary for technical or economic reasons.

Impacts under Alternative D

Under Alternative D about 293,000 acres of BLM land would be exclusion areas for wind energy rights-of-way, and as a result would be closed to commercial wind energy development. This includes about 79,000 acres of high potential areas for wind energy and 167,000 acres of moderate potential areas. About 79% of the high and 91% of the moderate development potential areas on BLM land would be available for wind energy rights-of-way. Table 4.59 shows the acres of wind energy development potential that would be open with minor constraints (standard terms/conditions and BMPs), avoidance areas, and exclusion areas for wind energy.

Table 4.59
Wind Energy Development Potential under Alternative D
(BLM Acres)

Development Potential	*Management Category*			
	Open Areas	*Avoidance Areas*	*Exclusion Areas*	*Total*
High	50,102	236,386	79,047	365,535
Moderate	186,457	1,483,437	167,419	1,837,313
Low	9,033	179,031	46,526	234,590
Total	245,592	1,898,854	292,992	2,437,438

About 76% of the BLM land within the qualified resource areas (QRAs) would be exclusion areas for wind energy rights-of-way. Table 4.60 shows 5,528 acres of BLM land within the QRAs that would be open with minor constraints (standard terms/conditions and BMPs), 2,083 acres would be avoidance areas, and 23,513 acres would be exclusion areas.

Table 4.60
Qualified Resource Areas under Alternative D
(BLM Acres)

Qualified Resource Area	*Management Category*			
	Open Areas	*Avoidance Areas*	*Exclusion Areas*	*Total*
MT_NE	3,958	519	10,648	15,125
MT_NW	1,570	1,564	12,865	15,999
Total	5,528	2,083	23,513	31,124

Cumulative Impacts

Under Alternative D, most of the BLM land (88%) would be available for wind energy rights-of-way.

This alternative would provide the second greatest number of open acres for potential siting of wind energy development on BLM land. This would also provide the potential for wind energy development on adjacent lands where the use of BLM land is necessary for technical or economic reasons.

Impacts under Alternative E (Preferred Alternative)

Under Alternative E about 1,540,000 acres of BLM land would be exclusion areas for wind energy rights-of-way, and as a result would be closed to commercial wind energy development. This includes about 192,000 acres of high potential areas for wind energy and 1,178,000 acres of moderate potential areas. About 48% of the high and 36% of the moderate development potential areas on BLM land would be available for wind energy rights-of-way. Table 4.61 shows the acres of wind energy development potential that would be open with minor constraints (standard terms/conditions and BMPs), avoidance areas, and exclusion areas for wind energy.

Table 4.61 Wind Energy Development Potential under Alternative E (Preferred Alternative) (BLM Acres)				
Development Potential	***Management Category***			
	Open Areas	***Avoidance Areas***	***Exclusion Areas***	***Total***
High	5,669	167,458	192,408	365,535
Moderate	26,357	632,809	1,178,147	1,837,313
Low	1,917	63,555	169,118	234,590
Total	33,943	836,822	1,539,673	2,437,438

About 79% of the BLM land within the qualified resource areas (QRAs) would be exclusion areas for wind energy rights-of-way. Table 4.62 shows 1,197 acres of BLM land within the QRAs would be open with minor constraints (standard terms/conditions and BMPs), 5,316 acres would be avoidance areas, and 24,611 acres would be exclusion areas.

Table 4.62 Qualified Resource Areas under Alternative E (Preferred Alternative) (BLM Acres)				
Qualified Resource Area	***Management Category***			
	Open Areas	***Avoidance Areas***	***Exclusion Areas***	***Total***
MT_NE	757	3,364	11,004	15,125
MT_NW	440	1,952	13,607	15,999
Total	1,197	5,316	24,611	31,124

Cumulative Impacts

Under Alternative E, about 37% of the BLM land would be available for wind energy rights-of-way.

The closure of BLM land to wind energy rights-of-way under this alternative (63% of the BLM land) could potentially limit development options on adjacent land if the use of BLM land is necessary for technical or economic reasons.

Social

Assumptions and Guidelines

For the social effects analysis, information from scoping and other planning documents (BLM 1992b, 1994a, 2003c, and 2008b) and discussions with people knowledgeable about the study area were used to develop a list of potentially affected groups and individuals, the concerns of these groups, and potential effects to these groups. Based on the concerns and potential effects, a set of indicators related to resource activity changes were developed for each set of potentially affected groups and individuals. The indicators were then examined by alternative for each group to determine the potential social effects. The potential social effects were then discussed with resource experts to determine the likelihood of the effect actually occurring to any given group.

In most cases, the social effects are described in terms of effects to quality of life, which can be caused by changes in resource availability and use. These effects could include changes in the amount and quality of available resources such as recreation opportunities or opportunities to develop oil and gas resources, and resolution or creation of problems related to these activities. Other beliefs that could affect quality of life include individuals having a sense of control over the decisions that affect their future and feeling that the government strives to act in ways that consider all stakeholders' needs.

The groupings in this section are made to facilitate the discussion of social effects. It should be noted that these groupings generalize the members' actual beliefs and values. For instance, some ranchers engage in recreation and are particularly concerned about resource protection. Recreationists may engage in both motorized and nonmotorized activities. Some individuals are concerned with resource development and resource protection. The social analysis will include the groups and individuals most likely to be affected by the plan.

The average age of the national and local populations will continue to increase. The economic, cultural, recreation, transportation and visual resource assumptions and effects sections include information that may be of interest to the reader interested in social effects.

Impacts Common to All Alternatives

No alternative would affect the major social trends or social organization in the local communities of the planning area.

Under any alternative, should oil and gas leasing and subsequent development occur, impacts to people living near or using the area in the vicinity of the lease could take place. 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 would be especially noticeable in rural areas where oil and gas development 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 exposure of private property to vandalism. For leases where the surface is privately owned and the mineral estate is federally owned, surface owner agreements, standard lease stipulations, and BMPs could address many of the concerns of private surface owners.

Under all alternatives current levels of forage available for livestock grazing would be maintained so there would be no social effects to operators or to local communities from changes in AUMs for livestock grazing. Under individual alternatives, there may be minor inconveniences or benefits to some operators due to changes in BLM actions; these will be discussed under the individual alternatives where they occur.

Noxious weeds and wildfire would be fought aggressively under all alternatives, which would be supported by the local populations. Under any alternative extreme fire behavior could result in smoke causing eye, throat or lung irritation, injury, loss of property and/or reduced recreation potential.

Under all alternatives, administration of a permit or lease allows for driving off road to administer the permit or lease, which could be perceived as unfair to recreationists who are not allowed to drive off road.

The increase in access to ACECs that could happen under any alternative could have both positive and negative effects in that it could provide more access for carrying out traditional uses but could also open up sensitive areas to vandalism and/or looting.

Environmental Justice

During the course of this analysis, no alternative considered would result in any identifiable disproportionate effects specific to any minority or low income population or community. The agency has considered all input from persons or groups regardless of age, race, income status, or other social or economic characteristic.

Impacts under Alternative A (Current Management)

Motorized game retrieval off road would not be allowed, which would reduce the potential for conflicts between ranchers and hunters during big game season as compared to Alternatives C and D.

Recreation management under Alternative A would continue as it has in the past. Opportunities for recreationists desiring a motorized experience in intensive use areas would continue to be available. No game retrieval would be allowed unless designated by future travel management planning; the present situation does not address the needs expressed by some hunters who feel motorized game retrieval is important, particularly in an area with an aging hunter

population. Opportunities to enhance the primitive experience desired by some recreationists would not exist to the same degree as under Alternatives B, C, or E. This alternative would not offer the opportunity to deal with existing problems such as closing existing fishing reservoirs that no longer offer high quality experiences.

Groups and individuals who give a high priority to resource use would probably support this alternative because it entails only slightly more restrictions than Alternative D, which has the fewest controls on oil and gas and other types of development. Employment and income from all BLM resources would increase by about 20% from current levels. This could lead to a population increase of about 500 people concentrated in Phillips, Valley, Blaine and Hill Counties. BLM program revenues and payments to counties would increase by about 30%; this reflects the increased development under this alternative and would be similar to Alternative D. Those who give a high priority to resource use include many local residents who are concerned about economic development and its potential positive effects on the social environment of the small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and greater sage-grouse habitat, would not feel this alternative offers adequate protection for wildlife and other resources. This could result in a decline in the quality of life for these groups and individuals.

Motorized game retrieval off road would not be allowed in limited or closed areas, which would offer some protection from activities that could interfere with traditional practices. OHV areas would remain open which could have a positive effect in that the areas would concentrate OHV use. Under this alternative, future mining could occur in both the Sweet Grass Hills (upon expiration of the withdrawal in 2017) and the Little Rocky Mountains, which could interfere with the ability of Native Americans to practice their traditional religious activities in an unencumbered way. This could result in a decline in the quality of life for Native Americans who engage in these activities.

Cumulative Impacts

Groups and individuals who give a high priority to resource use, including many local residents, indicate that current management has adequately protected these resources. The quality of life would stay the same under this alternative because their lifestyle needs would be met. Off-road recreation opportunities would be mixed because although the OHV open areas would continue, motorized game retrieval off road would not be allowed (unless opportunities were developed in future travel management planning).

Some individuals believe current management is not adequate for the long-term preservation of public resources such as greater sage-grouse habitat. They would not feel the alternative offers the ability to address current or future problems. Quality of life for these groups and individuals may decline under this alternative.

Recreationists who desire a primitive experience may not feel this alternative provides the opportunities to enhance this type of experience in the future. In addition, Native Americans who engage in traditional practices in the Sweet Grass Hills or the Little Rocky Mountains may be less able to practice their religion in an unencumbered way in the future.

Impacts under Alternative B

Motorized game retrieval off road would not be allowed, which would reduce the potential for conflicts between ranchers and hunters during big game season, as compared to Alternatives C and D. Allotments within the Greater Sage-Grouse Protection Priority Area ACEC and the Grassland Bird/Greater Sage-Grouse Priority Areas ACEC where grazing preference is relinquished or cancelled would remain available for livestock grazing and would be designated as resource reserve allotments if analysis does not support closing the allotment to grazing for the benefit of sage-grouse. Resource reserve allotments would be developed where grazing preferences are relinquished or cancelled outside of priority sage-grouse habitat. This could provide flexibility in ranch management for some operations but would not allow livestock AUMs to continue to be transferred to individual ranch operations when grazing preferences are relinquished or cancelled. Many ranchers indicate livestock AUMs should continue to support individual or family operations.

Recreation management under Alternative B would offer enhanced opportunities for recreationists desiring a high quality primitive experience because there would be less surface disturbance, enhanced fish and wildlife protection, less noise, more protected areas (e.g., ACECs, lands with wilderness characteristics), less future recreation development, more protection of the visual environment, etc. This could enhance the quality of life for those desiring a more primitive

experience. However, no game retrieval would be allowed, which does not address the needs expressed by some hunters who feel motorized game retrieval is important, particularly in an area with an aging hunter population. In addition, the areas currently available for intensive OHV use would be closed, which would completely preclude those activities on BLM land in the planning area, and may encourage some people to look elsewhere for recreation opportunities. This could increase conflicts of use and resource degradation.

Groups and individuals who give a high priority to resource use would not support this alternative because it contains the most restrictions on oil and gas and other types of development of any alternative. Employment and income from all BLM resources would decrease by about 35 to 40% from current levels. This could lead to a population decline of about 900 people concentrated in Phillips, Valley, Blaine and Hill Counties. BLM program revenues and payments to counties would reflect the decreased development and would decline by about 30% from current levels. Those who give a high priority to resource use include many local residents who are concerned about economic development and its potential positive effects on the social environment of the small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and greater sage-grouse habitat, would favor this alternative because it offers the most protection for wildlife habitat and other resources, and the least amount of surface disturbance. This could enhance the quality of life for these groups and individuals.

Motorized game retrieval off road would not be allowed which would offer some protection from activities that could interfere with traditional practices. No OHV areas would be designated as open, which could have the effect of dispersing OHV activity that could interfere with traditional practices. The BLM would recommend a 20-year extension of the Sweet Grass Hills TCP mineral withdrawal and would recommend a 20-year withdrawal for the Little Rocky Mountains TCP. This would enhance the ability to practice traditional religious activities in an unencumbered way and enhance the quality of life of Native Americans who engage in these activities.

Cumulative Impacts

Under Alternative B, activities in the planning area would be more restricted than under all other alternatives. Groups and individuals who give a high priority to long-term prairie preservation and greater sage-grouse habitat would feel these resources would be adequately protected and the opportunities they desire available in the future. However, they may also be concerned that some of the effects to wildlife from development restricted on public lands would be pushed onto private lands where the protections would not be in place. Quality of life for these groups and individuals could be enhanced under this alternative because their lifestyle needs may be met.

Native Americans who engage in traditional practices in the Sweet Grass Hills or the Little Rocky Mountains would be better able to practice their religion in an unencumbered way in the future.

Opportunities for primitive, quiet recreation experiences would be greatest under this alternative. The total effects to OHV use would also be greatest under this alternative as all intensive use areas would be closed and no motorized game retrieval off road would be allowed. However, this may encourage some people who like to travel off-road to look elsewhere for recreation opportunities, which could increase conflicts of use and resource degradation.

Groups and individuals who give a high priority to resource use, including many local residents, would feel that the proposed stipulations are too extreme. They may feel that management should continue as it has in the past so they can have the greatest opportunity to continue their current lifestyles which are dependent upon their current uses of BLM land and current population levels. However, it should be noted that the development that does not occur on public lands in this alternative may occur on adjacent private lands and therefore the employment and population changes would not be as drastic as when just examining public lands. Ongoing and future events that contribute to the current uncertainty include the activities of the American Prairie Foundation, potential changes in management on the C.M. Russell National Wildlife Refuge, and the ongoing sales of local ranches to people from outside Montana.

Impacts under Alternative C

Conflicts between ranchers and hunters could increase because motorized game retrieval off road would be allowed in a limited area. This could also cause the spreading of weeds. Resource reserve allotments may be developed under this

alternative where grazing preferences are relinquished or cancelled. This could provide flexibility in ranch management for some operations but would not ensure that livestock AUMs are transferred to individual ranch operations when grazing preferences are relinquished or cancelled. Many ranchers indicate livestock AUMs should continue to support individual or family operations.

Recreation management under Alternative C would offer enhanced opportunities for recreationists desiring a high quality primitive experience as in Alternative B. However, an area would be available for motorized game retrieval which would make those opportunities available to an aging hunter population. The areas currently available for intensive OHV use would be closed, which would completely preclude those activities on BLM land in the study area and may encourage some people to look elsewhere for recreation opportunities. This could increase conflicts of use and resource degradation.

Groups and individuals who give a high priority to resource use would probably not support this alternative because it contains more restrictions on oil and gas and other types of development than any alternative other than B. Employment and income from all BLM resources would increase by less than 10% compared to Alternatives A and D which project increases of around 20%. This less than 10% increase could lead to a population increase of about 200 people concentrated in Phillips, Valley, Blaine and Hill Counties. BLM program revenues and payments to counties would reflect the lesser levels of development under this alternative and would increase by about 11% from current levels. Those who give a high priority to resource use include many local residents who are concerned about economic development and its potential positive effects on the social environment of the small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and greater sage-grouse habitat, may feel this alternative does not offer enough protection for these resources. They may favor this alternative more than Alternatives A or D, but less than Alternatives B or E.

Motorized game retrieval off road would only be available in a limited area; this would offer some protection from activities that could interfere with traditional practices. No OHV areas would be designated as open, which could have the effect of dispersing OHV activity that could interfere with traditional practices. The BLM would recommend a 20-year extension of the Sweet Grass Hills TCP mineral withdrawal, which would enhance the ability to practice traditional religious activities in an unencumbered way and enhance the quality of life of Native Americans who engage in these activities. The Little Rocky Mountains TCP would be open to mineral entry, which could interfere with the ability of Native Americans to practice their traditional religious activities in an unencumbered way. This could result in a decline in the quality of life for Native Americans who engage in these activities.

Cumulative Impacts

Activities in the planning area would be more restricted than under Alternatives A or D, but less restrictive than under Alternatives B or E. Groups and individuals who give a high priority to long-term prairie preservation and greater sage-grouse habitat may not feel these resources would be adequately protected and the opportunities they desire available in the future. Quality of life for these groups and individuals may decline under this alternative because their lifestyle needs would not be met.

Effects to Native Americans who engage in traditional practices could be positive in the Sweet Grass Hills and negative in the Little Rocky Mountains in terms of their ability to practice their religion in an unencumbered way.

Recreation management under Alternative C would offer enhanced opportunities for recreationists desiring a primitive experience similar to Alternative B. However, an area would be open to motorized game retrieval but all of the OHV areas would be closed.

Groups and individuals who give a high priority to resource use, including many local residents, may feel that this alternative restricts oil and gas development too much. They may feel that management should continue as it has in the past so they can have the greatest opportunity to continue their current lifestyles which are dependent upon their current uses of BLM land and current population levels. Ongoing and future events that contribute to the current uncertainty include the activities of the American Prairie Foundation, potential changes in management on the C.M. Russell National Wildlife Refuge, and the ongoing sales of local ranches to people from outside Montana.

Impacts under Alternative D

Conflicts between ranchers and hunters could increase because motorized game retrieval off road would be allowed on most of the BLM land in the study area. The potential for spreading weeds would be greatest under this alternative because of the motorized game retrieval off road. Resource reserve allotments would not be considered, which would allow livestock AUMs to continue to be transferred to individual ranch operations when grazing preferences are relinquished or cancelled, which many ranchers support.

Recreation management under Alternative D would offer enhanced opportunities for recreationists desiring a motorized experience in intensive use areas and the opportunity to go off road to retrieve game. Going off road to retrieve game is important to some people, particularly in an area with an aging hunter population. However, there are a variety of problems associated with motorized game retrieval off road including the spread of weeds, creation of new roads, diminished quiet and solitude, difficulty of enforcement, etc. All of these effects could diminish the quality of the recreation experience for other users and could cause displacement of recreationists desiring a more primitive experience.

Groups and individuals who give a high priority to resource use would support this alternative because it contains the fewest restrictions on oil and gas and other development of any alternative. Employment and income from all BLM resources would increase by about 20% from current levels. This could lead to a population increase of over 500 people concentrated in Phillips, Valley, Blaine and Hill Counties. BLM program revenues and payments to counties would increase by about 30%; this reflects the increased development under this alternative and would be similar to Alternative A. Those who give a high priority to resource use include many local residents who are concerned about economic development and its potential positive effects on the social environment of the small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and greater sage-grouse habitat, would not feel this alternative offers adequate protection for these resources, because management actions under this alternative would slowly degrade existing conditions for wildlife in most of the planning area. This could result in a decline in the quality of life for these groups and individuals.

In this alternative, all BLM land in the planning area would be available for motorized game retrieval off road except in the Big Bend of the Milk River, Frenchman, Kevin Rim and Malta Geological ACECs or the Bitter Creek and Burnt Lodge WSAs, and the withdrawal for solid minerals in the Sweet Grass Hills TCP would not be recommended to extend beyond 2017. Both of these activities could interfere with the practice of traditional activities. However, a portion of the Little Rocky Mountains ACEC would be proposed for a mineral withdrawal and designated OHV areas could have the positive effect of concentrating OHV use. This alternative would have both positive and negative effects on the ability of Native Americans to practice traditional religious activities in an unencumbered way.

Cumulative Impacts

Under Alternative D, management would enhance economic opportunities in the planning area. Groups and individuals who give a high priority to resource use, including many local residents, indicate that economic development would benefit local communities. The quality of life of the above groups and individuals would be enhanced by this alternative because their lifestyle needs would be met. Off-road recreation opportunities would be enhanced because the OHV areas would continue and motorized game retrieval off road would be allowed across the study area. However, opportunities for primitive, quiet recreation experiences would decline under this alternative.

Adoption of Alternative D would contribute to an increasing concern regarding long-term preservation of the prairie ecosystems and greater sage-grouse habitat among local and nonlocal groups and individuals who place a high value on the protection of these resources. They would not feel the alternative offers the ability to address current or future problems. Quality of life for these groups and individuals may decline under this alternative.

Effects to Native Americans who engage in traditional practices could be positive in the Little Rocky Mountains but negative elsewhere in terms of their ability to practice their religion in an unencumbered way.

Impacts under Alternative E (Preferred Alternative)

Resource reserve allotments may be developed under this alternative where grazing preferences are relinquished or cancelled. This could provide flexibility in ranch management for some operations but would not ensure that livestock AUMs are transferred to individual ranch operations when grazing preferences are relinquished or cancelled. Many ranchers indicate livestock AUMs should continue to support individual or family operations.

Recreation management under Alternative E would offer more of a balance of opportunities for different types of users compared to any of the other alternatives. This alternative would allow managers more flexibility to respond to opportunities or problems as they arise. Some of the actions that would provide a higher quality primitive experience, as in Alternative B, would occur. No areas would be available for motorized game retrieval in limited or closed areas, which would make those opportunities unavailable to an aging hunter population; however, motorized game retrieval off road could be considered through future travel management planning. The Fresno and Glasgow OHV areas would remain open, which would provide opportunities for off-road use. This alternative may prevent some of the conflicts between motorized and nonmotorized recreationists because the off-road areas would stay open and motorized game retrieval off road would not occur.

Groups and individuals who give a high priority to resource use may not support this alternative because of the restrictions on oil and gas and other types of development. However, this alternative is less restrictive than Alternatives B and C. Employment and income from all BLM resources would increase by about 15% from current levels compared to Alternatives A and D which project increases of about 20%. This 15% increase could lead to a population increase of about 400 people concentrated in Phillips, Valley, Blaine and Hill Counties. BLM program revenues and payments to counties would reflect the greater levels of development than under Alternatives B and C and would increase by about 12% from current levels. Those who give a high priority to resource use include many local residents who are concerned about economic development and its potential positive effects on the social environment of the small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and greater sage-grouse habitat, may feel this alternative offers enough protection for these resources. They would favor this alternative more than any other alternative but B.

Motorized game retrieval off road would not be allowed in limited or closed areas (unless designated under future travel management), which would offer some protection from activities that could interfere with traditional practices. OHV areas would remain open which could have a positive effect in that the areas would concentrate OHV use. The BLM would recommend a 20-year extension of the mineral withdrawal for the Sweet Grass Hills, which would enhance the ability to practice traditional religious activities in an unencumbered way and enhance the quality of life of Native Americans who engage in these activities. The Little Rocky Mountains TCP would be open to mineral entry, which could affect the ability of Native Americans to practice traditional religious activities in an unencumbered way.

Cumulative Impacts

Under Alternative E, activities in the study area would be more restricted than under Alternatives A or D. Groups and individuals who give a high priority to long-term prairie preservation and greater sage-grouse habitat may feel these resources would be adequately protected and the opportunities they desire available in the future. They would feel the alternative offers the ability to address current or future problems. Quality of life for these groups and individuals may be enhanced under this alternative because their lifestyle needs would be met.

Effects to Native Americans who engage in traditional practices could be positive in the Sweet Grass Hills and negative in the Little Rocky Mountains in terms of their ability to practice their religion in an unencumbered way.

Recreation management under Alternative E would offer more of a balance of opportunities for different types of users compared to any other alternative. This alternative would allow managers more flexibility to respond to opportunities or problems as they arise. This alternative may prevent some of the conflicts between motorized and nonmotorized recreationists because, at least in the short term, one of the off-road areas would stay open and motorized game retrieval off road would not occur.

Groups and individuals who give a high priority to resource use, including many local residents, may feel that this alternative restricts oil and gas development too much. They may feel that management should continue as it has in the past so they can have the greatest opportunity to continue their current lifestyles which are dependent upon their current uses of BLM land.

Soil Resources and Vegetation – Rangeland

The effects to Soil Resources and Vegetation – Rangeland are addressed together in this section.

Assumptions and Guidelines

Spatial analysis was conducted with USDA-NRCS's Soil Data Viewer ArcGIS Extension and ESRI's ArcGIS Desktop 9.3 computer software using USDA-NRCS's SSURGO datasets. Effects are described qualitatively and, where possible, quantitatively.

For the purpose of this broad-scale analysis, the primary indicator of effects to soils and vegetation is the amount of acres of surface disturbance caused by allowable uses and management actions, particularly surface disturbance on soils with severe erosion hazards, badlands, and rock outcrop. The types of effects that are projected to occur to soils and vegetation as a result of the various alternatives are similar; however, the amount of acres disturbed is anticipated to vary by specific allowable uses and management actions associated with individual alternatives, as described below.

The following assumptions were made:

- Prescribed fire and fuels management are generally beneficial to rangeland vegetation.
- Reclamation would effectively mitigate long-term surface-disturbing effects.
- Livestock grazing is not a surface-disturbing activity.
- For analysis purposes, if a Soil Map Unit (SMU) has a severe erosion hazard rating then the entire SMU is rated severe. However, there may be areas within the SMU that could have a slight or moderate rating. For example, the Lisam-Dilts clays, 8% to 35% slopes SMU, has a severe erosion hazard rating. Slopes 22% and greater would have a severe erosion hazard but slopes less than 22% would have a slight or moderate rating. The opposite could be true for an SMU with a slight or moderate rating. There could be areas within the SMU with a severe rating. See the Soils section in Chapter 3 for an explanation of how erosion hazard ratings are derived.
- Soil and vegetation mitigation measures would be addressed at the site-specific project level. Erosion controls and other mitigation measures would be installed and maintained. These measures would effectively mitigate soil erosion.

Actions that contribute to the decline in abundance or distribution of naturally occurring grassland and shrubland communities are considered adverse impacts. Conversely, beneficial impacts to these communities include actions that protect or restore them in the planning area.

Direct effects to grassland and shrubland communities result from surface-disturbing and other activities that cause vegetation removal and mechanical damage to plants. Surface-disturbing activities generally are considered an adverse direct effect to grassland and shrubland communities. Activities such as livestock grazing, wildlife use, wildfire and vegetative treatments (e.g., prescribed fire, chemical, or biological) also have direct effects on these communities, which may be both adverse and beneficial. Indirect effects to grassland and shrubland communities result from activities that alter the quality and health of these communities. For example, activities that result in soil compaction, erosion, changes in hydrology, and encroachment of INPS are considered indirect effects. Beneficial effects to grassland and shrubland communities include activities that minimize, reduce, or prevent the spread of INPS into these communities and vegetative treatments to improve these communities.

Short-term effects to soils and vegetation are those that result during initial surface disturbance prior to stabilization by vegetation or practices/structures that minimize water and wind erosion. Long-term effects due to accelerated erosion would occur in locations where bare soils are allowed to remain exposed to water and wind for more than 5 years. Other long-term effects are due in part to changes in vegetation communities and the loss of productivity in areas where facilities and structures are built by removing or greatly altering the soil profile.

Qualitative observations during watershed assessments indicate that soil quality, stability, and watershed health have improved overall within the planning area. Soil quality and stability is diminishing in some areas due to concentrated commercial and recreational activities and use.

Projected increases in commercial (10% per year) and recreational activities/use (0.5% per year) may increase the potential for soil erosion and decreased soil quality in localized areas. Continued implementation of Standards for Rangeland Health is expected to maintain soil quality.

Impacts Common to All Alternatives

The following addresses key soil concepts that are fundamental to understanding the effects to soil quality and soil/site stability.

> "Soil quality is the capacity of a specific kind of soil to function within natural or managed ecosystem boundaries, sustain plant and animal productivity, maintain or enhance the quality of water and air, and support human health and habitation. Changes in the capacity of soil to function are reflected in soil properties that change in response to management or climate. Changes in soil quality that occur as a result of management affect:
>
> - the amount of water from rainfall and snowmelt that is available for plant growth;
> - runoff, water infiltration, and the potential for erosion;
> - the availability of nutrients for plant growth;
> - the conditions needed for germination, seedling establishment, vegetative reproduction, and root growth; and
> - the ability of the soil to act as a filter and protect water and air quality." (NRCS 2001)

Indirect effects attributed to disturbed soils include the following: (1) sedimentation of drainages and perennial water bodies primarily by water or wind erosion; (2) particulate matter affecting air quality through wind erosion; (3) reduced infiltration; (4) an increase in surface water runoff that could cause higher peak stream flows and possibly downstream flooding; and (5) changes in surface water quality caused by exposing soils or bedrock with undesirable chemical characteristics.

Protective management actions for wildlife/habitat, cultural, paleontological and geological resources, special designations, and wilderness characteristics would indirectly benefit soil and vegetation resources. This would be a result of stipulations/restrictions placed on surface-disturbing activities to protect those resource values. However, there could be times when soils and vegetation resources could be compromised by protective measures for those resources.

Surface-disturbing activities would affect soils and vegetation to varying degrees depending on the type of disturbance, amount, and location; soil and vegetation type; time of year; climatic factors; and surface hydrology. Surface-disturbing activities remove protective vegetative cover and/or crusts and can alter soil physical, chemical, and biological properties; resulting in increased soil susceptibility to water and wind erosion, and decreased soil quality and site productivity. Areas with soils that have severe erosion hazards, poor reclamation suitability, badlands, and rock outcrop are the most vulnerable to effects.

All soils are susceptible to accelerated erosion. Accelerated erosion is in excess of natural erosion rates and occurs when soil particles are detached and removed as a result of human and/or animal activities. Soils with severe erosion hazards, badlands, and rock outcrop are the most vulnerable to accelerated erosion. Once disturbed it is difficult and costly to stabilize these areas, affecting reclamation. Accelerated erosion is approximately 7 times greater on soils with a severe erosion hazard than predicted for soils with a low or moderate erosion hazard (USFS 2008).

Soil compaction results from equipment, vehicles, humans, and animals traveling over trails, roads, and land. Severity depends on soil type, soil moisture, vegetative cover, and the frequency and weight (lbs./sq. inch). Compaction alters soil structure reducing infiltration/permeability rates; in turn increasing runoff, erosion and potential sedimentation. Soil quality and vegetative vigor can decrease. Soils are the most susceptible to compaction during moist conditions.

Important soil components often affected by surface-disturbing activities are biological, chemical, and physical crusts. Biological soil crusts are an intimate association between soil particles and cyanobacteria, algae, microfungi, lichens, and bryophytes which live within or on top of the uppermost millimeters of soil (Rosentreter, et al. 2007). Chemical and physical crusts are inorganic features such as a salt crust or platy surface crust (USGS 2006). These crusts (biological and chemical/physical) hold soil particles in place to help stabilize soils; reducing erosion and increasing soil quality. Crusts can be completely damaged/destroyed/removed by repeated foot, vehicle traffic, or any other surface-disturbing activities. Once damaged/destroyed/removed, the erosive powers of water and wind can easily erode exposed soil particles.

Fire Management and Ecology: Prescribed and wildfires cause short-term, localized runoff, soil erosion, and sedimentation. Factors such as intensity, duration, soil moisture, vegetation type, fuel type and density, and time of year determine the severity of the effects to soil physical, chemical and biological properties. As vegetation recovers the effects diminish. Recovery typically occurs within 1 to 5 years, except in areas where there is high burn severity, resulting in minimal effects to the long-term productivity of a site. Soil effects are typically less severe from prescribed fire than from wildfire. Prescribed fire ignitions can be controlled to times of year when there is less likely damage to soils from excessive heating. Prescribed fires reduce fuel loading, minimizing the risk of high severity wildfires; therefore, short-term effects associated with prescribed fire generate long-term benefits by reducing the risk of highly damaging high severity wildfires.

Implementation of prescribed burning, mechanical treatments, or other appropriate methods to restore desired ecological conditions of rangelands, forests or woodlands would improve soil and vegetation quality in the long term.

Soils quality would benefit by implementation of emergency stabilization and rehabilitation (ES&R) treatments as these treatments are implemented to stabilize and prevent unacceptable degradation to natural resources and to repair or improve fire-damaged lands unlikely to recover naturally to management-approved conditions. Without taking these actions soils would be susceptible to erosion and long-term degradation indirectly affecting other resources and uses that are dependent on stable and productive soils.

Fluid Minerals: Fluid mineral development would affect soils and vegetation during exploration, drilling, production, and abandonment. Effects could include removal of vegetation, exposure of the soil, mixing of soil horizons, loss of topsoil productivity, soil compaction, and increased susceptibility to water and wind erosion. Site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored to minimize effects. The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM and USFS 2007) would be followed. Effects would be both short-term (well pads and pipelines) and long-term (production areas and access roads).

Reclamation is not normally a problem on drill pads (Munshower 1994). Areas not needed for active production and operations should undergo interim reclamation. Reclamation measures should begin as soon as possible after the disturbance and continue until successful reclamation is achieved. Generally, soil erosion rates are greater on recently reclaimed areas and decrease over time to natural levels in about 3-5 years. Areas needed for production, access roads, and facilities would require a long-term commitment of the soil and vegetation resource. These sites remain non-productive and continue to be at risk of erosion until abandonment and final reclamation. Production water, when spilled, could contaminate soils and vegetation (depending on properties of the water). This would affect reclamation by altering chemical characteristic of the soils (high EC, ESP, SAR, pH, etc.).

Forests and Woodlands: Disturbance associated with forest treatment activities would generate accelerated soil erosion in the short term and could increase soil compaction within treatment areas. Effects are greatest on roads and skid trails. Silvicultural prescriptions and contracts would be written with mitigation measures including, but not limited to, those specified in the Water Quality BMPs for Montana Forests (Logan 2001). These measures would provide protection to soil, vegetation, and water resources. Meeting the desired future condition in the long term with these treatments would

contribute to properly functioning watersheds that support productive plant communities consistent with long-term site potential.

Lands and Realty: Requests for land use authorizations (rights-of-way, leases or permits) will be analyzed and mitigation measures applied on a case-by-case basis through the environmental review process. Terms and conditions for rights-of-way, corridors, and development areas (oil and gas) will incorporate applicable BMPs, current professional practice, and recent scientific findings to protect soils and vegetation resources. Surface-disturbing effects would not occur in exclusion areas; therefore, there would be no soil and vegetation disturbance effects in these areas. If a surface-disturbing activity would be allowed in an avoidance area, site-specific measures would be developed to protect soils and vegetation from long-term degradation (see Chapter 2, Table 2.6 for a listing of the exclusion and avoidance areas).

It is anticipated there would be approximately 1,421 acres (less than 1% of the planning area) of soil and vegetation disturbances for rights-of-way within the next 20 years. Of these, 360 acres (less than 1% of the planning area) would be long-term disturbances as these would be for roads and communication sites.

Livestock Grazing: Livestock can compact soils where trampling, trailing, and congregation occur. Water or wind erosion of soils may be accelerated if insufficient litter or plant cover is left after the grazing season, or if plant composition is changed by grazing practices. Soil structure can be affected by livestock grazing if biological or physical soil crusts are damaged. Overgrazing can reduce the amount of organic matter, the carbon storing ability, and the kinds and numbers of microorganisms living in soils. Achieving or maintaining Standards for Rangeland Health and Guidelines for Livestock Grazing Management generally are effective in managing the effects to soils from livestock grazing. Adjustments to grazing authorizations are made on a case-by-case basis when site-specific studies indicate changes in management are needed.

Noxious Weeds and Other Non-Native Invasive Species: Treatments to control invasive and noxious weeds could result in short-term, localized effects to soil stability because vegetation could be removed making soil susceptible to erosion. However, controlling invasive and noxious weed species would be beneficial to soil quality if treatments result in increased native plant cover on sites degraded by weedy vegetation. Invasive and noxious weeds can impact soil function and reduce biodiversity. Many invasive and noxious weeds have relatively sparse canopies, which would result in greater amounts of erosion compared to native vegetation (BLM 2007b).

OHV Use, Travel Management Areas, and Transportation and Facilities: Travel management areas were identified and prioritized as high, moderate, and low, but no site-specific route designations would be made in this RMP; therefore, travel and transportation management plans would need to be developed that define designated motorized and nonmotorized transportation networks after the completion of this RMP. An interdisciplinary team, as well as the RMP cooperating agencies, would be used for special expertise in identifying the resource and use conflicts and benefits of various routes. Possible elements for route selection criteria may include erodible soils (severe water/wind hazard, badlands, rock outcrop) and soils with low bearing strength.

Travel on roads/trails could increase disturbances to soils and vegetation; resulting in increased soil compaction, rutting, surface runoff, and subsequent erosion. The severity of disturbance would depend upon soil conditions (moist or wet vs. dry or frozen), frequency, vehicle weight (lbs./sq. inch) and type, tire width or tread, and driver type. Effects would be greatest in areas of concentrated use that are not maintained or improved. Compaction and erosion could occur to the extent that natural revegetation could not occur and some sort of mechanical treatment would be required. Travel during wet soil conditions could lead to rutting and the creation of alternative routes, parallel and/or braided roads/trails. Ruts can provide a channel for concentrated flow to accelerate soil erosion.

BLM roads/trails that are properly designed, graded, and maintained would provide for improved road/trail conditions. This could result in decreased soil disturbances associated with creation of parallel or braided roads/trails and associated runoff and subsequent erosion. Roads/trails with poor design and improper maintenance would be the most susceptible to erosion due to runoff, compacted surfaces, and lack of vegetative cover. Typically, poorly designed and improperly maintained roads are incised and channel and/or pond water, leading to disturbance and/or erosion within and adjacent to the road. Appropriate design standards that minimize surface runoff and subsequent soil erosion would be required for new roads/trails.

Roads/trails would be assigned a maintenance level with specific minimum maintenance standards/intensities for control of runoff, erosion and sedimentation. Drainage structures would be installed or maintained as needed. Grading would be performed only where necessary to correct drainage problems and erosion or when ruts in the roadbed need addressed for travel comfort. This would result in an increase in vegetation over time within the roads/trails, reducing or slowing concentrated flow and stabilizing soils.

Prime Farmlands: Prime Farmlands would be protected from unnecessary and irreversible conversion to nonagricultural uses through identification as such and special attention during construction and reclamation.

Recreation: Recreational use could result in soil and vegetation disturbances. Disturbance would be the greatest in areas of concentrated use, such as roads, hiking trails, and campgrounds (dispersed or developed). These disturbances could result in localized soil compaction and erosion affecting soil and vegetation quality. Effects would depend on duration and circumstance of use.

Renewable Energy: Soils and vegetation would be affected renewable energy projects. Specific soil types at a given site would determine the degree of effects. Effects could include removal of vegetation, exposure of the soil, mixing of soil horizons, loss of topsoil productivity, soil compaction, and increased susceptibility to water and wind erosion. Site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored to minimize effects. There would be a long-term commitment of the soil and vegetation resource where roads and associated facilities are located.

Soil Resources: Achieving or maintaining Standards for Rangeland Health (Appendix H) would maintain or promote adequate amounts of ground cover (i.e., litter, live and standing dead vegetation, micro/biotic crusts, and rock/gravel), plant vigor, subsurface soil conditions that support permeability rates, soil biological organisms, nutrient cycling, and riparian and wetland functions. This would reduce soil compaction, runoff, erosion, and sedimentation; improving overall soil and vegetation quality.

Surface-disturbing activities are evaluated on a case-by-case basis using NRCS Soil Survey data/interpretations and/or through onsite investigations. Mitigation guidelines, BMPs, and avoidance of areas where erosion cannot be effectively controlled/mitigated and reclamation to BLM standards (Appendix J) is likely to be unsuccessful, generally are effective in mitigating surface-disturbing effects to soils and vegetation.

Solid Minerals: Soil and vegetation effects result from the removal, storage, and replacement of soils during the extraction of solid minerals. Soils would be compacted by heavy equipment usage and would be at risk of erosion. In some areas, soils would be completely removed to get at desired minerals; thus soil functionality at those sites would be eliminated until abandonment and final reclamation. In some situations, it could be expected that soil productivity would be completely eliminated even after final reclamation (e.g., highwalls). Reclamation planning would be required and implemented to return soil quality and site productivity. Specific effects would be addressed at the site-specific project level. It is anticipated that there could be approximately 80 acres (less than 1% of the planning area) of soil and vegetation disturbances to extract salable minerals within the next 20 years.

Vegetation – Rangeland, and Vegetation – Riparian and Wetland: Managing for healthy vegetation communities would help to achieve or maintain PFC. Achieving or maintaining PFC on upland sites promotes adequate amounts of vegetative cover to stabilize soils and provide organic material and nutrient cycling. Achieving or maintaining PFC in riparian areas promotes the growth of deep-rooted riparian vegetation that dissipates streamflow energy, stabilizes streambanks from cutting action, and filters sediment (Appendix H). Monitoring uplands and riparian areas for PFC would provide information needed to apply appropriate mitigation measures (if necessary) to protect soil and vegetation resources.

The effects of mechanical treatments on soils and vegetation would depend on the following: 1) the amount of soil exposed during the treatment; 2) the effect of surface disturbance on soil properties; 3) the site conditions, especially slope and patterns of precipitation; and 4) the vegetation response after treatment (BLM 2007b). It is anticipated that approximately 10,000 acres (less than 1% of the planning area) of mechanical treatments could occur within the next 20 years.

Cumulative Impacts

Long-term climate change and its effects on vegetation communities is speculative; however, it has been hypothesized that altered conditions driven by long-term climate change could largely be responsible for driving changes in plant community composition over which BLM may have little control. Most researchers agree that if current predictions for climate change come to pass, a shift in species habitat from lower to higher elevation and southern to northern latitude will occur; a great deal of uncertainty lies in whether it will get wetter or drier, or if a change in the timing of precipitation will occur. If recent trends can serve as any indicator, current drought cycles would suggest the future climate will likely be drier.

The timing of precipitation is fundamental in determining vegetation communities. Precipitation received during the growing season favors grassland, while that received during the winter favors shrubland. Hotter, drier climates tend to favor more annual type grass and forb species that are able to rapidly take advantage of moisture when available, rather than perennials that rely on a more consistent source of water.

Little evidence exists to suggest a change in the timing of precipitation is occurring; however, most climate experts have suggested that precipitation events will likely be less frequent and more intense in nature.

The climate of the recent past has supported a semi-arid grassland across most of the planning area. There is some transition from north to south. The far north is predominantly grassland; the far south tends to have more shrubs. This implies a moisture gradient, although management (i.e., grazing, fire suppression) may have contributed significantly to that effect in the past.

If the climate across the planning area shifts toward the hotter, drier, more intense precipitation scenario, plant communities are likely to transition more toward that of a semi-arid desert than the historic semi-arid grassland. A corresponding decline in carrying capacity would be expected, as perennial grasslands transition to shrublands and annual grasslands.

Circumstantial evidence and hypotheses state that this is already happening, although the combined effects of fire suppression and grazing confound efforts to identify a single cause, or even the contributions of individual factors. For example, all evidence indicates that sagebrush is more prevalent across the planning area than at any time since western settlement (Klement, et al. 2001).

If, on the other hand, the climate across the planning area shifts toward the hotter, wetter, more intense precipitation scenario, plant communities are likely to remain grasslands and carrying capacity would likely increase over time.

Soil erosion would be a major concern under either scenario because of the more intense precipitation events.

Managing vegetation based upon historical benchmarks under such a scenario is unrealistic. Greater emphasis should be placed on proactive management, as outcomes of management decisions will likely be uncertain. Monitoring will be fundamental to successfully adapt to change.

Impacts under Alternative A (Current Management)

Fire Management and Ecology, and Forests and Woodlands: Treatments (mechanical) and management activities (prescribed fire) to emphasize healthy forest conditions and to restore desired ecological conditions of rangelands would subject soils to localized short-term erosion and compaction effects as described under Impacts Common to All Alternatives. Table 4.63 lists the approximate number of acres that could be treated. Meeting the desired future condition in the long term with these treatments would contribute to properly functioning watersheds that support productive plant communities and would improve soil and vegetation quality in the long term. Also, on these treated acres the risk of high severity wildfires would be reduced.

Table 4.63 Fuels and Forest Treatment by Alternative (Acres and Percent of Total BLM Surface Acres)					
	Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
Treated Acres	11,600 (.48%)	34,480 (1.41%)	34,480 (1.41%)	34,480 (1.41%)	34,480 (1.41%)

Fluid Minerals: The approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO are listed in Table 4.64. Soils and vegetation would be protected on these acres because fluid mineral surface-disturbing activities and occupancy would not be allowed unless a Waiver, Exception, or Modification is granted. Table 4.64 also lists the approximate acres that would be subject to a Soils-CSU stipulation.

Table 4.64 Fluid Mineral Lease Stipulations for the Entire Planning Area by Alternative (Acres)					
	Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
Closed	102,298	3,173,637	218,586	74,674	152,702
Total NSO	282,062	258,560	1,291,160	357,456	1,711,378
Soils-NSO*	NA	78,465	99,982	NA	131,428
Soils-CSU	891,308	NA	774,408	NA	563,749

* Acres are included in the total acres of NSO.

The approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO within the North Blaine and Bears Paw South Field Development Areas are listed in Table 4.65. Soils would not be affected in these areas because fluid mineral surface-disturbing activities and occupancy would not be allowed. Table 4.65 also lists the approximate acres that would be subject to a Soils-CSU stipulation.

Table 4.65 Fluid Mineral Lease Stipulations for the North Blaine and Bears Paw South Areas by Alternative (Acres)					
	Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
North Blaine Field Development Area					
Closed	0	81,525	0	0	0
Total NSO	3,453	1,526	31,772	4,906	14,247
Soils-NSO*	NA	104	659	NA	659
Soils-CSU	16,559	NA	14,966	NA	11,322
Bears Paw South Field Development Area					
Closed	0	171,133	0	0	0
Total NSO	6,201	5,440	63,171	14,590	46,418
Soils-NSO*	NA	5,100	11,687	NA	11,687
Soils-CSU	120,097	0	99,549	NA	88,151

* Acres are included in the total acres of NSO.

The Soils-CSU stipulation states that surface use or occupancy within special areas would be strictly controlled, or if absolutely necessary, excluded. Special areas in this case would be slopes over 30%, or 20% on extremely erodible or slumping soils. Use or occupancy would be restricted only when the BLM demonstrates the restriction is necessary for the protection of such special areas. If it were demonstrated that the effects from the proposed surface use or occupancy to the soil resource could not be mitigated, the authorized officer would have the authority to exclude surface use or occupancy. This would provide protection to soils with a severe water erosion hazard on slopes over 20%. This stipulation would not provide protection to soils with a severe water erosion hazard under 20% slope, soils with severe wind erosion hazard, or other landforms where erosion could not be controlled/ mitigated or reclaimed to BLM program standards.

Fluid mineral development would affect soils and vegetation during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. Table 4.66 lists the number of new federal oil and gas wells. Drilling/development would occur mostly in the high and moderate development potential areas (see Map 2.2) over the next 15 to 20 years. The approximate total acres disturbed associated with the construction of well sites, access roads, and pipeline are listed in Table 4.66. Well pads and pipelines would undergo interim reclamation during production, stabilizing soils and returning productivity. The approximate acres that would undergo interim reclamation are listed in Table 4.66. A long-term commitment of soils would be required for access roads and production areas. Soil and vegetation productivity would be severely limited in those areas. The long-term disturbed acres are listed in Table 4.66.

Table 4.66
Number of Federal Fluid Mineral Wells and Associated Disturbance by Alternative
(Acres and Percent of Total BLM Oil and Gas Mineral Subsurface Acres)

	Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
New Wells	3,468	2,241	3,211	3,488	3,350
New Acres Disturbed	9,564 (.27%)	4,441 (.12%)	8,547 (.24%)	9,663 (.28%)	9,068 (.26%)
Interim Reclamation Acres Reclaimed	7,142 (.21%)	2,896 (.08%)	6,309 (.18%)	7,227 (.21%)	6,730 (.20%)
Long-Term Disturbed Acres	2,422 (.07%)	1,545 (.04%)	2,238 (.06%)	2,436 (.07%)	2,338 (.07%)

Livestock Grazing: Constructing/installing range improvement projects such as livestock reservoirs/pits and pipelines and tanks would result in short-term, localized compaction and soil erosion. Also, retaining water would result in saturated soil pores and aerobic conditions changing over time to anaerobic conditions. Oxygen would not be available to the soil flora and fauna and biological activity would be reduced. Vegetation composition would shift to hydrophytic species. Additionally, as a result of the anaerobic environment, soils would become reduced and undergo chemical reactions that are different than non-saturated soils. The approximate acres disturbed to construct/install reservoirs/pits and pipelines and tanks are listed in Table 4.67. Soil and vegetation mitigation would be addressed at the site-specific project level to minimize effects.

Table 4.67
Livestock Grazing Development Surface Disturbance by Alternative
(Acres and Percent of Total BLM Surface Acres)

		Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
Pipelines/ Wells	short-term	140 (<.01%)	175 (<.01%)	175 (<.01%)	140 (<.01%)	175 (<.01%)
	long-term	10 (<.01%)	12 (<.01%)	12 (<.01%)	10 (<.01%)	12 (<.01%)
Reservoirs	short-term	660 (.03%)	495 (.02%)	495 (.02%)	660 (.03%)	495 (.02%)
	long-term	200 (<.01%)	345 (.01%)	345 (.01%)	460 (.02%)	345 (.01%)

OHV Use and Travel and Transportation Management: A total of 124 acres would be designated open to OHV use off roads, primitive roads and trails (Fresno OHV Area and Glasgow OHV Area). Effects of OHV use on soils, vegetation, and watershed function include soil compaction, reduced water infiltration, diminished presence and impaired function of soil stabilizers (vegetation biological, chemical, and physical crusts, etc.), and accelerated erosion rates. Where biological and chemical crusts or other soil stabilizers are disturbed or destroyed, soil erosion from water and wind may increase beyond rates found in undisturbed sites with similar soils and conditions; nutrient-cycling processes also are likely to be disrupted, potentially leading to declines in soil fertility (USGS 2007a) and overall soil quality. Effects would be the greatest on sites with severe erosion hazards, shallow soils, badlands, and rock outcrop as these areas would be difficult to stabilize and reclaim once disturbed by repeated OHV use. Table 4.68 lists acres with severe erosion hazards, shallow soils, badlands, and rock outcrop in designated open OHV areas.

Table 4.68
Erosion Hazards, Shallow Soils, Badlands, Rock Outcrop Acres in Designated Open OHV Areas under Alternative A (Current Management)

	Severe Water Erosion Hazard Acres	*Severe Wind Erosion Hazard Acres*	*Shallow Soils Acres*	*Badlands Acres*	*Rock Outcrop Acres*	*Total BLM Acres*
Fresno OHV Area	22	0	22	51	0	84
Glasgow OHV Area	36	0	0	0	0	40

A total of 7,429 acres would be closed to OHV use (Sweet Grass Hills ACEC). Soils and vegetation on these acres would be protected from OHV use effects.

If big game retrieval off road would be allowed through subsequent site-specific planning, effects from big game retrieval to soils and vegetation would be dependent on factors such as soil conditions (dry or frozen vs. wet or moist), soil type, vehicle weight (lbs./sq. in.) and driver type. If game retrieval would occur during wet soil conditions, soils could become rutted and compacted. Effects would be the greatest on soils with severe erosion hazards, shallow soils, badlands, or rock outcrop.

Fifteen travel management planning areas would be prioritized. Table 4.69 lists acres with severe erosion hazards, badlands, and rock outcrop in each travel management area.

Table 4.69
Erosion Hazards, Badlands, Rock Outcrop Acres in Travel Management Areas under Alternative A (Current Management)

	Severe Water Erosion Hazard Acres	*Severe Wind Erosion Hazard Acres*	*Badlands Acres*	*Rock Outcrop Acres*	*Total BLM Acres*
Bears Paw to Breaks	56,396	0	12,129	9	89,369
Kevin Rim	4,413	77	59	0	16,325
Little Rocky Mountains	21,314	0	0	0	27,449
Lonesome Lake	8	0	0	0	121
Lower Marias River	4,541	0	2,657	0	12,014
Missouri Breaks	194,899	401	609	19,055	402,349
Northeast Bears Paw Breaks	3,592	0	0	0	4,351
Northwest of Glasgow	59	0	0	0	80
Northwest Blaine County	25,390	1,264	1,063	0	170,420

Table 4.69 Erosion Hazards, Badlands, Rock Outcrop Acres in Travel Management Areas under Alternative A (Current Management)					
	Severe Water Erosion Hazard Acres	***Severe Wind Erosion Hazard Acres***	***Badlands Acres***	***Rock Outcrop Acres***	***Total BLM Acres***
Sweet Grass Hills	2,858	0	0	0	7,879
Upper Marias River	6,235	9	0	0	8,908
Vimy	7,062	0	0	0	8,182
Wayne Creek	8,805	0	0	0	29,792
Woody Island	21,094	468	0	0	53,436
Remaining BLM Lands	459,662	21,449	195	111,383	1,606,688

Solid Minerals: Solid minerals have been or could be withdrawn and/or closed in several areas (see Chapter 2, Tables 2.15 and 2.16 for a listing of the areas. Within these areas the effects of mineral extraction to soils, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

It is anticipated that there could be approximately 2,495 acres (less than 1% of the planning area) of soil and vegetation disturbances to extract locatable minerals occurring in the Little Rocky Mountains, Sweet Grass Hills, and Brazil Creek. Effects would be as described under Impacts Common to All Alternatives.

Vegetation – Riparian and Wetland: Corrective measures to treat saline seep areas would occur once there is a problem. Once a saline seep develops it requires large amounts of input/energy to remediate the problem. Some saline seeps may not even be possible to remediate. Saline seeps are characterized by a buildup of salt in localized places, poor to no plant growth, water ponding, and slow water infiltration (McCauley and Jones 2005). Where saline seeps develop soils become "salt-affected." The term "salt-affected" refers to soils with substantial enough salt concentrations to affect plant health, soil properties, water quality, and other land and soil resource uses (McCauley and Jones 2005).

Cumulative Impacts

The BLM's past, present, and future goals are to maintain, improve, and/or restore soil and vegetation quality by preventing and reducing erosion and compaction. Authorized surface-disturbing activities are subject to an onsite evaluation to develop mitigation and plan for reclamation.

Past and present actions that have affected and would affect soil and vegetation resources include mineral exploration and development; improper livestock grazing; recreation; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on soil resources by causing surface disturbance contributing to soil compaction, erosion, and subsequent sedimentation.

It is anticipated that there could be up to approximately 223,654 acres of new surface disturbances on all land ownerships over the next 20 years. The disturbances would not occur at one time. Cumulatively, 1.4% of soils and vegetation would be affected from new surface disturbances.

A reasonable foreseeable future action that would affect soil resources would be the Keystone XL Pipeline. It is anticipated that construction would occur within the next 2 years. This pipeline would disturb approximately 300 acres (less than 1% of the planning area) of BLM land in the planning area. Short-term effects, such as compaction and erosion, would be expected. It has been demonstrated in the past that this type of action can be successfully reclaimed and soil and vegetation productivity returned (Northern Border Pipeline).

It is anticipated that up to 5,708 acres (less than 1% of the planning area) of surface disturbance could be associated with wind energy development on all land ownerships. Of these acres, 4,269 acres would be reclaimed leaving 1,439 acres (less than 1% of the planning area) with long-term disturbances. Specific soil types at a given site would determine the

degree of effects. Soil compaction and erosion could occur from the associated roads. There would be a long-term commitment of the soil and vegetation resource where the turbines and associated facilities are located.

Impacts under Alternative B

Fire Management and Ecology, and Forests and Woodlands: Table 4.63 lists the approximate number of acres that could be treated. Effects on treatment areas to emphasize healthy forest conditions and to restore desired ecological conditions of rangelands would be the same as described in Alternative A.

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO in the entire planning area and the North Blaine and Bears Paw South Field Development Areas. Effects on those acres would be the same as described in Alternative A. The Soils-NSO stipulation acres are included in the total NSO acreage.

The Soils-NSO stipulation states that no surface occupancy or use would occur on sensitive soils, badlands, rock outcrop, or slopes susceptible to mass failure. This stipulation would provide protection to soils and vegetation with both severe water and wind erosion hazards, badlands, rock outcrop, or slopes susceptible to mass failure. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim to BLM program standards.

Fluid mineral development would affect soils and vegetation during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. The number of new federal wells and associated acres of short-term and long-term disturbance are listed in Table 4.66.

Livestock Grazing: The approximate acres disturbed to construct/install reservoirs/pits and pipelines and tanks are listed in Table 4.67. Effects at each construction site would be the same as described in Alternative A.

OHV Use and Travel and Transportation Management: No areas would be designated as open to off-road travel; therefore, soils would not be subject to effects from OHV use as described in Alternative A.

Seven travel management planning areas would be prioritized. Table 4.70 lists acres with severe erosion hazards, badlands, and rock outcrop in each travel management area.

Table 4.70
Erosion Hazards, Badlands, Rock Outcrop, and Total BLM Acres in Travel Management Areas under Alternative B

	Severe Water Erosion Hazard Acres	*Severe Wind Erosion Hazard Acres*	*Badlands Acres*	*Rock Outcrop Acres*	*Total BLM Acres in Travel Management Areas*
Grassland Bird/Greater Sage-Grouse Priority Areas ACEC and Frenchman	123,695	19,674	28	26,715	490,477
Greater Sage-Grouse Protection Priority Area ACEC	401,664	434	609	78,676	997,338
Little Rocky Mountains	21,458	0	0	0	27,668
Marias River	10,879	9	2,206	0	19,032
North Missouri Breaks	65,524	0	12,579	9	101,523
Prairie Grasslands	49,913	1,539	0	0	149,681
Remaining BLM Lands	143,216	2,012	1,289	25,046	651,661

Solid Minerals: Solid minerals have been or could be withdrawn and/or closed in several areas (see Chapter 2, Tables 2.15 and 2.16 for a listing of the areas). Within these areas the effects of mineral extraction to soils and vegetation, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

It is anticipated that there could be approximately 355 acres (less than 1% of the planning area) of soil and vegetation disturbances to extract locatable minerals occurring in the Little Rocky Mountains, Sweet Grass Hills, and Brazil Creek. Effects would be as described under Impacts Common to All Alternatives.

Vegetation – Rangeland: Reclamation would be required for surface disturbances greater than 1/10 acre. In general, this would result in fewer acres left unreclaimed than under Alternative A; therefore, there would be an overall increase in areas where soil and vegetation quality is returned. Most production areas for oil and gas are 1/10 acre; this would ensure that these areas get reclaimed.

Vegetation – Riparian and Wetland: Reclaiming priority seep areas would improve soil and vegetation quality in those areas where reclamation would be successful. Design and mitigation measures to minimize the development of saline seep areas would protect soils from becoming "salt affected." The term "salt-affected" refers to soils with substantial enough salt concentrations to affect plant health, soil properties, water quality, and other land and soil resource uses (McCauley and Jones 2005).

Cumulative Impacts

The BLM's past, present, and future goals are to maintain, improve, and/or restore soil and vegetation quality by preventing and reducing erosion and compaction. Authorized surface-disturbing activities are subject to an onsite evaluation to develop mitigation and plan for reclamation.

Past and present actions that have affected and would affect soil and vegetation resources include mineral exploration and development; improper livestock grazing; recreation; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on soil resources by causing surface disturbance contributing to soil compaction, erosion, and subsequent sedimentation. Soil quality and watershed health, overall, has improved within the last 30 years and would continue to do so under this alternative.

It is anticipated that there could be up to approximately 241,116 acres of new surface disturbances on all land ownerships over the next 20 years. The disturbances would not occur at one time. Cumulatively, 1.5% of soils and vegetation would be affected from new surface disturbances.

A reasonable foreseeable future action that would affect soil and vegetation resources would be the Keystone XL Pipeline. It is anticipated that construction would occur within the next 2 years. This pipeline would disturb approximately 300 acres on BLM lands in the planning area. Short-term effects, such as compaction and erosion, would be expected. It has been demonstrated in the past that this type of action can be successfully reclaimed and soil and vegetation productivity returned (Northern Border Pipeline).

It is anticipated that up to 5,708 acres (less than 1% of the planning area) of surface disturbance could be associated with wind energy development on all land ownerships. Of these acres, 4,269 acres would be reclaimed leaving 1,439 acres (less than 1% of the planning area) with long-term disturbances. Specific soil types at a given site would determine the degree of effects. Soil compaction and erosion could occur from the associated roads. There would be a long-term commitment of the soil and vegetation resources where the turbines and associated facilities are located.

This alternative would be the most protective and would provide the greatest reductions of cumulative impacts by restricting surface-disturbing activities.

Impacts under Alternative C

Fire Management and Ecology, and Forests and Woodlands: Table 4.63 lists the approximate number of acres that could be treated. Effects on treatment areas to emphasize healthy forest conditions and to restore desired ecological conditions of rangelands would be the same as described in Alternative A.

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO in the entire planning area and the North Blaine and Bears Paw South Field Development Areas. Effects on those acres would be the same as described in Alternative A. The Soils-NSO stipulation acres are included in the total NSO acreage. Tables 4.64 and 4.65 also list the approximate acres that would be subject to a Soils-CSU stipulation.

The Soils-NSO and Soils-CSU stipulations would provide protection to sensitive soils and vegetation, badlands, rock outcrop, or slopes susceptible to mass failure. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim to BLM program standards.

Fluid mineral development would affect soils and vegetation during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. The number of new federal wells and associated acres of short-term and long-term disturbance are listed in Table 4.66.

Lands and Realty: Corridors and rights-of-ways impacts would be the same as described in Alternative A.

Livestock Grazing: The approximate acres disturbed to construct/install reservoirs/pits and pipelines and tanks are listed in Table 4.67. Effects at each construction site would be the same as described in Alternative A.

OHV Use and Travel and Transportation Management: A total of 7,513 acres would be closed to OHV use (Sweet Grass Hills ACEC, Fresno OHV Area, and Glasgow OHV Area). Soils and vegetation on these acres would be protected from motorized vehicle use effects.

Effects from game retrieval would be dependent on factors such as soil conditions (dry or frozen vs. wet or moist), soil type, vehicle weight (lbs./sq. in.) and driver type. If game retrieval would occur during wet soil conditions, soils could become rutted and compacted. Effects would be the greatest on soils with severe erosion hazards, shallow soils, badlands, or rock outcrop.

Seven travel management planning areas would be prioritized. Table 4.71 lists acres with severe erosion hazards, badlands, and rock outcrop in each travel management area.

Table 4.71
Erosion Hazards, Badlands, Rock Outcrop, and Total BLM Acres in Travel Management Areas under Alternatives C and D

	Severe Water Erosion Hazard Acres	***Severe Wind Erosion Hazard Acres***	***Badlands Acres***	***Rock Outcrop Acres***	***Total BLM Acres in Travel Management Areas***
Frenchman/Rock Creek	48,752	9,207	28	13,252	190,174
Little Rocky Mountains	21,458	0	0	0	27,688
Marias River	10,879	9	2,206	0	19,032
North Missouri Breaks	65,524	0	12,579	9	101,523
South Phillips County	189,829	1,105	0	1	575,917
South Valley County	258,844	0	777	79,029	584,820
Remaining BLM Lands	221,063	13,347	1,122	38,156	938,246

Solid Minerals: Solid minerals have been or could be withdrawn and/or closed in several areas (see Chapter 2, Tables 2.15 and 2.16 for a listing of the areas). Within these areas the effects of mineral extraction to soils and vegetation, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

It is anticipated that there could be approximately 355 acres (less than 1% of the planning area) of soil and vegetation disturbances to extract locatable minerals occurring in the Little Rocky Mountains, Sweet Grass Hills, and Brazil Creek. Effects would be as described under Impacts Common to All Alternatives.

Vegetation – Rangeland: Reclamation would be required for surface disturbances greater than 1/10 acre. Effects would be the same as described in Alternative B.

Vegetation – Riparian and Wetland: Reclaiming priority seep areas and implementing design and mitigation measures to minimize the development of saline seep areas would have the same effects as described in Alternative B.

Cumulative Impacts

The BLM's past, present, and future goals are to maintain, improve, and/or restore soil and vegetation quality by preventing and reducing erosion and compaction. Authorized surface-disturbing activities are subject to an onsite evaluation to develop mitigation and plan for reclamation.

Past and present actions that have affected and would affect soil resources include mineral exploration and development; improper livestock grazing; recreation; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on soil and vegetation resources by causing surface disturbance contributing to soil compaction, erosion, and subsequent sedimentation.

It is anticipated that there could be up to 245,228 acres of new surface disturbances on all land ownerships over the next 20 years. The disturbances would not occur at one time. Cumulatively, 1.5% of soils and vegetation would be affected from new surface disturbances.

A reasonable foreseeable future action that would affect soil and vegetation resources would be the Keystone XL Pipeline. It is anticipated that construction would occur within the next 2 years. This pipeline would disturb approximately 300 acres of BLM land in the planning area. Short-term effects, such as compaction and erosion, would be expected. It has been demonstrated in the past that this type of action can be successfully reclaimed and soil and vegetation productivity returned (Northern Border Pipeline).

It is anticipated that there could be up to 5,708 acres (less than 1% of the planning area) of surface disturbance associated with wind energy development on all land ownerships. Of these acres, 4,269 acres would be reclaimed leaving 1,439 acres (less than 1% of the planning area) with long-term disturbances. Specific soil types at a given site would determine the degree of effects. Soil compaction and erosion could occur from the associated roads. There would be a long-term commitment of the soil and vegetation resource where the turbines and associated facilities are located.

This alternative would provide an intermediate level of protection and mitigation of cumulative impacts.

Impacts under Alternative D

Fire Management and Ecology, and Forests and Woodlands: Table 4.63 lists the approximate number of acres that could be treated. Effects on treatment areas to emphasize healthy forest conditions and to restore desired ecological conditions of rangelands would be the same as described in Alternative A.

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO in the entire planning area and the North Blaine and Bears Paw South Field Development Areas. Effects on those acres would be the same as described in Alternative A.

Relocating a proposed oil and gas operation up to 200 meters (656 feet) (standard lease terms) would give the authorized officer the option to move a location off an area where erosion cannot be controlled/mitigated or reclaimed. However,

200 meters may not be far enough to move a location off of those areas; therefore; soils and vegetation would not be protected and would be at risk of having long-term effects to soil and vegetation quality.

Fluid mineral development would affect soils and vegetation during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. The number of new federal wells and associated acres of short-term and long-term disturbance are listed in Table 4.66.

Livestock Grazing: The approximate acres disturbed to construct/install reservoirs/pits and pipelines and tanks are listed in Table 4.67. Effects at each construction site would be the same as described in Alternative A.

OHV Use and Travel and Transportation Management: A total of 305 acres would be open to OHV use (Fresno OHV Area, Glasgow OHV Area, and Thirty Mile OHV Area). Effects of OHV use would be the same as described in Alternative A. It has been observed in the proposed Thirty Mile OHV Area that loose material lies underneath a chemical crust. Once this chemical crust is damaged/destroyed by motorized vehicles, this loose material would be susceptible to erosion by water and wind. This eroded material could add to the sediment yield into the nearby Thirty Mile Creek. Table 4.72 lists acres with severe erosion hazards, shallow soils, badlands, and rock outcrop in open travel areas.

Table 4.72
Erosion Hazards, Shallow Soils, Badlands, Rock Outcrop Acres in Designated Open OHV Areas under Alternative D

	Severe Water Erosion Hazard Acres	*Severe Wind Erosion Hazard Acres*	*Shallow Soils Acres*	*Badlands Acres*	*Rock Outcrop Acres*	*Total BLM Acres*
Fresno OHV Area	22	0	22	51	0	84
Glasgow OHV Area	36	0	0	0	0	40
Thirty Mile OHV Area	171	0	160	0	0	181

At the time of travel management planning, if areas are opened to off-road use, soils and vegetation on those areas would be affected as described in Alternative A.

Effects to soils and vegetation from game retrieval, as described in Alternative C, would not occur within the Big Bend, Kevin, Frenchman, and Malta Geological ACECs as these areas would be closed to game retrieval.

Seven travel management planning areas would be prioritized. The acres of soils with severe erosion hazards, badlands, and rock outcrop for the delineated travel management areas are shown in Table 4.71.

Solid Minerals: Solid minerals have been or could be withdrawn and/or closed in several areas (see Chapter 2, Tables 2.15 and 2.16 for a listing of the areas). Within these areas the effects of mineral extraction to soils and vegetation, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

It is anticipated that there could be approximately 300 acres (less than 1% of the planning area) of soil and vegetation disturbances to extract locatable minerals occurring in the Little Rocky Mountains, Sweet Grass Hills, and Brazil Creek. Effects would be as described under Impacts Common to All Alternatives.

Vegetation – Rangeland: Reclamation would be required for surface disturbances greater than 1/10 acre. Effects would be the same as described in Alternative B.

Vegetation – Riparian and Wetland: Reclaiming priority seep areas and implementing design and mitigation measures to minimize the development of saline seep areas would have the same effects as described in Alternative B.

Cumulative Impacts

The BLM's past, present, and future goals are to maintain, improve, and/or restore soil and vegetation quality by preventing and reducing erosion and compaction. Authorized surface-disturbing activities are subject to an onsite evaluation to develop mitigation and plan for reclamation.

Past and present actions that have affected and would affect soil and vegetation resources include mineral exploration and development; improper livestock grazing; recreation; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on soil resources by causing surface disturbance contributing to soil compaction, erosion, and subsequent sedimentation.

It is anticipated that there could be up to 246,659 acres of new surface disturbances on all land ownerships over the next 20 years. The disturbances would not occur at one time. Cumulatively, 1.6% of soils and vegetation would be affected from new surface disturbances.

A reasonable foreseeable future action that would affect soil and vegetation resources would be the Keystone XL Pipeline. It is anticipated that construction would occur within the next two years. This pipeline would disturb approximately 300 acres of BLM land in the planning area. Short-term effects, such as compaction and erosion, would be expected. It has been demonstrated in the past that this type of action can be successfully reclaimed and soil and vegetation productivity returned (Northern Border Pipeline).

It is anticipated that up to 5,708 acres (less than 1% of the planning area) of surface disturbance could be associated with wind energy development on all land ownerships. Of these acres, 4,269 acres would be reclaimed leaving 1,439 acres (less than 1% of the planning area) with long-term disturbances. Specific soil types at a given site would determine the degree of effects. Soil compaction and erosion could occur from the associated roads. There would be a long-term commitment of the soil and vegetation resource where the turbines and associated facilities are located.

This alternative would be the least protective of soils and vegetation and would result in the greatest cumulative impacts.

Impacts under Alternative E (Preferred Alternative)

Fire Management and Ecology, and Forests and Woodlands: Table 4.63 lists the approximate number of acres that could be treated. Effects on treatment areas to emphasize healthy forest conditions and to restore desired ecological conditions of rangelands would be the same as described in Alternative A.

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO in the entire planning area and the North Blaine and Bears Paw South Field Development Areas. Effects on those acres would be the same as described in Alternative A. The Soils-NSO stipulation acres are included in the total NSO acreage. Tables 4.64 and 4.65 also list the approximate acres that would be subject to a Soils-CSU stipulation.

The Soils-NSO and Soils-CSU stipulations would provide protection to soils and vegetation, badlands, rock outcrop, or slopes susceptible to mass failure. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim to BLM program standards.

Fluid mineral development would affect soils and vegetation during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. The number of new federal wells and associated acres of short-term and long-term disturbance are listed in Table 4.66.

Livestock Grazing: The approximate acres disturbed to construct/install reservoirs/pits and pipelines and tanks are listed in Table 4.67. Effects at each construction site would be the same as described in Alternative A.

OHV Use and Travel and Transportation Management: A total of 165 acres would be designated open to OHV use (Glasgow OHV Area and Fresno OHV area). Effects of OHV use on soils, vegetation, and watershed function include soil compaction, reduced water infiltration, diminished presence and impaired function of soil stabilizers (vegetation

biological, chemical, and physical crusts, etc.), and accelerated erosion rates. Where biological and chemical crusts or other soil stabilizers are disturbed or destroyed, soil erosion from water and wind may increase beyond rates found in undisturbed sites with similar soils and conditions; nutrient-cycling processes also are likely to be disrupted, potentially leading to declines in soil fertility (USGS 2007a) and overall soil quality. Effects would be the greatest on sites with severe erosion hazards, shallow soils, badlands, and rock outcrop as these areas would be difficult to stabilize and reclaim once disturbed by repeated OHV use. Table 4.73 lists acres with severe erosion hazards, shallow soils, badlands, and rock outcrop in open travel areas.

Table 4.73
Erosion Hazards, Shallow Soils, Badlands, Rock Outcrop Acres in Designated Open OHV Areas under Alternative E (Preferred Alternative)

	Severe Water Erosion Hazard Acres	*Severe Wind Erosion Hazard Acres*	*Shallow Soils Acres*	*Badlands Acres*	*Rock Outcrop Acres*	*Total BLM Acres*
Glasgow OHV Area	36	0	0	0	0	40
Fresno OHV Area	50	0	50	62	0	125

A total of 7,429 acres would be closed to OHV use (Sweet Grass Hills ACEC). Soils and vegetation on these acres would be protected from OHV effects.

At the time of travel management planning, if areas are opened to off-road use, soils on those areas would be affected as described above in the proposed designated open areas.

If game retrieval would be allowed, effects from game retrieval would be dependent on factors such as soil conditions (dry or frozen vs. wet or moist), soil type, vehicle weight (lbs./sq. in.) and driver type. If game retrieval would occur during wet/moist soil conditions, soils could become rutted and compacted. Effects would be the greatest on soils with severe erosion hazards, shallow soils, badlands, or rock outcrop.

Seven travel management planning areas would be prioritized. Table 4.74 lists acres with severe erosion hazards, badlands, and rock outcrop in each travel management area.

Table 4.74
Erosion Hazards, Badlands, Rock Outcrop and Total BLM Acres in Travel Management Areas under Alternative E (Preferred Alternative)

	Severe Water Erosion Hazard Acres	*Severe Wind Erosion Hazard Acres*	*Badlands Acres*	*Rock Outcrop Acres*	*Total BLM Acres*
Grassland Bird/Greater Sage-Grouse Priority Areas and Frenchman	87,726	9,207	28	27,324	415,875
Greater Sage-Grouse Protection Priority Area and Eastern Breaks and Badlands	401,664	434	609	78,676	997,338
Fresno	144	0	413	0	885
Little Rocky Mountains	21,458	0	0	0	27,688
Marias River	10,879	9	2,206	0	19,032
North Missouri Breaks	65,524	0	12,579	9	101,523
Remaining BLM Lands	228,954	14,018	877	24,437	875,059

Solid Minerals: Solid minerals have been or could be withdrawn and/or closed in several areas (see Chapter 2, Tables 2.15 and 2.16 for a listing of the areas). Within these areas the effects of mineral extraction to soils and vegetation, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

It is anticipated that there could be approximately 355 acres (less than 1% of the planning area) of soil and vegetation disturbances to extract locatable minerals occurring in the Little Rocky Mountains, Sweet Grass Hills, and Brazil Creek. Effects would be as described under Impacts Common to All Alternatives.

Vegetation – Rangeland: Reclamation would be required for surface disturbances greater than 1/10 acre. In general, this would result in fewer acres left unreclaimed than under Alternative A; therefore, there would be an overall increase in areas where soil quality is returned. Most production areas for oil and gas are 1/10 acre; this would ensure that these areas get reclaimed.

Vegetation – Riparian and Wetland: Reclaiming priority seep areas would improve soil and vegetation quality in those areas where reclamation would be successful. Design and mitigation measures to minimize the development of saline seep areas would protect soils from becoming "salt affected." The term "salt-affected" refers to soils with substantial enough salt concentrations to affect plant health, soil properties, water quality, and other land and soil resource uses (McCauley and Jones 2005).

Cumulative Impacts

The BLM's past, present, and future goals are to maintain, improve, and/or restore soil and vegetation quality by preventing and reducing erosion and compaction. Authorized surface-disturbing activities are subject to an onsite evaluation to develop mitigation and plan for reclamation.

Past and present actions that have affected and would affect soil and vegetation resources include mineral exploration and development; improper livestock grazing; recreation; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on soil and vegetation resources by causing surface disturbance contributing to soil compaction, erosion, and subsequent sedimentation. Soil quality and watershed health, overall, has improved within the last 30 years and would continue to do so under this alternative.

It is anticipated that there could be up to 245,872 acres of new surface disturbances on all land ownerships over the next 20 years. The disturbances would not occur at one time. Cumulatively, 1.5% of soils and vegetation would be affected from new surface disturbances.

A reasonable foreseeable future action that would affect soil and vegetation resources would be the Keystone XL Pipeline. It is anticipated that construction would occur within the next 2 years. This pipeline would disturb approximately 300 acres of BLM land in the planning area. Short-term effects, such as compaction and erosion, would be expected. It has been demonstrated in the past that this type of action can be successfully reclaimed and soil and vegetation productivity returned (Northern Border Pipeline).

It is anticipated that up to 5,708 acres (less than 1% of the planning area) of surface disturbance could be associated with wind energy development on all land ownerships. Of these acres, 4,269 acres would be reclaimed leaving 1,439 acres (less than 1% of the planning area) with long-term disturbances. Specific soil types at a given site would determine the degree of effects. Soil compaction and erosion could occur from the associated roads. There would be a long-term commitment of the soil and vegetation resource where the turbines and associated facilities are located.

This alternative would provide an intermediate level of protection and mitigation of cumulative impacts.

Sage Creek Area, Phillips County Photo by Kathy Tribby

Solid Minerals

Assumptions and Guidelines

Locatable

Administration of locatable minerals on BLM land would continue as required by law and regulation (43 CFR 3809) by taking the following steps:

- Review and process Notices to ensure the proposed actions do not create unnecessary or undue degradation of the environment.
- Review and process Plans of Operation to ensure the proposed actions do not create unnecessary or undue degradation of the environment.
- Conduct, at a minimum, annual compliance inspections on each active Notice and Plan of Operation.
- Allow casual use where work is done by hand and no explosives are used. Refer inquiries to appropriate agencies for further guidance on other permit requirements.

Impacts Common to All Alternatives

Leasable – Coal

No exploration or development of leasable minerals is anticipated to occur within the planning area during the life of the plan. Leasable mineral applications would be subject to the discretion of management and standard management practices would continue across all alternatives. To date, no areas have been identified with economic reserves to support future leasing analysis.

The entire planning area is currently open to solid mineral entry (leasable, locatable, and salable) with the exception of approximately 19,914 acres which are currently withdrawn in the Little Rocky Mountains and Sweet Grass Hills. All federal mineral acres within the planning area would be open for mineral entry for the entire planning period with the exception of the proposed withdrawals under each alternative.

Under all alternatives, the BLM will consider proposals for developing leasable minerals (coal, phosphate, sodium, potash, sulfur, oil shale, native asphalt, and solid and semi-solid bituminous rock) under the administration of the federal government on a case-by-case basis. Site-specific environmental analyses would be required to lease these minerals. Any proposal for coal leasing within a WSA must first undergo four separate screening processes (coal development potential, unsuitability criteria, multiple use tradeoffs, and surface owner consultation) to determine if the leasing proposal would be cleared for further consideration (BLM Manual H-8550-1, Interim Management Policy for Lands under Wilderness Review). For all leasable minerals other than coal, no leases may be issued in WSAs.

Locatable

The entire planning area is currently open to solid mineral entry (leasable, locatable, and salable) with the exception of approximately 23,444 acres which are currently withdrawn in the Little Rocky Mountains and Sweet Grass Hills. All federal mineral acres within the planning area would be open for mineral entry for the entire planning period with the exception of the proposed withdrawals under each alternative. In the Sweet Grass Hills, exploration could occur under all alternatives where lands are encumbered by mining claims with valid existing rights. Under valid existing rights, mining claims are not closed to locatable mineral activity.

Mining claims in WSAs located after October 21, 1976, will continue to be subject to location under the mining laws. Location methods and subsequent assessment work will be restricted to operations which the BLM determines satisfy the nonimpairment criteria (determined on a case-by-case basis). Work towards post-FLPMA discoveries may take place, but not to the extent that impairment is caused.

Standard management practices in the administration of locatable minerals would continue across all alternatives. The BLM would coordinate with Montana DEQ during the review, approval, inspection, and reclamation of mining operations. At a minimum, the BLM would conduct an annual compliance inspection on each active notice. Requirements of all state and federal laws would be met in the management of mining operations. Terms and conditions would be applied to mining activities (within the constraints of the mining law) to meet land health standards for uplands, riparian and wetlands, water quality, air quality, soil resources, and native plant and animal species.

All recommendations to dispose of, or withdraw, additional lands would be analyzed to determine the mineral potential of each tract before any decision is finalized.

Rehabilitation and closure of abandoned mine land sites and associated features would result in the removal or obscuring of geological information used by exploration companies to sample and map mineral deposits.

Cultural Resources: The management of cultural resources would seldom prevent locatable minerals development, but in order to avoid disturbance to any cultural resource, a cultural inventory and possible relocation of exploration or mining development could occur. This relocation, as well as any additional mitigation under standard avoidance or recovery procedures, would create time delays and further expenses for locatable minerals development.

Fire Management and Ecology: The management of fire and fuels could temporarily result in restricted access to a mining project during implementation of prescribed burning or wildfire suppression.

Fluid Minerals: Fluid mineral resource management would have a minimal impact on locatable solid minerals. If a conflict between fluid mineral development and locatable mineral development were to take place on the same tract of land and could not be accommodated or resolved outside of litigation, the minerals developer with the senior rights will usually prevail.

Because the demand of bentonite is closely tied with the oil and gas industry, activity in fluid mineral development in the planning area will help create opportunity for the local development of bentonite mining. This would have a positive impact on locatable minerals.

Lands and Realty: The BLM or other agency authorization of rights-of-way for facilities such as roads, highways, and powerlines could provide access and infrastructure for exploration of locatable minerals and mining operations. Acquisition of additional legal access across private or other lands could result in increased opportunities to explore and develop areas not accessible by another route.

Land ownership changes could result in acquisition or disposal of lands with mineral value, and could either increase or decrease opportunities for mineral development. Disposing of BLM land would increase split estate because most exchanges are for surface values rather than mineral. In most cases, the mineral estate is at least prospectively valuable and would be retained in federal ownership. Acquisition and disposal could increase the likelihood of surface owner conflicts with mineral development, leading to increased permitting complexity and development costs. When compared to the amount of BLM land in the planning area, this would be a minor impact due to the relatively small acreage of the disposal tracts.

Withdrawals from mineral entry will close areas to locatable mineral development. The degree of effect these withdrawals would have is described quantitatively under each proposed alternative.

Paleontological Resources: The management of paleontological resources would rarely prevent locatable mineral development, but in order to avoid disturbance to paleontological resources, a possible relocation of exploration or mining development could occur. This relocation, as well as possible inventory and any additional mitigation, would create time delays and further expenses for locatable mineral development. A certain area for the special management of paleontological resources has been identified as an ACEC and is analyzed quantitatively under the proposed alternatives.

Special Designations: The BLM would develop and implement measures to prevent unnecessary or undue degradation from exploration, mining, and reclamation activities. In some areas, such as WSAs and ACECs, these requirements could result in additional expenditures to protect resources and prevent unnecessary or undue degradation.

An approved Plan of Operations is required in designated ACECs for all surface-disturbing activities exceeding the casual use level. Activities which could normally proceed after the filing of a Notice would require an approved Plan of Operations in an ACEC. The increased environmental review, mandatory public comment period, and application of management prescriptions needed to protect ACEC values would result in timing delays or increased costs for mineral operators.

The degree of effect that these special designations would impose on locatable mineral development will be described quantitatively under each proposed alternative.

Wildlife: The management of wildlife resources and habitat outside of special designations would seldom prevent locatable mineral development, but in order to avoid significant impact to wildlife, special conditions and possible relocation of exploration or mining development could occur. This relocation, as well as any additional mitigation, would create time delays and further expenses for locatable mineral development if not closing the area to mineral entry through withdrawal. Certain areas for the special management of wildlife resources and habitat have been identified as ACECs, WSAs, or priority areas and are analyzed quantitatively under the proposed alternatives.

Salable

The entire planning area is currently open to solid mineral entry (leasable, locatable, and salable) with the exception of approximately 23,444 acres which are currently withdrawn in the Little Rocky Mountains and Sweet Grass Hills. All federal mineral acres within the planning area would be open for mineral entry for the entire planning period with the exception of the proposed withdrawals under each alternative.

The sale and free use of salable mineral materials will not be allowed in WSAs in most instances because it would not be compatible with the nonimpairment criteria (determined on a case-by-case basis). The existence of the use would constrain the Secretary's ability to recommend the area suitable or for the Congress to designate the area as wilderness.

Demand for sand and gravel, building stone, rip-rap and other mineral materials is anticipated to remain at current levels. This is due to the steady to gradual decrease in population and economic development within the planning area.

Extraction of salable material by excavation or mining would result in a mine or quarried pit. Effects from access roads and pit construction would be minor or moderate depending on the scale of the quarrying operations (size and ability to reclaim the ultimate pit). Existing requirements for topsoil salvage and reclamation would minimize impacts from mining.

Stipulated requirements and BMPs designed to avoid or minimize adverse effects on riparian zones from structures, support facilities, and roads could result in additional expenditures and a longer approval time for the developer. The BLM's discretionary sale approval policy could avoid sale of materials from riparian areas.

The BLM or other agency authorization of rights-of-way for facilities such as roads, highways, and powerlines could provide access and infrastructure. Alternatively, denial of rights-of-way could negatively affect operations.

The recommended withdrawal of areas under the various alternatives would have a negligible effect on the number of operations since the anticipated disturbed acreage is only 80 acres each year in the long term, over the entire planning area. The supply of mineral materials resources far exceeds demand within the planning area. Because of this constant demand, large area, and source of supply, the planned locations of mineral material sites could vary by alternative.

Impacts under Alternative A (Current Management)

Locatable

The current area withdrawn from mineral entry is approximately 23,444 acres. The Zortman/Landusky mine reclamation withdrawal (3,530 acres) would be allowed to expire in October 2015 and the Sweet Grass Hills withdrawal (19,671 acres) would be allowed to expire in April 2017, having a positive impact to locatable minerals by opening land for development.

Table 4.75 shows the acres of locatable mineral development potential by category. The short-term columns represent development potential acres when the withdrawals are in place, and the long-term columns represent the acres after the withdrawals are allowed to expire.

Table 4.75
Mineral Development Potential under Alternative A (Current Management)
(BLM Acres)

Development Potential	*Short-Term Development Potential*			*Long-Term Development Potential*		
	Open	*Restricted*	*Withdrawn*	*Open*	*Restricted*	*Withdrawn*
High	3,429	4,939	4,199	3,429	9,016	122
Moderate	14,585	11,927	2,691	14,585	14,397	221
Low	70,850	18,853	5,480	70,850	24,258	75

Open lands are open to location under the mining laws. Lands in the closed category (withdrawn) have been withdrawn or segregated from operation of the mining laws and are not available for mineral development. Restricted lands remain open to operation of the mining laws and are available for mineral development, but because of special designations, special management stipulations apply. These stipulations can result in a more extensive environmental review and increased environmental mitigation costs.

In general, the current management situation after the withdrawals of the Zortman/Landusky mine reclamation area and Sweet Grass Hills are allowed to expire would be the most favorable of all alternatives for locatable minerals exploration and development. Most of the high development potential areas that are no longer closed would still remain in special management areas (Little Rocky Mountains TCP and Sweet Grass Hills TCP) and would require a more extensive review in regard to the management of these lands. The Mountain Plover ACEC would also remain in place, which would create some restrictions within moderate and low development potential areas of the Brazil Creek area.

Impacts under Alternative B

Locatable

The existing withdrawals in the Little Rocky Mountains and Sweet Grass Hills (23,563 acres) would be recommended for renewal. Additional recommended withdrawals of about 1,648,000 acres would close more land to locatable mineral entry. A large portion of the withdrawn acres would be due to the Greater Sage-Grouse Protection Priority Area (1,034,102 acres) and Grassland Bird/Greater Sage-Grouse Priority Areas (480,035 acres), as well as the withdrawals of the Bitter Creek ACEC (60,717 acres), Kevin Rim ACEC (4,553 acres), Malta Geological ACEC (6,152 acres), Mountain Plover ACEC (24,672 acres), Little Rocky Mountains TCP (37,387 acres), and Zortman Cemetery (20 acres).

Table 4.76 shows the acres of locatable minerals development potential by category.

Table 4.76
Mineral Development Potential under Alternative B
(BLM Acres)

Development Potential	*Management Category*		
	Open	*Restricted*	*Withdrawn*
High	0	929	11,638
Moderate	3,357	1,244	24,602
Low	13,580	4,029	77,574

With a significant amount of land being withdrawn, the majority of the areas with high, moderate, and low mineral development potential are in the closed category (withdrawn). This alternative would reduce most locatable minerals development opportunities by eliminating any foreseeable development for the reestablishment and expansion of the Zortman and Landusky mines, and limiting all mining activity in the Sweet Grass Hills to the claims with valid existing

rights. Most of the remaining moderate and low development potential lands in the open category are within areas related to bentonite.

Restricted lands remain open to operation of the mining laws and are available for mineral development, but because of special designations, special management stipulations apply. These stipulations can result in a more extensive environmental review and increased environmental mitigation costs.

Impacts under Alternative C

Locatable

The existing withdrawals in the Little Rocky Mountains and Sweet Grass Hills would be recommended for renewal (23,563 acres). Additional recommended withdrawals of about 1,506,000 acres would close more land to locatable mineral entry. A large portion of the withdrawn acres would be due to the Greater Sage-Grouse Protection Priority Area (1,034,102 acres) and Grassland Bird/Greater Sage-Grouse Priority Areas (320,405 acres), but would also include the Bitter Creek ACEC (60,717 acres), Frenchman ACEC (39,661 acres), Kevin Rim ACEC (4,553 acres), Malta Geological ACEC (6,152 acres), Woody Island ACEC (15,804 acres), and Zortman Cemetery (20 acres).

Table 4.77 shows the acres of locatable minerals development potential by category.

Table 4.77
Mineral Development Potential under Alternative C
(BLM Acres)

Development Potential	*Management Category*		
	Open	*Restricted*	*Withdrawn*
High	0	3,009	9,558
Moderate	3,358	12,980	12,865
Low	33,951	15,442	45,790

Because of the amount of land being withdrawn from mineral entry, the majority of the areas with high and moderate mineral development potential are in the closed category (withdrawn). Similar to Alternative B, this alternative would reduce most locatable minerals development opportunities by eliminating any foreseeable development for the reestablishment and expansion of the Zortman and Landusky mines, and limiting all mining activity in the Sweet Grass Hills to the claims with valid existing rights. Most of the remaining moderate and low development potential lands in the open category are within areas related to bentonite.

Impacts under Alternative D

Locatable

The total area withdrawn from mineral entry would be approximately 185,000 acres. The Zortman/Landusky mine reclamation withdrawal (3,530 acres) would be allowed to expire in October 2015, and the Sweet Grass Hills withdrawal (19,671 acres) would be allowed to expire in April 2017, having a positive impact to locatable minerals by opening land for development. Recommended withdrawals under this alternative would include the Bitter Creek ACEC (60,717 acres), Frenchman ACEC (57,540 acres), Kevin Rim ACEC (4,553 acres), Little Rocky Mountains ACEC (15,000 acres), Malta Geological ACEC (6,152 acres), Woody Island ACEC (15,804 acres), and Zortman Cemetery (20 acres).

Table 4.78 shows the acres of locatable minerals development potential by category. The short-term columns represent development potential acres when the withdrawals are in place, and the long-term columns represent the acres after the withdrawals are allowed to expire.

Table 4.78 Mineral Development Potential under Alternative D (BLM Acres)						
Development Potential	***Short-Term Development Potential***			***Long-Term Development Potential***		
	Open	***Restricted***	***Withdrawn***	***Open***	***Restricted***	***Withdrawn***
High	3,429	4,844	4,294	3,429	6,016	3,122
Moderate	14,791	5,346	9,066	14,790	7,345	7,068
Low	71,417	2,445	21,321	71,417	7,844	15,922

After the withdrawals of the Zortman/Landusky mine reclamation area and the Sweet Grass Hills are allowed to expire, BLM management actions would be more favorable for locatable minerals exploration and development. Most of the high and moderate development potential areas that are no longer closed would still remain in special management areas (Little Rocky Mountains TCP and Sweet Grass Hills TCP) and would require a more extensive review in regard to the management of these lands. A partial withdrawal of the Little Rocky Mountains ACEC would still affect some of the moderate development potential of that area.

Impacts under Alternative E (Preferred Alternative)

Locatable

The total area withdrawn from mineral entry would be approximately 45,000 acres. The Sweet Grass Hills withdrawal (19,671 acres) would be renewed, potentially having no changing impact to locatable minerals development in that area. Other recommended withdrawals would include Azure Cave (143 acres), Camp Creek Campground (169 acres), Montana Gulch Campground (75 acres), and the Mountain Plover ACEC (24,672 acres).

Through the future withdrawal review process, the BLM would consider the need for a new withdrawal or right-of-way to promote successful reclamation of the Zortman/Landusky mine area. The new withdrawal area would likely be limited to the boundary of the Zortman/Landusky Mine Reclamation ACEC (2,605 acres). This would have a positive impact to locatable mineral development.

Table 4.79 shows the acres of locatable minerals development potential by category.

Table 4.79 Mineral Development Potential under Alternative E (Preferred Alternative) (BLM Acres)			
Development Potential	***Management Category***		
	Open	***Restricted***	***Withdrawn***
High	0	6,128	6,439
Moderate	3,358	23,342	2,503
Low	13,580	69,358	12,245

With most of the current withdrawals renewed and the addition of the Mountain Plover ACEC recommended withdrawal, the three areas with the most development potential would be affected. Within Brazil Creek, the moderate and low areas of development potential that were under the restricted management category under current management would be closed. The majority of the high development potential areas within the Little Rocky Mountains and the Sweet Grass Hills would continue under the closed category (withdrawn). If the withdrawal in the Little Rocky Mountains is allowed to expire through review, the Zortman/Landusky Mine Reclamation ACEC (2,604 acres) would still remain. This would open the area up to mineral entry, but special stipulations would apply for any operation, resulting in a more extensive environmental review and increased environmental mitigation costs.

Special Designations

Areas of Critical Environmental Concern (ACECs)

The following section addresses the effects to the relevant and important resources within the existing and potential ACECs. For additional information on the effects within each ACEC, please refer to the subheading *Special Designations* under the various resource sections of Chapter 4.

Existing ACECs

Azure Cave ACEC

Impacts Common to All Alternatives

Special management of this ACEC would continue under all alternatives. Retention of the Azure Cave ACEC (142 acres) would provide protection for sensitive bat species hibernating in the cave and features of the cave, and would provide for public safety by limiting access to the cave.

Continuing the mineral withdrawal for this area would protect the sensitive bat species and cave features from potential mineral exploration and development. About 85 acres (60%) have a high development potential for hardrock exploration and development and 57 acres (40%) have a moderate potential.

Cumulative Impacts

Special management of the cave would protect the sensitive bat species and cave features. Cumulative impacts are unlikely to be adverse to the sensitive bat species or cave features.

Impacts under Alternative A (Current Management)

The area would be open to mineral leasing and mineral material sales. However, the likelihood of leasing or material sales is limited in this area. The area would be an avoidance area for wind energy rights-of-way, which would protect sensitive bat species and cave features.

Cumulative Impacts

Special management of the cave would protect the sensitive bat species and cave features. Cumulative impacts are unlikely to be adverse to the sensitive bat species or cave features.

Impacts under Alternatives B, C, D, and E (Preferred Alternative)

The area would be closed to mineral leasing and mineral material sales and an exclusion area for wind energy rights-of-way, which would provide the greatest protection for sensitive bat species and cave features.

Cumulative Impacts

Special management of the cave would protect the sensitive bat species and cave features. Cumulative impacts are unlikely to be adverse to the sensitive bat species or cave features.

Big Bend of the Milk River ACEC

Impacts Common to All Alternatives

Retention of the Big Bend of the Milk River ACEC (1,979 acres) would protect and manage archaeological resources, including the Henry Smith and Beaucoup sites, which represent bison hunting and prehistoric ceremonial use of the Northwestern Plains.

Cumulative Impacts

The cumulative impacts to cultural resources within the Big Bend of the Milk River ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Impacts under Alternative A (Current Management)

Although an NSO stipulation for oil and gas leasing would be required, the stipulation would only apply to future leasing. A portion of the area is currently leased (985 acres or 50%) and natural gas exploration and production would have direct and indirect impacts on archaeological sites within the ACEC, such as gas infrastructure located through sites and well pad facilities located less than 10 feet from sites. Most of the lease area is within a moderate development potential for oil and gas (984 acres). It is anticipated that visual intrusions would occur in the future, but direct impacts to sites would be avoided since they be can mitigated through the Section 106 process.

No effects are anticipated from hardrock mining due to the lack of potential for locatable minerals and the area would be recommended for a mineral withdrawal. The ACEC would be open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the area, impacts could be anticipated but adverse effects would be mitigated through the Section 106 process.

The area would be an avoidance area for wind energy rights-of-way. About 1,681 acres (85% of the area) are within a moderate potential area for wind energy and 298 acres (15%) are within low development potential. The installation of either wind turbines or transmission lines could have adverse effects to cultural resources and the viewshed. Surface-disturbing activities could be mitigated through the Section 106 process, but the viewshed could not be mitigated.

Cumulative Impacts

The cumulative impacts to cultural resources within the Big Bend of the Milk River ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Impacts under Alternative B

The area would be closed to oil and gas leasing. However, a portion of the area is currently leased (985 acres or 50%) and natural gas exploration and production would have direct and indirect impacts on archaeological sites within the ACEC, such as gas infrastructure located through sites and well pad facilities located less than 10 feet from sites. Most of the lease area is within a moderate development potential for oil and gas (984 acres). It is anticipated that visual intrusions would occur in the future, but direct impacts to sites would be avoided since they be can mitigated through the Section 106 process.

Although the BLM would not recommend a mineral withdrawal for the area, no effects are anticipated from hardrock mining due to the lack of potential for locatable minerals. The ACEC would be open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the area, impacts could be anticipated but adverse effects would be mitigated through the Section 106 process.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. The ACEC is not within a high development potential area for wind energy. This exclusion would increase the protection to cultural resources from potential surface-disturbing activities and visual intrusions.

Cumulative Impacts

The cumulative impacts to cultural resources within the Big Bend of the Milk River ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Impacts under Alternative C

Although an NSO stipulation for oil and gas leasing would be required, the stipulation would only apply to future leasing. A portion of the area is currently leased (985 acres or 50%) and natural gas exploration and production would have direct and indirect impacts on archaeological sites within the ACEC, such as gas infrastructure located through sites and well pad facilities located less than 10 feet from sites. Most of the lease area is within a moderate development potential for oil and gas (984 acres). It is anticipated that visual intrusions would occur in the future, but direct impacts to sites would be avoided since they be can mitigated through the Section 106 process.

Although the BLM would not recommend a mineral withdrawal for the area, no effects are anticipated from hardrock mining due to the lack of potential for locatable minerals. The ACEC would be open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the area, impacts could be anticipated but adverse effects would be mitigated through the Section 106 process.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. The ACEC is not within a high development potential area for wind energy. This exclusion would increase the protection to cultural resources from potential surface-disturbing activities and visual intrusions.

Cumulative Impacts

The cumulative impacts to cultural resources within the Big Bend of the Milk River ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Impacts under Alternatives D and E (Preferred Alternative)

Although an NSO stipulation for oil and gas leasing would be required, the stipulation would only apply to future leasing. A portion of the area is currently leased (985 acres or 50%) and natural gas exploration and production would have direct and indirect impacts on archaeological sites within the ACEC, such as gas infrastructure located through sites and well pad facilities located less than 10 feet from sites. Most of the lease area is within a moderate development potential for oil and gas (984 acres). It is anticipated that visual intrusions would occur in the future, but direct impacts to sites would be avoided since they be can mitigated through the Section 106 process.

Although the BLM would not recommend a mineral withdrawal for the area, no effects are anticipated from hardrock mining due to the lack of potential for locatable minerals. The ACEC would be closed to salable minerals. This would increase the protection to cultural resources from surface-disturbing activities associated with sand and gravel extraction.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. The ACEC is not within a high development potential area for wind energy. This exclusion would increase the protection to cultural resources from potential surface-disturbing activities and visual intrusions.

Cumulative Impacts

The cumulative impacts to cultural resources within the Big Bend of the Milk River ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Bitter Creek ACEC

This ACEC is also a WSA. If the Bitter Creek WSA is released by Congress, an ACEC management plan would be completed consistent with the management direction as discussed in Chapter 2. Until an ACEC management plan is completed the area would be managed consistent with the Interim Management Policy and Guidelines for Lands under Wilderness Review (BLM 1995) as appropriate.

Impacts Common to All Alternatives

Special management of this ACEC would continue under all alternatives. Retention of the Bitter Creek ACEC (60,701 acres) would benefit scenic diversity and a variety of vegetation types and wildlife habitats. The area would remain

closed to oil and gas leasing until an ACEC management plan is completed that would address leasing, would be closed to solid mineral material sales, and would be an exclusion area for wind energy rights-of-way. The closures and exclusion would protect the ACEC from potential surface-disturbing activities and visual intrusions.

Cumulative Impacts

Special management of the ACEC would protect the scenic diversity and variety of vegetation types and wildlife habitats for which the ACEC was designated. Cumulative impacts would be minimal intrusions from activities associated with the Northern Border Pipeline.

Impacts under Alternative A (Current Management)

The Northern Border Corridor would be retained as a 4 1/2 mile corridor through the ACEC. This includes about 14,668 acres of BLM land within the ACEC. The existing right-of-way within the corridor would not affect values for which the ACEC was designated due to successful reclamation and soil and vegetation productivity.

The area would be open to solid mineral entry and location, but the development potential is very low (unknown).

Cumulative Impacts

Special management of the ACEC would protect the scenic diversity and variety of vegetation types and wildlife habitats for which the ACEC was designated. Cumulative impacts would be minimal intrusions from activities associated with the Northern Border Corridor.

Impacts under Alternative B

The Northern Border Corridor would be a 1 mile corridor but would not include the Bitter Creek WSA or ACEC. The ACEC would be an avoidance area for rights-of-way. These actions would protect the values for which the ACEC was designated and successful reclamation that has occurred.

The BLM would recommend a withdrawal from mineral entry and location (60,717 acres) to protect significant cultural, scenic, and wildlife values. This would benefit scenic views and sensitive archaeological resources, and would protect wildlife by providing a large, continuous, and contiguous amount of grassland habitat.

Cumulative Impacts

Special management of the ACEC would protect the scenic diversity and variety of vegetation types and wildlife habitats for which the ACEC was designated.

Impacts under Alternative C

The Northern Border Corridor would be a 2 mile corridor through the ACEC. This includes about 6,494 acres of BLM land within the ACEC. The ACEC would be an avoidance area for rights-of-way. These actions would protect the values for which the ACEC was designated and successful reclamation that has occurred.

The BLM would recommend a withdrawal from mineral entry and location (60,717 acres) to protect significant cultural, scenic, and wildlife values. This would benefit scenic views and sensitive archaeological resources, and would protect wildlife by providing a large, continuous, and contiguous amount of grassland habitat.

Cumulative Impacts

Special management of the ACEC would protect the scenic diversity and variety of vegetation types and wildlife habitats for which the ACEC was designated.

Impacts under Alternative D

The Northern Border Corridor would not be designated as a transportation and utility corridor and the area would be an avoidance area for rights-of-way. The values for which the ACEC was designated would be protected, but not to the degree provided under Alternatives A, B, or C.

The BLM would recommend a withdrawal from mineral entry and location (60,717 acres) to protect significant cultural, scenic, and wildlife values. This would benefit scenic views and sensitive archaeological resources, and would protect wildlife by providing a large, continuous, and contiguous amount of grassland habitat.

Cumulative Impacts

Special management of the ACEC would protect the scenic diversity and variety of vegetation types and wildlife habitats for which the ACEC was designated.

Impacts under Alternative E (Preferred Alternative)

The Northern Border Corridor would not be designated as a transportation and utility corridor and the area would be an avoidance area for rights-of-way. The values for which the ACEC was designated would be protected.

The area would be open to solid mineral entry and location, but the development potential is very low (unknown).

Cumulative Impacts

Special management of the ACEC would protect the scenic diversity and variety of vegetation types and wildlife habitats for which the ACEC was designated.

Kevin Rim ACEC

Impacts Common to All Alternatives

Retention of the Kevin Rim ACEC (4,557 acres) would protect the diverse archeological resources and significant raptor habitat.

Although an NSO stipulation for oil and gas leasing would be required, the stipulation would only apply to future leasing. Most of the area is currently leased (3,579 acres or 79%) and production would have direct and indirect impacts on cultural sites within the ACEC. It is anticipated that those types of impacts could occur in the future but the area is within a low or very low development potential for oil and gas. Avoidance and/or other types of mitigation (BMPs) could negate or lessen the effects.

Cumulative Impacts

The cumulative impacts to cultural resources within the Kevin Rim ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Impacts under Alternative A (Current Management)

Although the BLM would not recommend a mineral withdrawal for the area, no effects are anticipated from hardrock mining due to the lack of potential for locatable minerals. The ACEC would be open to salable minerals. This could have some potential effects to cultural resources as sand and gravel would be the most likely solid mineral resource extracted within the ACEC.

The area would be an avoidance area for wind energy rights-of-way. The entire area (4,557 acres) is within a high potential area for wind energy development. The installation of either wind turbines or transmission lines could have

adverse effects to cultural resources and the viewshed. Surface-disturbing activities could be mitigated through the Section 106 process, but the viewshed could not be mitigated.

Cumulative Impacts

The cumulative impacts to cultural resources within the Kevin Rim ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases and the potential for wind energy development.

Impacts under Alternatives B, C, and D

No effects are anticipated from hardrock mining due to the lack of potential for locatable minerals and the area would be recommended for a mineral withdrawal. The ACEC would also be closed to salable minerals. This is expected to contribute to potentially fewer effects as sand and gravel would be the most likely solid mineral resource extracted within the ACEC.

The area would be an exclusion area for wind energy rights-of-way. This would increase the protection to cultural resources from potential surface-disturbing activities and visual intrusions.

Cumulative Impacts

The cumulative impacts to cultural resources within the Kevin Rim ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Impacts under Alternative E (Preferred Alternative)

Although the BLM would not recommend a mineral withdrawal for the area, no effects are anticipated from hardrock mining due to the lack of potential for locatable minerals. The ACEC would be closed to salable minerals. This is expected to contribute to potentially fewer effects as sand and gravel would be the most likely solid mineral resource extracted within the ACEC.

The area would be an exclusion area for wind energy rights-of-way. This would increase the protection to cultural resources from potential visual intrusions.

Cumulative Impacts

The cumulative impacts to cultural resources within the Kevin Rim ACEC would be visual intrusions from the existing natural gas development and potential future development on existing oil and gas leases.

Mountain Plover ACEC

Impacts Common to All Alternatives

Special management of this ACEC would continue under all alternatives. Retention of the Mountain Plover ACEC (24,762 acres) would provide protection to the natural habitat for the mountain plover, a prairie bird. The area is unique because the hardpan areas provide habitat for mountain plovers away from traditional habitat associated with prairie dogs.

Cumulative Impacts

Special management of the ACEC would protect the natural habitat for the mountain plover, for which the ACEC was designated.

Impacts under Alternative A (Current Management)

A timing stipulation for oil and gas leasing would avoid direct long-term impacts to mountain plover habitat within the ACEC. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

The ACEC would be open for locatable solid minerals (bentonite) with timing stipulations to protect breeding mountain plovers. Timing stipulations would protect mountain plovers during the breeding season, but reclamation of mined areas does not appear to provide suitable habitat for mountain plovers.

The ACEC would be open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the ACEC, impacts could be anticipated from surface-disturbing activities associated with sand and gravel extraction. However, other areas are available for mineral materials.

The area would be an avoidance area for wind energy rights-of-way. About 44 acres (less than 1%) are within a high development potential area for wind energy, 21,042 acres (85%) are within moderate potential, and 3,676 acres (15%) are within low development potential. Wind energy facilities could result in population impacts through habitat loss from construction and maintenance of wind towers and associated facilities as well as avoidance of habitats within and near wind farm areas. Although few studies have focused on mountain plovers, it appears that construction and operation of wind farms may temporarily disrupt and displace breeding plovers, although there appears to be little risk from collisions with rotors (Young, et al. 2007).

Cumulative Impacts

Special management of the ACEC would protect the natural habitat for the mountain plover, for which the ACEC was designated.

Impacts under Alternative B

An NSO stipulation for oil and gas leasing would avoid direct long-term impacts to mountain plover habitat within the ACEC. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

The BLM would recommend a mineral withdrawal for the Mountain Plover ACEC. This would be beneficial for the mountain plover since the potential impacts from mining are permanent and can affect the mountain plover population by reducing habitat in the area.

The ACEC would be open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the ACEC, impacts could be anticipated from surface-disturbing activities associated with sand and gravel extraction. However, other areas are available for mineral materials and the area is considered to have low potential for mineral materials.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. This would increase protection of mountain plover habitat.

Cumulative Impacts

Special management of the ACEC would protect the natural habitat for the mountain plover, for which the ACEC was designated.

Impacts under Alternative C

An NSO stipulation for oil and gas leasing would avoid direct long-term impacts to mountain plover habitat within the ACEC. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

The BLM would recommend a mineral withdrawal for the Mountain Plover ACEC. This would be beneficial for the mountain plover since the potential impacts from mining are permanent and can affect the mountain plover population by reducing habitat in the area.

The ACEC would be open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the ACEC, impacts could be anticipated. However, other areas are available for mineral materials and the area is considered to have low potential for mineral materials.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. This would increase protection of mountain plover habitat.

Cumulative Impacts

Special management of the ACEC would protect the natural habitat for the mountain plover, for which the ACEC was designated.

Impacts under Alternative D

An NSO stipulation for oil and gas leasing would avoid direct long-term impacts to mountain plover habitat within the ACEC. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

The BLM would recommend a mineral withdrawal for the Mountain Plover ACEC. This would be beneficial for the mountain plover since the potential impacts from mining are permanent and can affect the mountain plover population by reducing habitat in the area.

The ACEC would be closed to salable minerals. This would increase the protection to mountain plover habitat from surface-disturbing activities associated with sand and gravel extraction.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. This would increase protection of mountain plover habitat.

Cumulative Impacts

Special management of the ACEC would protect the natural habitat for the mountain plover, for which the ACEC was designated.

Impacts under Alternative E (Preferred Alternative)

The ACEC would be closed to oil and gas leasing, which would avoid any impacts from oil and gas exploration and development to mountain plover habitat within the area. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

The BLM would recommend a mineral withdrawal for the Mountain Plover ACEC. This would be beneficial for the mountain plover since the potential impacts from mining are permanent and can affect the mountain plover population by reducing habitat in the area.

The ACEC would be closed to salable minerals. This would increase the protection to mountain plover habitat from surface-disturbing activities associated with sand and gravel extraction.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. This would increase protection of mountain plover habitat.

Cumulative Impacts

Special management of the ACEC would protect the natural habitat for the mountain plover, for which the ACEC was designated.

Prairie Dog Towns within the 7km Complex ACEC

Impacts under Alternative A (Current Management)

The Prairie Dog Towns within the 7km Complex ACEC (16,403 acres) would be retained. The configuration of the boundary for this ACEC was based upon black-tailed prairie dog colony distribution in 1988. Current prairie dog colony distribution no longer reflects the ACEC boundary due to ongoing plague impacts. Benefits for prairie dogs and associated species still found within the ACEC boundary would be maintained under Alternative A.

Cumulative Impacts

Special management of the ACEC would maintain prairie dog populations.

Alternatives B, C, D, and E (Preferred Alternative)

The Prairie Dog Towns within the 7km Complex ACEC would not be retained. Since current prairie dog colony configuration no longer reflects the ACEC boundary, the ACEC is no longer effective in providing special management for prairie dogs, associated species, and black-footed ferret reintroduction. Management actions directed at prairie dogs and associated species under the Wildlife and Special Status Species section of Chapter 2 would protect the resources for which the ACEC was originally established.

Cumulative Impacts

Proposed management actions would be beneficial for prairie dogs and other species associated with prairie dog towns such as mountain plovers.

Sweet Grass Hills ACEC

Impacts Common to All Alternatives

Retention of the Sweet Grass Hills ACEC (7,429 acres) would protect habitat which has high potential for reintroduction of the peregrine falcon; protect areas of traditional spiritual importance to Native Americans; and protect seasonally important elk and deer habitat and aquifers in the area that provide potable water to local residents.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was designated.

Impacts under Alternative A (Current Management)

Although an NSO stipulation for oil and gas leasing would be required, that stipulation would only apply to future leasing. However, only 116 acres (2%) is currently leased. The entire area is within a low development potential for oil and gas. The BLM would work directly with oil and gas operators on existing oil and gas leases to mitigate any adverse impacts to the resources caused by exploration and development activities.

The area would be an avoidance area for wind energy rights-of-way. About 6,377 acres (86%) are within a high development potential area for wind energy, 792 acres (11%) are within moderate potential, and 260 acres (3%) are within low potential. The installation of either wind turbines or transmission lines could have adverse effects to cultural resources and the viewshed. Surface-disturbing activities could be mitigated through the Section 106 process, but the viewshed could not be mitigated.

No impacts are anticipated to occur from hard rock mining because the Sweet Grass Hills TCP, of which this ACEC is part, is withdrawn from mineral entry until 2017. The ACEC is also closed to solid mineral leasing and impacts are not

anticipated to occur. However, the ACEC is currently open to salable minerals and if mineral materials (i.e., sand and gravel) are located within the ACEC, impacts are anticipated.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was designated.

Impacts under Alternative B

Under this alternative, 4,118 acres of the Sweet Grass Hills ACEC would also be managed to preserve and enhance the wilderness characteristics (apparent naturalness and outstanding opportunities for solitude or primitive and unconfined recreation) of the area. This portion of the ACEC would be closed to oil and gas leasing while the remainder would be NSO. Only 116 acres (2%) is currently leased. The entire area is within a low development potential for oil and gas. The BLM would work directly with oil and gas operators on existing oil and gas leases to mitigate any adverse impacts to the resources caused by exploration and development activities.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. Most of the area (86%) is within a high development potential area for wind energy. This would increase the protection to cultural resources from potential surface-disturbing activities and visual intrusions.

The BLM would recommend a continuance of the withdrawal for locatable minerals. No impacts are anticipated to occur from hardrock mining. The ACEC would be closed to solid mineral leasing and impacts are not anticipated to occur. The ACEC would also be closed to salable minerals. These constraints would provide protection from solid mineral extraction in the area.

Cumulative Impacts

Management of the area for wilderness characteristics would also protect the values for which the ACEC was designated.

Impacts under Alternative C

Although an NSO stipulation for oil and gas leasing would be required, that stipulation would only apply to future leasing. However, only 116 acres (2%) is currently leased. The entire area is within a low development potential for oil and gas. The BLM would work directly with oil and gas operators on existing oil and gas leases to mitigate any adverse impacts to the resources caused by exploration and development activities.

The BLM would recommend a continuance of the withdrawal for locatable minerals. There are no impacts anticipated to occur from hardrock mining. The ACEC would be closed to solid mineral leasing and impacts are not anticipated to occur. The ACEC would also be closed to salable minerals. These constraints would provide protection from solid mineral extraction in the area.

A portion of the ACEC (4,118 acres) would be an exclusion area for rights-of-way and the remainder would be an avoidance area. The entire ACEC would be an exclusion area for wind energy rights-of-way. Most of the area (86%) is within a high development potential area for wind energy. This would increase the protection to cultural resources from potential surface-disturbing activities and visual intrusions.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was designated.

Impacts under Alternative D

Impacts would be similar to Alternatives B and C, except that the withdrawal would be recommended to expire in 2017. At that time the ACEC would be open to locatable mineral extraction. Impacts to the ACEC could be significant if

mining would be allowed. Impacts expected to occur would be noise and visual impacts to individuals utilizing the ACEC for traditional uses; and damage and/or destruction to archaeological sites.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was designated.

Impacts under Alternative E (Preferred Alternative)

Impacts would be similar to Alternative B except the area would not be managed specifically to preserve and enhance wilderness characteristics for East Butte but the ACEC would be closed to oil and gas leasing. This closure along with other resource protections would help protect and enhance the wilderness characteristics found in the area as well as the resources for which the ACEC was established.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was designated.

Potential ACECs

Frenchman ACEC

Impacts Common to All Alternatives

Surface-disturbing activities could occur under all alternatives and BMPs for surface-disturbing activities would be applied. Under normal circumstances, standard mitigation guidelines are effective in minimizing impacts to resources; however, conditions such as severely erodible soils, severe winters with high mule deer populations on crucial winter range, or extreme environmental events may require more aggressive management actions to mitigate adverse impacts.

Cumulative Impacts

Cumulative impacts are discussed by alternative.

Impacts under Alternative A (Current Management)

The Frenchman ACEC would not be designated; however, resources would be impacted by management actions as described in the Soils and Vegetation – Rangeland and Wildlife and Special Status Species sections of Chapter 4.

The potential ACEC is within an area that has high and moderate potential for wind energy development (71% of the area). However, only 6% of the area is considered high development potential. The surface disturbance associated with wind energy development would most likely occur on the highly erodible soils, which are difficult to stabilize and reclaim after disturbance. A long-term commitment of the soil and vegetation resource would occur where the turbines and associated facilities are located.

Cumulative Impacts

Surface-disturbing activities could potentially affect soils and mule deer during severe winters.

Impacts under Alternative B

The Frenchman ACEC would not be designated; however, this area and surrounding BLM lands (a total of 81,733 acres) would be managed to preserve and enhance wilderness characteristics under Alternative B.

The area is within a very low development potential for oil and gas exploration and development and is currently unleased. The potential ACEC and surrounding area would be closed to oil and gas leasing under Alternative B to protect the wilderness characteristics.

The potential ACEC is within an area that has high and moderate potential for wind energy development. This and the surrounding area would be excluded from wind energy right-of-ways and become an avoidance area for other right-of-ways to protect wilderness characteristics.

Cumulative Impacts

Soils and wildlife resources would be protected by other management actions.

Impacts under Alternative C

The 42,020 acre Frenchman ACEC would be designated. Management actions would be implemented to protect erodible soils and areas (rock outcrop) and important wildlife habitats such as crucial mule deer winter range, greater sage-grouse leks and adjacent nesting habitat, and habitat for designated BLM sensitive species. Establishing the ACEC would restrict surface-disturbing activities such as mineral development and rights-of-way. The ACEC would be an exclusion area for wind energy rights-of-way.

An NSO stipulation for oil and gas leasing would avoid direct long-term impacts to scenic values, wildlife, and the unique landscape. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

Protecting the 34,395 acres of erodible soils and areas would benefit soil quality as these are the most difficult to stabilize and reclaim after disturbance. Protecting these erodible soils and areas would also benefit water quality and channel conditions in Frenchman Creek by minimizing sediment reaching the creek. These same areas are also a major component of the crucial mule deer winter range that can support up to 1,600 deer during severe winters.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was nominated.

Impacts under Alternative D

The 63,482 acre Frenchman ACEC would be designated. Management actions would be implemented to protect erodible soils and areas (rock outcrop) and important wildlife habitats such as crucial mule deer winter range, greater sage-grouse leks and adjacent nesting habitat, and habitat for designated BLM sensitive species. Establishing the ACEC would restrict surface-disturbing activities such as mineral development and rights-of-way. The ACEC would be an exclusion area for wind energy rights-of-way.

An NSO stipulation for oil and gas leasing would avoid direct long-term impacts to scenic values, wildlife, and the unique landscape. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

Protecting the 42,003 acres of erodible soils and areas would benefit soil quality as these are the most difficult to stabilize and reclaim after disturbance. Protecting these erodible soils and areas would also benefit water quality and channel conditions in Frenchman Creek by minimizing sediment reaching the creek. More acres of crucial mule deer winter range would be protected by this alternative and disturbances to large concentrations of deer in severe winters would be reduced. Additional acres of nesting habitat around grouse leks would be protected, as well as habitats for BLM sensitive species.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was nominated.

Impacts under Alternative E (Preferred Alternative)

The 42,020 acre Frenchman ACEC would be designated. Management actions would be implemented to protect erodible soils and areas (rock outcrop) and important wildlife habitats such as crucial mule deer winter range, greater sage-grouse leks and adjacent nesting habitat, and habitat for designated BLM sensitive species. Establishing the ACEC would restrict surface-disturbing activities such as mineral development and rights-of-way. The ACEC would be an exclusion area for wind energy rights-of-way.

An NSO stipulation for oil and gas leasing would avoid direct long-term impacts to scenic values, wildlife, and the unique landscape. The entire area is within a very low development potential for oil and gas exploration and development and is currently unleased.

Protecting the 34,395 acres of erodible soils and areas would benefit soil quality as these are the most difficult to stabilize and reclaim after disturbance. Protecting these erodible soils and areas would also benefit water quality and channel conditions in Frenchman Creek by minimizing sediment reaching the creek. These same areas are also a major component of the crucial mule deer winter range that can support up to 1,600 deer during severe winters.

Cumulative Impacts

Special management of the ACEC would protect the values for which the ACEC was nominated.

Grassland Bird/Greater Sage-Grouse Priority Areas ACEC

Impacts under Alternatives A, C, D, and E (Preferred Alternative)

The Grassland Bird/Greater Sage-Grouse Priority Areas ACEC would not be designated; however, resources would be impacted by management actions as described in the Soils and Vegetation – Rangeland, and Wildlife (Greater Sage-Grouse, Grassland Species and Sagebrush Species) sections of Chapter 4.

Cumulative Impacts

Soils, vegetation, and wildlife resources would be protected by management actions.

Impacts under Alternative B

Special management would protect the values for which the ACEC was nominated through the creation of a sagebrush and native grassland reserve to provide high quality habitat for greater sage-grouse, Sprague's pipit and other sagebrush and grassland-dependent species. The unique habitats would be protected from fragmentation due to anthropogenic disturbances.

Cumulative Impacts

Cumulative impacts would be the same as described for the greater sage-grouse and grassland bird priority areas in the Wildlife section of Chapter 4.

Greater Sage-Grouse Protection Priority Area ACEC

Impacts under Alternatives A, C, D, and E (Preferred Alternative)

The Greater Sage-Grouse Protection Priority Area ACEC would not be designated; however, resources would be impacted by management actions as described in the Soils and Vegetation – Rangeland, and Wildlife (Greater Sage-Grouse, Grassland Species and Sagebrush Species) sections of Chapter 4.

Cumulative Impacts

Soils, vegetation, and wildlife resources would be protected by management actions.

Impacts under Alternative B

Special management would protect the values for which the ACEC was nominated through the creation of a sagebrush and native grassland reserve to provide high quality habitat for greater sage-grouse and other sagebrush-dependent species. The unique habitats would be protected from fragmentation due to anthropogenic disturbances.

Cumulative Impacts

Cumulative impacts would be the same as described for the greater sage-grouse priority areas in the Wildlife section of Chapter 4.

Little Rocky Mountains ACEC

Impacts Common to All Alternatives

Impacts common to all alternatives are the same as the impacts described in the Cultural Resources section in Chapter 4.

Cumulative Impacts

Cumulative impacts are discussed by alternative.

Impacts under Alternatives A (Current Management), B, and C

The Little Rocky Mountains ACEC would not be designated; however, prehistoric and historic archaeological resources and spiritual and traditional resources within the area would be managed and protected through management of the Little Rocky Mountains TCP. See the Cultural Resources section of Chapters 2 and 4 for a more in-depth discussion of TCPs.

The area would be open to wind energy rights-of-way. About 15,020 acres (65%) are within a high development potential area for wind energy, 7,664 acres (33%) are within moderate potential, and 260 acres (1%) are within low potential. The installation of either wind turbines or transmission lines could have adverse effects to cultural resources and the viewshed. Surface-disturbing activities could be mitigated through the Section 106 process, but the viewshed could not be mitigated.

Cumulative Impacts

Management of the Little Rocky Mountains TCP would protect the prehistoric and historic archaeological resources, and spiritual and traditional resources within the area.

Impacts under Alternative D

The Little Rocky Mountains ACEC (27,163 acres) would be designated to protect prehistoric and historic archaeological resources and spiritual and traditional resources within the area.

An NSO stipulation for oil and gas leasing would be required, which would avoid potential impacts to prehistoric and historic archaeological resources in the area. The entire area is within a very low development potential for oil and gas and is currently unleased.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. This would increase the protection to cultural resources associated from potential visual intrusions.

The BLM would recommend a mineral withdrawal for the northern portion of the ACEC (15,000 acres). This would avoid potential impacts associated with mining in the area.

Cumulative Impacts

Special management would protect the values for which the ACEC was nominated.

Impacts under Alternative E (Preferred Alternative)

The Little Rocky Mountains ACEC would not be designated; however, prehistoric and historic archaeological resources and spiritual and traditional resources within the area would be managed and protected through management of the Little Rocky Mountains TCP. See the Cultural Resources section of Chapters 2 and 4 for a more in-depth discussion of TCPs, including the exclusion of wind energy rights-of-way.

Cumulative Impacts

Management of the Little Rocky Mountains TCP would protect the prehistoric and historic archaeological resources, and spiritual and traditional resources within the area.

Malta Geological ACEC

Impacts Common to All Alternatives

Impacts common to all alternatives are the same as the impacts described in the beginning of the Paleontological Resources section in Chapter 4.

Cumulative Impacts

Potential cumulative impacts to paleontological resources could result from surface-disturbing activities that cause erosion, soil compaction, and landscape alteration.

Impacts under Alternative A (Current Management)

The area would not be designated an ACEC. Alternative A provides for general protections for paleontological resources across the planning area as provided for in accordance with the BLM 8270 Guidance and Handbook. Based on recent internationally, nationally, and regionally significant paleontological discoveries in the area, it is expected that interest and use would increase in the area. With increased use, the potential for damage, destruction, theft, and vandalism also increases. Impacts due to damage, destruction, theft, and vandalism diminish the scientific value of paleontological resources.

Alternative A would involve further field investigations, including potentially identifying additional paleontological resources which could benefit scientific knowledge. An NSO stipulation for oil and gas leasing would be required only for known paleontological sites. All other resource uses would continue.

The area would be open to wind energy rights-of-way. About 857 acres (14%) are within a high development potential area for wind energy, 5,242 acres (85%) are within moderate potential, and 54 acres (1%) are within low potential. Wind energy development has the potential to affect paleontological resources because of the surface disturbance that is required during construction; however, the anticipated effects could be minimized or eliminated through avoidance and mitigation actions.

Cumulative Impacts

Potential cumulative impacts to paleontological resources could result from surface-disturbing activities that cause erosion, soil compaction, and landscape alteration.

Impacts under Alternatives B, C, and D

The area would be designated an ACEC (6,153 acres). The ACEC would limit surface-disturbing activities in the area. The potential for inadvertent impact, vandalism, and deterioration of the value of paleontological resources remains, but could be addressed in various ways in the management plans created following the ACEC designation. Field investigations with the potential for identifying additional paleontological resources could benefit scientific knowledge. Special management practices and policies would be put into place to address surface disturbance in this scientifically significant area.

Surface-disturbing activities such as those associated with fluid minerals leasing, oil and gas development, and geophysical exploration would be handled on a case-by-case basis and would require a paleontological inventory prior to project approval. A CSU stipulation for oil and gas leasing would be required. About 1,560 acres (25%) are within a moderate development potential area for oil and gas and are currently leased, and 4,593 acres (75%) are within a very low development potential area and are unleased.

A mineral withdrawal would be recommended for locatable minerals. This area is in a very low or unknown potential for locatable mineral development (geologic conditions are not favorable for mineral occurrence, or geological data is insufficient to support a determination). The area would also be closed to leasable and salable minerals. Restrictions on these three activities would avoid damage and destruction of paleontological resources.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. Most of the area (85%) is within a moderate development potential area for wind energy. This would increase the protection to paleontological resources from potential surface-disturbing activities.

Cumulative Impacts

Potential cumulative impacts to paleontological resources could result from surface-disturbing activities that cause erosion, soil compaction, and landscape alteration.

Impacts under Alternative E (Preferred Alternative)

The area would be designated an ACEC (6,153 acres). Surface-disturbing activities would be limited in the area. The potential for inadvertent impact, vandalism, and deterioration of the value of paleontological resources remains, but could be addressed in various ways in the management plans created following the ACEC designation. Field investigations with the potential for identifying additional paleontological resources could benefit scientific knowledge. Special management practices and policies would be put into place to address surface disturbance in this scientifically significant area.

The area within the higher elevations of the Little Rocky Mountains TCP (2,604 acres) would be closed to oil and gas leasing which would protect the prehistoric and historic archaeological resources in the area. For the remaining area, surface-disturbing activities associated with fluid mineral leasing, oil and gas development, and geophysical exploration would be handled on a case-by-case basis and would require a paleontological inventory prior to project approval. A CSU stipulation for oil and gas leasing would be required. About 1,560 acres (25%) are within a moderate development potential area for oil and gas and are currently leased, and 4,593 acres (75%) are within a very low development potential area and are unleased.

The area would be open to locatable minerals but this area is in a very low or unknown potential for locatable mineral development (geologic conditions are not favorable for mineral occurrence, or geological data is insufficient to support a determination).

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. Most of the area (85%) is within a moderate development potential area for wind energy. This would increase the protection to paleontological resources from potential surface-disturbing activities.

Cumulative Impacts

Potential cumulative impacts to paleontological resources could result from surface-disturbing activities that cause erosion, soil compaction, and landscape alteration.

Woody Island ACEC

Impacts under Alternative A (Current Management)

The Woody Island ACEC would not be designated and the impacts would be the same as those discussed in the Soils and Vegetation – Rangeland and Wildlife and Special Status Species sections of Chapter 4.

Currently, none of the federal minerals in the area are leased for oil and gas (approximately 15,808 acres of the 22,411 surface acres). All federal minerals within the area are available for leasing. Direct impacts for development on federal minerals could include creation of roads to access wells, associated traffic during production, and temporary surface disturbance from buried pipelines.

Lands in the area would be available for locatable, salable and leasable hardrock mineral extraction. Although none of these activities are occurring in the area at this time, opportunities may occur in the future.

The area would be open to wind energy rights-of-way. Currently there are no renewable energy developments in the area; however, the area is classified as a Wind Power Class 4 area with good wind resource potential. If renewable energy developments do occur in the area in the future, transmission corridors could be needed in the area.

Cumulative Impacts

Surface-disturbing activities could potentially affect soils and wildlife.

Impacts under Alternative B

The Woody Island ACEC would not be designated; however, mitigation would protect surface resources in the identified Grassland Bird/Greater Sage-Grouse Priority Areas. All lands in these areas would be withdrawn from locatable minerals and closed to leasable and salable minerals. There would be no further oil and gas leasing in this area.

Cumulative Impacts

Surface-disturbing activities could potentially affect soils and wildlife.

Impacts under Alternatives C and D

The BLM would designate the Woody Island ACEC (22,411 acres). Federal fluid minerals (about 22,393 acres) would be available for leasing, but would be constrained through the use of NSO stipulations. The entire area has a very low potential for oil and gas development (2 wells per township). Based on the RFD, the opportunity exists for 2 wells. Indirect impacts of any new wells would include roads to access producing wells and the temporary disturbances based on new pipelines.

A withdrawal would be recommended for locatable minerals, and leasable and salable solid minerals would be closed. This would increase the protection from potential surface-disturbing activities. Currently none of these activities occur in the area.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. Most of the ACEC (76%) is within a high development potential area for wind energy. This would increase the protection for the unique landscape from potential surface-disturbing activities.

Cumulative Impacts

Special management would protect the values for which the ACEC was nominated.

Impacts under Alternative E (Preferred Alternative)

The BLM would designate the Woody Island ACEC (32,869 acres). Federal fluid minerals (about 32,852 acres) would be available for leasing, but would be constrained through the use of NSO stipulations. The entire area has a very low potential for oil and gas development (2 wells per township). Based on the RFD, the opportunity exists for 2 wells. Indirect impacts of any new wells would include roads to access producing wells and the temporary disturbances based on new pipelines.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. Most of the ACEC (76%) is within a high development potential area for wind energy. This would increase the protection for the unique landscape from potential surface-disturbing activities.

Cumulative Impacts

Special management would protect the values for which this ACEC was nominated.

Zortman/Landusky Mine Reclamation ACEC

Impacts under Alternative A (Current Management)

The area would not be designated an ACEC. The area is currently withdrawn from mineral entry to facilitate reclamation and water treatment activities. The mineral withdrawal will expire in October 2015.

Without the withdrawal or any special management designation in place, the Zortman/Landusky reclamation site would be open to OHV use and mineral entry. This type of activity would create surface disturbance that has the potential to negatively impact the reclamation of soil and slopes, as well as exposing the public to hazards within the site.

The area would be open to wind energy rights-of-way. A large portion of the ACEC (47%) is within a high development potential area for wind energy.

Cumulative Impacts

Opening BLM land in this area to more exploration and mining activity in the long term could result in 10 possible exploration projects with a total of 50 acres of surface disturbance. This could also result in reestablishment of mining operations that could create disturbance on currently reclaimed areas of the mine footprint (1,200 acres).

Impacts under Alternatives B and C

Alternative B designates 3,575 acres of BLM land as an ACEC. This designation would limit access and restrict OHV activities to ensure public safety from any hazards within the reclamation site and its water treatment and maintenance facilities. The area would also continue to be withdrawn from mineral entry and closed to solid mineral leasables and salables to support reclamation success by preventing surface disturbance that results from mining activity.

Soil, water, vegetative, and visual resources would benefit due to the monitoring of produced water and stream quality, field inspections, and continued reclamation activities. Any impacts to vegetation that result from wild or prescribed fire would be beneficial to future growing seasons.

The area would include an NSO stipulation for oil and gas leasing. The entire area is within very low development potential for oil and gas and the area is unleased. An NSO stipulation would support reclamation success by preventing surface disturbance associated with oil and gas exploration and development.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. A large portion of the ACEC (47%) is within a high development potential area for wind energy. This exclusion would increase the success of the reclamation by preventing potential surface-disturbing activities.

Cumulative Impacts

A withdrawal from locatable mineral entry would eliminate any foreseeable development and any possible reestablishment and expansion of the Zortman and Landusky Mines.

Impacts under Alternative D

The area would not be designated an ACEC. The area is currently withdrawn from mineral entry to facilitate reclamation and water treatment activities. The mineral withdrawal will expire in October 2015.

Without the withdrawal or any special management designation in place, the Zortman/Landusky reclamation site would be open to OHV use and mineral entry. This type of activity would create surface disturbance that has the potential to negatively impact the reclamation of soil and slopes, as well as exposing the public to hazards within the site.

The area would be an exclusion area for wind energy rights-of-way with the designation of the Little Rocky Mountains ACEC. A large portion of the ACEC (47%) is within a high development potential area for wind energy.

Cumulative Impacts

A withdrawal from locatable mineral entry for the Little Rocky Mountains ACEC would eliminate any foreseeable development and any possible reestablishment and expansion of the Zortman and Landusky Mines.

Impacts under Alternative E (Preferred Alternative)

Alternative E designates 2,656 acres of BLM land as an ACEC. This designation would limit access and restrict OHV activities to ensure public safety from any hazards within the reclamation site and its water treatment and maintenance facilities. The BLM would also recommend a mineral withdrawal if necessary, limited to the area needed to support reclamation success in the future. This would support successful reclamation and protect the associated infrastructure.

Soil, water, vegetative, and visual resources would benefit due to the monitoring of produced water and stream quality, field inspections, and continued reclamation activities. Any impacts to vegetation that result from wild or prescribed fire would be beneficial to future growing seasons.

The area would be an avoidance area for rights-of-way and an exclusion area for wind energy rights-of-way. A large portion of the ACEC (47%) is within a high development potential area for wind energy. This exclusion would increase the success of the reclamation by preventing potential surface-disturbing activities.

Cumulative Impacts

As reclamation and water treatment is further established for the Zortman and Landusky Mine sites, future assessment may deem a reduction of the withdrawn are appropriate. The amount of acres for this reduction is unknown, but any amount of acres withdrawn on the mine site would have the same influence on the reestablishment of mineral development as the current withdrawal.

National Historic Trails

Impacts Common to all Alternatives

Direct effects to National Historic Trails typically result from actions that disturb the soil or alter characteristics of the surrounding environment that contribute to trail significance and introduce visual elements out of character with the property or that alter its setting, or result in neglect of the resource to the extent that it deteriorates or is destroyed. For

example, surface-disturbing activities that affect the trail are considered an adverse direct effect because the trail segments are nonrenewable. Conversely, actions that result in data collection and preservation of National Historic Trails can be considered beneficial effects.

Indirect effects result from project-induced increases or decreases in activity in the planning area. The construction of a recreational facility may increase visitor use, which could result in indirect effects to previously undisturbed trail segments. Recreation, in particular, is a complex issue as actions taken to preserve historic values can have both beneficial and adverse effects for heritage tourism and trail enthusiasts.

For all agency undertakings that could adversely affect National Historic Trails, the BLM complies with Section 106 of the NHPA prior to conducting the undertaking. Section 106 compliance typically includes inventory, evaluation, and consultation with the SHPO.

The potential adverse effects to trails is somewhat limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to trail segments contributing to the overall importance prior to any disturbance.

However, normal compliance with Section 106 of the NHPA prior to the approval of an action serves to moderate the amount of actual disturbance. In those cases in which an accommodation cannot be made, consultation between the BLM and the SHPO takes place to develop and implement a treatment plan to mitigate adverse effects to contributing segments. While this often results in project relocation, detailed recording and mapping or interpretation are some of the techniques used for mitigation, depending on the specific trail segment and the nature of the potential adverse effects.

The primary surface-disturbing activity would be from natural gas development, but both trails (Lewis and Clark National Historic Trail and Nez Perce National Historic Trail) are designated as NSO with varying distances from the Trails depending on the alternative (1/4 mile, 500 feet or 300 feet).

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) provide additional protection for those resources but those changes would have little effect on National Trails due to the NSO stipulation.

Cumulative Impacts

Management actions would have little effect on National Historic Trails.

Wild and Scenic Rivers

The BLM reviewed rivers and streams within the planning area and found a 1/2 mile segment of the Marias River at the confluence of the Missouri River to be eligible for inclusion in the National Wild and Scenic Rivers System (Appendix L).

Impacts under Alternative A (Current Management)

Under this alternative, the BLM would not recommend this segment for inclusion in the National Wild and Scenic Rivers System.

This BLM land along with a segment of the Marias River is entirely within the Upper Missouri River Breaks National Monument and would be managed consistent with the approved plan for the Monument (BLM 2008b). Management of the area already provides protection for the values along this segment of the Marias River.

Cumulative Impacts

Management actions would have little effect on this segment of the Marias River.

Impacts under Alternative B

Under this alternative, the BLM would recommend this segment for inclusion in the National Wild and Scenic Rivers System.

This BLM land along with a segment of the Marias River is entirely within the Upper Missouri River Breaks National Monument and would be managed consistent with the approved plan for the Monument (BLM 2008b). Management of the area already provides protection for the values along this segment of the Marias River.

Cumulative Impacts

Management actions would have little effect on this segment of the Marias River.

Impacts under Alternatives C, D, and E (Preferred Alternative)

The BLM would not recommend this segment for inclusion in the National Wild and Scenic Rivers System.

This BLM land along with a segment of the Marias River is entirely within the Upper Missouri River Breaks National Monument and would be managed consistent with the approved plan for the Monument (BLM 2008b). Management of the area already provides protection for the values along this segment of the Marias River.

Cumulative Impacts

Management actions would have little effect on this segment of the Marias River.

Wilderness Study Areas (Bitter Creek and Burnt Lodge)

Impacts Common to all Alternatives

Potential effects from vegetation management, energy and minerals, livestock grazing, wildland fire management, realty use authorizations and rights-of-way, transportation, OHVs, and mechanized vehicle use and recreation may occur under all alternatives. However, effects would be minimized due to the restrictions mandated by the WSA Interim Management Policy (BLM 1995), which states that activities must meet the non-impairment criteria.

Cumulative Impacts

Management actions would not impair the wilderness values.

Vegetation – Riparian and Wetland

Assumptions and Guidelines

In order to protect and/or restore riparian/wetland vegetation and associated water bodies in the planning area, the following assumptions are made:

- Montana DEQ Water Quality Management Plans would be developed in coordination and cooperation with surrounding agencies and private landowners.
- All riparian areas are evaluated according to the Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a) and managed for PFC. Streams and wetlands that are in PFC are better able to withstand infrequent, high-flow runoff events than those that are not functioning properly.
- Reintroducing fire into riparian habitats to restore plant communities would enhance long-term stability in these habitats.

The setback areas provided in the oil and gas stipulations for riparian protection are intended to act as a filtering process for water and sediment before either reaches the stream or wetland. The greater the setback distance that is applied to the resource, the less effect the oil and gas drilling and production processes would have on riparian and wetland values.

Designated travel routes are present within riparian corridors and influence riparian habitat through soil compaction, sediment input, and maintenance practices. The direct effects of these travel routes would be evaluated when travel management planning is implemented.

Direct effects to riparian and wetland communities result from disturbing vegetation or ground surface in these communities. Indirect effects to riparian and wetland communities result from actions within a watershed that cause a change in riparian and wetland functionality (e.g., increased rates of sediment loading or changes in hydrology). From these effects it can be assumed that:

- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surface (i.e., roads), changes in water routing, and loss of vegetation.
- Surface disturbance, transportation networks, ungulate use, and recreation activity increase the likelihood of noxious and invasive plant species introduction and spread in an area.

The greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment would enter the stream or wetland and contribute to the loss of riparian and wetland functionality.

Impacts Common to All Alternatives

Surface-disturbing activities that affect riparian and wetland systems are both direct and indirect. The direct effects are where actions occur within the riparian area itself, such as grazing or construction. The effect of vegetation removal makes these areas more susceptible to erosion, often leading to channel widening. The indirect effects are those that are generated offsite, usually from the upstream watershed. Generally, these watershed changes result in altered streamflow hydrology (e.g., increased frequency of peak flows) and increased sediment production and sediment delivery downstream. This additional sedimentation can cause changes in channel dynamics which can negatively affect the riparian vegetation that is protecting the stream bank. However, activities such as flow diversion and reservoir storage may have the opposite effects. Downstream riparian areas may adjust due to these indirect watershed effects.

Vegetation manipulation projects may cause short-term negative effects to riparian and wetland systems. The long-term effect from vegetation manipulation projects would be improved vegetative condition and habitat diversity, including diversity in composition and forage production as well as reduced erosion runoff on a landscape level, thereby producing less sediment and runoff in the riparian systems.

Range improvements such as water developments, fences, exclosures, and vegetation manipulation could cause a loss of vegetative cover and changes in plant composition and vigor adjacent to each project. Improved grazing management achieved through range improvements could provide periods of rest for plant growth and seed production to maintain plant vigor and could potentially improve vegetative composition on riparian and wetland areas.

Existing dams, reservoirs and irrigation systems on both federal and private lands have an effect on most of the lotic streams in the planning area. These types of projects, either fully functioning or abandoned, may have changed the hydrologic function of the streams and/or the vegetation in the riparian zone at some time. Generally the streams have adapted to the projects and are fully functional but at a different level of potential. In some cases this adaptation has not occurred and would require major inputs to correct the problem (i.e. removing a dam on private land, restoring an irrigation system back to the original contours) and move the riparian system back to its 'natural' potential and into proper functioning condition. In some cases these projects have created new and additional riparian areas by reducing peak flows and holding water longer in the riparian system. Some of these water holding facilities have down slope drainage that creates and maintains riparian habitat.

Any surface-disturbing activities in riparian areas would promote noxious weed infestations. Post-project weed monitoring and treatments would minimize effects in riparian areas.

Fire Management and Ecology: Both wildfire and prescribed fire (fuels management) have similar effects of removing vegetation and creating bare soil. The short-term effect would be increased bank erosion and sedimentation in the stream. Natural revegetation would occur in a 3-5 year timeframe.

In the long term, fire would increase the health and vigor of surviving vegetation, increase vegetation diversity, modify vegetation types (e.g., a change from shrubs to herbaceous vegetation), and modify age class and structure.

Fluid Minerals: Oil and gas wells co-produce water that is temporarily stored in pits on location. The type and abundance of constituents dissolved in produced water (salts and other compounds) vary within and among geologic basins. Soils can be contaminated and wetland and riparian vegetation can be reduced or eradicated when produced water unintentionally spills on the surface. Produced water has a higher potential to affect wetland and riparian values in the long term than erosion and sedimentation associated with surface-disturbing actions.

Reclamation could effectively mitigate long-term oil and gas surface-disturbing effects. Incorporating rangeland health standards and site-specific mitigation measures into plans of operation for resource extraction, along with site-specific habitat objectives developed through operating plans, would mitigate impacts to riparian and wetland habitat. However, because of protective measures put in place for other resource values (e.g., cultural resources and special status species), riparian values are often compromised at the drilling and production level even though riparian protections are provided.

As well densities increase, the opportunities to relocate operations away from riparian and wetland areas become more difficult. The room to maneuver away from other resources values (e.g., cultural sites and special status species) and still use the full setback of 200 meters (656 feet) for riparian protection becomes more difficult as the well locations and associated infrastructure conflict with other resources.

Parcels currently leased for oil and gas, including unitized fields, may have specific conditions attached to the lease that either provide some protection to riparian and wetland values in the form of a specific lease stipulation, or the standard lease term of relocating proposed operations up to 200 meters. This standard lease term can be applied to reduce the effects of oil and gas development on riparian and wetland values. Conditions of approval may be applied on proposed actions (i.e., APDs, Sundry Notices) and used to mitigate the effects of oil and gas development on riparian values (Appendix C, BMPs). These protections must be negotiated with the operators.

Bears Paw South and North Blaine Field Development Areas: The miles of lotic riparian and acres of lentic riparian habitat in these potential gas fields are displayed in Tables 4.80 and 4.81. These two areas provide only 1-2% of the riparian values in the planning area. Of the acres and miles of riparian in these areas, most is currently leased for oil and gas development. Any additional stipulations affecting lands currently unleased that could be applied to the lotic streams and lentic wetlands would constrain development on only 11 miles and 49 acres in the Bears Paw South area and 12.3 miles and 488 acres in the North Blaine area. A high density of wells is expected in both of these areas, making it more likely that the relocation of well pads and facilities 200 meters from riparian areas could conflict with other resource values. The effects of not being able to relocate the minimum 200 meter distance would be the same as those described under Alternative A.

Table 4.80
Riparian Habitat in the North Blaine Field Development Area

	BLM-managed Surface Leased by Category		*BLM Surface Unleased*		*Totals for North Blaine Field Development Area*			*Planning Area Totals*	
	Development Potential				*Total Miles/ Acres*	*% Unleased*	*Unleased Miles/ Acres*	*% Affected Miles*	*% Unleased Affected*
	Moderate	*Low*	*Moderate*	*Low*					
Lotic Miles	11.30	17.60	8.00	4.39	41	19%	12.4	4.2%	1.2%
Lentic Acres	256	558	142	346	1,302	11%	488	2.4%	.91%

Table 4.81
Riparian Habitat in the Bears Paw South Field Development Area

	BLM-managed Surface Leased by Category			*BLM Surface Unleased by Category*		*Bears Paw South Field Development Area Totals*			*Planning Area Totals*
	Development Potential					*Total Miles/ Acres*	*% Unleased*	*Unleased Miles/ Acres*	*% Unleased Affected??*
	High	*Low*	*Very Low*	*High*	*Low*				
Lotic Miles	18.27	0.44	0.42	6.55	4.45	30.13	37%	11	1.13%
Lentic Acres	85	16	0.47	36.8	12.7	150	33%	49	0.09%

Forests and Woodlands: The removal of forest products through both thinning and salable timber harvest could potentially create short-term disturbances of between 237 and 391 acres a year. The bare soil created by roads and the vegetation removal could cause increased sedimentation and stream bank erosion in localized intermittent streams in the Sweet Grass Hills and the Zortman area. The long-term effects would be minor as reclamation would provide vegetative cover and reduce erosion and sedimentation to pre-harvest levels.

The forest BMPs for maintaining water quality restrict the harvest of trees and road building in riparian zones, so no direct effects to the riparian resource are expected.

Livestock Grazing: Livestock grazing in riparian areas could reduce the extent of vegetative ground cover and vegetative species diversity. In locations of locally severe native vegetation loss, noxious weed infestations could occur. All of these effects could occur to variable extents across the planning area. Implementing livestock grazing guidelines to meet Standards for Rangeland Health would treat and improve riparian areas by maintaining or improving vegetative cover and structure to trap and hold sediment to rebuild streambanks, restore/recharge aquifers, and dissipate flood energy. Deep-rooted herbaceous and woody shrub species would be promoted to stabilize streambanks and reduce soil erosion.

The health and integrity of riparian vegetation would be protected and improved by livestock fencing, development of upland water sources, and timing livestock use to avoid sensitive periods in the spring or to reduce the intensity of grazing and trampling.

With proper grazing management and implementation of rangeland improvement projects, the health of riparian and wetland areas can be sustained or improved. All alternatives involve management of livestock grazing in riparian areas. The degree and extent of grazing-related impacts to riparian and wetland areas over the long term are expected to continue to improve. On the other hand, improper livestock grazing practices decrease the functionality of riparian and wetland areas through soil compaction, physical removal and destruction of vegetation, and trampling of streambanks causing bank failure. Livestock grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize streambanks. Kovalchik and Elmore (1992) state that improper livestock grazing adversely impacts the stability of some riparian areas dominated by willow.

Under all alternatives, 29,411 acres in the planning area are not available for livestock grazing. The riparian and wetland values in these areas would not be affected by livestock grazing.

By emphasizing monitoring on only higher-priority allotments (Categories I and M), undesirable conditions in lower-priority allotments may not be identified and deterioration or improvement that is occurring in vegetative communities may not be realized in a timely manner.

Livestock grazing would have no long-term impacts on riparian areas if properly managed under Standards for Rangeland Health and Guidelines for Livestock Grazing Management.

Noxious Weeds and Other Non-Native Invasive Species: Any surface-disturbing activities in riparian areas would promote noxious weed infestations. Post-project weed monitoring and treatments would minimize the long-term effects in riparian areas.

The chemical spraying of weeds along riparian zones with approved chemicals can kill non-targeted riparian vegetation, especially the shrub and tree component. This action would reduce plant species diversity in the short term and could cause accelerated erosion along streambanks. In the long term, the removal of noxious weeds, which tend to dominate the vegetative component, would increase the diversity of plant species and improve overall riparian and wetland health and the stability of the riparian system.

OHV Use and Travel and Transportation Management: The effects of designating travel management priorities on riparian values would be the same for all alternatives. The only difference is the schedule of which areas are a high priority for travel management planning. The high priority areas that would be scheduled to complete travel management under Alternative A are the Zortman area (which includes 10 lentic acres and 9 lotic miles of riparian habitat), and an area northwest of Glasgow (80 acres) that includes the 40 acre OHV area northwest of Glasgow (which has no riparian habitat).

The process of designating travel routes to reduce OHV travel in or close to riparian areas would improve vegetation, decrease bare soil, and place more riparian acres in proper functioning condition.

The implementation of the travel management plan and the proper management of roads in the riparian zones would, in the long term, improve the quality of the vegetation and reduce sedimentation and erosion where roads cross streams and wetlands and run parallel to stream segments.

The designated open OHV areas under all alternatives would have no direct negative effects on riparian values since no riparian vegetation is located in these designated areas. Bare soil could be carried off the site by wind and water, but the amount is small and would not affect the riparian or wetland systems as they are far removed from these sites.

Recreation: Recreation activities would result in localized effects, such as vegetation disturbance, trampling, and removal due to camping and off-road travel activities. Any effects to riparian function would be minor and temporary.

Solid Minerals:

Leasable and Salable: Development of leasable and salable minerals is expected to continue at the same rate as in the past. Mineral exploration and development activities could remove riparian vegetation in some cases. Affected areas would be maintained, protected, rehabilitated, and compensated to the extent practicable. This would contribute to re-establishing vegetation species diversity and productivity in the aftermath of potential riparian effects associated with mineral development activities. Long-term negative effects to riparian and wetland systems are expected to be very minor.

Locatable: The solid minerals RFD identified 57 miles of stream and 2,115 acres of wetland that are located in the high, moderate and low potential areas for solid mineral development. Table 4.82 shows the breakdown of riparian miles by hard rock and bentonite.

Approximately 9.5 miles of lotic stream are located in the high bentonite potential area in south Valley County. A total of 3.25 miles of stream are located in the high potential area for hard rock mining in the Little Rocky Mountains and Sweet Grass Hills.

The probability of a bentonite claim being developed in a wetland or riparian zone is very small. If adequate mitigation and BMPs are applied at the time of mine development, runoff from overburden piles into wetlands and riparian areas would be small. These developments could create surface disturbances that could have large short-term effects, but after reclamation would have very few long-term effects to the riparian vegetation. The most likely chance of these effects occurring is on the bentonite mining claims located in south Valley and south Phillips Counties. The probability of any of these long-term effects occurring is slight if proper reclamation standards and BMPs are applied at the time of mine development.

Table 4.82 Stream Miles in Bentonite and Hard Rock Potential Areas			
	Proper Functioning Condition	***Functioning At Risk***	***Nonfunctioning***
Bentonite			
High	4.18	5.63	-
Moderate	-	-	-
Low	14.86	15.31	-
None	627.87	306.41	32.48
Hard Rock			
High	3.24	-	-
Moderate	7.90	-	-
Low	5.83	0.28	-
None	629.94	327.06	32.48
Total	36.00	21.21	-

Special Designations: The existing and proposed special management areas, mostly ACECs, provide management constraints such as NSO, closed to leasing or mineral entry, and exclusion areas for wind energy rights-of-way. These constraints would all limit potential surface-disturbing activities in wetlands or riparian zones, thereby not degrading the existing wetland and riparian vegetation and maintaining an intact riparian ecological system. The more surface-disturbing activity is constrained, the more protection is provided to riparian and wetland values. The existing and proposed special designations would affect BLM minerals on approximately 171,650 subsurface and surface acres. A major portion of these acres (93%) are in the very low oil and gas development potential area. The remaining 7% are in the low and moderate potential areas. Substantial portions of the Frenchman, Mountain Plover, and Woody Island ACECs are unleased for oil and gas. The Bitter Creek and Burnt Lodge WSAs are unavailable for mineral leasing or location.

Vegetation: Assessing and monitoring riparian areas for PFC would help identify riparian areas that are functioning at risk or nonfunctioning. Improved health of riparian vegetation would maintain proper functioning condition or move degraded areas toward PFC.

Managing riparian areas with an emphasis on maintaining and restoring riparian function as defined in the Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a) would allow vegetation to develop in response to disturbance regimes as a result of management actions or natural events, particularly riparian areas that are functioning at risk, because they would be high priority for restoration.

Water Resources: Land disturbances introduce nonpoint source (NPS) pollution which can alter water resources and affect riparian and wetland vegetation by introducing salts, chemical compounds, and heightened concentrations of sediment and naturally occurring elements and minerals. Approved linear crossings that are constructed according to the BMP for stream crossings would affect riparian vegetation and streambank stability in the short term, but most effects could be reclaimed with little long-term effect to riparian vegetation.

Wetlands and riparian areas play a significant role in protecting water quality and reducing or eliminating many of the potential impacts of NPS pollution. One way this is achieved is by providing a buffer between uplands and adjacent water bodies. This can filter out NPS pollution before it can impact water quality. Healthy riparian areas and wetlands can also reduce NPS pollution by shading waterbodies, stabilizing streambanks, and controlling erosion.

In streams that do not meet state water quality standards, or that do not fully support their beneficial uses, the application of BMPs may not be sufficient to restore water quality. In these situations, the most effective and practical means of restoring water quality is through the development and implementation of science-based and locally supported water quality plans. The plans (and their associated TMDLs) identify reasonable land, soil, and water conservation practices

that are expected to reduce NPS pollution and ultimately achieve water quality standards. These practices include, but are not limited to BMPs.

In streams that meet state water quality standards and fully support their beneficial uses, the most effective and practical means of controlling NPS pollution is through the use of watershed planning and science-based BMPs.

Cumulative Impacts

The primary effects to riparian and wetland systems occur when native rangeland or land in the CRP lands are converted to croplands. This conversion is a major surface-disturbing activity and is expected to occur. Water runoff and sedimentation increases as these actions occur, potentially overloading the system with water and sediment. Any actions that increase these loads beyond a certain threshold will cause a loss of functionality of the stream and wetland vegetation and hydrology.

The major BLM actions that could affect surface disturbance in the long term are fluid minerals and commercial wind energy development that could occur on either private or federal land. The effects of fluid minerals on both private and federal land will be discussed under each alternative.

Wind Farms would generally have a minor effect on riparian and wetland values depending on the location of the farms. Most wind farms are located on ridges far enough away from streams that no effects would be expected in these areas. Natural wetlands could be affected by wind farms on a small scale if they are located in areas of high concentration of natural wetlands. If wind farms are located in farm land with little or no wetland values there would be no effects.

These effects could be limited to a small area, as in the case of a wind farm being developed in an area of extensive fluid mineral development. This could involve various land ownerships and the severity of the effects could vary depending on the location and the amount of riparian and wetland values in that particular location.

The proposed Keystone Pipeline would cross 5 miles of wetlands on federal land in Montana. The surface disturbance caused by these crossings would be short-term in nature. Temporary cumulative effects would include increased sedimentation and reduced flow. Bank stability may decrease in the short term until vegetative cover returns to pre-disturbance levels.

Improper grazing practices on both private and federal land could affect the riparian condition of lotic streams. The scattered land pattern increases the potential for cumulative effects on both BLM and other ownerships. Management changes implemented on BLM land and on adjoining lands could improve the condition of both. If some uses are restricted on BLM lands it could cause increased use on other lands, which could lead to the degradation of riparian conditions on those lands, and potentially downstream on BLM and other lands.

Most cumulative effects on riparian and wetlands are short-term in nature, as in most instances the disturbances affecting these values can be reclaimed over the long term.

Impacts under Alternative A (Current Management)

Long-term surface disturbance over the 20 year life of the plan would be on 2,188 federal acres, mostly in the high and moderate potential oil and gas development areas (70%). A small part of this effect would be the direct removal of vegetation on streambanks and around potholes when the surface-disturbing activities cannot be moved due to other resource values (i.e., cultural resources, sensitive species). A much larger effect upon riparian areas would result from watershed surface disturbances increasing stream sediment load, potentially changing stream dynamics which can cause the stream to become unstable. This instability can cause gully formation at the headwaters and sediment accumulation downstream where it may cause the channel and floodplain to aggrade. This effect would most likely occur on the small intermittent riparian areas in the planning area where oil and gas development is most intensive. The effects of fluid mineral development on wetlands (potholes, reservoirs) would be minimal if the disturbances could be moved away from the riparian vegetation. When disturbances cannot be avoided the effects would be mostly short-term as most of these effects would be reclaimed and the vegetation should reestablish to pre-disturbance levels. The short-term and long-term surface disturbance is the highest of all alternatives and has the most potential to affect riparian and wetland values.

Fluid Minerals: The stipulation for Alternative A (Appendix E.4, Alternative A) includes possible special areas such as:

> 500 feet, or when necessary, within the 25-year flood plain from reservoirs, lakes, and ponds and intermittent, ephemeral or small perennial streams; 1,000 feet, or when necessary, within the 100-year flood plain from larger perennial streams, rivers, and domestic water supplies.

For the purposes of this analysis the following assumptions have been made:

- The major reservoirs are Nelson, Fresno, Fort Peck, and Tiber.
- The intermittent and small perennial streams were derived from the 1:100000 Surface Management map.
- The major rivers were designated as the Milk, Marias, Teton, and Missouri.
- The current land use plan applies specific wetland stipulations to Lonesome Lake and Whitewater and Dibbler reservoirs.

The wetlands and remaining lotic riparian areas are protected under the standard terms and conditions (200 meters and 60 days).

For purposes of the impacts analysis only the proposed and existing stipulations will be analyzed.

The roads, wells and infrastructure associated with fluid minerals development would degrade riparian habitat if the structures are placed in or cross the riparian zone or wetland area. The potential effects are increased sedimentation from runoff and the potential runoff of degraded water into existing wetlands which could cause long-term damage to riparian soils and vegetation.

The oil and gas RFD identified high, moderate, low and very low areas of potential oil and gas development (Appendix E.1). In these areas 93% of the lotic streams and 85% of the wetlands are located in the low and very low category. Riparian miles and wetland acreage by potential oil and gas areas are depicted in Table 4.83. The table shows leased and unleased miles and acres of lotic riparian (streams) and lentic riparian (wetlands) in the oil and gas development potential areas.

Table 4.83
Riparian Values in Potential Oil and Gas Areas under Alternative A (Current Management)

	High Development Potential		***Moderate Development Potential***		***Low Development Potential***		***Very Low Development Potential***		***Total***	
	Leased	***Unleased***	***Leased***	***Unleased***	***Leased***	***Unleased***	***Leased***	***Unleased***	***Leased***	***Unleased***
Stream Miles	18	7	29	11	54	28	77	748	178	794
Wetland Acres	85	50	6,618	1,056	4,432	11,088	5,317	25,022	16,452	37,215

Sixty-five miles (7% of the total) of lotic streams are identified in the oil and gas high and moderate potential areas. Approximately 7,800 acres (15% of the total) of wetlands are located in the oil and gas high and moderate potential areas. The RFD has estimated that 75% of all new wells would occur in high and moderate development potential areas while only 4% of the activity would occur in the very low development potential areas. Currently 72% of the lotic riparian miles and 86% of lentic wetland acres that are located in the high and moderate development potential area are leased with at least the standard lease terms (200 meters). In general, most effects to riparian and wetland values due to fluid mineral development would occur in the high and moderate development potential areas as the density of the wells and related facilities is higher and it is much harder to move the wells and associated infrastructure 200 meters from the riparian zone, thereby increasing the chance for increased sediment load and the potential for produced water to run into the streams and wetlands.

Table 4.84 shows the well density totals (federal wells per square mile) by alternative and the potential increase in density for each development potential area as defined by the RFD. The table shows a significant increase in density of wells in the high and moderate development potential categories. As well density increases it becomes more problematic to keep the well site and associated infrastructure away from the riparian and wetland areas.

Table 4.85 shows the miles of stream and acres of wetlands that are affected by the NSO and closed designations (major constraints) that are applied by any resource (i.e., wildlife, cultural, riparian) for each alternative and potential area. This table also shows the acres wetlands and miles of assessed lotic streams that are leased and unleased within each potential area that are affected by the NSO or closed designation.

A total of 972 lotic (stream) miles and 53,668 lentic (wetland) acres have been assessed for condition in the planning area. Stipulations applied under Alternative A as shown in Table 4.85 would protect 243 miles (25%) and 5,890 acres (11%) of wetlands with the major constraints (closed or NSO). Of this total protected, 229 miles (94%) and 5,069 acres (87%) are unleased in the very low potential area. Only 6.7% of the lotic riparian miles and 14.4% of the wetland acres are in the high and moderate potential oil and gas development areas. These areas would be the most open to impacts from oil and gas development.

Lands and Realty: Under Alternative A, 90,343 acres of land which could have some riparian values would be available for disposal or exchange on a case-by-case basis to be determined by the natural resource specialists and managers. Riparian and wetland areas generally are not disposed of or traded unless equal or higher value land is received in the exchange.

Solid Minerals – Locatable: Under Alternative A, the potential short-term surface disturbance for solid mineral development is 390 acres, and the potential long-term surface disturbance is 2,495 acres (Table 4.5.) The majority of the surface disturbance (87%) would occur in the Little Rocky Mountains area if gold mining resumed. A withdrawal for solid minerals for the Zortman/Landusky mine reclamation area is in effect until 2015. Upon expiration of the withdrawal, the Zortman/Landusky mine area would again be available for mining claim location. However, the remaining federally owned subsurface acres are currently open to solid mineral entry. The expiration of the withdrawal would open up an additional 3,436 acres for solid mineral location and development in 2015. Of those acres, 1,200 acres are anticipated to have development in already disturbed areas and 710 acres have a potential for mining expansion.

Approximately 17 miles of lotic streams and 52 acres of wetlands are contained within the boundaries of the high and moderate potential hard rock mining areas. If the projected surface disturbance occurs in or close to riparian and wetland areas it would remove the vegetation and expose the streambank to erosion or dry up a natural wetland. Increased sedimentation from exposed soil could cause similar effects as described under the Fluid Minerals section of this document.

The mineral withdrawals of the Sweet Grass Hills (expires in 2017) and Zortman/Landusky (expires in 2015) would provide protection to riparian values, as surface disturbance from solid mineral development would not be allowed until the withdrawals expire or the existing mining claims are proven valid. If the withdrawals were not renewed or the existing mining claims were proven valid and mining resumed, some minor effects to riparian values would be expected.

Bentonite: The most likely place for locatable mineral development to occur is on existing bentonite claims in south Valley County and south Phillips County. The scale of mining in both locations is projected to be quite small; therefore, the effects on riparian areas would be small. The mining of bentonite in high potential areas would only affect 156 acres of wetlands and 9.5 miles of riparian. The effects associated with mining bentonite would be the same as those described in the Impacts Common to All Alternatives section.

Special Designations: The special designations (ACECs) would provide the least protection to riparian and wetland values of all the alternatives. The potential for surface disturbance, mostly from oil and gas development, is the highest of any alternative. Other surface-disturbing activities associated with minerals development would be allowed in most situations except for the WSAs.

Table 4.84
Well Density Totals (Federal Wells/Square Mile)

							% Increase over Current No. of Wells				
Development Potential	***Alternative A (Current Management)***	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***	***Current***	***Alternative A***	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E***
High	3.63	2.89	3.53	3.66	3.56	0.80	355%	262%	342%	358%	346%
Moderate	2.63	2.32	2.56	2.64	2.61	1.25	111%	85%	104%	111%	108%
Low	1.12	1.10	1.11	1.12	1.12	0.89	26%	23%	25%	26%	26%
Very Low	0.05	0.04	0.05	0.05	0.05	0.03	75%	62%	70%	75%	73%

Table 4.85
Riparian Habitat Affected by NSO and Closed to Leasing
(Lotic Miles/Lentic Acres)

		Leased				***Unleased***								
Alternative		***High Potential***	***Moderate Potential***	***Low Potential***	***Very Low Potential***	***High Potential***	***Moderate Potential***	***Low Potential***	***Very Low Potential***	***Total Riparian Habitat Affected***	***% of Total Affected in Planning Area***	***% of Total Very Low Potential Unleased***	***% of Total High, Moderate, Low Potential Unleased***	***% of Total Leased***
A (Current Management)	Lotic Miles	0	2	2	1	-	1	9	229	243	25.0%	94%	4%	2%
	Lentic Acres	9	284	139	232	2	111	44	5,069	5,890	11%	86%	3%	11%
B	Lotic Miles	18	29	54	77	7	11	28	748	972	100%	77%	5%	18%
	Lentic Acres	85	6,618	4,432	5,317	50	1,056	11,088	25,022	53,668	100%	47%	23%	31%
C	Lotic Miles	18	29	54	77	7	11	28	748	972	100%	77%	4%	18%
	Lentic Acres	85	6,618	4,432	5,317	50	1056	11,088	25,022	53,668	100%	47%	23%	31%
D	Lotic Miles	0	0	1	4	-	2	9	245	261	27%	94%	4%	2%
	Lentic Acres	28	157	109	137	12	59	118	7,614	8,235	15%	92%	2%	5%
E (Preferred Alternative)	Lotic Miles	18	29	54	77	7	11	28	748	972	100%	77%	4%	18%
	Lentic Acres	85	6,618	4,432	5,317	50	1,056	11,088	25,022	53,668	100%	47%	23%	31%

Water Resources: The acres of riparian vegetation associated with the Willow Creek structures located in south Valley County would decrease as reservoir projects are abandoned. The absence of surface water and lowering of the water table by the downcutting gully action would alter the ground water regime and remove the water necessary to maintain the existing riparian vegetation. The potential for new riparian vegetation to become established would be limited as water would be unavailable for riparian plants. This loss of riparian values would occur slowly over many years. Maintaining specifically designated reservoir projects would maintain a certain amount of riparian vegetation associated with the Willow Creek structures. Overall, the loss of riparian and wetland acreage due to the abandonment of the structures would be small in comparison to the total riparian acres in the planning area.

Cumulative Impacts

The long-term acres of disturbance (13,541) for both federal and non-federal actions are a very small percentage of the total disturbance when considering the size of the planning area (17.5 million acres). As most effects to riparian values are considered short-term, the long-term effects on riparian and wetland areas would be small if all the BMP and reclamation standards are adhered to. Surface disturbance on private land during the development of precious metals mining could have effects (increased sedimentation, water quality issues affecting plant survival and growth) on the federally controlled riparian areas downstream from the solid mineral development. Utilizing the standards for rangeland health would result in improved conditions.

Impacts under Alternative B

The effects to riparian and wetland communities under Alternative B from surface-disturbing activities are expected to be the least of any alternative. The projected short-term and long-term surface disturbance from BLM actions are the lowest of all alternatives. Compared with Alternative A, the long-term surface disturbance under Alternative B (1,056 acres) is approximately 48% less. The adverse effects anticipated from surface-disturbing activities are expected to be similar in nature, but less in intensity compared to Alternative A. Surface-disturbing activities under Alternative B would have the least potential adverse effects to riparian and wetland communities of all alternatives.

Fluid Minerals: The 1/4 mile NSO stipulation applied to oil and gas development for the protection of riparian and wetlands area would eliminate most of the effects of fluid mineral development to riparian vegetation. The 1/4 mile setback would also eliminate most of the potential water quality issues on any new leases. See Table 4.85 for the breakdown of leased and unleased acres and miles to which this suite of stipulations would apply. Approximately 18% of the lotic miles and 30% of the wetland acres are currently under lease. The area that is currently under lease (mostly areas of high and moderate potential for oil and gas) would still be protected by the standard lease terms (200 meters and 60 days). The resource protection stipulations applied under this alternative would only affect 45 miles and 12,193 acres of riparian habitat that are unleased in the high, moderate and low potential areas. This is 5% of the total lotic miles and 23% of the total wetlands. The remaining areas are either in the very low potential area or currently leased. The effects of the infrastructure and surface disturbance on the vegetation in the leased areas could decrease the amount of riparian vegetation in PFC if the 200 meter setback could not be maintained due to other resource concerns. As existing leases expire the 1/4 mile NSO would be applied to new leases, which would protect more riparian areas from surface disturbance thereby maintaining or potentially increasing the amount of PFC riparian and wetland areas.

Solid Minerals – Locatable: The effects of solid mineral extraction on riparian and wetland resources would be similar to those described in Alternative A except in the scale of the activity. Under Alternative B, the potential short-term and long-term surface disturbance for solid mineral development is 355 acres (Table 4.5.) The existing and proposed withdrawal actions would limit any future development within the Little Rocky Mountains and Sweet Grass Hills, even though all of the high and moderate potential areas are claimed and could be developed in spite of the withdrawal action. Validation of claims would have to occur which would slow the permitting process, but mining could occur albeit at a slower pace and less acreage than under Alternative A.

Bentonite: Under this alternative almost all of the lotic streams would be provided a level of protection from mineral entry in the areas with potential for bentonite mining. Valid existing claims could be developed with restrictions in place.

Lands and Realty: The land adjustment Category 3 lands that are identified for disposal by exchange or sale would include 193 acres of land that may have wetland and riparian values. The BLM could potentially acquire land with equal or better riparian and wetland values when a land exchange is completed. A resource specialist would review the potential riparian and wetland values before completing any proposed exchange or sale.

Special Designations: The levels of protection provided in the constraints for each ACEC varies in Alternative B. Other resource constraints applied to oil and gas development and mineral development under this alternative would make the designation of some ACECs for special management unneeded for riparian protection. The Woody Island and Frenchman areas are not proposed for special designation under this alternative, but surface disturbance from fluids and solid minerals development that could affect riparian and wetland values would be minimized by constraints applied by other resource protection measures.

***Special Status Species*:** The priority area designation in portions of Valley County and South Phillips County would reduce surface disturbance on riparian and wetland vegetation as it prohibits most surface-disturbing activities. Under this alternative 608 miles of lotic riparian and 22,142 acres of wetlands would be protected from most surface-disturbing activities by the designation. Lotic riparian and lentic wetlands currently in PFC would be maintained in their existing condition as no new surface disturbances would be allowed. Most of the riparian values affected by this designation are in low potential oil and gas areas. These areas have a low potential for surface disturbance.

Wilderness Characteristics: The management of 386,462 acres for wilderness characteristics would protect these lands from most new surface disturbances and would therefore protect the riparian areas from surface-disturbing activity. Under this alternative 197 miles of lotic streams and 1,919 acres of wetlands would be protected from surface disturbance. Lotic riparian and lentic wetlands currently in PFC (133.2 miles and 1,918 acres) would be maintained in their existing condition as no new surface disturbances would be allowed. Most of the riparian values affected by management for wilderness characteristics are in low potential oil and gas areas except for the Western Breaks area which has some high potential oil and gas areas. Less than 1% of the riparian habitat in the HiLine planning area is located in the high potential area of the Bears Paw South Field Development Area.

Table 4.86 shows riparian BLM surface in areas with identified wilderness characteristics.

Table 4.86
Riparian BLM Surface in Areas with Identified Wilderness Characteristics under Alternative B

	Leased Lotic Miles			*Available for Lease Lotic Miles*			*Total Lotic Miles*			*Lentic Acres*		
	FAR	*NF*	*PFC*	*FAR*	*NF*	*PFC*	*FAR*	*NF*	*PFC*	*Lease d*	*Avail-able*	*Total*
Eastern Breaks and Badlands				0.64							1	1
Prairie Grasslands	4.39		3.45	1.98		41.92	6.37		45.37	192	758	950
Sagebrush Grasslands				52.06	3.75	71.50	52.06	3.75	71.50		920	920
Island Mountain Range						8.02			8.02		4	4
Western Breaks and Badlands			7.97	1.23		0.35	1.23		8.32	39	5	44
Total	**4.39**		**11.42**	**55.92**	**3.75**	**121.77**	**60.31**	**3.75**	**133.19**	**231**	**1,688**	**1,919**

Cumulative Impacts

This alternative would have the least cumulative effects from BLM actions of any alternative as it is the most restrictive for surface-disturbing actions from fluid minerals and has the least area open to commercial wind energy development. The stipulations on the development of fluid minerals and wind energy could shift these actions to private and state lands, which could affect riparian and wetland values on those lands.

Impacts under Alternative C

The effects to riparian and wetland communities under Alternative C for surface-disturbing activities would be the same as under Alternative A, except in intensity. Under Alternative C, the projected short-term and long-term surface disturbance from BLM actions is the second lowest of all alternatives. The long-term surface disturbance under Alternative C (1,927 acres) would be approximately 10% less than under Alternative A.

Fluid Minerals: The types of effects to riparian and wetland communities under Alternative C for fluid mineral leasing are expected to be the same as described under Alternative A, except in magnitude. Effects would be slightly less in magnitude than Alternative A. Effects to riparian and wetlands would occur mostly on leased areas in the high, moderate, and low potential areas where the new stipulations would not be implemented unless the current lease expires. See Table 4.85 for details concerning miles and acres of riparian that are leased and would not be affected by the new stipulations.

Alternative C establishes a 500 foot NSO around all lotic and lentic riparian areas which would limit potential contamination of riparian areas and soils contamination by produced water from fluid minerals activity. This alternative would provide protection second only to Alternative B from surface-disturbing activities that could affect riparian systems.

The acres and miles of riparian habitat that could have major constraints (closed or NSO) put on the unleased area is the same as Alternative B. Approximately 18 miles and 1,106 acres of riparian would be expected to be protected in the high and moderate potential areas (see Table 4.85).

Lands and Realty: The effects to riparian areas would be the same as Alternative B. Under this alternative 193 acres of land with potential wetland or riparian values would be available for disposal. The BLM could potentially acquire land with equal or better riparian and wetland values when a land exchange is completed. A resource specialist would review the potential riparian and wetland values before completing any proposed exchange or sale.

OHV Use and Travel and Transportation Management: The effects of OHV use and travel management on riparian habitat would be the same as under Alternative B.

Allowing game retrieval could cause some temporary damage to riparian vegetation as vehicles crush the vegetation with tires. In most cases a full recovery of the vegetation is expected; however, if the one-time tracks are used repeatedly a "road" could be made and some long-term effects to riparian vegetation could occur. The magnitude of this effect would depend on the type of vehicle (four-wheeler, pickup truck) and soil moisture conditions (wet, dry, frozen). These effects would occur mostly in the fall in south Valley and south Phillips Counties. A total of 1,970 acres of wetlands and 116 miles of lotic riparian located in these areas could be affected.

Solid Minerals – Locatable: The effects would be the same as under Alternative B.

Special Designations: No effects to riparian values are expected under this alternative from the establishment of ACECs. Most of the riparian and wetland values would be protected by other resource stipulations applied to surface-disturbing activities.

Special Status Species: The effects would be the same as under Alternative B except for the acres protected from fluid minerals leasing. The effects to riparian and wetlands would be minor as the protection priority areas have low and very low potential for oil and gas development.

Wilderness Characteristics: The management of 228,419 acres for wilderness characteristics would protect these lands from most new surface disturbances and would therefore protect the riparian areas from surface-disturbing activity. Under this alternative 197 miles of lotic streams and 1,919 acres of wetlands would be protected from surface disturbance. Lotic riparian and lentic wetlands currently in PFC (133.2 miles and 1,918 acres) would be maintained in their existing condition as no new surface disturbances would be allowed. Most of the riparian values affected by management for wilderness characteristics are in low potential oil and gas.

Table 4.87 shows riparian BLM surface in areas with identified wilderness characteristics.

Table 4.87
Riparian BLM Surface in Areas with Identified Wilderness Characteristics under Alternative C

	Leased Lotic Miles			*Available for Lease Lotic Miles*			*Total Lotic Miles*			*Lentic Acres*		
	FAR	*NF*	*PFC*	*FAR*	*NF*	*PFC*	*FAR*	*NF*	*PFC*	*Leased*	*Avail-able*	*Total*
Eastern Breaks and Badlands				0.64			0.64				1	1
Prairie Grasslands			2.88			31.54			34.42	1	333	334
Sagebrush Grasslands				42.14	1.51	53.42	42.14	1.51	53.42		750	750
Island Mountain Range						8.02			8.02		4	4
Total			**2.88**	**42.77**	**1.51**	**92.98**	**42.77**	**1.51**	**95.86**	**1**	**1,088**	**1,089**

Cumulative Impacts

The cumulative effects to riparian and wetland values would be the same as Alternative B.

Impacts under Alternative D

The types of effects to riparian and wetland communities under Alternative D for surface-disturbing activities are expected to be the same as described under Alternative A. Under Alternative D, the projected short-term and long-term surface disturbances from BLM actions are the highest of all alternatives. The long-term surface disturbance effects under Alternative D (2,202 acres) are approximately the same as Alternative A.

Based on the acreage of disturbance and the management actions implemented to reduce disturbance to riparian and wetland communities, adverse effects to these resources under Alternative D would be the same as Alternative A.

Fluid Minerals: The effects to riparian and wetland communities would be the same as described under Alternative A, except in magnitude. Alternative D allows the most surface disturbance of any alternative. Approximately the same numbers of wells are proposed in the high, moderate and low potential areas as described in Alternative A. Approximately 7,809 acres of wetlands and 65 miles of stream riparian are in the high and moderate potential oil and gas areas and could be affected by the actions proposed in Alternative D. See Table 4.85 for a breakdown of leased and unleased acreage. The proposed lease stipulation would establish a setback of 300 feet for the protection of the lotic riparian and wetland resources which would provide the least protection of all the alternatives and less than the standard lease term of a 200 meter setback that would apply under Alternative A. Protection of riparian values by stipulations closing or establishing NSO applied by other resources would include approximately 16 miles of lotic streams and 621 acres of wetlands that are either currently leased or in the very low potential area. This measure would provide protection to 27% of the streams and 15% of the wetlands when considering the very low potential areas. Under alternative D, approximately 245 miles and 7,614 acres are closed or NSO in the very low potential area. Approximately 95% of these protected values are in the very low potential area.

Lands and Realty: This alternative identifies approximately 554 acres of wetlands and 9.7 miles of lotic stream riparian area as available for exchange or disposal under the Category 3 designation. This would be the most total acres for disposal and the most potential riparian and wetland areas available for exchange or disposal of all the alternatives. The effects to riparian and wetland values would be the same as Alternative B. The BLM could potentially acquire similar or better riparian values when a land exchange is completed. A resource specialist would review the potential riparian and wetland values before completing any proposed exchange or sale.

OHV Use and Travel and Transportation Management: Allowing game retrieval could cause some short-term, temporary effects to riparian and wetland vegetation as vehicles crush the vegetation with tires. In most cases a full recovery of the vegetation is expected; however, if the one-time tracks are used repeatedly a "road" could be made and some long-term effects to riparian vegetation could occur. The magnitude of this effect would depend on the type of vehicle (four-wheeler, pickup truck) and soil moisture conditions (wet, dry, frozen).

Under this alternative, 53,317 acres of wetland and 869 miles of lotic riparian could be affected from motorized game retrieval off road. The potential short-term effects of OHV travel from game retrieval to wetlands and riparian values would be the largest of any alternative. The potential for long-term effects to riparian systems would be very small from off-road use occurring during game retrieval.

A 1/2 mile section of Thirty Mile Creek is within 1/4 mile of the Thirty Mile OHV area (180 acres). The soils in this area are fragile and susceptible to both wind and water erosion. Runoff from this area could carry some sediment into Thirty Mile Creek. The effects of this additional sedimentation on the BLM section of this creek would be minor but may contribute to sedimentation of the irrigation systems on the private land located downstream.

Solid Minerals -- Locatable: The establishment of the Little Rocky Mountains ACEC and the associated mineral withdrawal would limit mining opportunities in the Little Rocky Mountains, making the effects of this alternative very similar to Alternative B. Under Alternative D, the potential short-term surface disturbance for solid mineral development is 235 acres, and the potential long-term surface disturbance is 300 acres (Table 4.5.)

Special Designations: Alternative D would provide additional protection to riparian areas in the form of NSO for oil and gas leasing and closure to mineral entry and sale, which would eliminate surface-disturbing activities from these sources. The Woody Island ACEC would specifically protect the wetlands acreage shown in Table 4.88 from most surface-disturbing activities.

Table 4.88
Additional Protections for Wetlands in the Woody Island ACEC under Alternatives D and E (Preferred Alternative)

	Leased (Acres)	*Unleased (Acres)*	*Total (Acres)*
Alternative D	-	2,635	2,635
Alternative E	672	2,888	3,560

Cumulative Impacts

This alternative provides the least stipulations to oil and gas development and opens up the most area to wind energy development on BLM land, yet overall the BLM contribution to cumulative effects is very small on a planning-area scale. Some effects could occur on a small scale if both a wind farm and oil and gas field were developed in an area with high concentrations of wetland or riparian values.

Impacts under Alternative E (Preferred Alternative)

Long-term surface disturbance over the 20 year life of the plan would be 2,055 BLM acres, mostly in the high and moderate potential oil and gas development areas (70%). The effects on wetland and riparian values would be the same as Alternative A.

Fluid Minerals: The types of effects to riparian and wetland communities under Alternative E for fluid mineral leasing are expected to be the same as described under Alternative A. The proposed CSU setback (300 feet) and the NSO stipulation on the lotic and lentic water bodies for the protection of riparian values would provide levels of protection greater than Alternatives A and D, but less than Alternatives B or C. The protection of riparian values that would result from applying the closed or NSO stipulations (major constraints) to fluid minerals resource would serve to uphold the current physical, chemical, and biological integrity of approximately 972 miles of lotic streams and 53,668 acres of wetlands. See Table 4.85. The NSO stipulation would provide protection to 100% of the water resources associated with the lotic and lentic riparian areas.

The CSU stipulation that provides a 300 foot setback from riparian vegetation would allow some flexibility in placing structures associated with fluid mineral development. The NSO stipulation within lentic or lotic areas (standing and moving water) does not apply to production facilities (e.g., pipelines). Some minor short-term effects could occur to the riparian system during operation and/or maintenance of facilities that cross a water body. These effects could include degradation of riparian vegetation, alteration of wildlife habitat, and decreased water quality due to increased sedimentation and potential leakage of contaminants. The probability of riparian vegetation and water resources incurring these effects is very small.

Between 4% and 5% of the lotic riparian and 23% of the lentic riparian that is unleased in the high, moderate or low potential areas would be affected by the implementation of major constraints (closed or NSO) proposed under Alternative E (see Table 4.6).

Lands and Realty: The effects to riparian and wetland values would be the same as under Alternative B. A total of 14,029 acres would be available for disposal. Of the total available, 193 acres have possible wetland or riparian values. The BLM could potentially acquire similar or better land with riparian and wetland values when a land exchange is completed. A resource specialist would review the potential riparian and wetland values before completing any proposed exchange or sale.

OHV Use and Travel and Transportation Management: The potential effects of big game retrieval would be evaluated when travel management is completed.

Areas open to OHV use have no riparian or wetlands areas associated with the designated open areas, so no effects are expected. Any new areas that could potentially be designated open during travel management planning would be evaluated for effects to the riparian and wetland resources at that time.

Solid Minerals – Locatable: The effects of solid mineral extraction on riparian and wetland resources would be similar to those described in Alternative A except in the scale of the activity. Under Alternative E, the potential short-term and long-term surface disturbance for solid mineral development is 355 acres (Table 4.5.) The existing and proposed withdrawal actions would limit any future development within the Little Rocky Mountains and Sweet Grass Hills, even though all of the high and moderate potential areas are claimed and could be developed in spite of the withdrawal action. Validation of claims would have to occur which would slow the permitting process, but mining could occur albeit at a slower pace and less acreage than under Alternative A.

Bentonite: Under this alternative the Mountain Plover ACEC would be withdrawn from mineral entry. Approximately 15.6 miles of lotic stream would be protected from mineral entry. Valid existing claims could be developed with restrictions in place. The probability of a bentonite claim being developed in a wetland or riparian zone is very small. If adequate mitigation and BMPs are applied at the time of mine development, runoff from overburden piles into wetlands and riparian areas would be small. These developments could create surface disturbances that could have large short-term effects, but after reclamation would have very few long-term effects to the riparian vegetation. The most likely chance of these effects occurring is on the bentonite mining claims located in south Valley County and south Phillips County. The probability of any of these long-term effects occurring is slight if proper reclamation standards and BMPs are applied at the time of mine development.

Special Designations: The effects of special designations on riparian and wetland resources would be very similar to Alternatives C and D except for the acres open for mineral entry and leasing which would increase slightly under Alternative E. Most areas are closed to fluid mineral leasing or have an NSO stipulation as a management action. The Woody Island ACEC, although nominated for special designation for the unique landscape and scenic characteristics, as

well as protecting the fragile watershed and wildlife species from fragmentation due to roads and other surface-disturbing activities, has a high concentration of wetlands and would benefit greatly from the NSO stipulation as a majority of the BLM land within the boundary has not been previously leased for oil and gas development (see Table 4.88).

Special Status Species: The protection priority area designations in Valley County and south Phillips County could reduce surface-disturbing activities on riparian and wetland vegetation as CSU stipulations would be applied to surface-disturbing activities. Under this alternative 608 miles of lotic riparian and 22,142 acres of wetland would be protected from most surface-disturbing activities. It is estimated that 70% of the long-term surface disturbance effects would come from fluid mineral development. A total of 95% of this disturbance would occur in the high, moderate and low potential areas of oil and gas development. The protection priority areas are mostly in very low potential areas for oil and gas development so the effects of these special designations on riparian and wetland values would be very small from oil and gas development. Lotic riparian areas and lentic wetlands currently in PFC would be maintained in their existing condition.

Wilderness Characteristics: The management of 10,714 acres for wilderness characteristics would protect these lands from most new surface disturbances and would therefore protect the riparian areas from surface-disturbing activity. Under this alternative less than one acre of wetlands would be protected from surface disturbance. Lentic wetlands currently in PFC (0.61 acres) would be maintained in their existing condition as no new surface disturbances would be allowed. Most of the riparian values affected by management for wilderness characteristics are in low potential oil and gas.

Cumulative Impacts

Oil and gas activity, solid mineral development, wind energy development and OHV use on both BLM and other lands that create soil disturbance and remove vegetation could cause increased runoff, erosion and sediment transport resulting in the degradation of riparian/wetland systems. The effects and scale of effects would be the same as under Alternative D.

Vegetation – Special Status Plants

This section describes potential impacts on special status plants from management actions of other resource programs. For the purpose of this analysis, short-term impacts to special status plants include those activities that contribute to the decline in abundance or distribution of a species within 5 years of when the activity occurs. Long-term impacts are those that impact a species beyond 5 years. For this analysis, direct impacts to special status plant species are actions resulting in damage to or loss of individual plants, fragmentation of habitat, loss of habitat quality, loss of pollinators, and loss of soil seed banks. Surface-disturbing activities, herbivory, trampling, fire, and herbicide application are considered the primary direct impacts to special status plant species. Indirect impacts are those actions that compromise the protection of special status plants, such as actions that change the habitats in a way that makes them unsuitable for future colonization.

Assumptions and Guidelines

Assumptions and guidelines used in this impact analysis include the following:

- Where resources overlap, management actions associated with protecting wildlife habitats, riparian vegetation, and cultural resources may benefit special status plant species if those management actions are for protection against disturbance of the sites.

- The total amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown, and could underestimate the potential impact of surface disturbance on special status plant populations.

- Existing provisions (e.g., presence/absence surveys conducted prior to proposed actions at appropriate times to ensure positive identification) to protect special status species are carried out and conditional monitoring is conducted (e.g., grazing and surface disturbance reclamation) to ensure special status species are not jeopardized.
- Management toward desired plant community is assumed to exceed the requirements of managing toward desired future condition.
- Establishing management actions that preclude or restrict development, including those not specifically aimed at conserving special status plant species, are assumed to benefit special status plant species where populations overlap with management action boundaries.
- Impact analyses are based on the amount of vegetation and soil disturbed, the threats identified for special status plant species in Chapter 3, and the level of stipulations placed on BLM actions that could adversely impact special status plant species because the densities and locations of these species in the planning area are not entirely known.
- Following conservation measures for all listed and sensitive species in the BLM's Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS (BLM 2007c) is anticipated to mitigate most impacts to special status plant species from weed control programs.

Allowable uses and management actions having the potential to impact special status plant species include all surface-disturbing activities, concentrated livestock and native ungulate grazing, OHV use, noxious weeds, fire management, and water-depleting activities.

As special status plant species are impacted by the alternatives, they can, in turn, impact resource uses. For example, actions designed to conserve special status plant species could limit livestock grazing, mineral development, fire management and ecology, vegetation treatments, OHV use, and control of noxious weeds. The impacts of special status plant species on other resource topics (e.g., fire management and ecology, etc.) are not anticipated to be substantial; however, they are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

Impacts from most surface-disturbing activities to special status plants would be minimal under all alternatives due to mitigation measures in place through policies such as the Montana Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a), BMPs for oil and gas activities, the 6840 manual for special status species management, and the Integrated Vegetation Management handbook (H 1740-2).

Additionally, protections and management prescriptions for riparian areas would mitigate impacts to special status plant species in the planning area since four known special status plant species occur in riparian areas.

Air Resources: Impacts would be minimal in all alternatives.

Fire Management and Ecology: Wildfires would affect special status plants and plant communities by temporarily removing aboveground vegetation, changing plant community composition, inhibiting plant succession, and removing woody vegetation and plant litter. If special status plants are dependent on a specific seral stage or plant association, a wildfire could upset the ecological balance that supports a sensitive plant's habitat or plant community. Wildfire could also enhance the habitat for special status plants and serve as a catalyst for their reestablishment and proliferation.

Fluid Minerals and Solid Minerals: Impacts from minerals management to special status plant species would be negligible because of required mitigation measures. Any proposed developments are reviewed and required site inventories are completed prior to permitting, and new locations of special status plant species and communities which might be found would be subject to mitigation measures to ensure continued existence of the plant site. Additionally, stipulations for riparian/wetland hydrology benefit most of the special status plant species found in the planning area. Stipulations for the Sweet Grass Hills ACEC benefit a special status plant species thought to be in the area.

Forests and Woodlands: None of the known special status plant species in the planning area occur in forests or wooded areas. There is no impact from the actions for this resource in any alternative.

Recreation: Recreational activities would result in localized impacts, such as vegetation disturbance, trampling, and removal due to camping and off-road travel activities. Recreational activities that require a permit would not be authorized in known locations of special status plant species if there were a potential to adversely impact the plants. Activities that do not require a permit such as camping outside of designated campgrounds, could cause minor impacts on sensitive plants and their habitats.

Lands and Realty: No land tenure adjustments are proposed in any of the areas with known special status plants. Land tenure adjustments will not impact special status plant species in all alternatives.

Livestock Grazing: Grazing levels are the same across alternatives which make impacts to special status plants from livestock grazing the same across all alternatives. Such impacts would be minimal due to mitigation measures in place through policies such as the Montana Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a).

Noxious Weeds and Other Non-Native Invasive Species: Special status plant species and communities could be adversely impacted by the spread and proliferation of weeds because of their limited size and distribution. Weed management would help to control weed populations and thereby improve the health of native plant communities. Stipulations are in place to protect special status plants from undesirable impacts from noxious weed treatments.

OHV Use and Travel and Transportation Management: OHV use would result in localized impacts on vegetation, such as reduction of vegetation cover and density and community composition changes. The generation of dust from vehicular travel on roads next to special status plant species could affect plant photosynthesis and population survival because of the small number of individual plants in some areas. Reclamation would replace abandoned roads with herbaceous and shrubby vegetation and the impacts stated above would no longer occur.

Soil Resources: Actions to protect soil surface, prevent erosion and mitigate surface disturbance across all alternatives would benefit special status plant species.

Special Designations: No known special status plants occur in any of the special designation areas.

Vegetation – Rangeland and Riparian/Wetland: Vegetation management actions under all alternatives work to meet the vegetation objectives. Meeting these objectives also meet the objective(s) for special status plants.

Water Resources: Actions identified to maintain or improve watershed, wetland, and riparian functions benefit five special status plant species found in the planning area. Not allowing new permanent facilities in 100-year floodplains is especially beneficial.

Cumulative Impacts

Cumulative impacts from actions developed for the alternatives are unlikely to be adverse to the continued existence of special status plants in the planning area. Mitigation measures required by policy and directive as well as required pre-disturbance inventories make it unlikely that there would be an accumulation of adverse impacts. Special status plants occupy a very small portion of the planning area (approximately 4,260 acres) and it is unlikely that extensive additional occupied acreage will be discovered during the life of this plan.

Visual Resources

An effect to the visual quality of the landscape occurs when a management activity creates noticeable surface disturbance that contrasts with the form, line, color, or texture in the landscape. Allowable uses and management actions that could affect visual resources include surface development and associated infrastructures such as vegetation management, range improvement projects, or more intensive activities such as natural gas development. Most natural

gas development is expected in the high and moderate reasonable foreseeable development areas of Blaine and Phillips Counties.

Small-scale, dispersed development (range improvements, etc.) have a lesser impact due to the ability to fit these facilities into natural landscapes. Visual resources in areas with a high potential for natural gas development are likely to be more heavily impacted through the long-term. In addition, actions that occur on lands not administered by the BLM (regardless of ownership) can affect the visual resources of the adjacent BLM lands.

Assumptions and Guidelines

Assumptions and guidelines used in this impact analysis include the following:

- Future development and other land use activities described under each alternative are compared to recommended VRM classes and the existing visual conditions to determine potential effects. For example, because Class III and Class IV lands allow for moderate to high modifications to the landscape, the more acreage of Class III and Class IV designated lands within an alternative, coupled with projected acres of surface disturbance, will estimate the amount of moderate to high landscape modifications and visual resource effects allowed by alternative.
- Resource protective measures can protect the existing visual resources and scenic quality of the landscape.
- VRM objectives will be applied to all management actions and appropriate mitigation measures will be developed to comply with established visual resource class objectives.
- Short-term effects on visual quality may occur for long-term resource benefit.

Table 4.89 depicts acres by VRM class for each alternative.

Table 4.89
Visual Resource Management Classes by Alternative (Acres)

VRM Class	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
I	0	90,032	74,506	74,506	74,506
II	417,334	977,396	914,194	127,439	841,087
III	58,513	498,298	521,322	584,113	521,868
IV	1,961,591	871,712	927,413	1,651,380	999,977

Impacts Common to All Alternatives

The management goals for visual resources, which would be to manage BLM land and activities consistent with VRM objectives, could be met for all alternatives. Potential effects could occur under all alternatives, on a site-specific basis, from activities such as proposed oil and natural gas development, forest and woodland treatments, lands and realty actions, mining, recreation, OHV use, grazing and fire suppression. However, by following BMPs and mitigation for specific projects, the degree or level of effects to visual resources would be minimized.

Livestock Grazing: Approximately 670 to 800 acres of BLM land are projected to be disturbed in the short term by range improvements actions. In the long term, 157 to 210 acres are projected to be disturbed with implementation of reclamation activities. These surface-disturbing acres are primarily associated with rangeland improvement projects such as constructing fences, wells, and small reservoirs throughout the planning area. The actual construction of these range improvements would increase soil and vegetation disturbance and possibly fragment the landscape by constructing barriers (fences) to the recreating public. New roads may be created to access the range improvements during construction. Range improvements could affect visual resources through the addition of forms, lines, colors, and textures that would not be found in the surrounding landscape, which may affect the scenic quality and degrade the recreational

opportunities and experiences where rangeland improvements are constructed. The effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Recreation: The sighting and design of recreation developments, facilities, and projects could affect visual resources through the introduction of forms, lines, colors, and textures that contrast with the characteristic landscape. However, these developments, facilities and projects would be planned to minimize any potential contrasts and to meet the VRM objectives of the area. Dispersed recreation activities could strengthen existing line, form, and color contrast through the use of existing roads, trails, and campsites. Closure and/or rehabilitation of undeveloped sites would restore the visual resources of specific sites.

Solid Minerals – Locatable: Approximately 115 to 150 acres of BLM land are projected to be disturbed in the short term by locatable solid mineral actions associated with bentonite. No long-term acres are projected to be disturbed because of implementation of reclamation activities. These surface-disturbing actions are associated with extracting bentonite and would leave small to moderate open pits on the landscape, with new roads to access these pits. The only known specific locations for bentonite extractions are in south Phillips and south Valley Counties. Where these pits and other disturbances occur they would affect visual resources by creating changes in the form, line, color and texture of the landscape. These visual effects could affect scenic quality and may degrade recreational opportunities and experiences, primarily during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, and viewing wildlife nearby these surface-disturbing activities. After mineral extraction and reclamation of these pits are complete the described effect to the recreating publics would be reduced.

Approximately 210 to 240 acres of BLM land are projected to be disturbed in the short term by locatable solid mineral actions associated with hardrock mining. In the long term, 185 acres to 2,345 acres are projected to be disturbed with the potential for mining in the Little Rocky Mountains under Alternative A. These surface-disturbing actions are associated with extracting hardrock minerals and would leave open pits on the landscape, with new roads to access these pits. Where these pits and other disturbances occur they would affect visual resources by creating changes in the form, line, color and texture of the landscape. These visual effects could affect scenic quality and may degrade recreational opportunities and experiences, primarily during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, and viewing wildlife nearby these surface-disturbing activities. After mineral extraction and reclamation of these pits are complete the described effect to the recreating publics would be reduced.

Solid Minerals – Salable: Approximately 80 acres of BLM land are projected to be disturbed in the short term and long-term by salable solid mineral actions. These surface-disturbing acres are primarily associated with excavating and processing gravel from small open pits throughout the planning area. In addition to extracting and processing gravel in these pits new roads would be created to access them. Although the pits would be smaller than those described for locatable minerals, the effects would be the same on visual resources but to a lesser degree.

Vegetation – Rangeland: Approximately 10,000 acres of BLM land are projected to be disturbed in the short term by mechanical treatment actions (e.g., range improvements). No long-term acres are projected to be disturbed because of implementation of reclamation activities. These surface-disturbing acres are associated with the vegetation treatment action of chisel plowing (10,000 acres) throughout the planning area. The actual vegetation treatment of plowing the ground to remove undesirable vegetation would be temporary and increase soil and vegetation disturbance only until the more desirable vegetation regrows. Chisel plowing could affect visual resources by temporarily changing the form, line, color, and texture of the landscape, which may affect the scenic quality and degrade recreational opportunities and experiences. The effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Cumulative Impacts

It is anticipated that the Keystone X/L Pipeline right-of-way will be issued to construct a 36 inch oil pipeline in the next 3 years on BLM Land in northeast Phillips County and through Valley County. Approximately 1,186 acres of BLM land are projected to be disturbed in the short term by this action. These surface-disturbing actions are associated with excavating and burying the 36 inch pipeline which would create new roads to access the pipeline construction and cause soil erosion and vegetation loss. Construction of the pipeline would affect visual resources by creating changes in the

form, line, color and texture of the landscape which may affect the scenic quality and degrade recreational opportunities and the quality of the recreational experiences in and around the pipeline construction area. These effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, wildlife viewing, hiking, and horseback riding.

The degradation of visual resources and quality of recreational experiences on BLM lands associated with the installation of the Keystone X/L pipeline would affect the eligibility of those lands for special designations.

Impacts under Alternative A (Current Management)

Under Alternative A, approximately 35,541 acres of BLM land are expected to be disturbed by BLM actions in the short term and 2,581 acres in the long term. These management actions could affect visual resources by creating changes in the form, line, color and texture of the landscape. The effects to visual resources would be greatest over time in areas where large-scale development occurs.

The effects to visual resources from surface-disturbing activities under Alternative A, while minor, are anticipated to be similar in type to all other alternatives; however, the intensity of effects varies by alternative. Alternative A projects the second highest acreage of surface disturbance among the alternatives.

Fire Management and Ecology: Approximately 6,860 acres of BLM land are projected to be disturbed in the short term by prescribed fire actions and approximately 4,740 acres by mechanical treatment actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation.

Prescribed fire actions would burn vegetation to improve the health of the land but would leave a blackened landscape, increase soil erosion, produce smoke, and add many temporary two-track suppression roads throughout the treated area. Although this land treatment would have a short-term effect on visual resources by creating changes in the form, line, color and texture of the burned landscape, the long-term benefits from improving the health of land would far outweigh the smaller negative effects from the initial prescribed burn. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat, which may improve the scenic quality and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Surface disturbance from mechanical treatments includes the action of thinning dense stands of timber trees, and would have the same effects on visual resources as prescribed fire except the short-term period of time would be a little longer due to the time needed for the thinned trees to dry before underburning. Prescribed fire could be used throughout the planning area but more would occur in Phillips and Valley Counties. Mechanical thinning would occur primarily in timbered areas of the Little Rocky Mountains. Prescribed fire would occur during spring, summer, and fall when fuels are within acceptable burning standards.

Fluid Minerals: Approximately 9,564 acres of BLM land are projected to be disturbed in the short term by oil and natural gas development actions and 2,422 acres in the long term. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads and visual intrusions from natural gas meter houses and compressor stations, which would affect visual resources by creating changes in the form, line, color and texture of the landscape. Existing laws, regulations, and policies would minimize the effects from oil and gas development activities to visual resources through mitigation. Effects could also be reduced by utilizing VRM class objectives to provide the basis for allowable changes in form, line, color, and texture. The effects to visual resources would mostly occur within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties and would continue throughout the life of the plan or term of the leased wells.

Approximately 102,298 acres would be closed to fluid mineral leasing, and 282,062 acres would be open subject to NSO. This would have the effect of protecting the existing visual resources on those acres from natural gas development surface-disturbing actions. The protective measures would have a beneficial effect on scenic quality for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Forests and Woodlands: Approximately 4,740 acres of BLM land are projected to be disturbed in the short term by silviculture treatments, fuels management, and forest product harvesting actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation. Short-term surface disturbance from harvesting timber and underburning the slash and vegetation left after the harvest would produce smoke, remove vegetation, increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect on visual resources by creating changes in the form, line, color and texture of the landscape, the long-term benefits from improving the health of land would far outweigh the smaller negative effects from harvesting the timber and underburning. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Lands and Realty: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. In the long term, 360 acres are projected to be disturbed due to reclamation activities. Rights-of-way, leases and permits would be granted for surface-disturbing actions such as utility lines, communication sites, pipelines, and oil and natural gas development. These surface-disturbing actions associated with rights-of-way, leases and permits would create new roads, visual intrusions from powerlines and communication sites, and affect the visual resources by creating changes in the form, line, color and texture of the landscape.

OHV Use and Travel and Transportation Management: Alternative A continues current OHV use designations, including 84 acres open to OHV use within the Fresno OHV area north of Havre and 40 acres open to OHV use just north of the town of Glasgow; designates 2,359,287 acres as limited to existing roads, primitive roads and trails; and designates 7,429 acres in the Sweet Grass Hills ACEC as closed to OHV use. OHV use would be limited to designated roads, primitive roads and trails (ways) in WSAs (74,428 acres).

OHV activities can affect the visual resources if these uses cause vegetation loss, soil exposure, or erosion. Visual resources could be most affected in those areas designated as open (124 acres) because cross-country travel can add different colored, linear forms that contrast with the forms and colors of the characteristic landscape. OHV use on designated or existing roads, primitive roads and trails could increase color contrasts between the travel surface and the surrounding vegetation through continued vegetation loss and soil erosion.

Visual Resource Management: Under current management, 17% of the planning area would continue to be managed as VRM Class II (417,334 acres), 2% would be managed as VRM Class III (58,513 acres), and 81% of the planning area would be managed as VRM Class IV area (1,961,591 acres). Under current management, there are no VRM Class I areas within the planning area.

Maintaining the existing VRM classes would allow a variety of management actions that could affect existing visual resources, depending on the VRM class. Alternative A has the second largest acreage managed under the Class III and IV objectives and the second highest projected surface-disturbing acres of all the alternatives.

Cumulative Impacts

Past and present surface-disturbing actions that affect visual resources include mineral exploration and development, lands and realty rights-of-way, range improvements, OHV and recreation use, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within high wind energy potential areas, one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres, with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres, with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with development of the two wind energy proposals would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines, which would affect the visual resources by adding vertical lines and linear and complex forms to the landscape in areas of high wind energy potential and available for development of wind farms (329,652 acres).

Resource protective measures that eliminate new surface-disturbing actions also protect the existing visual resources and scenic quality of the landscape. Alternative A would continue to allow for the highest acreage of projected surface-disturbing actions of all the alternatives and the least amount of acres of protective resource measures. Because these and other reasonably foreseeable future actions in the planning area from federal, state, private and other lands within and adjacent to the planning area would have adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape, the total cumulative impact to visual resources would be the greatest of all the alternatives.

Impacts under Alternative B

Under Alternative B, approximately 62,837 acres of BLM land are expected to be disturbed in the short term by BLM actions and 2,576 acres in the long term. These management actions could affect visual resources by creating changes in the form, line, color and texture of the landscape. The effects to visual resources would be greatest over time in areas where large-scale development occurs.

Potential effects to visual resources from Alternative B would be less than any other alternative, because it projects the lowest acreage of surface disturbance among the alternatives.

Fire Management and Ecology: Approximately 26,660 acres of BLM land are projected to be disturbed in the short term by prescribed fire actions and approximately 7,820 acres by mechanical treatment actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation.

Prescribed fire actions would burn vegetation to improve the health of the land but would leave a blackened landscape, increase soil erosion, produce smoke, and add many temporary two-track suppression roads throughout the treated area. Although this land treatment would have a short-term effect on visual resources by creating changes in the form, line, color and texture of the burned landscape, the long-term benefits from improving the health of land would far outweigh the smaller negative effects from the initial prescribed burn. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat, which may improve the scenic quality and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Surface disturbance from mechanical treatments includes the action of thinning dense stands of timber trees, and would have the same effects on visual resources as prescribed fire except the short-term period of time would be a little longer due to the time needed for the thinned trees to dry before underburning. Prescribed fire could be used throughout the planning area but more would occur in Phillips and Valley Counties. Mechanical thinning would occur primarily in timbered areas of the Little Rocky Mountains. Prescribed fire would occur during spring, summer and fall when fuels are within acceptable burning standards.

Fluid Minerals: Approximately 4,440 acres of BLM land are projected to be disturbed in the short term by oil and natural gas development actions and 1,544 acres in the long term. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads and visual intrusions from natural gas sheds and compressor stations, which would affect visual resources by creating changes in the form, line, color and texture of the landscape. Existing laws, regulations, and policies would minimize the effects from oil and gas development activities to visual resources through mitigation. Effects could also be reduced by utilizing VRM class objectives to provide the basis for allowable changes in form, line, color, and texture. The effects to visual resources would mostly occur within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties and would continue throughout the life of the plan or term of the leased wells.

Approximately 3,173,637 acres would be closed to fluid mineral leasing, and 258,560 acres would be open subject to NSO. This would have the effect of protecting the existing visual resources on those acres from natural gas development surface-disturbing actions. These protective measures would have a beneficial effect on scenic quality for dispersed

recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking, horseback riding and viewing wildlife.

Forests and Woodlands: Approximately 7,820 acres of BLM land are projected to be disturbed in the short term by silviculture treatments, fuels management, and forest product harvesting actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation. Short-term surface disturbance from harvesting timber and underburning the slash and vegetation left after the harvest would produce smoke, remove vegetation, increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect on visual resources by creating changes in the form, line, color and texture of the landscape, the long-term benefits from improving the health of land would far outweigh the smaller negative effects from harvesting the timber and under burning. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Lands and Realty: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. In the long term, 360 acres are projected to be disturbed because of implementation of reclamation activities. Rights-of-way, leases and permits would be granted for surface-disturbing actions such as utility lines, communication sites, pipelines, and oil and natural gas development. These surface-disturbing actions associated with rights-of-way, leases and permits would create new roads, visual intrusions from powerlines and communication sites, and would affect the visual resources by creating changes in the form, line, color and texture of the landscape.

OHV Use and Travel and Transportation Management: Alternative B has no "open" OHV use areas designated; designates 2,359,287 acres as limited to existing roads, primitive roads and trails; and designates 7,513 acres (Fresno OHV area and Sweet Grass Hills ACEC) as closed to OHV use. OHV use would be limited to designated primitive routes in WSAs (74,428 acres).

OHV activities can affect the visual resources if these uses cause vegetation loss, soil exposure, or erosion. OHV use on designated or existing roads, primitive roads and trails could increase color contrasts between the travel surface and the surrounding vegetation through continued vegetation loss and soil erosion.

Visual Resource Management: Under Alternative B, 4% of the planning area would be managed as VRM Class I (90,032 acres), 40% as VRM Class II (977,396 acres), 20% as VRM Class III (498,298 acres), and 36% as VRM Class IV (871,712 acres). The Bitter Creek and Burnt Lodge WSAs, along with the Sweet Grass Hills and Kevin Rim ACECs would be managed as VRM Class I areas (90,032 acres).

Alternative B proposes the greatest acreage in Class I and II areas and the most acreage of resource protective measures (no surface disturbance) of any alternative. In addition, Alternative B proposes the least acreage of Class III and IV areas and lowest surface-disturbing acres of all the alternatives. Accordingly, it affords more protection to visual resources and results in fewer adverse effects to visual resources than any other alternative.

Wilderness Characteristics: Approximately 386,462 acres would be managed to preserve and enhance the wilderness characteristics of those BLM lands. These areas would be closed to oil and gas leasing, become exclusion areas for wind energy rights-of-ways, and become avoidance areas for other rights-of-ways. Of these lands, 4,118 acres would be managed as VRM Class I meaning the level of change to the characteristic landscape should be very low and must not attract attention, and 382,347 acres would be managed as VRM Class II meaning any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Alternative B proposes the greatest number of acres protecting wilderness characteristics which, in turn, would protect the visual resources of those lands.

Wildlife: Approximately 1,500,000 acres would be closed to not only oil and gas leasing, but also to locatable, leasable and salable minerals, renewable energy developments, and new rights-of-way for transmission lines for the purpose of protecting sage-grouse and grassland bird habitat areas in Phillips and Valley Counties. The acres closed would eliminate surface-disturbing actions and infrastructure developments (roads, wind turbines, powerlines, etc.) from the above activities. Eliminating these surface-disturbing actions maintains the existing condition of the soil and vegetation resources and protects visual resources. These protective measures would have a beneficial effect on scenic quality for

dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Cumulative Impacts

Past and present surface-disturbing actions that affect visual resources include mineral exploration and development, lands and realty rights-of-ways, range improvements, OHV and recreation use, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within high wind energy potential areas, one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with development of the two wind farms would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines, which would affect the visual resources by adding vertical lines and linear and complex forms to the landscape in areas of high wind energy potential and available (35,165 acres) for development of wind farms.

Resource protective measures that eliminate new surface-disturbing actions also protect the existing visual resources and scenic quality of the landscape. Alternative B would allow for the lowest acreage of projected surface-disturbing actions of all the alternatives and the greatest amount of acres of protective resource measures. Because these and other reasonably foreseeable future actions in the planning area from federal, state, private and other lands within and adjacent to the planning area will have adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape the total cumulative impact to visual resources would be the lowest of all the alternatives.

Impacts under Alternative C

Under Alternative C, approximately 63,404 acres of BLM land are expected to be disturbed in the short term by BLM actions and 2,734 acres in the long term. These management actions could affect visual resources by creating changes in the form, line, color and texture of the landscape. The effects to visual resources would be greatest over time in areas where large-scale development occurs.

Potential effects to visual resources from surface-disturbing activities under Alternative C are less than any other alternative except those identified under Alternative B.

Fire Management and Ecology: Effects would be the same as under Alternative B.

Fluid Minerals: Approximately 8,547 acres of BLM land are projected to be disturbed in the short term by oil and natural gas development actions and 2,238 acres in the long term. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads and visual intrusions from natural gas sheds and compressor stations, which would affect visual resources by creating changes in the form, line, color and texture of the landscape. Existing laws, regulations, and policies would minimize the effects from oil and gas development activities to visual resources through mitigation. Effects could also be reduced by utilizing VRM class objectives to provide the basis for allowable changes in form, line, color, and texture. The effects to visual resources would mostly occur within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties and would continue throughout the life of the plan or term of the leased wells.

Approximately 218,586 acres would be closed to fluid mineral leasing, and 1,291,160 acres would be open subject to NSO. This would have the effect of protecting the existing visual resources on those acres from natural gas development

surface-disturbing actions. These protective measures would have a beneficial effect on scenic quality for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Forests and Woodlands: Effects would be the same as under Alternative B.

Lands and Realty: Effects would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: This alternative is the same as Alternative B except that a big game hunting retrieval area would be established in southern Phillips and Valley Counties.

Motorized game retrieval off road would be allowed during the big game hunting season on BLM lands east of Highway 191 and south of the Dry Fork Road in south Phillips County and south of the Willow Creek Road in south Valley County except in the Burnt Lodge WSA (see Chapter 2, Figure 2.2 for the location of the game retrieval area, 387,118 acres). Game retrieval would occur between the hours of 10:00 a.m. and 2:00 p.m. and in a minimum time frame utilizing the shortest route, and avoiding resource damage.

OHV activities can affect the visual resources if these uses cause vegetation loss, soil exposure, or erosion. OHV use on designated or existing roads, primitive roads and trails could increase color contrasts between the travel surface and the surrounding vegetation through continued vegetation loss and soil erosion. Visual resources could be affected in the game retrieval area (387,118 acres) because cross-country travel can add different colored, linear forms that contrast with the forms and colors of the characteristic landscape.

Visual Resource Management: Alternative C would manage visual resources similarly to Alternative B with 3% of the planning area managed as VRM Class I (74,506 acres), 38% as VRM Class II (914,194 acres), 21% as VRM Class III (521,322 acres), and 38% as Class IV (927,413 acres). The Bitter Creek and Burnt Lodge WSAs would be managed as VRM Class I areas (74,506 acres).

Under Alternative C, the planning area has less acreage of resource protective measures than Alternative B, which allows for more surface development and visual resource effects compared to Alternative B, but less than Alternative A or D. This alternative protects scenic quality better than Alternative A and D, and less than Alternative B.

Wilderness Characteristics: Under Alternative C approximately 228,419 acres would be managed to preserve and enhance wilderness characteristics. Of these lands, 4,118 acres (area 1) would be managed as VRM Class I and 224,301 acres (areas 20B, 49C, 54, 55, 62, 90, 91A, 91B, 93, 49B and 53) would be managed as VRM Class II. Under VRM Class I, the level of change to the characteristic landscape should be very low and must not attract attention. Under Class II, any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Under Alternative C, fewer acres would be managed for wilderness characteristics than Alternative B. Managing these lands for resources other than wilderness characteristics means that some areas would receive a VRM III or IV classification which allows for more noticeable impacts to the characteristic landscape.

Wildlife: Approximately 820,000 acres would be closed to not only oil and gas development, but also to locatable, leasable and salable minerals, renewable energy developments, and new rights-of-way for transmission lines for the purpose of protecting sage-grouse habitat areas in south Phillips and south Valley Counties. The acres closed would eliminate surface-disturbing actions and infrastructure developments (roads, wind turbines, powerlines, etc.) from the above activities. Eliminating these surface-disturbing actions maintains the existing condition of the soil and vegetation resources and protects visual resources. These protective measures would have a beneficial effect on scenic quality for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Cumulative Impacts

Past and present surface-disturbing actions that affect visual resources include mineral exploration and development, lands and realty rights-of-way, range improvements, OHV and recreation use, and vegetation treatments for fire

management and forest health. In general, these actions have all had cumulatively adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape. Recently there has been increased interest in developing wind energy within the planning area.

In an effort to analyze the resource effects of wind energy development in the planning area, the BLM analyzed the development of two wind energy proposals within high wind energy potential areas: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with development of the two wind farms would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines which would affect the visual resources by adding vertical lines and linear and complex forms to the landscape in areas of high wind energy potential and available (178,622 acres) for development of wind farms.

Resource protective measures that eliminate new surface-disturbing actions also protect the existing visual resources and scenic quality of the landscape. Alternative C would allow for the second lowest acreage of projected surface-disturbing actions of all the alternatives and a similar but somewhat lesser amount of acres of protective resource measures than in Alternative B. Because these and other reasonably foreseeable future actions in the planning area from federal, state, private and other lands, within and adjacent to the planning area, will have adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape the total cumulative impact to visual resources would be the second lowest of all the alternatives.

Impacts under Alternative D

Under Alternative D, approximately 63,945 acres of BLM land are expected to be disturbed in the short term by BLM actions and 2,979 acres in the long term. These management actions could affect visual resources by creating changes in the form, line, color and texture of the landscape. The effects to visual resources would be greatest over time in areas where large-scale development occurs.

Potential effects to visual resources from Alternative D would be the greatest of any other alternative, because it projects the highest acreage of surface disturbance among the alternatives.

Fire Management and Ecology: Effects would be the same as under Alternative B.

Fluid Minerals: Approximately 9,663 acres of BLM land are projected to be disturbed in the short term by oil and natural gas development actions and 2,436 acres in the long term. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads and visual intrusions from natural gas sheds and compressor stations, which would affect visual resources by creating changes in the form, line, color and texture of the landscape. Existing laws, regulations, and policies would minimize the effects from oil and gas development activities to visual resources through mitigation. Effects could also be reduced by utilizing VRM class objectives to provide the basis for allowable changes in form, line, color, and texture. The effects to visual resources would mostly occur within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties and would continue throughout the life of the plan or term of the leased wells.

Approximately 74,674 acres would be closed to fluid mineral leasing, and 357,456 acres would be open subject to NSO. This would have the effect of protecting the existing visual resources on those acres from natural gas development surface-disturbing actions. These protective measures would have a beneficial effect on scenic quality for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Forests and Woodlands: Effects would be the same as under Alternative B.

Lands and Realty: Effects would be the same as under Alternative B.

OHV Use and Travel and Transportation Management: Alternative D has three areas designated as open to off-road vehicle use: the parcel north of Glasgow (40 acres), Fresno OHV area north of Havre (84 acres), and the Thirty Mile OHV area northwest of the town of Harlem (181 acres); designates 2,366,535 acres as limited to existing roads, primitive roads and trails; and does not designate any acres as closed to OHV use. OHV use would be limited to designated roads, primitive roads and trails (ways) in WSAs (74,428 acres).

Motorized game retrieval off road would be allowed during the big game hunting season on all BLM lands in the planning area except in the following areas:

- Bitter Creek WSA (60,701 acres) and Burnt Lodge WSA (13,727 acres)
- Big Bend of the Milk River ACEC (1,979 acres)
- Kevin Rim ACEC (4,557 acres)
- Frenchman ACEC (63,482 acres)
- Malta Geological ACEC (6,153 acres)

Game retrieval would occur between the hours of 10:00 a.m. and 2:00 p.m. and in a minimum timeframe utilizing the shortest route, and avoiding resource damage.

OHV activities can affect the visual resources if these uses cause vegetation loss, soil exposure, or erosion. Visual resources could be most affected in those areas designated as open (305 acres) because cross-country travel can add different colored, linear forms that contrast with the forms and colors of the characteristic landscape. OHV use on designated or existing roads, primitive roads and trails could increase color contrasts between the travel surface and the surrounding vegetation through continued vegetation loss and soil erosion. Visual resources could be affected in the game retrieval area because cross-country travel can add different colored, linear forms that contrast with the forms and colors of the characteristic landscape. Effects from game retrieval in almost the entire planning area (2,290,669 acres) would be much greater than in Alternative C where the acreage for game retrieval is much smaller (387,118 acres).

Visual Resource Management: Under Alternative D, 3% of planning area would be managed as VRM Class I (74,506 acres), 5% as VRM Class II (127,439 acres), 24% as VRM Class III (584,113 acres), and 68% as VRM Class IV (1,651,380 acres). The Bitter Creek and Burnt Lodge WSAs would be managed as VRM Class I areas (74,506 acres).

A variety of management actions would be allowed that could affect existing visual resources, depending on the VRM class. Not only does Alternative D have the largest acreage managed under the Class III and IV objectives, but also has the highest projected surface-disturbing acres of all the alternatives.

Cumulative Impacts

Past and present surface-disturbing actions that affect visual resources include mineral exploration and development, lands and realty rights-of-way, range improvements, OHV and recreation use, and vegetation treatments for fire management and forest health. In general, these actions have all had cumulatively adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within high wind energy potential areas: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with development of the two wind farms include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and

powerlines which would affect the visual resources by adding vertical lines and linear and complex forms to the landscape in areas of high wind energy potential and available (286,488 acres) for development of wind farms.

Resource protective measures that eliminate new surface-disturbing actions would also protect the existing visual resources and scenic quality of the landscape. Alternative D would allow for the greatest acreage of projected surface-disturbing actions of all the alternatives and the lowest amount of acres of protective resource measures. Because these and other reasonably foreseeable future actions in the planning area from federal, state, private and other lands, within and adjacent to the planning area, will have adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape, the total cumulative impact to visual resources would be the greatest of all the alternatives.

Impacts under Alternative E (Preferred Alternative)

Potential effects to visual resources from surface-disturbing activities under Alternative E are very similar to Alternative C.

Fire Management and Ecology: Approximately 26,660 acres of BLM land are projected to be disturbed in the short term by management ignited prescribed fire actions and approximately 7,820 acres by mechanical treatment actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation.

Surface disturbance from prescribed fire actions would burn vegetation to improve the health of the land but would leave a blackened landscape, increase soil erosion, produce smoke, and add many temporary two-track suppression roads throughout the treated area. Although this land treatment would have a short-term effect on visual resources by creating changes in the form, line, color and texture of the burned landscape, the long-term benefits from improving the health of land would far outweigh the smaller negative effects from the initial prescribed burn. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat, which may improve the scenic quality and should increase the recreational opportunities for wildlife viewing, hiking and hunting.

Surface disturbance from mechanical treatments includes the action of thinning dense stands of timber trees, and would have the same effects on visual resources as prescribed fire except the short-term period of time would be a little longer due to the time needed for the thinned trees to dry before under burning. Prescribed fire could be used throughout the planning area but more would occur in Phillips and Valley Counties. Mechanical thinning would occur primarily in timbered areas of the Little Rocky Mountains. Prescribed fire will occur during spring, summer and fall when fuels are within acceptable burning standards.

Fluid Minerals: Approximately 9,068 acres of BLM land are projected to be disturbed in the short term by oil and natural gas development actions and 2,337 acres in the long term. Surface-disturbing actions associated with development of new oil and gas wells would include the creation of new roads and visual intrusions from natural gas sheds and compressor stations, which would affect visual resources by creating changes in the form, line, color and texture of the landscape. Existing laws, regulations, and policies would minimize the effects from oil and gas development activities to visual resources through mitigation. Effects could also be reduced by utilizing VRM class objectives to provide the basis for allowable changes in form, line, color, and texture. The effects to visual resources would mostly occur within the high and moderate potential areas for oil and gas development in Blaine, Hill, and Phillips Counties and would continue throughout the life of the plan or term of the leased wells.

Approximately 152,702 acres would be closed to fluid mineral leasing, and 1,711,378 acres would be open subject to NSO. This would have the effect of protecting the existing visual resources on those acres from natural gas development surface-disturbing actions. These protective measures would have a beneficial effect on scenic quality for dispersed recreational opportunities during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, hiking, horseback riding, and viewing wildlife.

Forests and Woodlands: Approximately 7,820 acres of BLM land are projected to be disturbed in the short term by silviculture treatments, fuels management, and forest product harvesting actions. No long-term acres are projected to be disturbed because of reclamation activities and regrowth of vegetation. Short-term surface disturbance from harvesting timber and underburning the slash and vegetation left after the harvest would produce smoke, remove vegetation,

increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect on visual resources by creating changes in the form, line, color and texture of the landscape, the long-term benefits from improving the health of land would far outweigh the smaller negative effects from harvesting the timber and underburning. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat, which may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking, and hunting.

Lands and Realty: Approximately 1,421 acres of BLM land are projected to be disturbed in the short term by right-of-way authorizations. In the long term, 360 acres are projected to be disturbed because of implementation of reclamation activities. Rights-of-way, leases and permits would be granted for surface-disturbing actions such as utility lines, communication sites, pipelines, and oil and natural gas development. Surface-disturbing actions associated with rights-of-way, leases and permits would include the creation of new roads, visual intrusions from powerlines and communications sites, and would affect the visual resources by creating changes in the form, line, color and texture of the landscape.

OHV Use and Travel and Transportation Management: The effects would be the same as under Alternative C except that no game retrieval would be allowed, but options for big game retrieval could be considered during subsequent site-specific travel management planning.

Visual Resource Management: Under Alternative E, 3% of the planning area would be managed as VRM Class I (74,506 acres), 35% as VRM Class II (841,087 acres), 21% as VRM Class III (521,868 acres), and 41% as VRM Class IV (999,977 acres). The Bitter Creek and Burnt Lodge WSAs would be managed as VRM Class I areas (74,506 acres).

Alternative E has the second highest combined acreage in VRM Classes I and II of all the alternatives, which would preserve or retain the existing character of the landscape. The acres in VRM Class IV are the least of any alternative, yet still make lands available for projects which could modify the existing character of the landscape.

Wilderness Characteristics: Under Alternative E, approximately 10,714 acres (Areas 49B and 53) would be managed to preserve and enhance their wilderness characteristics. These lands would be managed as VRM Class II meaning any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Under this alternative, fewer acres would be managed for wilderness characteristics than Alternatives B and C. Most of the areas in the district which currently meet the wilderness characteristics criterion will be managed for other resources such as migratory birds, soils and priority protection areas which will help to maintain or enhance those wilderness characteristics. However, managing lands for other resources means that some of these areas may receive a VRM III or IV classification which allows for more noticeable impacts to the characteristic landscape. Over time, the cumulative impacts to visual resources on these lands will cause them to no longer meet the wilderness characteristics criterion.

Cumulative Impacts

Cumulative effects would be the same as under Alternative C except for wind energy.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy proposals within high wind energy potential areas, one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with development of the two wind farms would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from construction of wind turbines and powerlines which would affect the visual resources by adding vertical lines and linear and complex forms to the landscape in areas of high wind energy potential and available (173,127 acres) for development of wind farms.

Water Resources

Assumptions and Guidelines

The BLM manages water resources for resource values (e.g., watershed health, wildlife, riparian) and resource uses (e.g., recreation and water supply). BLM management and the condition of resources (including upland vegetation, soils, and riparian vegetation) in watersheds across the planning area affect the quality and quantity of water resources that traverse BLM lands. Protecting the quality and quantity of water for ourselves and future generations consists of the BLM adhering to the objectives of the federal Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the nation's water.

Water quantity management is primarily influenced by watershed functions that include capture, storage, and beneficial release of precipitation and runoff. BMPs include reservoir, pit, pond, water saver, spring, and water pipeline developments that function for multiple beneficial uses and provide additional and alternative water sources for wildlife, livestock, recreation, or riparian and wetland vegetation. Reservoirs function to retain water, detain runoff, increase infiltration, and trap sediment associated with overland flow. The BLM's operational plan for reservoirs and the effectiveness of BMPs rely on accurate measurements, timely implementation, and monitoring of both implementation and effectiveness.

The PFC method is implemented by the BLM in order to evaluate the condition of riparian vegetation and riparian function which indicate causes and sources of current and potential water quality conditions. Properly functioning riparian areas have stable streambanks (low sediment input) that are well vegetated (low thermal loading). The functioning condition can also imply whether or not livestock are spending excessive time in or immediately adjacent to the waterway (low bacteria and nutrients). Riparian trends also provide valuable information. Improving trends indicate that banks are becoming more stable (lower sediment load), shading is improving (less thermal loading), and livestock are spending less time in or immediately adjacent to the waterway (less bacteria or nutrients). Declining trends would likely indicate the opposite. Riparian vegetation responds readily to changes in management and can be modified to produce conditions more favorable to stream stability and water quality.

Resource specialists continually assess and record the riparian and wetland conditions conterminous with surface water on BLM land and update datasets that contain information pertaining to miles and acres of functioning lotic and lentic water across the planning area. One dataset identifies water segments that are exceeding state water quality standards or that do not fully support beneficial uses according to the Montana 303(d)/305(b) Integrated Report. Other datasets contain water rights information regarding places of use and points of diversion. Correlating proposed surface disturbances and alternative management themes with the BLM's datasets (utilized by ESRI's ArcGIS Desktop 9.3 computer software) enables the effects on water resources to be described qualitatively and, where possible, quantitatively.

The following paragraphs present key concepts of water quality impairment that are fundamental to understanding potential effects to water resources.

Precipitation and runoff either infiltrate the soil or gather on the surface and flow down slope, picking up soil particles as velocity increases. Vegetation traps and holds soil in place and hinders erosion. If there is little or no vegetation runoff will easily accumulate large amounts of soil. Runoff is abrasive and can cut rills and gullies in upland terrain before flowing into the nearest body of water.

Sediment that has reached a water body can be suspended at high concentrations for a short period of time or at low concentrations for an extended period of time. Sediment suspension depends on particle size and density, water velocity, and stream characteristics. Clay particles stay in suspension for days or even years and contribute significantly to water clarity and turbidity. Sediment often carries other pollutants including nutrients, bacteria, and toxic and synthetic chemicals. Water quality and the overall productivity of a stream system can be affected when sediment is washed into a stream and pools are filled, riffles are covered or embedded, and sunlight is shaded from aquatic plants. As excess sediment in the water column settles out, the storage volume of the stream can decrease, thereby increasing the likelihood of flood events.

The movement of sediment through a stream channel network is a function of past and present land activities. The vast majority of sediment transport in a stream occurs during periods of high flow. Streams naturally tend toward a state of equilibrium between erosion and sedimentation. As streams meander through floodplains the outside of the stream cuts into the streambanks, eroding it away, while the inside of the stream deposits sediment which creates sandbars. Under many conditions, the amount of sediment carried by a stream will increase as erosion in the watershed increases and decline as erosion decreases. A stream has a finite capacity for transporting sediment. Once the supply of sediment exceeds the stream's carrying capacity, any additional sediment will be deposited in channels and floodplains. These stored deposits can be remobilized into the stream system years or even decades later.

Riparian and wetland areas are the green zones bordering lakes, rivers, reservoirs, estuaries, potholes, springs, seeps, and perennial, intermittent or ephemeral streams where the water table is usually at or near the surface. The interface between the terrestrial zone and the aquatic zone is the riparian area which acts as a natural biofilter of prime importance to water quality and stream stability and is generally more productive than other zones in terms of total biomass.

Riparian zones are one of the most important defenses against pollutants for a water body. The ground cover of riparian zones reduces the velocity of runoff and enables water to percolate into the soil. As runoff works its way downslope pollutants are accumulated, but when polluted runoff reaches the riparian zone the roots of vegetation filter out certain pollutants that are beneficial to plant growth (i.e., fertilizers, pesticides, and nutrients) and runoff that reaches the receiving water is in a cleaner state.

Impacts Common to All Alternatives

Surface-disturbing activities affect water resources to varying degrees depending on the type, amount, and location of disturbance; time of year; precipitation; and the condition and types of present and surrounding soil and vegetation. Surface-disturbing activities lead to alterations in the chemical, physical, and biological integrity of water when vegetation and protective crusts are removed or manipulated and when natural soil architecture and functionality is disrupted. Machinery and vehicles integrated into surface-disturbing activities could leak or foster fluid spills, including engine oil, hydraulic oil, and fuel (gasoline or diesel), etc. Such spills could impact water quality in a watershed following spring runoff or precipitation events. Changes in natural cover or topography can cause or contribute to an increase in sediment delivery to streams. Even though surface-disturbing activities are short-lived and considered temporary they can have severe and long-lasting effects on water quality and overall stream function.

Poorly controlled erosion and sediment from surface-disturbing activities on steep slopes negatively impact water quality and hydrology. Surface-disturbing activities can induce rilling and gullying. Rills and gullies are often discontinuous in natural undisturbed areas, which disables water flow velocities and energies from reaching the magnitudes attained by continuous flows. Disturbances that lead to erosion of sensitive soil surfaces can form continuous rills and channels which can grow into continuous gullies. Steep slope disturbance usually involves some form of grading. Grading is the mechanical excavation and filling of natural slopes to produce a level working surface. Areas that have been graded, and that are not yet successfully reclaimed, may exhibit poor drainage or increased runoff velocities when overland flow is undiffused due to diversion. Surface-disturbing activity on slopes requires adequate site assessment, planning, design, and safe and stable construction and reclamation.

Surface-disturbing activities in and around riparian and wetland areas heighten vulnerability to erosion while increasing the opportunity for pollution and sediment to access water bodies until a functional riparian zone becomes established that is capable of biofiltration. Surface-disturbing activities that stir up sediment and increase streambank erosion may contribute to the loss of vegetation in riparian areas which could result in increased water temperatures and turbidity. Elevated water temperatures reduce the solubility of dissolved oxygen and decrease the oxygen carrying capacity of water. Riparian areas act as biofilters of pollution and accumulate probable water contaminants. Disrupting and loosening such accumulation, by removing or otherwise agitating riparian soils and vegetation, may expose surface and subsurface nutrients, fertilizers, and contaminants that are susceptible to being flushed into water bodies and impairing water quality.

Fire Management and Ecology: High severity fire is detrimental to watershed function and water quality. Fire is potentially very damaging to watershed biodiversity, reservoir water quality, plant communities, and other natural resources. By killing vegetation, burning the organic matter in litter and soil, and forming impervious soil layers, severe

fires can accelerate runoff from the watershed. Bare soils and increased runoff cause greater detachment and transport of soil particles. With reduced infiltration, saturated soil conditions and shallow debris flows become more prevalent. Sediment yields increase markedly, particularly where riparian vegetation is burned. Besides the direct effects of high severity fires, surface disturbance related to fire suppression and post-fire activities also may adversely affect water quality and watershed function. Although total surface water yield may increase for several years following a fire in response to decreased transpiration and vegetation interception, the value of the increased yield is limited in that it occurs during peak flows.

Steeply sloping lateral ridges with grassy vegetation can result in rapidly spreading wildfire that accelerates uphill towards the main ridgeline, increasing the size and intensity of a fire burning out of control. This possibility can be minimized by effectively reducing fuel loads on lateral ridges. Fuel modification areas are very effective in reducing the burning intensity and rate of spread of wildfire.

Fire management and ecology consist of removing or reducing the amount of vegetation on the landscape which, depending on site-specific characteristics, may reduce the amount of water loss to transpiration and increase water runoff. Fire management activities that occur early in the dry season may have reduced negative water resource effects as vegetation and root structures have sufficient recovery time prior to the wet season. Water quality impacts may be minimized when riparian vegetation is maintained to allow a buffer beside water bodies for biofiltration.

Use of prescribed fire to prevent unacceptable accumulations of stubble, brush, understory, and other fire fuels in areas where low to moderate fire intensity is preferable and high intensity wildfire is to be avoided can ultimately have a positive effect on watershed functions and water quality. Factors such as intensity, duration, soil moisture, vegetation type, fuel type and density, and time of year determine the severity of the impacts to the physical, chemical, and biological properties of water resources. As vegetation recovers the impacts diminish. Areas that have not undergone high burn severity typically recover within one to five years.

Table 4.63, Fuels and Forest Treatment by Alternative, lists the approximate number of acres that could be treated. Treated areas that met the desired future condition in the long term would contribute to properly functioning watersheds while the risk of high severity wildfires across treated acres would be reduced.

Fluid Minerals: Fluid mineral development could affect water resources during exploration, drilling, production, and abandonment. Table 4.66, Number of Federal Fluid Mineral Wells and Associated Disturbance by Alternative, lists the number of new federal oil and gas wells by alternative and includes the approximate total disturbed acres associated with the construction of well sites, access roads, and pipelines. Actions that can affect surface water and groundwater resources include removal of vegetation, exposure of the soil, mixing of soil horizons, loss of topsoil productivity, soil compaction, increased susceptibility to erosion, and the introduction of hydrocarbons and chemicals.

Hydraulic fracturing is a standard treatment for stimulating the productivity of oil and gas wells. The process consists of pumping a viscous fluid containing a propping agent into a wellbore at high pressure in order to create and stabilize fractures that extend from the wellbore into the target oil or gas formations. Fracturing fluids and the conditions for their use are summarized in Table 4.90. The chemical additives of the fluid are summarized in Table 4.91. The ideal products for propping open the fracture, once the pumps are shut down and the fracture begins to close, are silica sand, resin-coated (epoxy) sand, and ceramic proppants.

The majority of the treatments are pumped for these seven reasons:

- increase the flow rate of oil and/or gas from low permeability reservoirs,
- increase the flow rate of oil and/or gas from wells that have been damaged,
- connect the natural fractures and/or cleats in a formation to the wellbore,
- decrease the pressure drop around the well to minimize sand production,
- decrease the pressure drop around the well to minimize problems with asphaltine and/or paraffin deposition,
- increase the area of drainage or the amount of formation in contact with the wellbore, and
- connect the full vertical extent of a reservoir to a slanted or horizontal well.

Table 4.90
Fracturing Fluids and Conditions for Their Use

Base Fluid	*Fluid Type*	*Main Composition*	*Use Conditions*
Water Based	Linear Fluids	Gelled Water, GUAR<HPG, HEC, CMHPG	Short Fractures, Low Temperatures
	Crosslinked Fluids	Crosslinker + GUAR, HPG, CMHPG, CMHEC	Long Fractures, High Temperatures
Foam Based	Water-based Foam	Water and Foamer + N2 or CO2	Low Pressure Formations
	Acid-based Foam	Acid and Foamer +N2	Low Pressure, Water Sensitive Formations
	Alcohol-based Foam	Methanol and Foamer +N2	Low Pressure Formations with Water Blocking Problems
Oil Based	Linear Fluids	Oil, Gelled Oil	Water Sensitive Formation, Short Fractures
	Crosslinked Fluids	Phosphate Ester Gels	Water Sensitive Formation, Long Fractures
	Water External Emulsions	Water + Oil + Emulsifier	Good for Fluid Loss Control

Source: EPA 2004.

Table 4.91
Fracturing Fluid Chemical Additives

Type of Additive	*Function Performed*	*Typical Products*
Biocide	Kills Bacteria	Gluteridehyde Carbonate
Breaker	Reduces Fluid Viscosity	Acid, Oxidizer, Enzyme Breaker
Buffer	Controls the pH	Sodium Bicarbonate, Fumaric Acid
Clay Stabilizer	Prevents Clay Swelling	KCl, NH CL, KCl Substitutes
Diverting Agent	Diverts Flow of Fluid	Ball Sealers, Rock Salt, Flake Boric-Acid
Fluid Loss Additive	Improves Fluid Efficiency	Diesel, Particulates, Fine Sand
Friction Reducer	Reduces the Friction	Anionic Copolymer
Gel Stabilizer	Reduces Thermal Degradation	MEOH, Sodium Thiosulphate
Iron Controller	Keeps Iron In Solution	Acetic & Citric Acid
Surfactant	Lowers Surface Tension	Fluorocarbon, Nonionic

Source: EPA 2004.

Engineers design a fracturing operation using computer models that take into account the physical and chemical properties of the rock, the fluids contained within that rock, and the mechanical condition of the well. The geology of the planning area offers protection from groundwater contamination because groundwater that furnishes drinking water typically is separated from gas and oil reservoirs by thousands of feet and by impermeable layers. Other states have had reports of groundwater contamination associated with hydraulic fracturing of coalbed methane formations.

In naturally fractured or cleated formations, such as gas shales or coal seams, it is possible that multiple fractures can be created and propagated during a hydraulic fracture treatment. Hydraulic fracturing can open up pathways for fluids or gases from geologic layers to flow where they are not intended, which presents an opportunity for groundwater contamination. Surface water resources could experience negative effects if fracturing fluid chemicals and wastewater leak or spill from the well bore, flowlines, trucks, tanks, or pits.

Oil and gas operations must attempt to uphold water resource integrity through conduct that minimizes adverse effects to surface and subsurface resources, prevents unnecessary surface disturbance, and conforms with currently available technology and practice. Oil and gas operators cannot commence either drilling operations or preliminary construction activities before the BLM's approval of the Application for Permit to Drill (APD). A copy of the approved APD and any Conditions of Approval must be available for review at the drill site and all operators, contractors, and subcontractors must comply with the requirements of the approved APD and/or Surface Use Plan of Operations. Unless it is otherwise provided in an approved Surface Use Plan of Operations, the operator must not conduct operations in riparian areas, floodplains, playas, lakeshores, wetlands, and/or areas subject to severe erosion and mass soil movement.

Site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored in order to minimize effects to water resources. The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM and USFS 2007), would be followed. Potential effects to water resources are both short-term and long-term.

Access roads, facilities, and areas needed for production would require a long-term commitment to soil and vegetation which would maintain water resource quality. Areas may remain non-productive and continue to be at risk of erosion until abandonment and final reclamation. Production water, when spilled, could contaminate soils and impact surface and groundwater quality. Areas not needed for active production and operation should undergo interim reclamation as soon as possible after the disturbance and continue until successful reclamation is achieved. Generally, erosion rates are greater on recently reclaimed areas and decrease to natural levels in about 3-5 years.

Forests and Woodlands: The removal of forest products through both thinning and salable timber harvest would create short-term disturbances of between 237 and 391 acres a year. The bare soil created by roads and removal of vegetative cover could increase erosion and sedimentation on the uplands in the Sweet Grass Hills and Zortman area.

Mitigation measures for silvicultural prescriptions and contracts would provide protection to water resources by including specifications from the Water Quality BMPs for Montana Forests (Logan 2001). Properly functioning watersheds that support productive plant communities consistent with site potential would likely be established in the long term.

The forest BMPs for maintaining water quality restrict the harvest of trees and road building in riparian zones; therefore, water quality would not be adversely impacted due to direct effects of riparian vegetation disturbance.

Geology: Protecting and preserving geological resources would have a positive effect on water resources. Erosion is a natural process by which soil and rock material is loosened and removed. Natural erosion occurs primarily on a geologic time scale, but when human activities alter the landscape, the erosion process can be greatly accelerated. The cumulative effects on water resources due to erosion depends on many factors such as the amount of rainfall, type of land cover, slope length and gradient, and the size and density of sediment.

Lands and Realty: Rights-of-way would be avoided where reclamation to BLM standards is unachievable and where control and mitigation of excess soil erosion is not feasible. It is projected that within the next 20 years right-of-way authorizations could lead to a short-term disturbance of approximately 1,421 acres of soil and vegetation. The quality of water resources would be maintained through mitigation of adverse effects at the site-specific project level.

Livestock Grazing: Streams are particularly vulnerable to impacts caused by livestock grazing. Water erosion may be accelerated if insufficient litter or plant cover is left after the grazing season, or if plant composition is changed by grazing practices. Overgrazing can eliminate riparian vegetative cover, resulting in increased soil erosion and sedimentation. Increases in nonpoint source pollution, and loss of channel stability, can deteriorate water quality and diminish the ability of ecosystems to maintain healthy aquatic communities across localized and watershed scales.

Stream conditions and degraded water resources characterized by livestock overgrazing often include unstable and eroded banks, sedimentation, buried or embedded rock substrates, loss of riparian vegetative cover and associated organic matter inputs, increased width-to-depth ratio, reduced current in shallow water, nutrient enrichment, increased algae growth, reduced dissolved oxygen, higher temperatures, and reduced wildlife habitat structure.

To reduce the impact to water quality caused by nonpoint source pollution, including livestock grazing, Section 319 of the Clean Water Act requires that nonpoint sources are assessed and BMPs are developed to improve water quality. Achieving or maintaining Standards for Rangeland Health and Guidelines for Livestock Grazing Management, along with PFC assessments, generally are productive in managing the effects of livestock grazing on water resources. Adjustments to grazing authorizations are made on a case-by-case basis when site-specific studies indicate the necessity for management alterations.

Construction and installation of range improvement projects such as livestock watering reservoirs, pits, tanks, and pipelines would result in localized compaction and soil erosion which could affect water resources in the short term. For the installation of wells, 10 to 12 acres of land could be affected in the long term by BLM actions while 57 acres could be affected in the long term by non-BLM actions. Range improvement projects that diverted livestock away from riparian areas and stream corridors would benefit water resources. The approximate acres disturbed to construct and install reservoirs, pits, tanks, and pipelines are listed in Table 4.67, Livestock Grazing Development Surface Disturbance by Alternative. Successful reclamation of all reservoir and pipeline developments would ensure that there are no long-term surface disturbances. Avoidance, mitigation, and minimization of adverse effects to water resources during construction and installation would be addressed at the site-specific project level.

An expanse of salt crystals can form on the surface below reservoirs that are constructed with, on, or around saline soils. Saline seeps can restrict plant growth, reduce vegetative yields, degrade soil stability, and affect water quality. Persistent saline seep problems that are a result of BLM-developed reservoirs will be evaluated, prioritized, and reclaimed as funding becomes available.

Noxious Weeds and Other Non-Native Species: Surface-disturbing activities in and around riparian areas could promote noxious weed and invasive species infestation. Many invasive and noxious weeds have relatively sparse canopies, which could generate greater amounts of erosion compared to native vegetation.

Spraying of weeds along riparian corridors with approved chemicals can kill non-targeted riparian vegetation; riparian shrubs and trees are especially susceptible. Targeting noxious weeds and invasive species in riparian zones may reduce the diversity of plant species in the short term, which could lead to accelerated erosion along the streambanks. Removal of noxious weeds, which are capable of dominating the vegetative component of riparian zones, could increase the diversity of plant species in the long term and improve overall health and stability of the riparian system.

OHV Use and Travel and Transportation Management: The majority of the earth's surface has been shaped through various forms of natural erosion including water, wind, and mechanical. Water is the most important erosive agent, either flowing across land or in rivers and streams. Mechanical, or man-induced erosion, can accelerate the natural processes of water and wind erosion. Off-highway vehicle traffic can change the speed, timing, quantity, and quality of water moving through the landscape.

Off-highway vehicle use can damage, disrupt, and compact soil stabilizers including macrofloral elements (plants), microfloral elements (lichen, fungal, and algal crusts), and inorganic elements (soil crusts). Long-lasting negative impacts to water resources, including decreased water infiltration and increased runoff that prompts erosion, can commence when the force of rolling wheels disrupts and compacts soil stabilizers.

Off-highway vehicle use has implications on water quality and accelerated erosion when increased overland flow and sediment transport arise in response to altered runoff hydraulics through channelized flow in vehicle tracks. Obstructions to overland flow on hills and slopes can be smoothed by vehicle compaction, resulting in greater flow rates, which can lead to erosion and the creation of channels and gullies.

Off-highway vehicle use introduces gallons of gasoline and motor oil capable of contaminating soil and water on BLM land as a result of emissions and inefficient combustion. Oil, lubricants, and other undesired chemicals may become incorporated in water quality if vehicles ford stream crossings deep enough to dislodge or wash off grimy undercarriages, transmissions, engines, etc.

Undesirable noxious weeds and non-native invasive species can hitchhike on the undercarriage of vehicles which can affect water resources. For a summary of related potential effects see Noxious Weeds and Other Non-Native Invasive Species under Impacts Common to All Alternatives.

Recreation: Recreational use can result in soil, vegetation, and water resource disturbances. Disturbance would be the greatest in areas of concentrated use, such as roads, hiking trails, and campgrounds (dispersed or developed). These disturbances could result in localized vegetation disruption, soil compaction, erosion, and sedimentation that could negatively affect water resources depending on circumstance of use and duration.

Renewable Energy Resources: The BLM hypothetically described two types of wind farms in order to determine the reasonable foreseeable commercial wind energy development scenario for the planning area (Appendix O). The hypothetical model for a small wind farm capable of annually generating 100 megawatts of energy involves construction of 63 wind turbines which would amount to 133 acres of BLM land disturbance projected in the short term and 33 acres in the long term. The hypothetical model for a large wind farm capable of annually generating 200 megawatts of energy involves construction of 134 wind turbines which would disturb 724 acres of BLM land in the short term and 183 acres in the long term. These acreage figures do not include surface disturbances that could occur by installation of transmission lines.

Water resources could be impacted when soils and vegetation are affected by wind energy development. Alternative energy site location characteristics would determine the degree of effects. Soil compaction and erosion would occur along roadways which could increase overland flow and the concentration of dissolved and suspended sediment. The maintenance of the chemical, physical, and biological integrity of water resources in and around wind turbines and the associated facilities would be a long-term commitment.

Soils: Achieving or maintaining Standards for Rangeland Health and expertly evaluating the effects of proposed actions on soil resources would have a positive effect on water resources. Maintaining and promoting adequate ground cover, plant vigor, and nutrient cycling, along with biological, riparian, and wetland functions would help to ensure water quality by minimizing erosion and water resource contamination. Subsurface soil conditions that support permeability rates assist in decreasing overland flow and erosion and abet biofiltration and groundwater purification.

Solid Minerals: Water is a solvent that can break down and dissolve many substances such as rock, minerals, and concentrated fluids. Organic compounds and inorganic elements can be attracted to the ionic charge of a water molecule and can be carried along in solution. Minerals present in water are known as dissolved solids. Water in motion has kinetic energy and is capable of carrying larger particles in suspension.

Solid mineral exploration and development has the potential to increase erosion and sedimentation which could lead to increased concentrations of dissolved and suspended solids in surface and groundwater. Erosion is affected by a wide range of site-specific factors, including, but not limited to: climate, soils, slope angle, slope length, and slope aspect. Access roads, pads, other constructed support facilities, and the removal of soils, vegetation, and overburden to expose subsurface materials, create an erosive environment. Natural drainage patterns can temporarily be disrupted and surface water may not be capable of infiltrating soil that has been compacted or rock that has been exposed. Overland flow can increase and lead to rill and gully development which induces increased sediment transport to streams. The potential for erosion is highest immediately following surface-disturbing activities, but can remain high until final site stabilization and revegetation.

Ground water quality can be affected by water infiltration at the site of solid mineral removal or by contaminated runoff leaving the site and finding its way into groundwater. Springs can become an issue when they are exposed and present volumes of water that may erode or become polluted. Interception or diversion can adversely affect water resources and watershed function while introduction of substances (or certain forms of energy such as heat) can physically and/or chemically alter water. When water quality is impaired it may not be suitable for beneficial use, and when it is not available in the required or accustomed quantities, at pre-mining points of use, social and biological issues may arise.

Water that percolates through contaminated material can become polluted. Water contamination problems are most often due to several pollutants residing in a waste water stream. The twelve groups of mining-related contaminants include: organic reagents, dissolved solids (soluble salts), oils, anions and cations, cyanides, suspended solids, acids and alkalis, turbidity, base metals, thermal influences, fluorides, and radioactivity. The possible combinations of the above pollutants comprise five major problems: acid mine drainage, alkaline and saline mine drainage, heavy metal pollution, eutrophication, and deoxygenation.

Acid mine drainage (AMD) is a term commonly used to describe leachate, seepage, or drainage that has been affected by the natural oxidation of sulfide minerals contained in rock that is exposed to air and water as a result of mining activity. The reactive sulfide minerals, in combination with oxygen and water, create sulfuric acid. Natural biological activity often accelerates the oxidation reaction responsible for the formation of AMD. AMD and heavy metal pollution can detrimentally impact the quality of ground and surface water. Ore that poses significant AMD risk and are commonly mined are gold, silver, copper, iron, zinc, lead, and coal.

Authorization to allow the release of contaminated waters into the environment must be in compliance with the Clean Water Act, Safe Drinking Water Act, Endangered Species Act, other applicable federal and state environmental laws, consistent with the BLM's multiple use responsibilities under the Federal Land Policy and Management Act (FLPMA), and fully reviewed in the appropriate NEPA document.

The surface disturbance area associated with mineral material sales that are actions of the BLM is expected to be 80 acres in the short term and 80 acres in the long term for all alternatives.

Special Designations: The management constraints that pertain to existing and proposed special management areas all limit surface-disturbing activity potential which could prevent degradation of water resources in and around the special management areas.

Vegetation – Rangeland: Rangelands comprise the majority of watershed surface area that supports livestock production and provides habitat for native wildlife. Precipitation that falls on rangeland vegetation is a major source of aquifer recharge and surface water that ultimately joins rivers and streams flowing through and adjacent to the rangeland. Use and management of rangeland vegetation can have major impacts on the water resources that infiltrate the ground, flow over the land, and render forage and habitat for wildlife and livestock.

The intensity, duration, and quantity of rainfall events, along with the vegetative cover, soil type, topography, and geology of the rangeland will determine the amount of water that can be captured for beneficial use. Water that percolates through rangeland soils and geological substrata contributes to spring flow and aquifer recharge. Rangeland in an unhealthy state will have increased runoff with high nutrient and sediment content and will not maintain adequate soil moisture which is needed for the production of native plants required by livestock and native wildlife. Unhealthy rangelands may also exhibit poor slope stability and heightened levels of erosion.

Managing rangelands for healthy vegetation communities by pursuing Standards for Rangeland Health, Guidelines for Livestock Grazing Management, and PFC assessments assists in achieving or maintaining PFC on upland sites which includes the promotion of adequate amounts of vegetative cover to stabilize soils and ensure proper overland flow characteristics. Monitoring uplands and riparian areas for PFC would provide information needed to apply appropriate mitigation measures (if necessary) to ensure water resources are not adversely affected.

It is anticipated that approximately 10,000 acres could be mechanically treated and affected in the short term within the next 20 years. The effects of mechanical treatments on water resources would depend on the following: 1) the area exposed by the treatment; 2) the effect of surface disturbance on soil properties; 3) the site conditions, especially slope and patterns of precipitation; and 4) the vegetation response after treatment (BLM 2007b).

Vegetation – Riparian and Wetland: Assessing and monitoring riparian areas for PFC in accordance with Riparian Area Management Technical References for Lotic Areas (BLM, USFS and NRCS 1998) and Lentic Areas (BLM, USFS and NRCS 2003) and Standards for Rangeland Health would assist in identification of water quality impairment associated with riparian areas functioning at risk or not functioning. Achieving or maintaining PFC in riparian areas promotes the growth of deep-rooted riparian vegetation that dissipates streamflow energy, stabilizes streambanks from cutting action, and filters sediment. Improving the health of riparian vegetation by directing management efforts toward achieving PFC would increase the quality of water resources.

The hydrologic regimes of watershed basins dictate their chemical characteristics and subsequently the plant and invertebrate communities they support. Salts occur naturally in the planning area in many bedrock deposits and in some deposits that lie on top of the bedrock. Surface water and groundwater flowing over and through these deposits dissolves and transports sodium and magnesium sulfate salts. Seven major types of salinity are associated with saline groundwater rising to the surface: slough ring salinity, coulee bottom salinity, artesian salinity, depression bottom salinity, outcrop

salinity, slope-change salinity, and contact salinity. When water accumulates on the surface and evaporates, the salts are left behind and only salt-tolerant vegetation is capable of survival. Over time, the salts accumulate on the soil surface and a white crust forms where salt is highly concentrated.

Structural controls that provide water management and relief can be applied to control saline seeps at the surface and subsurface levels. Biological controls consist of growing crops and salt-tolerant perennial grasses. Crops can intercept water before it percolates below the root zone where the water is capable of accumulating salt that could seep to the surface later. Perennial grasses can be grown in areas where the salt concentration is not so high as to completely prevent all plant growth. Grasses provide cover and shading which reduces evapotranspiration and, in turn, reduces the rise of salty water to the soil surface.

Reclaiming seep areas would improve soil and vegetation quality and could improve water resources in those areas where reclamation is a success. Water resources could be affected in the short term and long-term by design and mitigation measures implemented to protect and minimize the development of saline seep areas.

Cumulative Impacts

The BLM's goal is to maintain and restore the chemical, physical, and biological integrity of the nation's water. Authorized surface-disturbing activities are subject to an onsite evaluation of potential water resource disturbances in order to avoid, mitigate, and minimize water quality degradation.

Past and present actions that have affected and would affect water resources include mineral exploration and development; improper livestock grazing; recreation; vehicle travel; and fire. In general, these actions have cumulative impacts on water resources through pollution introduction and surface disturbance that contributes to resource contamination, soil compaction, erosion, and subsequent sedimentation.

A reasonable foreseeable future action that could affect water resources would be the Keystone XL Pipeline. It is anticipated that construction would occur within the next two years. This pipeline would disturb approximately 300 acres of BLM land in the planning area. Compaction, erosion, chemical leaks and spills, degradation of riparian zones, and minor alterations to watershed function could have an effect on the quality of water resources. It has been demonstrated in the past that these types of actions can be successfully reclaimed, soil and vegetation productivity can return, and effects to water resources can be mitigated.

Impacts under Alternative A (Current Management)

Fluid Minerals: The approximate acres that would be closed to fluid mineral leasing, and acres that would be open subject to NSO are listed in Table 4.64, Fluid Mineral Lease Stipulations for the Entire Planning Area by Alternative. Water resources would be protected on these acres because fluid mineral surface-disturbing activities and occupancy would not be allowed. Table 4.64 also lists the approximate acres that would be subject to a Soils-CSU stipulation.

The approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO within the North Blaine and Bears Paw South Field Development Areas are listed in Table 4.65, Fluid Mineral Lease Stipulations for the North Blaine and Bears Paw South Field Development Areas by Alternative. Water resources would be protected on these acres because fluid mineral surface-disturbing activities and occupancy would not be allowed. Table 4.65 also lists the approximate acres that would be subject to a Soils-CSU stipulation.

Fluid mineral development could affect water resources during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. Drilling and development would occur mostly in the high and moderate development potential areas (Appendix E.1) spread out over the next 15 to 20 years. A total of 2,422 acres would be disturbed in the long term and 9,564 acres disturbed in the short term by BLM actions under this alternative. Well pads and pipelines would undergo interim reclamation during production which would stabilize soils and minimize runoff and sedimentation. A long-term commitment to soil and vegetation that would fundamentally offer protection to water resources would be required for access roads and production areas. Soil and vegetation productivity would be limited on acres that exhibit long-term disturbance and an elevated potential for negative water resource impacts would exist.

In analyzing riparian and wetland disturbances that could influence water resources, the following factors and assumptions were integrated:

- Alternative A identifies stipulations according to floodplains. Floodplains have not been designated across the entire planning area.
- Major reservoirs are Nelson, Fresno, Fort Peck, and Tiber.
- Intermittent and small perennial stream miles were obtained from the 1:100000 Surface Management map.
- Major rivers were designated as the Milk, Marias, Teton, and Missouri.
- The current land use plan applies specific wetland stipulations to Whitewater and Dibbler Reservoirs.
- The wetlands and remaining lotic riparian areas are protected under the standard terms and conditions (200 meters (656 feet) and 60 days).
- Only the proposed and existing stipulations will be analyzed.
- Roads, wells, and infrastructure associated with fluid mineral development could degrade water resources, the effects of which could be compounded if riparian and wetland areas are disturbed or manipulated.

The oil and gas RFD designated high, moderate, low and very low areas of potential oil and gas development. In these areas 93% of the lotic streams and 85% of the wetlands are located in the low and very low development potential categories. The riparian miles and wetland acres located within varying development potential areas are summarized in Table 4.83, Riparian Values in Potential Oil and Gas Areas under Alternative A (Current Management). The table shows leased and unleased miles of lotic riparian (streams) and leased and unleased acres of lentic riparian (wetlands) in all of the potential oil and gas areas.

Sixty-five miles (7% of the total) of lotic streams are identified in the oil and gas high and moderate development potential areas. Approximately 7,809 acres (15% of the total) of wetlands are located in high and moderate development potential areas. The RFD estimated that 75% of all new wells would occur in high and moderate development potential areas while only 4% of the activity would occur in very low development potential areas. Currently 72% of lotic riparian miles and 86% of lentic wetland acres that are located in the high and moderate development potential areas are leased with respect to the minimum standard stipulations (200 meters for relocation in order to protect resources). Most potentially negative effects to water resources associated with fluid mineral development would exist in high and moderate development potential areas where the density of wells and related facilities is higher and where it is more difficult to relocate wells and associated infrastructure 200 meters from riparian areas.

Table 4.85 identifies the miles of assessed streams and acres of wetlands that are affected by NSO and closed designations (major constraints) applied by any resource (i.e., wildlife, cultural, riparian) according to potential in leased and unleased areas.

A total of 972 lotic (stream) miles have been assessed for condition while the lentic (wetland) acres total 53,668 in the planning area. Stipulations applied under Alternative A, as shown in Table 4.85, would protect 243 miles (25%) and 5,890 acres (11%) of wetlands with major constraints (closed or NSO). Of the total protected (243 miles and 5,890 acres), 229 miles (94%) and 5,069 acres (87%) are unleased in the very low development potential area.

Lands and Realty: Under Alternative A, 90,343 acres of land which could have some riparian values would be available for disposal or exchange on a case-by-case basis to be determined by natural resource specialists and managers. Generally, riparian and wetland areas are not disposed of or traded unless equal or higher value land is received in the exchange.

Surface-disturbing activities described above in Impacts Common to All Alternatives could affect water resources within the designated corridors. Rights-of-way would be avoided where sensitive resources are present. Water resources would be protected in areas where soil erosion cannot be effectively mitigated or controlled and where reclamation to BLM standards is likely to be unsuccessful.

OHV Use and Travel and Transportation Management: A total of 124 acres would be open to OHV use off roads, primitive roads and trails (Fresno OHV Area and Glasgow OHV Area). Effects of OHV use on water resources could occur as described in Impacts Common to All Alternatives. Effects to water resources would be the greatest where there are severe erosion hazards, shallow soils, badlands, riparian vegetation, and rock outcrop. Table 4.68 lists acres with severe erosion hazards, shallow soils, badlands, and rock outcrop in designated open OHV areas.

A total of 7,952 acres previously open would be closed to OHV use (Sweet Grass Hills ACEC). Water resources in and around these acres would be protected from OHV effects.

Effects on water resources from big game retrieval, if it were to be allowed, would be dependent on factors such as soil conditions (dry or frozen vs. wet or moist), soil type, vehicle weight (lbs./sq. in.) and driver type. If big game retrieval were to occur during wet soil conditions, ruts may be created and surfaces compacted to resist infiltration which could affect runoff and lead to erosion.

Renewable Energy Resources: Of the BLM land that exhibits wind energy development potential, 82% of the total acres would be avoidance areas for renewable energy rights-of-way where special stipulations, design features, mitigation measures, and/or BMPs would likely go beyond the standard right-of-way terms and conditions. The quality of water resources would be maintained through mitigation of adverse effects at the site-specific project level. Water resources would not be affected by renewable energy development where renewable energy rights-of-way would be excluded on 8% of the of the BLM land that yields wind energy development potential. Standard right-of-way terms and conditions would apply to 10% of the total acres of BLM land that possess wind energy development potential and that are open to renewable energy rights-of-way. Rights-of-way would be avoided where reclamation to BLM standards is unachievable and where control and mitigation of excess soil erosion is not feasible.

Solid Minerals: Under this alternative, BLM actions would contribute to 2,495 acres of long-term surface disturbance and 390 acres of short-term surface disturbance.

The current area withdrawn from mineral entry is 23,444 acres. The Zortman/Landusky mine reclamation withdrawal (3,530 acres) would be allowed to expire in October 2015 and the Sweet Grass Hills withdrawal (19,671 acres) would be allowed to expire in April 2017. If the withdrawals were not renewed and mining resumed, effects of mineral extraction on water resources as described in Impacts Common to All Alternatives could occur.

Table 4.75 shows the acres of locatable mineral development potential by category. The Long-Term columns represent the acres after the withdrawals are allowed to expire while the Short-Term columns represent development potential acres when the withdrawals are in place.

Lands in the Open category are open to location under the mining laws. Lands in the Closed category have been withdrawn or segregated from operation of the mining laws and are not available for mineral development. Lands in the Restricted category remain open to operation of the mining laws and are available for mineral development, but because of special designations, special management stipulations that serve to uphold the chemical, physical, and biological integrity of water resources would be applied.

Solid minerals have been or could be withdrawn and/or closed in the Big Bend ACEC; Azure Cave; Camp Creek and Montana Gulch Campgrounds; and Zortman Cemetery. Within these areas the effects of mineral extraction on water resources, as described in Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods. Most of the high development potential areas that are no longer closed still remain in special management areas (Little Rocky Mountains TCP and Sweet Grass Hills TCP) and would require a more extensive review in regard to the management of these lands. The Mountain Plover ACEC also remains in place which includes restrictions within moderate and low development potential areas of the Brazil Creek area.

The solid minerals RFD (Appendix P) identifies 57 miles of stream and 2,115 acres of wetland that are located in the high, moderate, and low potential areas for solid mineral development. Table 4.82 shows the breakdown of riparian miles by their functioning status in potential hard rock and bentonite mining areas.

Approximately 9.5 miles of lotic stream are located in the high potential bentonite mining location in south Valley County. The probability of a bentonite claim being developed in a wetland or riparian zone is very small. A total of 3.25 miles of stream are located in the high potential area for hard rock mining in the Little Rocky Mountains and the Sweet Grass Hills. If adequate mitigation and BMPs are applied at the time of mine development, the chemical, physical, and biological integrity of water resources would be upheld.

Special Designations: The special designations (ACECs) and associated proposed actions of Alternative A would provide the lowest protection to water resources and riparian and wetland values of all the alternatives. The potential for

surface disturbance, mostly from oil and gas development, is the highest of any alternative. Other surface-disturbing activities associated with minerals development would be allowed in most situations except for the WSAs.

Water Resources: The acres of riparian vegetation associated with impoundments along Willow Creek in south Valley County would decrease as reservoir projects are abandoned. Water resources could be negatively affected by the absence of structures and associated operational procedures that, in the past, ensured the presence of surface water for riparian vegetation maintenance in the reservoirs, along the wetted perimeters, and below outlet structures. The potential for new riparian vegetation to become established, or for existing vegetation to survive, would be limited as water would be unavailable in appropriate quantities to support hydrophytic vegetation. This loss of riparian values is dependent on climatic conditions and could take many years. Allowing structures to breach and fail could lead to large loads of silt and sediment in Willow Creek, the remaining impoundments along Willow Creek, and the larger perennial water bodies that Willow Creek is attributed to. Maintaining specifically designated reservoir projects and applying appropriate operational procedures along Willow Creek would sustain a certain amount of riparian vegetation which could serve to protect or enhance water quality. Over all, the loss of riparian and wetland acreage and water quality impacts due to the abandonment of the structures would be small in comparison to the total riparian acres and water resource concerns in the planning area.

Cumulative Impacts

The approximate acres of new surface disturbance that could occur within the planning area over the next 20 years vary due to the different sizes of the hypothetical wind farm. The anticipated approximate short-term and long-term surface disturbance from all actions in the entire planning area under this alternative is 223,654 and 18,813 acres, respectively. The disturbances would not occur at one time. A small portion of the surface disturbance would include direct removal of vegetation on streambanks and around potholes when the surface-disturbing activities cannot be moved due to other resource values (i.e., cultural resources and sensitive species). The effects of mineral development on water resources would be minimized if the disturbances could be moved away from riparian areas.

Impacts under Alternative B

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO across the entire planning area and the North Blaine and Bears Paw South Field Development Areas, respectively. Effects on those acres would be the same as described in Alternative A. The Soils-NSO stipulation acres that would offer some protection to water resources are included in the total NSO acreage.

The Soils-NSO stipulation, which states that no surface use or occupancy would occur on soils with a severe erosion hazard, badlands, rock outcrop, or slopes susceptible to mass failure, would provide protection to water resources in such areas. Once disturbed, these areas are the most difficult and costly to stabilize and reclaim to BLM program standards in order to ensure long-term protection of water resources. Protective and performance measures would be established for surface use or occupancy in areas where soils with severe erosion hazards are present. The use or occupancy of the surface would not be permitted if protective and performance measures cannot be satisfied.

Fluid mineral development could affect water resources during exploration, drilling, production, and abandonment as described in Impacts Common to All Alternatives. As portrayed in Table 4.3, a total of 1,544 acres would be disturbed in the long term and 4,440 acres disturbed in the short term by BLM actions under this alternative.

Alternative B proposes the smallest number of new wells and the least amount of surface disturbance of all alternatives. The 1/4 mile NSO stipulation applied to oil and gas development for the protection of riparian and wetland areas would provide substantial protection to the chemical, physical, and biological integrity of water resources. Table 4.86 offers a breakdown of leased and unleased wetland acres and riparian miles that the stipulations under this alternative would affect. Areas that have been identified as possessing wilderness characteristics would be closed to oil and gas leasing. The riparian and wetland areas that are currently under lease (mostly areas of high and moderate fluid mineral development potential) would remain protected by the standard lease terms (200 meters and 60 days). Approximately 18% of the lotic miles and 31% of the wetland acres are currently under lease. When leases expire in areas with wilderness characteristics, 9% of the lotic miles and 1% of the lentic acres that are currently under lease would no longer be available for oil and gas leasing and the 1/4 mile NSO stipulation would be applied to new leases outside of areas with

wilderness characteristics. The resource protection stipulations for unleased high, moderate, and low potential areas outside of areas with wilderness characteristics would apply to 45 miles of riparian zones and 12,193 acres of wetlands. This is 5% of the total lotic miles and 23% of the total acres of wetlands. The remaining riparian and wetland areas are either in the very low potential area or are currently leased.

Under Alternative B, the BLM would encourage oil and gas operators to develop and implement methods that treat produced water and enable its beneficial use. Successful treatment would assist in preventing produced water pits from potentially contaminating surface water and groundwater.

Lands and Realty: The land adjustment Category 3 lands that are identified for disposal, by exchange or sale, would include 193 acres of land that may have wetland and riparian values. The BLM could potentially acquire land with equivalent or better riparian and/or wetland values when a land exchange is completed. There could be either positive or negative indirect effects to water resources associated with exchange or disposal of BLM lands. A resource specialist would review the potential riparian and wetland values associated with an exchange or disposal before completing the action. All areas that exhibit wilderness characteristics would be avoidance areas for rights-of-way and stipulations set forth to protect water resources would be determined on a case-by-case basis at the project level.

OHV Use and Travel and Transportation Management: Effects of OHV use on water resources could occur as described under Impacts Common to All Alternatives. No areas would be open to cross-country motorized vehicle use, and water resources would not be subject to effects (as described under Alternative A) from such use.

Renewable Energy Resources: Under this alternative, water resources would receive the greatest amount of protection of all alternatives through the exclusion of renewable energy rights-of-way in 90% of the areas that yield development potential. Of the BLM land that exhibits wind energy development potential, 10% would be avoidance areas for renewable energy rights-of-way where special stipulations, design features, mitigation measures, and/or BMPs would likely go beyond the standard right-of-way terms and conditions. The quality of water resources would be maintained through mitigation of adverse effects at the site-specific project level. Less than 1% of the BLM land that exhibits wind energy development potential would be open to renewable energy rights-of-way with standard right-of-way terms and conditions. Rights-of-way would be avoided where reclamation to BLM standards is unachievable and where control and mitigation of excess soil erosion is not feasible.

Solid Minerals: Under this alternative, BLM actions would contribute to 355 acres of long-term surface disturbance and 355 acres of short-term surface disturbance.

The existing 23,563 acres of withdrawals in the Little Rocky Mountains and Sweet Grass Hills would be renewed. In addition, about 1,647,638 acres of withdrawals would also close more land to locatable mineral entry. A large portion of the withdrawn acres is due to the Greater Sage-Grouse Protection Priority Area (1,034,102 acres) and Grassland Bird/Greater Sage-Grouse Priority Areas (480,035 acres), as well as the withdrawals of the Bitter Creek ACEC (60,717 acres), Kevin Rim ACEC (4,553 acres), Malta Geological ACEC (6,152 acres), Mountain Plover ACEC (24,672 acres), Little Rocky Mountains TCP (33,742 acres), and Zortman Cemetery (20 acres). Within these areas the effects of mineral extraction to water resources, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

Table 4.76 shows the acres of locatable minerals development potential by category. With a significant amount of land being withdrawn, the majority of the areas with high, moderate, and low mineral development potential are in the Closed category. This alternative would reduce most locatable minerals development opportunities by eliminating any foreseeable development for the reestablishment and expansions of the Zortman and Landusky Mines and limiting all mining activity in the Sweet Grass Hills to the claims with valid existing rights. Most of the remaining moderate and low development potential lands in the Open category are within areas related to bentonite.

The probability of a bentonite claim being developed in a wetland or riparian zone is very small. If adequate mitigation and BMPs are applied at the time of mine development, the chemical, physical, and biological integrity of water resources would be upheld.

Special Designations: The levels of protection provided in the constraints for each ACEC varies in Alternative B. Some ACECs assign special management of riparian areas and water resources where constraints are currently in place for oil, gas, and mineral development under Alternative B.

Special Status Species: The protection priority habitat areas in portions of Valley County and south Phillips County would reduce surface disturbances on riparian and wetland vegetation as most surface-disturbing activities would be prohibited. Most of the protection priority habitat areas covered by this designation are in areas of low potential for disturbance. Under Alternative B, 608 miles of streamside riparian areas and 22,142 acres of wetlands would be protected from most surface-disturbing activities by the designation. Not allowing surface disturbances in riparian and wetland areas that are in PFC would assist in maintenance of such a condition while watershed functions and water resource values would benefit.

Vegetation – Rangeland: Most production areas for oil and gas are 1/10 acre. In Alternative B, reclamation would be required for surface disturbances greater than 1/10 acre. More acres would be reclaimed and water resources would likely benefit in Alternative B versus Alternative A.

Wilderness Characteristics: Closure to oil and gas leasing, and accepting the expiration of leases in areas that exhibit wilderness characteristics, would benefit water resources in those areas by excluding surface and subsurface disturbances associated with oil and gas development. Avoiding and excluding rights-of-way would help to uphold the integrity of water resources in areas with wilderness characteristics by limiting the potential for man-induced erosion and sedimentation. Where specific areas are managed for their wilderness characteristics, water resources would be managed to meet the intent of the visual quality objectives. Construction and restoration of water developments and physical improvements to FAR and NF riparian areas would include levels of change to the characteristic landscape that are low to very low.

Cumulative Impacts

Under Alternative B, the projected long-term surface disturbances in the planning area would be the lowest of all alternatives, and surface-disturbing activities would have the least potential of all the alternatives to adversely affect water resources. The approximate acres of new surface disturbance that could occur within the planning area over the next 20 years vary due to the different sizes of the hypothetical wind farm. The anticipated approximate short-term and long-term surface disturbance from all actions in the entire planning area under this alternative is 241,116 and 17,727 acres, respectively. The disturbances would not occur at one time.

Impacts under Alternative C

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO in the entire planning area and the North Blaine and Bears Paw South areas, respectively. Effects to water resources on those acres would be the same as described in Alternative A. The Soils-NSO stipulation acres, that would offer some protection to water resources, are included in the total NSO acres. Table 4.64 also lists the approximate acres that would be subject to a Soils-CSU stipulation capable of protecting water resources.

The Soils-NSO and Soils-CSU stipulations would assist in preserving the integrity of water resources by providing protection to areas with severe water and wind erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim in order to ensure long-term protection of water resources. Protective and performance measures would be established for surface use or occupancy in areas where soils with severe erosion hazards are present. The use or occupancy of the surface would not be permitted if protective and performance measures cannot be satisfied.

The types of effects to water resources under Alternative C for fluid mineral leasing are expected to be the same as described under Alternative A, except in magnitude. A total of 2,238 acres would be disturbed in the long term and 8,547 acres disturbed in the short term by BLM actions under this alternative.

Potentially negative effects to water resources would mostly subsist on leased areas in the high, moderate, and low potential areas where the new stipulations would not be implemented unless the current leases expired.

The acres of wetlands and miles of riparian zones that could have major constraints (closed or NSO) put on the unleased areas is the same as Alternative B. Approximately 18 miles of riparian zones and 1,106 acres of wetlands would be protected in the high and moderate potential areas (see Table 4.85). This alternative would provide protection second only to Alternative B from surface-disturbing activities that could affect water resources.

Alternative C establishes a 500 foot NSO around all lotic and lentic riparian areas which would provide protection to water resources by sustaining valuable riparian and wetland functions and by limiting the potential for produced water to contaminate surface water designated for beneficial uses.

Lands and Realty: The effect on riparian zones and water resources would be similar to Alternative B. Potential wetland and riparian values could exist within 193 acres of land that would be available for disposal. The BLM could potentially acquire land with equivalent or better riparian and wetland values when a land exchange is completed. Either positive or negative indirect effects to water resources could be associated with exchange or disposal of BLM lands. A resource specialist would review the potential riparian and wetland values associated with an exchange or disposal before completing the action.

OHV Use and Travel and Transportation Management: The acreage of soils with severe erosion hazards, badlands, and rock outcrop for the delineated travel management areas are shown in Table 4.71.

A total of 8,076 acres would be closed, where previously open, to OHV use (Sweet Grass Hills ACEC, Fresno OHV Area, and Glasgow OHV Area.). Water resources in and around these areas would be protected from motorized vehicle use effects.

Effects on water resources from big game retrieval, if it were allowed, would be dependent on factors such as soil conditions (dry or frozen vs. wet or moist), soil type, vehicle weight (lbs./sq. in.) and driver type. If big game retrieval were to occur during wet soil conditions, ruts may be created and surfaces compacted to resist infiltration, which could affect runoff and lead to erosion. Water resource effects would be greatest where soils with severe erosion hazards, shallow soils, badlands, riparian areas, or rock outcrop were traversed. South Valley County and south Phillips County have 970 acres of wetlands and 116 miles of lotic riparian areas with conjoined water resource values that could potentially be affected.

Renewable Energy Resources: Water resources would not be affected by renewable energy development on 54% of the of the BLM land that yields development potential because renewable energy rights-of-way would be excluded under this alternative. On BLM land that exhibits wind energy development potential, 24% of the acreage would be open to renewable energy rights-of-way with standard right-of-way terms and conditions. Rights-of-way would be avoided where reclamation to BLM standards is unachievable and where control and mitigation of excess soil erosion is not feasible. Of the BLM land that exhibits wind energy development potential, 22% of the total acres would be avoidance areas for renewable energy rights-of-way where special stipulations, design features, mitigation measures, and/or BMPs would be likely to go beyond the standard right-of-way terms and conditions. The quality of water resources would be maintained through mitigation of adverse effects at the site-specific project level.

Solid Minerals: Under this alternative, BLM actions would contribute to 355 acres of long-term surface disturbance and 355 acres of short-term surface disturbance.

The existing 23,563 acres of withdrawals in the Little Rocky Mountains and Sweet Grass Hills would be renewed. Locatable mineral entry would be closed on an additional 1,506,086 acres that would be withdrawn. The majority of the withdrawn acres include the Greater Sage-Grouse Protection Priority Area (1,034,102 acres), the Grassland Bird/Greater Sage-Grouse Priority Areas (320,405 acres), the Zortman Cemetery (20 acres), and the following ACECs: Bitter Creek ACEC (60,717 acres), Frenchman ACEC (39,661 acres), Kevin Rim ACEC (4,553 acres), Malta Geological ACEC (6,152 acres), and Woody Island ACEC (18,804 acres). Within these areas the effects of mineral extraction to water resources, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

Table 4.77 shows the acres of locatable minerals development potential by category. Because of the amount of land being withdrawn from mineral entry, the majority of the areas with high and moderate mineral development potential are in the Closed category. Similar to Alternative B, this alternative would reduce most locatable minerals development

opportunities by eliminating any foreseeable development for the reestablishment and expansions of the Zortman and Landusky Mines and limiting all mining activity in the Sweet Grass Hills to the claims with valid existing rights. Most of the remaining moderate and low development potential lands in the Open category are within areas related to bentonite.

The probability of a bentonite claim being developed in a wetland or riparian zone is very small. If adequate mitigation and BMPs are applied at the time of mine development, the chemical, physical, and biological integrity of water resources would be upheld.

Special Designations: Under Alternative C, the projected special designations would provide protection from the effects of surface occupancy and use through NSO for oil and gas and closure to mineral entry and sale in riparian areas. The more constrained surface-disturbing activities are the more water resources are protected. The Woody Island ACEC, if made available for leasing under the oil and gas leasing program, would offer protection from most surface-disturbing activities on 2,635 acres of wetlands.

Special Status Species: The effects would be the same as under Alternative B except for the acres protected from fluid mineral leasing. The effects to water resources associated with riparian and wetland areas would be minor as the protection priority areas are in the low and very low development potential areas for oil and gas development.

Vegetation – Rangeland: Reclamation would be required for surface disturbances greater than 1/10 acre. Effects would be the same as described in Alternative B.

Wilderness Characteristics: Closure to oil and gas leasing or leasing with an NSO stipulation would benefit water resources in those areas by excluding surface and subsurface disturbances associated with oil and gas development. Avoiding and excluding rights-of-way would help to uphold the integrity of water resources in areas with wilderness characteristics by limiting the potential for man-induced erosion and sedimentation. Where specific areas are managed for their wilderness characteristics, water resources would be managed to meet the intent of the visual quality objectives. Construction and restoration of water developments and physical improvements to FAR and NF riparian areas would include levels of change to the characteristic landscape that are low to very low.

Cumulative Impacts

The types of effects to water resources under Alternative C for surface-disturbing activities are expected to be the same as described under Alternative A except in intensity. Under Alternative C, the projected long-term surface disturbance in the planning area would be the second lowest of all alternatives. The approximate acres of new surface disturbance that could occur within the planning area over the next 20 years vary due to the different sizes of the hypothetical wind farm. The anticipated approximate short-term and long-term surface disturbance from all actions in the entire planning area under this alternative is 245,228 and 18,421 acres, respectively. The disturbances would not occur at one time.

Impacts under Alternative D

Fluid Minerals: Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO across the entire planning area and the North Blaine and Bears Paw South Field Development Areas, respectively. Effects to water resources in and around those areas would be the same as described in Alternative A.

Fluid mineral development would affect water resources during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. A total of 2,436 acres would be disturbed in the long term and 9,663 acres disturbed in the short term by BLM actions under this alternative.

Relocating a proposed oil and gas operation up to 200 meters (standard lease terms) would provide the authorized officer the option to move a location away from an area where erosion cannot be controlled, mitigated, or reclaimed. However, 200 meters may not be a great enough distance to ensure water resources are not at risk of receiving adverse impacts.

Protection of riparian values by stipulations that close surface utilization or establish NSO would protect water resources along 261 miles of riparian zones and 8,235 acres of wetlands. The protection measures under Alternative D would provide maximum protection to 27% of assessed riparian areas and 15% of wetlands. Approximately 94% of these maximum protected values are in the very low development potential area.

The actions proposed in Alternative D could adversely affect water resources through disturbances to riparian and wetland areas. The proposed setback (300 feet) for the protection of riparian and wetland resources would provide the least protection to water resources of all the alternatives and less than the standard lease term of 200 meters applied in Alternative A.

Lands and Realty: Alternative D identifies approximately 554 acres of wetlands and 9.7 miles of riparian areas along streams that would be available for exchange or disposal under the Category 3 designation. Alternative D identifies the largest total acres for disposal and the most potential riparian and wetland areas available for exchange or disposal of all the alternatives. The effects to water resources would be similar to Alternative B. The BLM could potentially acquire similar or better riparian values when a land exchange is completed. An exchange and a disposal would have resource specialist reviews before completing the action.

OHV Use and Travel and Transportation Management: A total of 305 acres would be open to cross-country motorized vehicle use (Fresno OHV Area, Glasgow OHV Area, and Thirty Mile OHV Area). Watershed values associated with these acres would be subject to the effects described under Impacts Common to All Alternatives and to impacts addressed in the preceding paragraph related to a chemical crust. Table 4.72 lists acres with severe erosion hazards, shallow soils, badlands, and rock outcrop in designated open OHV areas.

The acres of soils with severe erosion hazards, badlands, and rock outcrop for the delineated travel management areas are shown in Table 4.71. At the time of travel management planning, if areas are open to off-road use, water resources linked to those areas could be affected as described in Alternative A.

Effects of cross-country motorized vehicle use would be the same as described in Alternative A. It has been observed in the proposed Thirty Mile OHV Area that loose material lies underneath a chemical crust. Once this chemical crust is disturbed by motorized vehicles the underlying material becomes exposed to erosion. Unnatural and excessive amounts of eroded material produced by the OHV area could add to the dissolved and suspended sediment load in Thirty Mile Creek.

Impacts to water resources from big game retrieval, as described in Alternative C, would not occur within the following areas closed to big game retrieval: Big Bend, Kevin, Frenchman, and Malta Geological ACECs. Under Alternative D, 53,317 acres of wetland and 869 miles of lotic riparian could potentially be affected from motorized game retrieval off road. The potential short-term effects of OHV travel from game retrieval to wetlands and riparian values would be the largest of any alternative.

Renewable Energy Resources: Of the BLM land that exhibits wind energy development potential, 78% of the total acres would be avoidance areas for renewable energy rights-of-way where special stipulations, design features, mitigation measures, and/or BMPs would likely go beyond the standard right-of-way terms and conditions. The quality of water resources would be maintained through mitigation of adverse effects at the site-specific project level. Water resources would not be affected by renewable energy development where renewable energy rights-of-way would be excluded on 12% of the of the BLM land that yields wind energy development potential. Standard right-of-way terms and conditions would apply to 10% of the total acres of BLM land that possess wind energy development potential and that are open to renewable energy rights-of-way. Rights-of-way would be avoided where reclamation to BLM standards is unachievable and where control and mitigation of excess soil erosion is not feasible.

Solid Minerals: Under Alternative D, BLM actions would contribute to 300 acres of long-term surface disturbance and 235 acres of short-term surface disturbance.

The total area withdrawn from mineral entry is 169,845 acres. The Zortman/Landusky mine reclamation withdrawal (3,530 acres) would be allowed to expire in October 2015, and the Sweet Grass Hills (19,671 acres) withdrawal would be allowed to expire in April 2017. If the withdrawals were not renewed and mining resumed, effects of mineral extraction on water resources as described in Impacts Common to All Alternatives could occur.

Solid minerals have been or could be withdrawn and/or closed in the Big Bend, Kevin Rim, Malta Geological, Woody Island, Frenchman, Mountain Plover, and Bitter Creek ACECs; Azure Cave; Sweet Grass Hills TCP; Zortman Cemetery; Camp Creek and Montana Gulch Campgrounds; and the Greater Sage-Grouse Protection Priority Area and Grassland Bird/Greater Sage-Grouse Priority Areas. Within these areas the effects of mineral extraction to water resources, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

Table 4.78 shows the acres of locatable mineral development potential by category. The Long-Term column distinguishes the acres after the withdrawals are allowed to expire while the Short-Term columns presents development potential acres when the withdrawals are in place.

Most of the high and moderate development potential areas that would no longer be closed reside in special management areas (Little Rocky Mountains TCP and Sweet Grass Hills TCP) and would require a more extensive review in regard to the management of these lands. Partial withdrawal of the Little Rocky Mountains ACEC would affect some of the moderate development potential of that area.

The probability of a bentonite claim being developed in a wetland or riparian zone is very small. If adequate mitigation and BMPs are applied at the time of mine development, the chemical, physical, and biological integrity of water resources would be upheld.

Special Designations: Alternative D would provide additional protection to riparian areas in the form of NSO for oil and gas leasing and closure to mineral entry and sale, which would eliminate surface-disturbing activities from these sources and uphold the chemical, physical, and biological integrity of water resources.

The Woody Island ACEC would protect water resources from most surface-disturbing activities (see Table 4.88, Additional Protections for Wetlands in Woody Island ACEC) for acres protected.

Vegetation – Rangeland: Reclamation would be required for surface disturbances greater than 1/10 acre. Effects would be the same as described in Alternative B.

Cumulative Impacts

The types of effects to water resources through impacts to riparian and wetland communities are expected to be the same as described under Alternative A for surface-disturbing activities. Under Alternative D, the projected short-term and long-term surface disturbances in the planning area are the highest of all alternatives. The approximate acres of new surface disturbance that could occur within the planning area over the next 20 years vary due to the different sizes of the hypothetical wind farm. The anticipated approximate short-term and long-term surface disturbance from all actions in the entire planning area under this alternative is 246,659 and 18,852 acres, respectively. The disturbances would not occur at one time.

Impacts under Alternative E (Preferred Alternative)

Fluid Minerals: Fluid mineral development could affect water resources during exploration, drilling, production, and abandonment as described under Impacts Common to All Alternatives. A total of 2,337 acres would be disturbed in the long term and 9,068 acres disturbed in the short term by BLM actions under this alternative.

Tables 4.64 and 4.65 list the approximate acres that would be closed to fluid mineral leasing and acres that would be open subject to NSO in the entire planning area and the North Blaine and Bears Paw South Field Development Areas, respectively. The Soils-NSO stipulation acres are included in the total NSO acres. Table 4.64 also lists the approximate acres that would be subject to a Soils-CSU stipulation.

The Soils-NSO and Soils-CSU stipulations would assist in preserving the integrity of water resources by providing protection to areas with severe water and wind erosion hazards, badlands, rock outcrops, or slopes susceptible to mass failure. These areas, once disturbed, are the most difficult and costly to stabilize and reclaim to BLM program standards. Protective and performance measures would be established for surface use or occupancy in areas where soils with severe

erosion hazards are present. The use or occupancy of the surface would not be permitted if protective and performance measures cannot be satisfied.

The proposed CSU setback (300 feet) and the NSO stipulation on the lotic and lentic water bodies for the protection of riparian values would provide levels of protection for water resources that are less than Alternatives B or C, but greater than Alternatives A and D. The CSU stipulation that provides a 300-foot setback from riparian vegetation could allow some flexibility in placing structures associated with fluid mineral development. NSO within lentic or lotic areas (standing and moving water) does not apply to production facilities (e.g., pipelines). Where production facilities are allowed, the physical, chemical, and biological integrity of water resources could be negatively affected during operation and maintenance due to potential sediment and contaminant introduction. Protection of riparian values achieved through application of closed or NSO stipulations (major constraints) to fluid mineral resources would serve to uphold the quality of water resources conterminous with approximately 972 miles of lotic streams and 53,668 acres of wetlands (see Table 4.85). Of the 972 miles of assessed lotic streams that are in the Potential Development Area, 77% are unleased and in the Very Low Development Potential Area. Within the planning area, 47% of all of the wetland acres on BLM land are unleased and in the Very Low Development Potential Area.

Lands and Realty: Surface-disturbing activities described under Impacts Common to All Alternatives could affect water resources within the designated corridors. Rights-of-way would be avoided where resources are sensitive to direct and cumulative impacts. Water resources would be protected in areas where soil erosion cannot be effectively mitigated or controlled and where reclamation to BLM standards is likely to be unsuccessful.

There could be either positive or negative indirect effects to water resources associated with exchange or disposal of BLM lands. A total of 14,029 acres would be available for disposal. Of the total available, 193 acres have possible wetland or riparian values. Generally, riparian and wetland areas are not disposed of or traded unless equal or higher value land is received in the exchange. An exchange and a disposal would have resource specialist reviews before completing the action.

OHV Use and Travel and Transportation Management: Effects of off-highway vehicle use on water resources could occur as described under Impacts Common to All Alternatives. Effects to water resources would be the greatest in areas with severe erosion hazards, shallow soils, badlands, riparian vegetation, and rock outcrop.

A total of 165 acres would be open to OHV use (Glasgow OHV Area and Fresno OHV area). Water resources in and around these acres would be subject to effects identified under Impacts Common to All Alternatives. Table 4.73 lists acres with severe erosion hazards, shallow soils, badlands, and rock outcrop in open travel areas. A total of 7,952 acres would be closed to OHV use (Sweet Grass Hills ACEC). Water resources around these acres would be offered protection from OHV effects.

At the time of travel management planning, if areas are opened to off-road use, water resources in and around the areas could be affected. The effects of OHV use on soils and watershed function include soil compaction, reduced water infiltration, diminished presence and impaired function of soil stabilizers (vegetation; biological, chemical, and physical crusts; etc.), and accelerated erosion rates. Where biological and chemical crusts, or other soil stabilizers, are disturbed or destroyed, erosion could lead to decreased water quality reflected by increased dissolved and suspended sediment. Effects would be the greatest on soils with severe erosion hazards, shallow soils, badlands, and rock outcrops, as these areas would be difficult to stabilize and reclaim once disturbed by repeated motorized vehicle use.

Effects on water resources from big game retrieval, if allowed, would be dependent on factors such as soil conditions (dry or frozen vs. wet or moist), soil type, vehicle weight (lbs./sq. in.) and driver type. If big game retrieval were to occur during wet soil conditions, ruts may be created and surfaces compacted to resist infiltration which could affect runoff and lead to erosion. Water resource effects would be greatest where soils with severe erosion hazards, shallow soils, badlands, riparian vegetation, or rock outcrop were traversed.

Renewable Energy Resources: Under this alternative, water resources would receive the second greatest amount of protection of all alternatives through the exclusion of renewable energy rights-of-way in 63% of the areas that yield development potential. Of the BLM land that exhibits wind energy development potential, 36% would be avoidance areas for renewable energy rights-of-way where special stipulations, design features, mitigation measures, and/or BMPs would be likely to go beyond the standard right-of-way terms and conditions. The quality of water resources would be

maintained through mitigation of adverse effects at the site-specific project level. Approximately 1% of the BLM land that exhibits wind energy development potential would be open to renewable energy rights-of-way with standard right-of-way terms and conditions. Rights-of-way would be avoided where reclamation to BLM standards is unachievable and where control and mitigation of excess soil erosion is not feasible.

Solid Minerals: Under this alternative, BLM actions would contribute to 355 acres of long-term surface disturbance and 355 acres of short-term surface disturbance.

Solid minerals have been or could be withdrawn and/or closed in the Big Bend, Kevin Rim, Sweet Grass Hills, Malta Geological, and Mountain Plover ACECs; Azure Cave; Sweet Grass Hills TCP; Zortman Cemetery; Camp Creek and Montana Gulch Campgrounds; Zortman/Landusky mine reclamation area; a portion of the Little Rocky Mountains TCP; greater sage-grouse protection priority areas, and Grassland Bird/Greater Sage-Grouse Priority Areas. Within these areas the effects of mineral extraction to water resources, as described under Impacts Common to All Alternatives, would not occur during the withdrawal or closed time periods.

Through the future withdrawal review process, BLM would consider the need for a new withdrawal or right-of-way to promote successful reclamation for the Zortman/Landusky mine reclamation. The area for the withdrawal would not exceed the existing withdrawal boundary, but would likely be smaller (maximum size would be 2,560 acres). The chemical, physical, and biological integrity of water resources would benefit significantly in the long term from reclamation in the Zortman/Landusky Mine area.

With most of the current withdrawals renewed and the addition of the Mountain Plover ACEC recommended withdrawal, the integrity of water resources would be upheld in the three areas with the most solid mineral development potential. Within Brazil Creek, the moderate and low areas of development potential that were under the Restricted management category under current management would be closed. The majority of the high development potential areas within the Little Rocky Mountains and the Sweet Grass Hills continue to fall under the Closed category. If the withdrawal in the Little Rocky Mountains is allowed to expire through review, the Zortman/Landusky Mine Reclamation ACEC (2,560 acres) would still remain. This would open the area up to mineral entry, but special stipulations would apply for any operation, resulting in a more extensive environmental review and increased water resource protection.

Special Designations: The Azure Cave ACEC (142 acres), Bitter Creek ACEC (60,701 acres), Mountain Plover ACEC (24,762 acres), and Sweet Grass Hills ACEC (7,428 acres) would be closed to oil and gas leasing. These same ACECs, and the proposed Malta Geological ACEC (6,153 acres) and proposed Woody Island ACEC (32,869 acres) would be withdrawn from mineral entry and location. All of the aforementioned ACECs, and the Kevin Rim ACEC (4,557 acres), the Big Bend of the Milk River ACEC (1,979 acres), and the proposed Frenchman ACEC (42,020 acres) would be closed to solid mineral leasing and mineral material sales. The closures and withdrawals in all of these areas lend significant protection to water resources.

Under Alternative E, the Proposed Little Rocky Mountains ACEC area would not be designated an ACEC. NSO stipulations for oil and gas leasing would be included in the Big Bend of the Milk River ACEC, Kevin Rim ACEC, the Proposed Frenchman ACEC, and the Proposed Woody Island ACEC. The Proposed Malta Geological ACEC would include a CSU stipulation for oil and gas leasing. Water resources would be moderately protected in areas that are not designated ACECs and that are not closed to oil and gas leasing.

All existing and proposed ACECs would be avoidance areas for rights-of-way and exclusion areas for wind energy rights-of-way. The water resources that traverse these specially designated areas would benefit from such avoidance and exclusions.

Special Status Species: The protection priority area designations in Valley County and south Phillips County could reduce surface disturbance activities on riparian and wetland vegetation and help to ensure water resource integrity is upheld as it provides CSU stipulations to surface-disturbing activities. Fluid mineral development would create 70% of the long-term surface disturbance effects, 95% of which would occur in high, moderate, and low development potential areas. The protection priority areas are in the low and very low development potential areas for fluid mineral development so the effects of these special designations on riparian and wetland values and amalgamated water resources would be very small. Lotic riparian and lentic wetlands currently in PFC would be maintained in their existing condition which would positively influence watershed functions and water quality.

Vegetation – Rangeland: Most production areas for oil and gas are 1/10 acre. Reclamation would be required for surface disturbances greater than 1/10 acre. More acres would be reclaimed and water resources would likely benefit.

Wilderness Characteristics: Leasing with an NSO stipulation for oil and gas would benefit water resources in those areas by excluding surface and subsurface disturbances associated with oil and gas development. Avoiding and excluding rights-of-way would help to uphold the integrity of water resources in areas with wilderness characteristics by limiting the potential for man-induced erosion and sedimentation. Where specific areas are managed for their wilderness characteristics, water resources would be managed to meet the intent of the visual quality objectives. Construction and restoration of water developments and physical improvements to FAR and NF riparian areas would include levels of change to the characteristic landscape that are low to very low.

Cumulative Impacts

The approximate acres of new surface disturbance that could occur within the planning area over the next 20 years vary due to the different sizes of the hypothetical wind farm. The anticipated approximate short-term and long-term surface disturbance from all actions in the entire planning area under this alternative is 245,872 and 18,645 acres, respectively. The disturbances would not occur at one time.

Wilderness Characteristics

The BLM inventory update identified approximately 386,462 acres in 26 areas (Map W.9) that have wilderness characteristics or approximately 16% of the BLM land in the planning area. Chapter 3 describes the inventory process and provides a general description of the inventoried areas. This section identifies the potential impacts to wilderness characteristics from implementing proposed management actions in the RMP. Impacts to the wilderness characteristics are described in terms of how certain actions affect the wilderness qualities of naturalness, undeveloped condition, opportunities for solitude or primitive and unconfined type of recreation, or unique or supplemental qualities of a given area, such as significant cultural resources.

Impacts to naturalness occur when management activities fragment the size of natural, undisturbed landscapes through development activities or other resource uses that alter natural ecosystem processes or degrade the appearance of having been affected primarily by the forces of nature. Opportunities to experience solitude or to participate in an unconfined type of primitive recreation can be impacted by activities that create impacts to the visual environment and that create disturbances to recreation users from restricted access, permanent developments, and the presence of field crews, equipment and associated noise. Allowable uses and management actions that could affect wilderness characteristics include surface development and associated infrastructures such as vegetation management, range improvement projects, or more intensive activities such as natural gas development. Impacts to other resources from management of wilderness characteristics are described under the respective resource headings throughout Chapter 4.

Wilderness characteristics in areas with a high potential for resource development are likely to be more heavily impacted through the long-term. Small-scale, dispersed development (range improvements, etc.) have a lesser impact due to the ability to fit these facilities into natural landscapes. In addition, actions that occur on lands not administered by the BLM (regardless of ownership) can affect the wilderness characteristics of the adjacent BLM lands.

Assumptions and Guidelines

In order to protect and/or restore wilderness characteristics in the planning area, the following assumptions are made:

- Short-term impacts to apparent conditions of naturalness and solitude from restoration and management projects would be necessary to manage for long-term naturalness.
- Reintroducing fire would enhance long-term naturalness and ecosystem function in lands with wilderness characteristics.

- Designated travel routes within areas with wilderness characteristics would be identified to prevent impacts to natural resources and the visitor experience. The direct effects of these travel routes would be evaluated when travel management planning is implemented.
- Surface disturbances generally decrease conditions of naturalness due to short and long-term visual resource contrast from loss of vegetation, soil impacts, and alteration of wildlife behaviors.
- The greater the amount of surface disturbance authorized within areas possessing wilderness characteristics, the greater potential impact to naturalness and opportunities for solitude or primitive recreation.
- Resource protection stipulations and measures can protect the existing wilderness characteristics of the landscape.
- Short-term effects on wilderness characteristics may occur for long-term resource benefit.
- Areas possessing wilderness characteristics are not subject to the policies or guidance applicable to WSAs or Wilderness Areas.
- Under Alternative A, decisions on projects in areas possessing wilderness characteristics would be consistent with current management.

Impacts Common to All Alternatives

Protective management actions for wilderness characteristics, wildlife/habitat, cultural, paleontological and geological resources, and special designations would have both direct and indirect impacts on wilderness characteristics. Stipulations and reclamation requirements would be placed on surface-disturbing activities to help protect those resource values.

Surface-disturbing activities would affect wilderness characteristics to varying degrees depending on the type of disturbance, amount, duration (long-term versus short-term), location, and success of reclamation efforts.

Fire Management and Ecology: Fire suppression activities would be expected under all alternatives. Impacts from the use of mechanical equipment for construction of firelines, safety zones, spike camps or landing zones would be expected to degrade naturalness in the short term. Rehabilitation efforts would mitigate impacts over the long term.

Planning for the role of wildland fire as an essential ecological process and natural change agent could benefit naturalness in areas with wilderness characteristics where fire is allowed to play a natural role in the ecosystem. Opportunities for solitude and primitive recreation opportunities would be impacted during fire periods and restoration, due to visual impacts and the presence of suppression and ES&R crews and equipment. ES&R treatments would stabilize and prevent unacceptable degradation to natural resources and would repair or improve fire-damaged lands unlikely to recover naturally to management-approved conditions, which would help ensure long-term naturalness of the impacted areas. Without taking these actions, native vegetation communities, wildlife habitat, aquatic resources, as well as the road and trail system would be susceptible to long-term degradation.

Fluid Minerals: Approximately 70,172 acres (19%) of lands with wilderness characteristics are currently leased for oil and gas development. About 13, 697 acres within the Western Breaks and Badlands region are in the high development potential while the remaining areas fall within the low to very low development potential. Exploration activities and development potential are estimated based on known mineral surveys/inventories, which is subject to change over time with the introduction of new information or technologies.

Livestock Grazing: Livestock grazing can impact native biological communities and often requires developments to accomplish allotment objectives. Impacts to primitive recreation would also be expected due to cattle congregation in recreation use areas which could create conflict between recreation users and cattle. Achieving or maintaining Standards for Rangeland Health and Guidelines for Livestock Grazing Management would benefit wilderness characteristics by maintaining and enhancing natural environments.

Noxious Weeds and Other Non-native, Invasive Species: Management of non-native, invasive species would have the both short and long-term impacts to naturalness and the visitor experience. Eradication and containment of invasive species would help maintain and improve natural vegetative communities and ecosystem processes in the long term. Short-term impacts may occur during and shortly following project implementation. The presence of treatment crews would detract from solitude during project implementation periods, but would benefit long-term opportunities for primitive recreation in an unaltered landscape. Short-term disturbances from plant removal may also create short-term impacts to visual resources, but would benefit the visual setting in the long term through maintenance and recovery of native species.

OHV Use and Travel and Transportation Management: Future travel management planning that is proposed under all of the action alternatives would take proactive steps to inventory, designate and maintain a sustainable transportation system.

Cumulative Impacts

The proposed Keystone X/L Pipeline includes construction of a 36 inch oil pipeline on BLM land in northeast Phillips County and through Valley County. Approximately 1,186 acres of BLM land are projected to be disturbed in the short term by this action. These surface-disturbing actions are associated with excavating and burying the 36 inch pipeline which would create new roads to access the pipeline construction and cause soil erosion and vegetation loss. Construction of the pipeline would affect visual resources by creating changes in the form, line, color and texture of the landscape which may affect the scenic quality and degrade recreational opportunities and the quality of the recreational experiences in and around the pipeline construction area. These effects would be greatest during the fall hunting season and to a lesser degree during the spring and summer for those who enjoy pleasure driving, wildlife viewing, hiking, and horseback riding.

Impacts under Alternative A (Current Management)

Under Alternative A, no lands with wilderness characteristics would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation.

Fire Management and Ecology: All fires would be managed for full suppression under the current management. Opportunities for solitude and primitive recreation opportunities would be impacted during fire periods and restoration, due to visual impacts and the presence of suppression and ES&R crews and equipment. The construction of new fire lines and other disturbances related to suppression activities would detract from naturalness and the visitor experience in the short term. ES&R treatments would stabilize and prevent long-term degradation to natural resources and would repair or improve fire-damaged lands unlikely to recover naturally to management-approved conditions, which would help ensure long-term naturalness of the impacted areas. Without taking these actions, native vegetation communities, wildlife habitat, aquatic resources, as well as the road and trail system would be susceptible to long-term degradation.

Fluid Minerals: Under Alternative A, approximately 51,108 acres of areas with wilderness characteristics would be subject to NSO for other resource values. Wilderness characteristics would be protected on these acres because fluid mineral surface-disturbing activities and occupancy would not be allowed unless a waiver, exception, or modification is granted.

Forests and Woodlands: Thinning treatments and sale of forest products would continue to be done as needs and opportunities arise and would be identified and prescribed through silvicultural planning. The Island Mountain Range (4,118 acres) would continue to be closed to commercial timber sales but other areas possessing wilderness characteristics would be open to potential harvest of wood products. Removal of wood products would create short-term visual impacts of exposed stumps and slash piles and involve some off-road trails that may be utilized by the recreating public. Best management practices and use of prescribed fire to remove debris would help keep visual these impacts and introduction of invasive plant species to a minimum and promote the overall, long-term health of forests and woodlands.

Lands and Realty

Rights-of-Way, Leases and Permits: No existing easements or permits are authorized for the areas with wilderness characteristics. However, future demand for rights-of-way to provide legal access to private lands and for roads, transmission lines and other energy facilities is likely in some areas with high mineral potential and intermixed land ownership.

Livestock Grazing: Impacts would be similar to those described under Impacts Common to All Alternatives. Range improvements could be built to support AMPs, which would impact the apparent naturalness of areas with wilderness characteristics.

OHV Use and Travel and Transportation Management: The Island Mountain Range (Area 1) would be closed to motorized use. Impacts would be similar to those described under Impacts Common to all Alternatives.

Cross-country vehicle use for game retrieval would not be allowed under this alternative, which would prevent future impacts to naturalness or the visitor experience from this use.

Solid Minerals: About 2,473 of lands with wilderness characteristics have a high or moderate potential for hardrock minerals. The Island Mountain Range (Area 1) is currently withdrawn from mineral entry until 2017. The BLM would review the withdrawal prior to expiration. If the withdrawal is not extended impacts to wilderness characteristics could be expected.

Vegetation – Rangeland, Riparian and Wetland: Range improvements such as additional fences and livestock waters could have an impact on the apparent naturalness of areas with wilderness characteristics. Land treatments to increase vegetation production, such as chisel plowing, could also have impacts on the visual quality and apparent naturalness of those areas. These impacts would range from short-term to long-term, depending on the type of treatment and vegetative response.

Wilderness Characteristics: No actions would be taken to manage lands with wilderness characteristics to retain their wilderness qualities under this alternative.

Cumulative Impacts

Past and present actions that have affected and would affect wilderness characteristics include mineral exploration and development; livestock grazing; recreational use; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on wilderness characteristics by causing surface disturbance contributing to impacts to naturalness.

The Keystone X/L pipeline would cross approximately 3.2 miles of the one area with wilderness characteristics (Area 84). The pipeline effectively would divide the inventoried lands with wilderness characteristics in half, making the remaining portions unmanageable to protect wilderness characteristics.

Recently there has been increased interest in developing wind energy within the planning area. In an effort to analyze the resource effects of wind energy development, the BLM analyzed the development of two wind energy farms within high wind energy potential areas, one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy farm involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres, with 200 acres of BLM land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy farm involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres, with 727 acres of BLM land disturbance projected in the short term and 544 acres in the long term.

Surface-disturbing actions associated with development of the two wind energy farms would include the creation of new roads, increased soil erosion and vegetation loss, and large visual intrusions from the construction of wind turbines and powerlines, which would affect the wilderness characteristics by adding vertical lines and linear and complex forms to the landscape in areas of high wind energy potential and available for development of wind farms. About 46,309 acres of lands with wilderness characteristics are within a high wind energy development potential.

Resource protective measures that eliminate new surface-disturbing actions also protect the wilderness characteristics of the landscape. Alternative A would continue to allow for the highest acreage of projected surface-disturbing actions of all the alternatives and the least amount of acres of protective resource measures. Because these and other reasonably foreseeable future actions in the planning area from federal, state, private and other lands within and adjacent to the planning area would have adverse effects on visual resources by creating changes to the form, line, color, and texture of the landscape, the total cumulative impact to visual resources would be the greatest of all the alternatives.

Impacts under Alternative B

Under Alternative B, approximately 386,462 acres of BLM land (16% of BLM lands in the planning area) would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics).

Although these areas may be affected by resource conflicts that may be inconsistent with retention of wilderness characteristics, under Alternative B the BLM would apply management to preserve these characteristics to the extent practicable. Potential effects to wilderness characteristics from Alternative B would be less than any other alternative, because it projects the lowest acreage of surface disturbance among the alternatives.

Cultural Resources: Management actions proposed for the Sweet Grass Hills Traditional Cultural Property would protect and enhance wilderness characteristics in the Island Mountain Range (Area 1). Managing the area with an NSO stipulation for oil and gas, as an exclusion area for wind energy rights-of-way, closed to solid mineral leasing and withdrawn from locatable mineral entry would prevent new impacts to wilderness characteristics from development activities. Development of existing leases/claims would create potential impacts to visual resources, the undeveloped character and conditions of naturalness within the Island Mountain Range.

Fire Management and Ecology: Approximately 6,860 acres of BLM land in the entire planning area are projected to be disturbed in the short term by prescribed fire actions. No long-term impacts are expected from reclamation activities. Regrowth of vegetation would improve the visual and natural qualities of the treated areas over the long term.

Both wildfire and prescribed fire would create short-term impacts to primitive and unconfined recreation opportunities, as well as long-term impacts to naturalness. Wildfire would create short-term, localized impacts to visual resources, recreation uses and solitude. Where fuels and vegetative conditions are restored through prescribed fire, the use of heavy equipment and other direct suppression techniques may be reduced in the long term, which would minimize impacts to wilderness characteristics from development of new human-created disturbances and mechanized uses. Impacts are typically less severe from prescribed fire than from wildfire, due to constraints on size and fire line construction techniques. Application of minimum impact suppression tactics would further prevent and minimize impacts from suppression activities. Implementation of prescribed burning, mechanical treatments, or other appropriate methods to restore desired ecological conditions of rangelands, forests or woodlands would improve naturalness in the long term.

Fluid Minerals: Lands with wilderness characteristics would be closed to fluid mineral leasing under this alternative. Approximately 70,172 acres of lands with wilderness characteristics are currently leased for oil and gas development. Most natural gas development is expected to occur in the high and moderate reasonable foreseeable development areas of Blaine and Phillips Counties. About 13,697 acres of lands with wilderness characteristics are within high development areas (Western Breaks and Breaks and Badlands). Fluid mineral development could occur on areas currently leased. Energy development would affect wilderness characteristics during exploration, drilling, production, and abandonment. Effects could include alteration of vegetation, alteration of soils, habitat fragmentation and ongoing activities that would diminish naturalness. Opportunities for solitude and primitive recreation would be diminished relative to the amount of new facility development and the amount of activity that creates noise, dust, emissions or other developments that degrade the natural and undeveloped recreation setting.

Site-specific mitigation measures, BMPs, and reclamation standards would be implemented and monitored to minimize long-term effects to natural resources. The Gold Book, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM and USFS 2007) would be followed. Effects would be both short-term (well pads and pipelines) and long-term (production areas and access roads). Impacts to wilderness characteristics may be protected in the long term if restoration efforts can effectively reestablish native flora and fauna and reclaim or disguise

development facilities. No new leases would be authorized or existing leases renewed within areas with wilderness characteristics, which would limit impacts to existing lease areas.

Forests and Woodlands: Under Alternative B, the BLM would offer forest products as opportunities arise. Best management practices would be used to keep adverse impacts to a minimum and the goals and objectives of any treatments would be to mimic ecological processes. Treatment activities would cause short-term impacts to the wilderness characteristics of the areas but the long-term effects are expected to benefit the resource. The potential for silvicultural treatments would be greatest in the Island Mountain Range, Western Breaks and Badlands and Eastern Breaks and Badlands where trees are a common vegetative component.

Lands and Realty

Access: Retention of areas with wilderness characteristics would ensure continued opportunities for dispersed recreational use by the public.

Land Ownership Adjustment: Under Alternative B, all areas with wilderness characteristics would be categorized for retention of public ownership. This would ensure continuance of the recreational opportunities associated with these areas but would limit the opportunities for land exchanges or sales that would benefit wilderness characteristics and opportunities for improved public access elsewhere.

Rights-of-Way, Leases and Permits: Lands with wilderness characteristics would be managed as right-of-way avoidance areas. If lands with wilderness characteristics could not be avoided during sighting of right-of-way facilities, long-term impacts to naturalness, the undeveloped character and opportunities for solitude and primitive recreation would be expected. Long-term impacts to visual resources would be likely, but may be mitigated if facilities can be buried and if permanent access/maintenance roads are not required for operation of the right-of-way. Short-term impacts to visual resources and recreation opportunities would be unavoidable in the short term due to removal/ alteration of vegetation, wildlife, and soils, as well as from disturbances created by use of access roads and construction activities at development sites.

Livestock Grazing: Livestock grazing has the potential to impact naturalness, the undeveloped character, and to create conflict with recreation users. Manipulation of vegetation, alteration of soils, and the presence of fecal matter would create unnatural conditions and would impact opportunities for solitude, particularly in areas where livestock congregate. Range facilities, such as fences, water troughs, and tanks have the potential to degrade wilderness characteristics by creating new developments, disturbing visual resources, and influencing wildlife migration, reproduction, and mortality (e.g., sage-grouse/fence collisions). However, facilities may help livestock operators meet the standards for rangeland health and proper functioning condition, which could improve or maintain natural conditions in areas with wilderness characteristics. Natural conditions would be expected to remain similar to those present now, and may improve in areas that are not currently meeting standards where future allotment management restores natural conditions.

OHV Use and Travel and Transportation Management: All areas with wilderness characteristics would be managed as semi-primitive motorized except the Island Mountain Range, which would be managed as semi-primitive non-motorized. These areas would provide opportunities for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Visitors will have the opportunity for a high degree of interaction with the natural environment with moderate challenge and risk and the chance to use outdoor skills.

Areas with wilderness characteristics would be managed to allow for OHV use on existing routes, with the exception of the Island Mountain Range, which would continue to be managed under a closed designation. Formal route designations would not be made under this alternative. Providing continued access on established routes would benefit some users by allowing continued access to backcountry resources for hunting and other recreation uses, but would also diminish opportunities for solitude commensurate with increasing use. Limiting vehicle use to existing routes would minimize new disturbance and help maintain vegetation and wildlife communities, benefitting naturalness. Managing routes in areas with wilderness characteristics as “primitive routes” would preclude most proactive maintenance efforts, which may create both short- and long-term impacts to naturalness and primitive recreation. Without regular maintenance, access would remain stable or may be diminished where routes become impassable due to improper location and design or heavy precipitation events. Maintaining routes in primitive condition would minimize the potential for increased use which would help maintain opportunities for solitude. However, in cases where existing routes deteriorate, there would

be the potential to impact naturalness in areas with high erosion potential, which may lead to multiple user-created routes.

Under this alternative there would be no provision for motorized cross-country vehicle use to retrieve big game species during hunting seasons. Therefore, wilderness characteristics would not be subject to effects from cross-country motorized vehicle use for this purpose, as described in the other action alternatives.

Recreation: Managing areas with wilderness characteristics for semi-primitive motorized recreation setting would maintain existing opportunities for primitive and unconfined recreation. The goals for managing as a semi-primitive motorized setting would provide some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Providing continued opportunities for a high degree of interaction with the natural environment, to have moderate challenge and risk and to use outdoor skills would enhance opportunities for solitude and primitive recreation. This management setting also provide for a low concentration of visitors and subtle on-site managerial controls, which would retain existing opportunities for solitude and an unconfined type of recreation.

Solid Minerals: Exploration and development of solid minerals could create lasting impacts to wilderness characteristics. Removal of bentonite resources, for example, would alter natural ecosystem process through the removal and alteration of vegetation and soils, development of new structures and roads, and increased use. Approximately 4,663 acres are within a low potential for bentonite resources (no high or moderate areas). About 6,260 acres are within a high, moderate or low potential for hardrock mineral resources. Once developed, it is unlikely that an area could be returned to natural conditions. Impacts to visual resources and opportunities for solitude or primitive recreation would be persistent during development and operations.

Vegetation – Rangeland, Riparian, and Wetland: Vegetation treatments on areas with wilderness characteristics would have to be analyzed on a case-by-case basis to ensure they meet VRM Class II specifications (VRM Class I in Area 1). This would include range improvements such as additional fences and livestock waters and land treatments, such as chisel plowing, to increase vegetation production. Impacts from these management treatments would range from short- to long-term, depending on the type of treatment used and vegetative response. Projects that would cause adverse, long-term impacts to the wilderness characteristics of these lands would not be allowed.

Visual Resources: Managing all 386,462 acres of lands with wilderness characteristics to meet VRM Class I or II objectives would retain the appearance of naturalness by allowing only minor changes to the characteristic landscape that would not be discernible to the average person. Opportunities for primitive recreation would benefit from retaining the natural setting because opportunities to escape from the sights and sounds of civilization would remain available. Projects that would create dominant contrasts to the landscape characteristics of form, line, color or texture of the landscape would be minimized, except where valid development rights exist. Adhering to VRM objectives would minimize disturbances and activities that would be incompatible with providing opportunities for solitude or primitive recreation.

Dry Fork Creek, Phillips County Photo by Kathy Tribby

Wilderness Characteristics: Under this alternative, all 26 areas totaling 386,462 acres that were found to have wilderness characteristics would be managed to maintain or enhance their wilderness qualities. A variety of protective measures would be applied to these areas, as described above under the applicable resource sections. The areas that would be managed to protect their wilderness qualities are shown in Table 4.92 and Map W.9, which is available on the internet at http://blm.gov/8qkd.

Table 4.92
Areas Managed for Wilderness Characteristics
Alternative B

Inventory No.	*Area*	*Acres*
1	East Butte Sweet Grass Hills	4,118
3A	Sand Creek	13,299
3B	Cummings Bench	6,244
4	Black Elk Coulee	8,719
19A	Beauchamp Creek West	8,000
19B	Beauchamp Creek East	5,039
19C	Beauchamp Creek South	6,039
20A	Dry Fork/Garey Coulee West	7,206
20B	Dry Fork/Garey Coulee East	7,024
32A	Lamere/Lambing Coulees North	14,237
32B	Lamere/Lambing Coulees South	25,744
33	Phillips Black Coulee	8,676
49A	Sage Creek - Badland Coulee	5,327
49B	Sage Creek - Castle Butte	5,144
49C	Sage Creek - The Sag	35,954
53	Square Creek	5,570
54	Gumbo Plateau	16,718
55	Lower Grant Coulee	39,913
56	Moss Coulee	14,337
62	Caravan/Mark Hawk Hills	49,564
84	Rock Creek	9,264
90	East Fork Crow Creek	20,289
91A	Frenchman Creek - East	24,999
91B	Snake Creek	22,312
93	Frenchman Creek - Northwest	14,133
94	Box Elder Creek	8,593
	Total	386,462

Cumulative Impacts

Past and present actions that have affected and would affect wilderness characteristics include mineral exploration and development; livestock grazing; recreational use; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on wilderness characteristics by causing surface disturbance contributing to impacts to naturalness.

Impacts under Alternative C

Under Alternative C, approximately 228,419 acres of BLM land (9% of total BLM land in the planning area and 59% of total lands with wilderness characteristics) in 12 areas would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics).

Although these areas may be affected by resource conflicts that may be inconsistent with retention of wilderness characteristics, in these 12 areas, the BLM would apply management to preserve these characteristics to the extent practicable. Potential effects to wilderness characteristics from Alternative C would be less than Alternatives A, D and E but more than Alternative B.

Under this alternative, the remaining 14 areas (158,043 acres) possessing wilderness characteristics would be managed to protect or develop other resource values that may conflict with the naturalness and opportunities for solitude and primitive or unconfined recreation. These areas are in the high development potential for oil and gas development and/or contain a high percentage of acres already leased for fluid or solid mineral development.

Cultural Resources: The impacts would be the same as Alternative B.

Fire Management and Ecology: The impacts would be the same as Alternative B.

Fluid Minerals: Under Alternative C, the Island Mountain Range (Area 1), Sagebrush Grasslands (Areas 20B, 49C, 54, 55 and 62), and Eastern Breaks and Badlands (Areas 49B and 53) would be closed to fluid mineral leasing (143,794 acres). The Prairie Grasslands (90, 91A, 91B and 93 would be NSO (78,280 acres). Approximately 571 acres of Area 91B is currently leased for oil and gas development though the potential for development is very low. No new leases would be authorized or existing leases renewed within areas with wilderness characteristics, which would limit impacts to existing lease areas.

Management actions within these areas would have to meet VRM Classification I for the Island Mountain Range and II for the remaining areas. Potential affects to wilderness characteristics during exploration, drilling, production, and abandonment would have to be mitigated to meet the goals and objectives of these classifications.
Energy development on areas not managed for wilderness characteristics would be subject to the guidelines and development potential consistent with other resource needs. These guidelines may not be adequate to protect and maintain the current level of wilderness characteristics.

Forests and Woodlands: The impacts would be the same as Alternative B.

Lands and Realty

Access: Retention of areas with wilderness characteristics would ensure continued opportunities for dispersed recreational use by the public.

Land Ownership Adjustment: Under Alternative C, the 12 areas with wilderness characteristics would be categorized for retention of public ownership. This would ensure continuance of the recreational opportunities associated with these areas but would limit the opportunities for land exchanges or sales that would benefit wilderness characteristics and opportunities for improved public access elsewhere.

Rights-of-Way, Leases and Permits: Lands with wilderness characteristics would be managed as right-of-way avoidance areas under this alternative. If lands with wilderness characteristics could not be avoided during sighting of right-of-way facilities, long-term impacts to naturalness, the undeveloped character and opportunities for solitude and primitive recreation would be expected. Long-term impacts to visual resources would be likely, but may be mitigated if facilities can be buried and if permanent access/maintenance roads are not required for operation of the right-of-way. Short-term impacts to VRM and recreation opportunities would be unavoidable in the short term due to removal/ alteration of vegetation, wildlife, and soils, as well as from disturbances created by use of access roads and construction activities at development sites.

Livestock Grazing: The impacts would be the same as Alternative B.

OHV Use and Travel and Transportation Management: Under Alternative C, Areas 49C, 54, 62, 49B and 53 (95,631 acres) would be managed as semi-primitive motorized while areas 1, 20B, 55, 90, 91A, 91B and 93 (132,788 acres) would be managed as semi-primitive non-motorized. These areas would provide opportunities for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Visitors will have the opportunity for a high degree of interaction with the natural environment with moderate challenge and risk and the chance to use outdoor skills.

Under this alternative, areas managed for wilderness characteristics would allow for OHV use on existing routes only, with the exception of the Island Mountain Range, which would continue to be managed under a closed designation. Formal route designations would be made during travel management planning. Providing continued access on established routes would benefit some users by allowing continued access to backcountry resources for hunting and other recreation uses, but would also diminish opportunities for solitude commensurate with increasing use. Limiting vehicle use to existing routes would minimize new disturbance and help maintain vegetation and wildlife communities, benefitting naturalness. Managing routes in areas with wilderness characteristics as "primitive routes" would preclude most proactive maintenance efforts, which may create both short- and long-term impacts to naturalness and primitive recreation. Without regular maintenance, access would remain stable or may be diminished where routes become impassable due to improper location and design or heavy precipitation events. Maintaining routes in primitive condition would minimize the potential for increased use which would help maintain opportunities for solitude. However, in cases where existing routes deteriorate, there would be the potential to impact naturalness in areas with high erosion potential, which may lead to multiple user-created routes. Cross-country travel for the purpose of big game retrieval would not be allowed in areas managed for wilderness characteristics.

Recreation: Managing areas with wilderness characteristics for semi-primitive non-motorized and semi-primitive motorized recreation settings would maintain existing opportunities for primitive and unconfined recreation. The goals for managing these settings would also provide some opportunity for isolation from man-made sights, sounds, and management controls in a predominantly unmodified environment. Providing continued opportunities for a high degree of interaction with the natural environment, to have moderate challenge and risk and to use outdoor skills would enhance opportunities for solitude and primitive recreation. This management setting also provide for a low concentration of visitors and subtle on-site managerial controls, which would retain existing opportunities for solitude and an unconfined type of recreation.

Solid Minerals: The impacts would be the same as Alternative B.

Vegetation – Rangeland, Riparian, and Wetland: The impacts would be the same as Alternative B.

Visual Resources: The impacts would be the same as Alternative B.

Wilderness Characteristics: Under Alternative C, 12 areas totaling 228,419 acres would be managed to retain or enhance their wilderness qualities. A variety of protective measures would be applied to these areas under the applicable resource sections. The areas that would be managed to protect their wilderness qualities are shown in Table 4.93 and Map W.9, which is available on the internet at http://blm.gov/8qkd.

Cumulative Impacts

Past and present actions that have affected and would affect wilderness characteristics include mineral exploration and development; livestock grazing; recreational use; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on wilderness characteristics by causing surface disturbance contributing to fragmentation and impacts to naturalness.

Areas that currently meet the wilderness characteristics criterion but are managed for development or protection of other resource values, such as oil and gas or bentonite removal, could be impacted to the point where they no longer meet the criterion for wilderness characteristics resulting in a net loss of opportunities for solitude and opportunities for primitive and unconfined recreation.

Table 4.93 Areas Managed for Wilderness Characteristics Alternative C		
Inventory No.	***Area***	***Acres***
1	East Butte Sweet Grass Hills	4,118
20B	Dry Fork/Garey Coulee East	7,024
49B	Sage Creek - Castle Butte	5,144
49C	Sage Creek - The Sag	18,635
53	Square Creek	5,570
54	Gumbo Plateau	16,718
55	Lower Grant Coulee	39,913
62	Caravan/Mark Hawk Hills	49,564
90	East Fork Crow Creek	20,289
91A	Frenchman Creek - East	24,999
91B	Snake Creek	22,312
93	Frenchman Creek - Northwest	14,133
	Total	228,419

Impacts under Alternative D

Potential effects to wilderness characteristics from Alternative D would be the greatest of any other alternative, because it projects the highest acreage of surface disturbance among the alternatives. This disturbance would impact the naturalness, solitude, and opportunities for primitive and unconfined recreation.

Cultural Resources: Island Mountain Range –The impacts would be similar to Alternative B except the BLM would not recommend an extension of the current withdrawal from locatable mineral entry for the Sweet Grass Hills. Potential mining activities would impact the naturalness and opportunities for solitude and primitive and unconfined recreation within the Island Mountain Range.

Fire Management and Ecology: The impacts would be the same as Alternative B.

Fluid Minerals: Under Alternative D, approximately 96,202 acres of areas with wilderness characteristics would be subject to NSO for other resource values. Wilderness characteristics would be protected on these acres because fluid mineral surface-disturbing activities and occupancy would not be allowed unless a waiver, exception, or modification is granted. Another 280,386 acres would be available for leasing with controlled surface use or timing stipulations and 9,877 acres with standard terms only.

Over time, the impacts of increased fluid mineral development throughout the planning area would have an impact on areas that currently possess wilderness characteristics as well as those adjacent. This development could cause long-term or permanent disturbances that would impact the naturalness, opportunities for solitude and opportunities for primitive and unconfined recreation. Supplemental values of these areas could also be compromised.

Forest and Woodlands: Other impacts would be similar to Alternative B except a full range of forest health treatments would be allowed in the Island Mountain Range which could include the sale of wood products. Activities associated

with logging and removal of wood products would have an adverse impact on the naturalness, solitude and opportunities for primitive and unconfined recreation in the area.

Lands and Realty

Access: Loss of areas with wilderness characteristics through sale or exchange could lead to a loss of public access to those lands.

Land Ownership: Lands possessing wilderness characteristics would not be designated as Category 1 (retention) lands and may be considered for sale or exchange (Category 2) as opportunities arise.

Rights-of-Way, Leases and Permits: Issuance of rights-of-way, leases or disturbance permits on or through areas with wilderness characteristics could cause long-term or permanent disturbances that would impact the naturalness, opportunities for solitude and opportunities for primitive and unconfined recreation. Supplemental values of these areas could also be compromised.

Livestock Grazing: The impacts would be the same as Alternative B.

OHV Use and Travel and Transportation Management: Under this alternative, the East Butte of Sweet Grass Hills (Area 1) would be limited to OHV use and off road big game retrieval would be allowed between the hours of 10:00 a.m. and 2:00 p.m. Opening up this area to OHV use and allowing hunters to drive off of existing trails to retrieve big game could speed up the spread of unauthorized trails in the area and impact, not only the wilderness characteristics (naturalness, solitude, and opportunities for primitive and unconfined recreation), but also the resources for which the ACEC portion of the area was designated.

Recreation: Alternative D offers the least restrictions to developed and motorized recreation than the other alternatives. This could lead to more dispersal of these types of recreation across the planning area, potentially reducing impacts to areas that would normally receive concentrated use but increasing the overall number of acres impacted. An increase in motorized and developed recreation on lands with wilderness characteristics would affect the naturalness, opportunities for solitude and primitive and unconfined recreation, and supplemental values in those areas.

Renewable Energy: About 10% of the planning area (232,502 acres) would be open to wind energy rights-of-way with minor constraints (standard terms/conditions and BMPs) and 78% of the planning area (1,906,946 acres) would be avoidance areas (Table 2.13). About 46,309 acres of lands with wilderness characteristics are within a high development potential for wind energy. In areas that are not managed to retain their wilderness characteristics, new developments, such as wind farms, transmission facilities and access roads, as well as the operation of renewable energy facilities would impact the undeveloped quality and visitor experience in these areas.

Special Designations: Under Alternative D, the Frenchman ACEC (63,482 acres) would be designated to maintain the unique landscape and scenic characteristics and protect the fragile watershed and wildlife species from fragmentation. The proposed ACEC includes all or portions of Areas 93, 91A and 91B. Management of the ACEC would help preserve the wilderness characteristics in those areas.

Vegetation – Rangeland, Riparian and Wetland: Range improvements such as additional fences and livestock waters would have an impact on the apparent naturalness of areas with wilderness characteristics. Land treatments to increase vegetation production, such as chisel plowing, would also have impacts on the visual quality and apparent naturalness of those areas. These impacts would range from short- to long-term, depending on the type of treatment and vegetative response.

Visual Resources: The Prairie Grasslands in northeast Phillips County and northwest Valley County (Areas 93, 91A and 91B) would be managed as VRM Class II. This classification would help preserve the wilderness characteristics by maintaining the existing character of the landscape. The remaining areas with wilderness characteristics would be managed as VRM Class III and VRM Class IV. The objective of these classifications allow for moderate to major modifications to the existing character of the landscape which, potentially, would have great impact to the wilderness characteristics of these areas.

Wilderness Characteristics: Under Alternative D, no actions would be taken to manage lands with wilderness characteristics to retain their size, apparent naturalness, opportunities for solitude, opportunities for primitive and unconfined recreation, or supplemental values. These lands would be managed for other resource values which may be in direct conflict with preservation of wilderness characteristics.

Wildlife: Management for various wildlife species and their resource needs on a case-by-case basis would help maintain some wilderness characteristics in those areas where they happen to overlap. However, the stipulations enforced to protect wildlife (i.e. spacing and timing limits) may not adequately protect all the criterion for wilderness characteristics in an area resulting in a net loss of acres, naturalness, opportunities for solitude or opportunities for primitive and unconfined recreation.

Cumulative Impacts

Past and present actions that have affected and would affect wilderness characteristics include mineral exploration and development; livestock grazing; recreational use; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on wilderness characteristics by causing surface disturbance contributing to fragmentation and impacts to naturalness.

Areas that currently meet the wilderness characteristics criterion but are managed for development or protection of other resource values, such as oil and gas or bentonite removal, could be impacted to the point where they no longer meet the criterion for wilderness characteristics resulting in a net loss of opportunities for solitude and opportunities for primitive and unconfined recreation.

Impacts under Alternative E (Preferred Alternative)

Under Alternative E, the Eastern Breaks and Badlands region (Areas 49B and 53) consisting of approximately 10,714 acres of BLM land (0.4% of total BLM lands in the planning area and 3% of total lands with wilderness characteristics) would be managed to preserve and enhance the apparent naturalness and the opportunities for solitude and primitive and unconfined recreation (wilderness characteristics).

Within these two areas, the BLM would apply management to preserve these characteristics to the extent practicable. Potential effects to wilderness characteristics from Alternative E would be less than Alternatives A and D but more than Alternatives B and C.

All other areas within the planning area possessing wilderness characteristics would be managed to protect or develop other resource values. In some cases, management for these other resource values would also maintain all or some of the wilderness characteristics of those areas.

Cultural Resources: The impacts would be the same as Alternative B.

Fire Management and Ecology: The Sweet Grass Hills FMU, which includes the Island Mountain Range, would be managed as a fire management category B. All unplanned fires would be fully suppressed, which could create impacts to naturalness from construction of fire lines, safety zones, spike camps and access roads. Management under category B would allow for prescribed burning, which could benefit the maintenance and recovery of natural vegetation communities. Proactively reducing fuel levels to natural conditions may also prevent more aggressive suppression tactics that would impact naturalness.

The remaining areas would be managed as fire management category C, where fire is desired to manage ecosystems. Areas in this category would have the potential to allow wildfire to have a natural role in ecosystem management, which would benefit naturalness and may prevent some potential impacts from suppression efforts.

Fluid Minerals: Under the preferred alternative, the Eastern Breaks and Badlands region (Areas 49B and 53) would be NSO for oil and gas leasing to protect wilderness characteristics.

The Island Mountain Range (Area 1) would be closed to mineral leasing to protect cultural resources. This closure would prevent any new impacts from development and operations of energy facilities, thereby protecting wilderness characteristics of the area. Much of the Sagebrush Grasslands (Areas 20B, 49C, 49D, 54, 55 and 62) and Prairie Grasslands (Areas 90 and 91B) regions would be open to mineral leasing but with major constraints to protect the special wildlife values of those lands. The wildlife constraints such as timing and spacing limits would reduce or slow down development in these areas but may not be adequate to maintain the wilderness characteristics.

A portion of the Prairie Grasslands region (Areas 93 and 91A) would be included in the Frenchman ACEC and managed to maintain the unique landscape and scenic characteristics and protect the fragile watershed and wildlife species from fragmentation. The ACEC would be NSO for oil and gas leasing.

Management under an NSO stipulation would prevent new surface development within these areas, which would protect naturalness and the visitor experience from development conflicts. Most of the lands that would be managed as NSO are located in areas with low or very low mineral potential, which naturally limits the demand for leases or possibility of development. However, some areas may have mineral potential that could be accessed using directional drilling or other technologies that allow for extraction without surface facilities. In these areas, development may occur on or near the area boundaries, which may create outside disturbances that would detract from the visitor experience within protected areas due to clustering of development.

The remaining areas with wilderness characteristics would be open to oil and gas leasing with minor constraints. Constraints such as timing limitation, controlled surface use or standard lease terms would help prevent undue degradation of public land resources, but may fall short of protecting wilderness characteristics if development occurs. Energy development would affect wilderness characteristics during exploration, drilling, production, and abandonment. Effects could include alteration of vegetation, alteration of soils, habitat fragmentation and ongoing activities that would diminish naturalness. Opportunities for solitude and primitive recreation would be diminished relative to the amount of new facility development and the amount of activity that creates noise, dust, emissions or other developments that degrade the natural and undeveloped recreation setting.

Forest and Woodlands: Forest treatments would have the potential to alter conditions of naturalness and opportunities for primitive recreation in the short term. Removal of vegetation and surface disturbance associated with the removal of forest materials could create contrasts to the visual resources and would create noise and other human disturbances during project periods. Surface disturbance may lead to noxious weed infestations and proliferation where disturbed soils become available for the establishment of weed seeds. Adhering to BMPs would prevent most unnecessary impacts from occurring. These impacts would be less noticeable and would help return forested environments to their natural condition over time, which would benefit wilderness characteristics in the long term.

Lands and Realty

Land Ownership Adjustments: The Eastern Breaks and Badlands areas would be identified for retention or very limited disposal through exchange. The areas would not be available for sale (Category 2 lands under Land Ownership Adjustment). Retaining these areas under federal ownership would help ensure the manageability of these areas for protecting their wilderness characteristics consistent with the management direction proposed by this plan. The lands would be exchanged only if necessary to further protect or enhance the wilderness characteristics.

Rights-of-Way, Leases and Permits: The areas that are targeted to maintain wilderness characteristics would be managed as ROW avoidance areas. In these areas, efforts would be made to reroute future proposals. A right-of-way may be allowed if no reasonable alternative is found; however, special mitigation measures may be required to protect sensitive resource values. Rights-of-way may also be allowed if they support or promote other management objectives for the area. If ROWs are authorized, they would have the potential to impact wilderness characteristics by creating new developments and by authorizing the use of motorized equipment and vehicles to construct, operate and maintain facilities. These impacts may be mitigated where disturbed areas are returned to natural conditions, and where permanent access roads are not required for operation and maintenance.

Livestock Grazing: The impacts would be the same as Alternative B.

OHV Use and Travel and Transportation Management: Under this alternative, the Eastern Breaks and Badlands would be designated limited to OHV use and managed for semi-primitive motorized use pending subsequent travel management planning. This area is a moderate priority for travel management. The Island Mountain Range would remain closed to motorized travel which would prevent future impact to naturalness from the development of new routes, pull-offs, and vehicle camping areas. Closed areas also offer the greatest opportunities for solitude by limiting access to non-motorized means. Managing the remaining areas with wilderness characteristics as limited to designated or existing routes would help minimize the proliferation of new vehicle routes, especially where planning and implementation (e.g. signs, enforcement) take priority. Preventing the establishment of new routes protects naturalness and primitive recreation opportunities by maintaining natural conditions and limiting access in certain areas where solitude is currently available and important to users. Adverse impacts to wilderness characteristics are more likely to occur the longer it takes to plan and implement a designated route system.

Paleontological Resources: Paleontological investigations and excavations may create short-term disturbances to vegetation, soils and the visitor experience in small, site specific areas. The presence of field crews would also create short-term impacts to visitors' solitude. These impacts would be negligible in the long term, following site restoration. New information gained through investigations would benefit the supplemental values of areas with wilderness characteristics and may provide for increase public education opportunities and appreciation.

Recreation: This alternative would maintain and establish a range of recreation settings from semi-primitive to roaded natural. In general, wilderness characteristics would be better protected under a non-motorized designation when compared to semi-primitive motorized or road natural designation.

The Island Mountain Range would (Area 1) would be managed to maintain and provide non-motorized recreation opportunities. This area would be managed in a manner most consistent with protecting wilderness characteristics and would be least likely to have increasing levels of motorized use.

The Eastern Breaks and Badlands (Areas 53 and 49B) would be managed to maintain and provide semi-primitive motorized recreation opportunities (10,714). While these areas would not develop facilities to increase motorized use, they would be open for uses that could become incompatible with protecting wilderness characteristics if use increases. Increasing use may necessitate route maintenance and structures to prevent resource impacts from continued use. In these cases, the wilderness characteristics would be degraded in the long term. Managing vehicle use to maintain semi-primitive access should maintain levels of access and the existing levels of solitude and primitive recreation opportunities.

The remaining areas would not be managed as roaded natural. The roaded natural designation would provide for motorized recreation opportunities in a natural setting. Motorized recreation would be expected to increase over time, which would have the potential to degrade the conditions and visitor experience in areas that have wilderness characteristics.

Renewable Energy Resources: The Eastern Breaks and Badlands (10,714 acres) would be managed to retain their wilderness characteristics and excluded from future renewable energy development projects, including wind energy site monitoring and testing. Another 282,987 acres are not managed for wilderness characteristics but are not available for wind energy development for other resource values. No impacts from renewable energy exploration or development would be expected in these areas. In areas that are not managed to retain their wilderness characteristics and available for wind energy, new developments, such as wind farms, transmission facilities and access roads, as well as the operation of renewable energy facilities would impact the undeveloped quality and visitor experience in these areas.

Special Designations: Managing the Sweet Grass Hills and Frenchman ACECs would protect wilderness characteristics in some areas (Areas 1, 90, and 91A).

Vegetation – Rangeland, Riparian/Wetland: The impacts would be the same as Alternative B.

Visual Resources: The Island Mountain Range (Area 1) would be managed to meet VRM Class I objectives, which would prevent any alteration of the visual environment. Maintaining the natural form, line, and color of the setting would prevent large-scale surface disturbance and would help maintain primitive recreation opportunities.

Seventeen areas would be managed as Class II. VRM Class II objectives would retain the characteristic landscape features allowing for only minor modifications that would not be readily observable by visitors. VRM II objectives are consistent with providing primitive recreation opportunities and would prevent large-scale disturbances or developments from occurring within these areas.

Nine areas would be managed as Class III or IV. Class III and IV VRM objectives would allow for modifications to the natural setting, which would degrade wilderness characteristics in these areas.

Wilderness Characteristics: Under the preferred alternative, two areas totaling 10,714 acres that were found to have wilderness characteristics would be managed to retain or enhance their wilderness qualities. A variety of protective measures would be applied to these areas, as described above under the applicable resource sections. The areas that would be managed to protect their wilderness qualities are shown in Table 4.94 and Figure 2.6.

Table 4.94
Areas Managed for Wilderness Characteristics
Alternative E (Preferred Alternative)

Inventory No.	*Area*	*Acres*
49B	Sage Creek - Castle Butte	5,144
53	Square Creek	5,570
	Total	10,714

Wildlife: Under this alternative, the northern portion of Area 53 (approximately 1,880 acres) would overlap the Greater Sage-Grouse Protection Priority Area in south Phillips and Valley Counties. The entire area, including the portion that overlaps the protection priority area, would be managed to protect wilderness characteristics which will also benefit wildlife species such as greater sage-grouse.

Of the remaining areas with wilderness characteristics that will be managed for other resource values, the Sagebrush Grasslands region (203,714 acres) is located within the Greater Sage-Grouse Protection Priority Area in south Phillips and Valley Counties and a portion of the Prairie Grasslands area (Areas 84, 90, 91B, 93 and 94) (65,998 acres) is located within the Grassland Bird/Greater Sage-Grouse Priority Area in north Phillips and Valley Counties. These areas will be managed for protection of specific wildlife species rather than wilderness characteristics.

Under management for these wildlife species and their resource needs, development in these areas would be limited and controlled by an NSO for oil and gas leasing which would help preserve wilderness characteristics. These areas would be avoidance areas for ROWs which means applications for ROWs and ROW renewals would be considered on a case-by-case basis and may, in some cases, be approved if they are not in direct conflict with the goals and objectives of the priority areas. These actions whether individual or cumulative, depending on their level of short and long-term disturbance, could have an adverse effect on wilderness characteristics, resulting in a net loss of acres, naturalness, opportunities for solitude or opportunities for primitive and unconfined recreation.

The priority areas would be exclusion areas for wind energy ROWs and closed to leasable minerals which would help preserve wilderness characteristics.

Some wildlife mitigation that could be required for development within the priority areas, such as high visibility reflectors on fences, could be in direct conflict with retaining wilderness characteristics by affecting the apparent naturalness of the area.

Cumulative Impacts

Past and present actions that have affected and would affect wilderness characteristics include mineral exploration and development; livestock grazing; recreational use; vehicle travel; and wildfire and prescribed fire. In general, these actions have cumulative impacts on wilderness characteristics by causing surface disturbance contributing to fragmentation and impacts to naturalness.

Areas that currently meet the wilderness characteristics criterion but are managed for development or protection of other resource values, such as oil and gas or bentonite removal, could be impacted to the point where they no longer meet the criterion for wilderness characteristics resulting in a net loss of opportunities for solitude and opportunities for primitive and unconfined recreation.

Wildlife

Assumptions and Guidelines

All alternatives propose actions to manage wildlife habitats throughout the planning area. The focus of management and the acres to be managed vary by alternative. Many of the management actions for wildlife are directed at mitigating direct, short-term impacts of surface-disturbing and disruptive activities in proximity to sensitive wildlife areas.

Impacts to wildlife resources will manifest through changes in the ecological communities, including humans (Hebblewhite 2008). These changes can be classified into direct and indirect effects, and short-term and long-term effects. Actions that remove, degrade, or fragment wildlife habitats are considered adverse. Actions that protect, conserve, or improve habitats, such as limitations on disturbance and habitat restoration, are considered beneficial.

Wildlife populations can be affected by the direct loss of habitat through surface-disturbing activities or through the avoidance of disruptive activities. Populations may also be affected by changes to habitat composition and/or structure related to vegetation management.

Direct impacts to wildlife could result from mortality of individuals or the loss or gain of habitats or key habitat features. Habitats can be lost and fragmented by activities such as mineral exploration and extraction, vegetation conversion or treatments, fire management, construction and maintenance of roads, primitive roads and trails, and development of wind energy facilities. Habitats can also be created through natural processes, vegetation management and habitat restoration. Human activities such as noise and/or movement associated with surface-disturbing activities, management activities, and recreation can impact wildlife, potentially causing abandonment of a nest, breeding area, or home range. Disturbances are particularly harmful during sensitive periods. Sensitive periods vary for different species and include periods for nesting and breeding grouse, nesting raptors, and wintering big game and greater sage-grouse. These disturbances can affect wildlife at local scales or larger scales and the relative effects will vary with the life history of individual species. Generally, larger species have a greater range of habitat needs throughout their life span and respond to landscape-level disturbances more than smaller species. Big game (deer, elk and antelope) and greater sage-grouse are two prominent wildlife groups in the planning area that have demonstrated responses to landscape-level disturbances. Many of the current oil and gas stipulations in place to protect wildlife resources are effective at mitigating effects at local scales, but often do not mitigate impacts at larger scales (Naugle, et al. 2009).

Indirect impacts to wildlife are difficult to determine and can have impacts far beyond direct effects. Indirect effects can impact whole wildlife communities through species interactions. Changes, either negative or positive, in populations of one species can result in changes to other species and the exact direction and extent of the changes are hard to predict. For example, increased water production in the Powder River Basin of southeastern Montana due to energy development led to an increase in the population and distribution of the mosquito species which carries the West Nile virus. This, in turn, resulted in increased mortality to greater sage-grouse due to West Nile virus (Walker 2008). Indirect impacts can also occur through behavioral changes such as the avoidance of roads and well sites, leading to population level impacts (Sawyer, et al. 2005, 2006).

Disturbance impacts range from short-term displacement and shifts in activities to long-term abandonment of home range or population declines (Sawyer, et al. 2005, 2006; Hebblewhite 2008). Short-term impacts to wildlife are activities that an individual or species respond to immediately, but do not affect population viability. Short-term disturbances may cause animals to abandon an area, nest, or breeding area during one breeding season, but wildlife may return to the area and reproduce successfully the following season. These types of disturbances rarely impact the long-term reproduction or survival of individual animals or species, but they may cumulatively impact populations if they occur with greater frequency or duration, or occur throughout large portions of the habitat.

Long-term impacts to wildlife are impacts that continue indefinitely, resulting in population level changes. Long-term impacts are often the result of indirect effects or cumulative short-term effects and are difficult to definitively assign to one particular disturbance factor. Long-term population level impacts are often not noticed for many years, particularly in relatively long lived animals such as deer, elk and antelope (Hebblewhite 2008). Long-term impacts to wildlife populations through behavioral responses to increased human disturbance are associated with the amount of surface disturbance. Initial surface disturbance removes vegetation and disturbs soil resulting in a direct loss of habitat as noted above, but also indirectly affects wildlife populations through habitat fragmentation and avoidance of disturbances (Hebblewhite 2008). Avoidance is variable but the average zone of influence is approximately 1,000 meters (3,281 feet) from roads and oil and gas wells for ungulates (Hebblewhite 2008) and 100 meters (328 feet) from roads for passerine birds (Ingelfinger and Anderson 2004). Walston, et al. (2009) found that indirect effects at these distances resulted in effects to 61% and 15% of sagebrush habitats respectively.

Although reclamation restores habitats, thereby reducing long-term surface disturbance acreage, many wildlife species may still avoid a reclaimed area because of permanent facilities (e.g., roads, well pads, etc.) located adjacent or within the habitat area. Some effects can be mitigated by removing or modifying facilities such as powerlines, roads, or other structures.

Higher densities of permanent facilities and roads have been found to increase the adverse impacts to wildlife although investigations on landscape-level effects have only been completed on a few species. Hebblewhite (2008) conducted an analysis of relevant published studies addressing the effects of energy development on big game throughout North America and found significant long-term impacts to ungulate populations (mule deer, antelope, and elk) when well densities exceed between 0.1 and 0.4 wells/km² (0.26 and 1.04 wells/mi²) and road densities exceed between 0.18 and 1.05 linear km/km² (0.290 and 1.689 linear miles of road/mi²) in ungulate habitat. Some species of grassland birds also avoid improved roads, particularly Sprague's pipits, Baird's sparrows, and chestnut-collared longspurs (Sutter, et al. 2000).

Recent investigations conducted on the effects of oil and gas activities on greater sage-grouse found impacts to breeding populations when well densities exceed one well pad/2.6 km² (one well pad/mi²) within 3 km (1.9 miles) of a lek (Holloran 2005) and impacts at well densities of 8/mi² exceeded the species threshold of tolerance (Holloran 2005, Walker, et al. 2007, Doherty, et al. 2006). Harju, et al. (2009) found that long-term effects varied by development area but generally occurred at densities greater than two well pads/mi² within 5.3 miles of a lek. Some areas had impacts when well densities were less than one well pad/mi^2 and common well pad densities of 4 and 8 well pads/mi² were associated with lek declines ranging from 13-74% and 77-79% respectively (Harju, et al. 2009). Holloran (2005) and Walker, et al. (2007) found effects were often not noted until 3-4 years after development and Harju, et al. (2009) found effects in some areas were only apparent 9-10 years after development, suggesting that the full impact of development may not have yet occurred from recent oil and gas activities. In addition, Tack (2009) found the probability of large leks (>25 males) decreased with the number of wells within 12.3 km (7.6 miles) of a lek and no large leks were expected when well pads exceeded 2 wells/mi². Yearling females avoided infrastructure when selecting nesting sites (Holloran, et al. 2010) and older females that nested near infrastructure had lower survival (Holloran 2005). *This suggests that impacts to greater sage-grouse populations are determined by the level of disturbances in nesting habitat regardless of the distance of disturbances to leks, and impacts can be assessed by well density in sagebrush habitats even though those impacts are measured by the number of males at nearby leks and are often described in relation to distance to leks.* The threshold level for disturbances in silver sage habitats may be lower because of the limited habitat available in this system (Tack 2009).

For some wildlife species disturbances are related to the timing of activities. Raptors are more vulnerable to disturbances during the early stages of nesting. Big game are more vulnerable during the winter, although disturbances located outside winter range areas during the growing season can affect the physiological condition and subsequent winter survival of individuals.

Table 4.95 summarizes the anticipated short-term and long-term surface disturbance from BLM actions in the planning area. Reasonably foreseeable actions contributing to this surface disturbance are discussed in the introduction of Chapter 4. Because the precise location of foreseeable actions in the planning area is not known, Table 4.95 and associated types of development were used to estimate the relative impact of alternatives on wildlife.

Table 4.95 Future Surface Disturbance on BLM Land by Alternative (Acres)					
	Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
Short-Term Disturbance	34,703	52,170	56,277	57,708	56,922
Reclaimed Disturbance	30,933	49,485	52,898	53,898	53,320
Long-Term Disturbance	3,770	2,685	3,379	3,810	3,602

Throughout the planning area, BLM-authorized activities associated with all resources and all resource use programs would be subject to mitigation and minimization guidelines and Best Management Practices (BMPs) (Appendix C), including specific Mitigation Measures and Conservation Actions for Greater Sage-Grouse (Appendix M).

Methods and assumptions used in this impact analysis include the following:

All Wildlife

- Changes to vegetation types; either in quantity, quality, or increased fragmentation, are compared to baseline conditions for each alternative (Chapter 3). Adverse and beneficial impacts to vegetation types (i.e., wildlife habitats) are assumed to have a corresponding adverse or beneficial impact on wildlife species.

- Loss of habitat, whether direct or indirect, can reduce populations via reduced survival, reduced reproduction, or emigration. Individuals pushed from habitats near disturbances will increase densities on remaining habitats, exposing populations to greater density-dependent effects (Sawyer, et al. 2005).

- Thresholds for densities of roads and oil and gas wells have been described for big game (Hebblewhite 2008), and long-term significant impacts to big game species are expected to begin at well densities from 0.26 to 1.04 wells/mi² and with road densities between 0.29 and 1.69 miles of road/mi². The higher figures are used as the threshold in this analysis.

- The extent of disturbances that result in impacts to wildlife was estimated by adding a 1,000 meter buffer to existing oil and gas wells for big game (Hebblewhite 2008) and a 100 meter buffer for passerine birds (Ingelfinger and Anderson 2004). Impacts from new wells were not estimated since we are unable to determine the location of new wells to calculate how much overlap in disturbance areas would occur between the new wells and existing wells.

- All known raptor nests were used in the analysis and all raptor nests of unknown species are assumed not to be special status species.

- The BLM will utilize best available information, management and conservation plans, and other research and related directives, as appropriate; to guide wildlife habitat management on BLM land.

Special Status Species

- Precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, population data for special status wildlife species are often lacking, or habitat types impacted by surface-disturbing activities cannot be predicted.

- Thresholds for densities of roads and oil and gas wells have been described for greater sage-grouse. Effects to sage-grouse populations have been noted when well pad densities exceed 1 well/mi² (Holloran 2005) and long-

term significant impacts are expected when well pad densities exceed 2 wells/mi² (Harju, et al. 2009; Tack 2009) in greater sage-grouse habitat.

- Actions impacting one species have similar impacts on other species using the same habitats or areas.
- Management of sagebrush habitats follows the BLM National Sage-Grouse Habitat Conservation Strategy. Using these guidelines, greater sage-grouse serve as an umbrella species for all sagebrush-dependent species (Hanser and Knick 2009).
- Short-term and long-term surface disturbance are assumed to occur in vegetation types in proportion to the availability of these vegetation types in the planning area. Impact acreages for vegetation types are not absolute, but serve as a relative comparison among alternatives.
- The migratory nature and relative mobility of some special status wildlife species (e.g., greater sage-grouse, grassland birds, migratory birds, and raptors) exposes these species to effects on non-BLM land more so than other species. In the case of migratory species, impacts to winter and migration habitats could adversely impact the viability of some species. Winter and migration habitats are assumed to be at least as important to long-term viability of these species as breeding and nesting habitats.
- Grizzly bears, gray wolves, bull trout, pallid sturgeon, least terns, whooping cranes, and Canada lynx are found in the planning area but no impacts are expected to occur to these species as a result of activities on BLM land in the planning area.
- Impacts are addressed only for BLM sensitive species for which BLM management can impact recovery.

Impacts Common to All Alternatives

Allowable uses and management actions that could impact wildlife habitats include all surface-disturbing activities, primarily oil and gas activities; disruptive activities, usually related to surface-disturbing activities; and actions that result in changes to vegetation structure and diversity without intensive soil disturbance such as livestock grazing. At various intensities, the actions of all alternatives could adversely impact wildlife through the loss, degradation, and fragmentation of habitats, and benefit wildlife through the protection, enhancement, and restoration of habitats. Potential effects from each category of activities are described below as they apply to all alternatives.

All alternatives have surface-disturbing and disruptive activities. The impacts projected to occur to wildlife as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to wildlife from surface-disturbing and disruptive activities and changes in vegetation structure and composition are described under individual alternatives.

Fire Management and Ecology, and Forests and Woodlands: Planned and unplanned fire removes vegetation and can impact soils. Although fire adversely impacts wildlife habitats in the short term by removing vegetation, the long-term benefits of fire often outweigh the short-term adverse impacts. Fire can improve the quality of wildlife habitats by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats. Fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages, young age classes of woody plants, or grassland habitats with little residual cover.

Fire suppression can have adverse effects to wildlife habitats. For example, fuels tend to build under repeated fire suppression, sometimes resulting in intense fires that can cause long-term adverse impacts to soils and subsequent revegetation to provide wildlife habitats. Repeated fire suppression in forests also results in loss of fire-induced wildlife habitats.

Fire suppression activities remove vegetation and disturb soil. Suppression activities can have both short-term and long-term impacts to big game and other habitats. Construction of fire lines can cause habitat loss, degradation, and fragmentation in the short term. Moreover, if not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of noxious weeds, thereby resulting in long-term adverse impacts to wildlife habitats. Timely rehabilitation of the effects of fire suppression is important to maintaining the quality of wildlife habitats.

Fluid Minerals: Oil and gas development (well pads and associated roads) is anticipated to contribute to long-term surface disturbance and loss of wildlife habitats in the planning area as discussed in the introduction of Chapter 4 (Tables 4.2, 4.3, and 4.4). Some areas would have greater impacts from oil and gas activities compared to other areas. The location and density of individual gas wells in the planning area is determined by the geology and oil and gas resource distribution.

Impacts to wildlife have occurred in portions of the planning area from past activities, particularly in areas where current well densities are high, but the extent of those impacts are unknown because we have do not have enough information on the distribution and abundance of wildlife prior to development in those areas.

Although the short-term effects to wildlife habitat and populations are mediated by reclamation, those reclaimed areas adjacent to, or surrounding long-term habitat disturbance do not necessarily result in reclaimed wildlife habitat. Many species often avoid areas of long-term surface disturbance and disruption resulting in long-term indirect effects. Avoidance is not the same as exclusion and ungulates may still use areas near disturbances. However, the avoidance or lower probability of use of habitats near surface-disturbing and disruptive activities creates indirect habitat losses. Loss of habitat, whether direct or indirect, can reduce populations via reduced survival, reduced reproduction, or emigration. Individuals pushed from habitats near disturbances will increase densities on remaining habitats, exposing populations to greater density-dependent effects (Sawyer, et al. 2005).

Applying a 1,000 meter avoidance zone (Hebblewhite 2008) to existing wells, which may lead to long-term indirect impacts to populations of ungulates, results in 11,413 acres (8%) of BLM lands in the high development potential areas; 123,819 acres (32%) in the moderate potential areas; 45,260 acres (10%) in the low potential areas; and 10,830 acres (0.4%) in the very low potential areas within 1,000 meters of an active well (Table 4.96). The number of wells would increase and the acres within 1,000 meters of an active well would also increase in each of the oil and gas potential areas under all alternatives (Table 4.96). Many of these wells would be placed in areas currently not within 1,000 meters of an active well because of well spacing restrictions. The number of wells that can be placed in the lands currently not within 1,000 meters of an active well, based on standard well spacing of one well per square mile, is used as an indicator of how much of this land could potentially be affected when compared with the number of anticipated new wells within each development potential area.

The only stipulation for oil and gas leasing common to all the alternatives is an NSO stipulation that will be implemented within 1/4 mile of special status species habitat unless other species-specific management actions apply. This stipulation would limit surface-disturbing and disruptive activities to mitigate long-term loss of the species habitat and long-term indirect effects from disturbances and disruptions near habitat. The effects of this stipulation would be beneficial for any species it would be applied to, but the extent of the benefits is unknown and would be based on the ecology of the individual species.

Table 4.96
BLM Land within 1,000 Meters of Existing Wells and Anticipated New Wells on BLM Land by Alternative

	Existing Wells			*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Development Potential	*BLM Acres within 1000m of Well*	*BLM Acres Remaining*	*Number of Wells available at 1 Well/Sq. Mile*	*Anticipated New Wells BLM*	*Anticipated New Wells BLM*	*Anticipated New Wells BLM*	*Anticipated New Wells BLM*	*Anticipated New Wells BLM*
High	11,413	134,786	210	434	167	388	442	405
Moderate	123,819	262,540	410	992	283	832	1,001	931
Low	45,260	393,457	614	382	169	343	384	362
Very Low	10,830	2,769,224	4,326	66	28	54	67	58

Lands and Realty: Rights-of-way occur in the planning area under all alternatives and impact wildlife in varying ways. Utility poles may benefit some birds by providing perching or nesting structures; however, these same utility structures also can cause mortality through electrocution and collisions (APLIC 2006). Utility poles can also impact greater sage-grouse and sharp-tailed grouse by providing perches for predatory birds. Even when these structures are fitted with anti-perching devices, the grouse may perceive the structures as a predation risk without direct mortality, particularly when they are near breeding areas (Frid and Dill 2002).

Wind energy facilities are a particular type of right-of-way action that can be a source of mortality for birds and bats when they collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Wind energy facilities also result in direct impacts through habitat loss by construction and maintenance of wind towers and associated facilities as well as indirect impacts due to avoidance of wind farm areas.

Rights-of-ways for new roads or road upgrades may impact migratory birds through indirect avoidance of roadways and associated traffic. Sprague's pipits, Baird's sparrows, and Chestnut-collared longspurs have been found to avoid improved roads (ditched on each side) (Sutter, et al. 2000).

Livestock Grazing, and Vegetation – Rangeland: Cattle grazing remains the most widespread effect to vegetation structure in the planning area, but grazing is a natural disturbance in this area and implementation of allotment management plans (AMPs), intensively working with the permittees since the early 1980s, and the Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997a) have improved range conditions and thus habitat values for most species in the planning area. The most impact to wildlife habitats from livestock is anticipated in concentrated areas, such as water sources and riparian areas. In general, proposed grazing management will be beneficial to wildlife by introducing large-scale heterogeneity and maintaining rangeland health in grassland and shrub habitats. Continued proper management of livestock grazing through the implementation of the standards and guidelines can minimize adverse impacts to wildlife.

Vegetation treatments used to manage rangelands and forests, such as chisel plowing and silvicultural treatments, can impact wildlife habitats by changing the structure and composition of vegetation. The impacts of these changes vary considerably between wildlife species, or even within species in relation to seasonal habitat requirements, depending on the location, extent and severity of the treatments. The impact to wildlife from these activities is expected to be low across the planning area because of the limited acres anticipated to be treated. Vegetation treatments on non-native rangelands can improve the value of those areas as wildlife habitat or improve habitat conditions on native rangelands through changes in grazing pasture rotations.

Noxious Weeds and Other Non-Native Invasive Species: Noxious weeds contribute to loss of wildlife habitats, increase soil erosion, reduce water quantity and quality, and reduce structural and species diversity. Controlling the spread of noxious weeds is necessary to maintain wildlife habitats. Comprehensive management plans are anticipated to be effective in controlling the adverse impacts of noxious weeds. Targeting and eradicating noxious weeds particularly detrimental to certain wildlife habitats are anticipated to benefit wildlife. Leafy spurge is a noxious weed often found in habitats that are important to numerous wildlife species. If the spread of noxious weeds in the planning area continues, adverse impacts to wildlife habitats are anticipated, but strong weed control efforts will be implemented under all alternatives and should mitigate the impacts of weed infestations on wildlife habitat.

OHV Use and Travel and Transportation Management: Roads can result in direct mortality of wildlife species during construction and more importantly from collisions with vehicles operating on the roads. Mortality varies with the average volume and speed of traffic on roads (Forman and Alexander 1998). In addition, because roads typically are void of vegetation and exhibit impervious surface or compacted soil, they often promote increased surface runoff and lead to soil erosion and transport of pollutants to nearby streams, wetlands, or riparian areas. The density of roads also impacts habitat integrity through fragmentation of habitats. The management of roads, primitive roads and trails will be addressed in subsequent travel management plans. New user-created roads, primitive roads and trails could continue to be established in the planning area under all alternatives pending development of a travel management plan. Wildlife habitats will continue to be impacted by roads in the planning area under all alternatives.

Off-road vehicle use is another surface-disturbing activity which, through removal of vegetation, disturbance of soil, and transport of noxious weeds, can degrade wildlife habitats. Currently, only 124 acres of the planning area are open to OHV use off of existing roads, primitive roads and trails.

Recreation: Impacts to wildlife from recreation activities are expected to be low and remain similar across alternatives with a majority of the planning area managed as an ERMA allowing for dispersed recreation.

Renewable Energy: Wind energy facilities can be a source of direct mortality for wildlife, particularly birds and bat mortalities resulting from collisions with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Wind energy facilities also result in indirect population impacts through habitat loss from construction and maintenance of wind towers and associated facilities as well as avoidance of habitats within and near wind farm areas. Impacts to wildlife from wind farms located in areas with highly fragmented native habitats would minimize impacts to priority wildlife species in the planning area (Kiesecker, et al. 2011). Within the planning area, two candidate species may be particularly vulnerable to impacts from wind development: greater sage-grouse and Sprague's pipit. In addition, a suite of special status species associated with grassland habitats including a number of bird species may also be particularly vulnerable to impacts associated with wind development.

The presence of wind turbines may displace some species of grassland birds (Leddy, et al. 1999; Johnson, et al. 2000); however, data are lacking for most mixed-grass and shortgrass affiliated birds. Sprague's pipits negatively respond to shrub and tree densities, and it is likely that they exhibit negative responses to other vertical structures in their habitat (e.g., wind turbines, telecommunication towers, powerline towers), although specific data are limited (Jones 2010). The impacts of wind farms on sage-grouse have not been documented; however, it has been suggested that as a large-scale industrial development it may have similar effects as natural gas (shallow and coal-bed) development (MFWP 2005). In Wyoming, gas development has resulted in wide-scale extirpation or reduction of populations at distances as great as 4 miles from leks (Holloran 2005, Walker 2008). Both gas development and wind farms are characterized by extensive road developments that fragment habitat and increase potential for vehicle collisions. Vertical structures, transmission lines, and turbines may decrease survival or reproductive success as a result of collisions and creation of habitat for predators. Additionally, the structures themselves may alter habitat suitability, resulting in abandonment.

Response of grassland passerines to wind energy development is currently under investigation in North and South Dakota (Shaffer and Johnson 2008). Very preliminary data suggest that grasshopper sparrows avoid turbines, whereas western meadowlarks and chestnut-collared longspurs do not avoid turbines. Species that do not avoid turbines may be more vulnerable to direct mortality, particularly those species whose aerial courtship displays occur at altitudes within the rotor sweep area of turbines. Sprague's pipits may be particularly vulnerable because they prefer landscape features that are also preferred by wind developments. Highest male densities are often along north-south oriented ridges. They are also more vulnerable because males take advantage of winds to display for up to several hours in relatively small areas 50 to over 100 meters above the ground (Robbins 1998). Eagles may also be particularly susceptible to mortality at wind turbines.

Utility poles associated with wind farms may benefit some birds by providing perching or nesting structures; however, these same utility structures also can cause mortality through electrocution and collisions (APLIC 2006). Utility poles can also impact greater sage-grouse and sharp-tailed grouse by providing perches for predatory birds. Even when these structures are fitted with anti-perching devices, the grouse may perceive the structures as a predation risk without direct mortality, particularly when they are near breeding areas (Frid and Dill 2002). Utility poles increase the avoidance areas associated with wind farms and increase fragmentation of remaining habitats resulting in long-term indirect population declines of species associated with native habitats where wind farms occur.

New roads or road upgrades associated with wind farms may impact special status wildlife through indirect avoidance of roadways and associated traffic. Sprague's pipits, Baird's sparrows, and chestnut-collared longspurs have been found to avoid improved roads (ditched on each side) (Sutter, et al. 2000). In addition, construction of roads may negatively impact grassland birds by fragmenting habitat. Sprague's pipit relative abundance and productivity increased with area of available habitat (patch size), and chestnut-collared longspur and Baird's sparrow relative abundances were also influenced by patch size and shape (Davis 2003). Roads would increase the avoidance areas associated with wind farms and increase fragmentation of remaining habitats resulting in long-term indirect population declines of species associated with native habitats where wind farms occur, particularly those noted above.

Soils: Mitigation proposed under all alternatives to protect soil resources will benefit wildlife habitat by ensuring the basis for all wildlife habitat is conserved or improved.

Special Designations: The Kevin Rim (raptors), Bitter Creek (general wildlife) and Azure Cave (bat hibernaculum) ACECs will be retained under all alternatives. This will continue to benefit the resources for which these ACECs were established through area-specific management actions needed to protect or enhance wildlife values. In addition, retention of the Sweet Grass Hills ACEC and the Big Bend of the Milk River ACEC will benefit wildlife species found in those areas by limiting disturbances and minimizing disruptions.

Wildlife

Small Mammals: The small mammals group includes the shrews, mice, rabbits, weasels, and bats. No specific management actions for most small mammals exist under any alternative, but these species would be impacted by other resource management actions. Nongame mammals are found in a variety of habitats and are affected by management actions in the preferred vegetation type of each species. Management actions and allowable uses that restrict or mitigate the effects of surface disturbances and disruptions, regardless of the resource the action applies to, are generally beneficial for mammals occupying habitats as described for migratory birds.

Bats also can utilize a variety of habitats, but caves, abandoned mines, and badland areas are important features for many bat species. Bats that use caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, other rock features, and riparian areas. Mitigation for effects to these species would occur in project level analysis.

Swift fox occur in grassland habitats north of the Milk River in the planning area and could be affected by surface-disturbing and disruptive activities. However, impacts would be mitigated in project level analysis and no large-scale, long-term impacts are anticipated for this species under all alternatives.

Animal damage control is conducted by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) Wildlife Services and would not differ among alternatives. Animal damage control typically applies to coyote, red fox, and skunk in the planning area. Impacts to these species through control actions can be intensive but no difference in adverse impacts to predatory animals is anticipated across alternatives.

Impacts from surface-disturbing activities, disruptive activities, and management actions are anticipated for special status nongame mammals. Surface disturbance is anticipated to have localized adverse impacts to special status nongame mammal habitats including temporary and permanent loss of habitats. Fragmentation and degradation of habitat for special status nongame mammals also is anticipated from surface-disturbing activities and associated development.

Birds

- *Greater Sage-Grouse:* Impacts from surface-disturbing activities, disruptive activities, and management actions are anticipated for greater sage-grouse across all alternatives. Estimated short-term and long-term surface disturbance from BLM actions in the planning area are anticipated to result in loss, degradation, and fragmentation of sagebrush habitat. Oil and gas development is the major source of surface disturbance identified in the planning area under all alternatives, and oil and gas development has been identified as a cause of declining greater sage-grouse populations (Doherty, et al. 2006, Walker, et al. 2007, Naugle, et al. 2009, Harju, et al. 2009). Surface disturbance is anticipated to have adverse impacts to sagebrush habitats including temporary and permanent loss of habitats across all alternatives. Fragmentation and degradation of habitat for greater sage-grouse also is anticipated from surface-disturbing activities and associated development.

- *Migratory Birds:* Each migratory bird species occupies a unique ecological niche and may be subject to a unique set of limiting factors. Given the variety of food habits and breeding requirements of the migratory birds that occupy the planning area, it is certain that any decision to restore or enhance habitat for a particular species will benefit one species or species group, to the detriment of another. Cottonwood galleries and riparian shrubs are particularly important for migratory birds in the planning area.

  Many special status migratory birds breed and nest on BLM land and winter elsewhere. Although impacts to these species on their winter habitat are not subject to BLM management, impacts to breeding and nesting habitats from surface-disturbing activities, disruptive activities, and management actions on BLM land are anticipated for migratory birds.

Because of the number and diversity of migratory bird species and habitat requirements, the descriptions of impacts are categorized under the following habitats: forest and woodland species, grassland species, riparian and wetland species, and sagebrush species.

- *Forest and Woodland Species* – No specific management actions for migratory birds in forests and woodlands are proposed in the alternatives. Management actions and constraints proposed under all alternatives in the Fire Management and Ecology, and Forests and Woodlands sections will provide a mosaic of forested habitat conditions that will benefit a broad range of forest-associated species.

- *Grassland Species* – Grassland-associated migratory birds benefit from actions to conserve special status species grassland birds, and those management actions, which are included in the Wildlife section of Chapter 2, will have benefits for all grassland-associated birds. In addition, grazing management for rangeland health under the current standards and guidelines for all alternatives will benefit grassland-associated species.

- *Riparian and Wetland Species* – No specific management actions are noted for riparian and wetland species but actions to protect and conserve water quantity and quality in the planning area will benefit these species. In addition, management actions that benefit waterfowl will also benefit riparian and wetland species. Grazing management for rangeland health under the current standards and guidelines for all alternatives will benefit riparian-associated species.

- *Sagebrush Species* – A number of management actions related to greater sage-grouse conservation will have benefits for all sage-associated birds (Hanser and Knick 2009). In addition, grazing management for rangeland health under the current standards and guides for all alternatives will benefit sage-associated species.

Priority special status bird species associated with these habitats are:

- *Forest and woodland species* – American three-toed woodpecker, red-headed woodpecker.

- *Grassland Species* – Baird's sparrow, chestnut-collared longspur, dickcissel, Le Conte's sparrow, long-billed curlew, marbled godwit, McCown's longspur, mountain plover, and Sprague's pipit.

- *Riparian and Wetland Species* – black tern, Franklin's gull, Nelson's sharp-tailed sparrow, piping plover, white-faced ibis, willet, Wilson's phalarope.

- *Sagebrush species* – Brewer's sparrow, greater sage-grouse, loggerhead shrike, sage thrasher.

- *Raptors:* Special status raptor species are the bald eagle, northern goshawk, Swainson's hawk, burrowing owl, golden eagle, ferruginous hawk, and peregrine falcon. All new powerlines constructed on BLM lands will be required to comply with the most current raptor protection standards. Currently, these are *Suggested Practices for Avian Protection on Power Lines: The State of the Art 2006* (APLIC 2006). Existing powerlines constructed on BLM land with rights-of-way processed after 1976 will be modified to prevent electrocution of raptors if problems are identified. These actions will greatly reduce impacts to raptors from powerlines on BLM lands under all alternatives. No management actions are specific to raptors under each alternative other than those noted for oil and gas activities.

- *Waterfowl:* No specific management actions for surface-disturbing activities relate to waterfowl. However, as noted above, management actions and allowable uses which restrict or mitigate the effects of surface disturbances and disruptions, regardless of the resource the action applies to, are generally beneficial for waterfowl. Management actions and allowable uses that protect water quality and quantity and riparian habitats are particularly beneficial for waterfowl.

Amphibians and Reptiles: Management actions and allowable uses which restrict or mitigate the effects of surface disturbances and disruptions, regardless of the resource the action applies to, are generally beneficial for reptiles and amphibians. Management actions and allowable uses that protect water quality and quantity and riparian habitats are

particularly beneficial for amphibians. Impacts from surface-disturbing and disruptive activities on important habitat or seasonal use areas (i.e., snake hibernaculum) can be mitigated with standard oil and gas lease terms under each alternative. Impacts to reptiles and amphibians will be minimal with the implementation of these actions.

Cumulative Impacts

Impacts from BLM actions under all alternatives are additive to impacts occurring on non-BLM lands throughout the planning area. Non-BLM impacts generally will not vary by alternative and are discussed here as the baseline to which impacts described for BLM actions under each alternative will be added.

The primary direct impact to wildlife habitats in the planning area is the direct loss of native habitats from conversion to row crop and small grain production. Much of this conversion occurred in the past resulting in agricultural lands comprising about 36% of the planning area, primarily in the western portion. However, continued conversion is expected on private lands in the planning area based on current trends in the Northern Great Plains (Fargione, et al. 2009). In addition, contracts on 1,154,000 acres of private lands enrolled in the Conservation Reserve Program (CRP) in Montana (most of it within the planning area) and not currently cropped will not be renewed, potentially resulting in additional losses of wildlife habitat (Fargione, et al. 2009). The percent of non-federal surface ownership converted to cropland could incrementally continue to increase through the life of the plan. Oil and gas activities on all lands in the planning area are projected by alternative and are discussed in the cumulative effects section for each alternative.

Applying a 1,000 meter avoidance zone (Hebblewhite 2008) to existing wells, which may lead to long-term indirect impacts to populations of ungulates, results in 147,145 acres (39%) in the high development potential areas; 550,565 acres (45%) in the moderate potential areas; 971,353 acres (25%) in the low potential areas; and 169,252 acres (1.7%) in the very low potential areas within 1,000 meters of an active well (Table 4.97). The number of wells will increase and the acres within 1,000 meters of an active well will also increase in each of the oil and gas potential areas under all alternatives (Table 4.97). Many of these wells will be placed in areas currently not within 1,000 meters of an active well because of well spacing restrictions. The number of wells that can be placed in the lands currently not within 1,000 meters of an active well based on standard well spacing of one well per square mile is used as an indicator of how much of this land potentially will be affected when compared with the number of anticipated new wells within each development potential area.

Table 4.97
Total Land in the HiLine Planning Area within 1,000 Meters of Existing Wells and Anticipated New Wells by Alternative (Total Wells)

	Existing Wells			*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
Development Potential	*Total Acres within 1000m of Well*	*Total Acres Remaining*	*Number of Wells Available at 1 well/sq. Mile*	*Anticipated New Wells Total*	*Anticipated New Wells Total*	*Anticipated New Wells Total*	*Anticipated New Wells Total*	*Anticipated New Wells Total*
High	147,145	228,620	357	1,665	1,229	1,606	1,679	1,623
Moderate	550,565	680,465	1,063	2,659	2,054	2,513	2,663	2,607
Low	971,353	2,853,610	4,458	1,375	1,244	1,344	1,376	1,360
Very Low	169,252	9,528,599	14,888	315	260	293	316	306

Alternative energy projects could also impact important wildlife habitat in the planning area. A number of wind farms are currently in production or are planned in the region. Although no wind farms are currently proposed for BLM lands in the planning area, one large and one small wind farm are projected to be built on BLM land somewhere in the planning area under all alternatives. The long-term impacts on wildlife resources from wind farms are predicated on the location they are built. If wind farms are located in areas that are currently not providing high quality wildlife habitat or are outside of major migration routes, impacts to wildlife would be minimized compared to a wind farm placed in high

quality wildlife habitat or in a migration corridor (Martin, et al. 2009). Wind farms placed in high value wildlife habitat could result in significant long-term direct and indirect impacts to many wildlife species through direct mortality (particularly birds and bats) to avoidance, displacement, and habitat fragmentation resulting in population level impacts.

Declining populations of many species associated with grassland habitats have been attributed, in large part, to alteration of disturbance regimes and extensive conversion of habitat to cropland (Samson and Knopf 1994, Fitzgerald et al. 1999, Knapp et al. 1999, Blann 2006). Data from the U.S. Department of Agriculture show that the nation's private grassland and rangeland declined by 25 million acres in just 20 years (1983 to 2003), largely as a result of conversion to cropland (GAO 2007). The greatest losses occurred in the northern Great Plains, specifically in Montana and the Dakotas. Conversion may accelerate in the near future to accommodate a projected four-fold increase in biofuels (Nash 2007, USDA National Agricultural Statistics Service 2007). These impacts to wildlife populations through loss of habitat continue to occur within the planning area making native habitats on BLM lands even more important to populations of grassland and sage associated species. The addition of wind projects into the remaining native habitat on BLM lands will further degrade habitat and result in population declines of species dependent on the habitats where the developments will occur.

Cumulative impacts to wildlife and wildlife habitats are expected to be most prevalent where BLM lands are mixed with non-federal lands and synergistic effects of direct habitat loss through conversion to cropland and indirect disturbances, primarily from oil and gas activities, are expected to occur. Alternately, large blocks of BLM land or blocks where BLM land is interspersed with private rangeland without high densities of surface-disturbing activities are expected to continue to provide important wildlife habitat.

Impacts under Alternative A (Current Management)

Estimated short-term direct disturbance from all surface-disturbing activities is 34,703 acres (Table 4.95). Approximately 30,933 acres would be reclaimed, resulting in 3,770 acres of direct long-term surface disturbance from all surface-disturbing activities under Alternative A.

Fire Management and Ecology, and Forests and Woodlands: About 4,740 acres of forested acres could be mechanically treated for forest health. This is less than 1% of all forested habitat managed by the BLM in the planning area. Short-term direct impacts to wildlife from these treatments would be minimal because of the limited acreage involved in treatments.

Approximately 6,860 acres could be treated with prescribed fire. These treatments would provide heterogeneity in these habitats and the effects would be beneficial for most wildlife species as long as treatments in sage habitats are designed to avoid long-term effects. Forest management under Alternative A uses silviculture treatments to achieve stand vigor. In general, forest management and silviculture treatments under Alternative A are anticipated to have mixed effects on big game. Alternative A also proposes to achieve desired future condition in sagebrush and mountain shrub communities. Both of these communities are used by wildlife, and achieving desired future condition on all acreage within the planning area is anticipated to benefit wildlife.

Fluid Minerals: Approximately 102,298 acres of BLM minerals would be closed to oil and gas leasing under Alternative A to protect a variety of resource values, not just wildlife. An additional 282,062 acres would be available for leasing with an NSO stipulation, of which 87% is located in the very low oil and gas development potential area. These protections would benefit all wildlife species located in these areas by minimizing surface-disturbing activities and associated avoidance as noted under Impacts Common to All Alternatives, Fluid Minerals, and Table 4.96.

The number of new wells on BLM minerals anticipated under Alternative A is 1,874 wells. Most of these wells would be located in the moderate development potential area (992 wells). This would result in 9,564 acres of direct short-term habitat disturbance and 2,422 acres of direct long-term habitat disturbance. Most of this disturbance would occur in grassland/sagebrush/shrubland habitats (approximately 92%, based on the percentage of habitat types in the planning area).

Although stipulations may mitigate impacts at local scales, impacts to wildlife often happen at much larger scales. Large-scale impacts to wildlife and wildlife habitats are best described by the density of impacts on the landscape. Road

effects are discussed in this section since most road development in the planning area is anticipated to be associated with oil and gas activities. Impacts to wildlife populations are often not immediate and may be manifest in population level responses a number of years after the initial disturbance.

Under Alternative A mean well densities on BLM land in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.03 wells per square mile) (Table 4.98). Mean road densities would exceed 1.69 miles of road/mi² in the moderate development potential area (Table 4.99). A significant decline in populations of big game animals would be expected within all potential areas except in the very low development potential area under Alternative A because of the density of wells and roads.

Table 4.98
Anticipated Well Density (Wells per Square Mile) on BLM Land by Alternative

Development Potential	*Existing Well Density*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
High	0.44	2.34	2.64	2.14	2.38	2.22
Moderate	1.69	3.33	2.36	3.06	3.34	3.23
Low	0.62	1.18	0.87	1.12	1.18	1.15
Very Low	0.01	0.03	0.02	0.02	0.03	0.03

Table 4.99
Anticipated Road Density (Miles of Road per Square Mile) on BLM Land by Alternative

Development Potential	*Existing Road Density*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
High	0.47	1.21	1.14	1.15	1.23	1.17
Moderate	1.24	2.29	1.92	2.21	2.30	2.26
Low	0.64	1.01	0.92	1.00	1.02	1.01
Very Low	0.89	0.90	0.89	0.90	0.90	0.90

The greatest impact in the long term would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.44 wells/mi² to 2.34 wells/mi² (a 420% increase) and mean road densities would increase from 0.47 to 1.21 miles of road/mi². This would result in a direct and indirect loss of most habitat for big game in the high development potential areas. Approximately 220,000 acres of big game winter range are currently within the high development potential area and the entire area is considered seasonal habitat for elk and mule deer.

The number of wells anticipated in the high and moderate potential areas are also expected to result in most of the potential areas being within 1,000 meters of an existing well (avoidance zone for big game), based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.96). Alternative A provides a number of stipulations to minimize disturbance impacts from oil and gas activities at local scales through stipulations limiting timing or distance from key wildlife resource values. These are addressed below. The acreage figures are not additive as some resource values overlap.

- *Big Game:* Alternative A has a restriction on oil and gas activities in big game winter range areas by excluding drilling from December 1 to May 15. This mitigation would eliminate short-term direct disturbance on 903,000 acres of winter range during critical time periods for animal stress but would allow long-term disturbances to occur on winter range. This would lead to long-term changes in big game populations if well densities exceed thresholds for winter range. Mean well densities would exceed a threshold of 1.06 wells/mi² on approximately 120,000 acres of winter range in the high, moderate, and low development potential areas (13% of all winter range). Alternative A has no stipulations to mitigate impacts to bighorn sheep range or bighorn sheep lambing

areas, and impacts to bighorn sheep populations would be expected if oil and gas activities were to occur in bighorn sheep habitat.

- *Black-footed Ferret:* An NSO stipulation would be implemented within 1/4 mile of essential black-footed ferret habitat to limit surface-disturbing activities. This would result in approximately 82,523 acres of black-footed ferret habitat on BLM lands where direct and indirect impacts would be avoided.

- *Black-tailed Prairie Dog:* An NSO stipulation would be implemented within 1/4 mile of essential black-tailed prairie dog habitat to limit surface-disturbing activities. This would result in approximately 82,523 acres of BLM prairie dog habitat where direct and indirect impacts would be minimized.

- *Colonial Waterbird:* Under Alternative A, direct and indirect long-term impacts to waterbird colonies are mitigated by an NSO stipulation for activities within 1/4 mile of a waterbird colony. This would result in 1,545 acres surrounding waterbird colonies where surface-disturbing and disruptive activities would not be allowed. Most of this protection (95%) would apply in the very low development potential area.

- *Game Birds:* Under Alternative A, an NSO stipulation would apply within 500 feet of sharp-tailed grouse leks to limit surface-disturbing activities. A timing restriction would apply from March 1 to June 30 for grouse nests to minimize disruptive activities. This would result in approximately 2,984 acres of habitat surrounding leks where direct impacts would be avoided. Direct effects would be mitigated by avoiding direct impacts to nesting habitats with the timing stipulation, but indirect long-term effects would still be present from surface-disturbing activities initiated outside the timing stipulation. Most sharp-tailed grouse nests within 1.3 miles of their lek and disturbances located within that distance would have indirect long-term impacts on sharp-tailed grouse populations (Giesen and Connelly 1993).

- *Greater Sage-Grouse:* Alternative A has a restriction on oil and gas activities in greater sage-grouse nesting areas by excluding drilling from March 1 to June 15. This mitigation would eliminate short-term direct disturbance on 1,187,040 acres of sage-grouse nesting habitat on BLM lands. Direct effects would be mitigated by avoiding direct impacts to nesting habitats with the timing stipulation, but indirect long-term effects would still be present from surface-disturbing activities initiated outside the timing stipulation. A 1/4 mile NSO also protects breeding activities at leks from long-term direct impacts, but does not protect nesting and brood rearing habitat located outside the 1/4 mile limit from long-term impacts. This would lead to long-term declines in sage-grouse populations if well densities exceed thresholds for long-term disturbances. Well densities would exceed a threshold of approximately 1 well/mi^2 on approximately 136,458 acres of sage-grouse habitat on BLM lands in the high, moderate, and low development potential areas (11% of all grouse habitat) under this alternative. This would result in an expected decrease in the populations of greater sage-grouse in all of these areas and depending on the exact configuration and density of well pads, could result in extirpation of greater sage-grouse from these areas.

  Greater sage-grouse winter habitats are protected from disruptive activities through stipulations in place to protect wildlife winter ranges. The timing stipulation for drilling activities on wildlife winter range is from December 1 to May 15. Direct effects would be mitigated by applying a timing stipulation to 1,549,358 acres of winter habitats on BLM land, but indirect long-term effects would still be present from surface-disturbing activities initiated outside the timing restriction (May 16 through November 30).

- *Least Tern:* Under Alternative A, an NSO stipulation would be implemented within 1/4 mile of essential least tern habitat to limit surface-disturbing activities. This would protect least tern habitat and nesting activities in the planning area should this species be found nesting on BLM land.

- *Mountain Plover:* Under Alternative A, an NSO stipulation would be implemented within 1/4 mile of essential mountain plover habitat to limit surface-disturbing activities. This would result in approximately 325,053 acres of mountain plover habitat where direct long-term impacts would be avoided.

- *Piping Plover:* Under Alternative A, an NSO stipulation would be implemented within 1/4 mile of essential piping plover habitat to limit surface-disturbing activities. This would apply to approximately 614 acres of

piping plover habitat overlying federal minerals not covered by other more restrictive stipulations. Long-term effects to piping plover populations are not expected with these mitigations in place.

- *Raptors:* Under Alternative A, surface-disturbing and disruptive impacts to raptors are mitigated by stipulations which require a 1/4 mile timing restriction from March 1 to August 1 for any raptor nest. Ferruginous hawks, bald eagles and peregrine falcons have a 1/4 mile NSO restriction in the Judith-Valley-Phillips portion of the planning area, and within a 1/4-3 mile zone of identified essential habitat for the West HiLine portion of the planning area. Direct impacts would be avoided to ferruginous hawks and bald eagle nesting areas (no peregrine falcon nests are known in the planning area) on approximately 2,909 acres surrounding nests. The timing stipulation would mitigate direct effects during the breeding season, but the timing stipulations do not mitigate direct and indirect effects from surface-disturbing activities that would impact nesting raptors in subsequent years.

- *Swift Fox:* Under Alternative A, a CSU stipulation would be implemented within 1/2 mile of swift fox dens to limit surface-disturbing activities in the Lonesome Lake portion of the planning area. The rest of the planning area would have a 1/4 mile NSO from a swift fox den. This stipulation would ensure long-term protection of denning activities for all known dens.

Livestock Grazing, and Vegetation – Rangeland: Changes to rangeland vegetation would be similar across all alternatives. These changes are primarily derived from grazing on these habitats and current grazing management would be beneficial to wildlife by introducing large-scale heterogeneity in grassland habitats. However, under Alternative A the minimum rest period from grazing following any major disturbance to vegetation communities would be two growing seasons, which may benefit some wildlife species in the short term. Long-term goals to promote heterogeneity in grassland habitats would be minimized with this management action as long as grazing within the disturbed areas does not impact soil resources and contribute to increased soil erosion.

Noxious Weeds and Other Non-Native Invasive Species: Road density is a relative measure of noxious weed risk because many weeds are spread through vehicle traffic (Gelbard and Belnap 2003). Management of noxious weeds would be similar through all alternatives but effective management would be dependent on the amount of treatment needed to control infestations. The risk of noxious weed infestation is similar to all alternatives other than Alternative B and would at least nearly double the current road density in the high, moderate, and low development potential areas. It is not known if control efforts would minimize impacts to wildlife habitat.

OHV Use and Travel and Transportation Management: Impacts from motorized off-road vehicle use are limited to 124 acres in two open areas in the planning area. The impacts on wildlife are limited in these small areas. Alternative A does not allow for motorized game retrieval off road, minimizing impacts to vegetation and soil resources as well as limiting disruptions to wildlife from motorized vehicles.

Renewable Energy: Under Alternative A about 188,871 acres of BLM land would be exclusion areas for wind energy rights-of-way. BLM land within 1 mile of National Historic Trails, in WSAs, and within two miles of large waterfowl producing reservoirs would be exclusion areas for wind energy rights-of-way. All other areas would be open areas with minor constraints (standard terms/conditions and BMPs) or avoidance areas for wind energy rights-of-way.

In an effort to analyze the resource effects of wind energy development, the BLM analyzed the effects of development of two hypothetical wind energy proposals within a high wind energy potential area: one for 100 megawatts and the other for 200 megawatts of energy (Appendix O). The 100 megawatt wind energy proposal involves construction of 63 wind turbines which would leave a footprint on the landscape of approximately 2,800 acres, with 200 acres of land disturbance projected in the short term and 152 acres in the long term. The 200 megawatt wind energy proposal involves construction of 134 wind turbines which would leave a footprint on the landscape of approximately 10,706 acres with 727 acres of land disturbance projected in the short term and 544 acres in the long term. Surface-disturbing actions associated with the construction of the two wind energy proposals would include the creation of new roads, increased soil erosion, and vegetation loss from the construction of wind turbines and powerlines.

The impacts of either wind farm scenario depicted above would depend on the type of wildlife habitat located within and near the location of the wind development, but in general impacts to wildlife habitat and populations would be greatest and result in impacts to wildlife habitat and populations when the project is located in areas with high value to fish and

wildlife, such as maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, grouse leks, or other areas of seasonal importance. Project impacts would also be greatest in areas of intact habitat in the planning area, where development would result in habitat degradation, loss or fragmentation; particularly those areas with species sensitive to habitat fragmentation, areas identified as critical for the recovery of a listed species, a core population area, or an expansion area of a recovering species. Impacts to wildlife from wind farms located away from areas with high value for wildlife would minimize impacts to priority wildlife species in the planning area.

The development of wind energy projects within high value habitats for grassland birds would result in short-term and long-term population declines of the species through direct mortality from wind farm operations as well indirect impacts through avoidance of the towers and infrastructure (powerlines, roads, buildings) and wind farm operation activities (increased vehicle traffic, human presence and disturbance). As noted above, Sprague's pipits may be particularly vulnerable to mortality from strikes by wind turbine blades. Development within high value greater sage-grouse habitat would also result in short-term and long-term population declines of the species through direct mortality from wind farm operations as well indirect impacts through avoidance of the towers and infrastructure (powerlines, roads, buildings) and wind farm operation activities (increased vehicle traffic, human presence and disturbance). Impacts may be particularly high for a population of greater sage-grouse that migrate from breeding areas in southern Saskatchewan and northern Valley County to wintering areas in southern Valley County if a wind energy development would occur within their migration corridor. Any additional stresses to this population from increased mortality or disruption of migration routes could result in extirpation of this species in Saskatchewan.

Soils: Alternative A considers a CSU on surface-disturbing activities for slopes over 30% or for slopes over 20% on extremely erodible or slumping soils. This would mitigate impacts to soil resources on approximately 484,117 acres in the planning area and would be beneficial for most wildlife in the planning area by protecting the integrity of habitats.

Special Designations: In Alternative A, all existing ACECs are retained and no additional ACECs are proposed. This would be beneficial for the wildlife resources located in the current ACECs, but some areas with unique and valuable wildlife values that meet the relevance and importance criteria as potential ACECs would not be afforded special management.

Vegetation – Riparian and Wetland: Alternative A provides some protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions by restricting surface use and occupancy within 500 feet of streams, lakes, reservoirs, canals, and associated riparian habitats. This mitigation would protect approximately 364,109 acres of wildlife habitat associated with floodplains and waterbodies.

Wildlife: In addition to the actions noted above, specific management actions and impacts for wildlife categories (mammals and birds) are described below.

Mammals

- *Bighorn Sheep:* Alternative A provides for management actions to minimize disease transmission from domestic sheep to bighorn sheep. The Judith-Valley-Phillips portion of the planning area does not allow grazing by domestic sheep to overlap bighorn sheep habitat, and the West HiLine portion does not allow allotments currently classified for cattle to be changed to domestic sheep grazing. These management actions may be detrimental to bighorn sheep because they do not provide adequate management to minimize disease transmission between wild and domestic sheep, and the potential for disease transmission remains high despite these actions. This could result in significant long-term direct impacts to bighorn sheep in the planning area.

- *Black-footed Ferret:* All management actions for black-footed ferrets under Alternative A occur in the Phillips County portion of the planning area and these management actions (except for the restriction on surface-disturbing activities) all occur in the Prairie Dog Towns within the 7km Complex ACEC.

  Oil and gas activities are managed with a 1/4 mile NSO for special status species habitat and this would apply to black-tailed prairie dog towns and black-footed ferrets under Alternative A.

Actions and impacts noted above for black-tailed prairie dogs are actions and impacts that would affect black-footed ferrets indirectly through impacts to their habitats. Recreational shooting on prairie dog towns would be maintained but may be prohibited on prairie dog towns where ferret reintroduction is occurring. However, shooting would be managed on towns with reintroduced ferrets unless impacts from shooting are found to be detrimental.

Management actions in Alternative A for black-footed ferrets would follow the Black-footed Ferret Recovery Plan (USFWS 1988a). Specific management actions that would apply only to the Prairie Dog Towns within the 7km Complex ACEC include: powerlines and rights-of-way would be located to avoid prairie dog towns and discourage raptor perching; animal damage control on Prairie Dog Towns within the 7km Complex would be allowed. Stipulations on the placement of M44s, traps, and snares would be necessary to avoid accidently taking black-footed ferrets; recreational activities would be allowed and managed to prevent adverse impacts to ferrets; controlling ferret predators and monitoring for ferret diseases in specific locations within the 7km Complex may be necessary; the BLM would maintain existing livestock AUMs within the 7km Complex; and a public education program would be jointly developed by USFWS, CMR, MFWP and the BLM to explain the ferret management effort and to minimize any potential problems (i.e., distemper, etc.).

Impacts to black-footed ferrets under Alternative A would be beneficial and long-term should ferrets continue to exist in the planning area or should reintroduction efforts begin again. However, continued shooting of prairie dogs could negatively impact ferret habitat.

- *Black-tailed Prairie Dog:* Acres of active black-tailed prairie dog towns have fluctuated greatly since 1992 when sylvatic plague was discovered in the black-tailed prairie dog population of southern Phillips County. Plague continues to be the primary factor in determining prairie dog populations in the planning area. Prairie dog management in the planning area under Alternative A would vary by previously designated resource areas.

  - *Phillips Resource Area (Phillips County)* – The BLM would manage prairie dog shooting on BLM land before and after ferret reintroduction. The BLM would respond to requests for information, prepare maps, sign prairie dog towns, and manage the towns to provide shooting. Shooting may be restricted to a certain number of people each year to ensure the quality of the experience. Prairie dog shooting may temporarily be prohibited on prairie dog towns where black-footed ferret reintroduction is occurring. However, shooting would be managed on these towns and towns subsequently occupied by the ferret, unless impacts from shooting are shown to be detrimental.

    The BLM, in cooperation with the USFWS and MFWP, would maintain the existing prairie dog habitat and distribution on BLM land within the 7km Complex based on a 1988 survey. The BLM would also support cooperative agreements for prairie dog towns on the CMR, lands administered by the Montana Department of Natural Resources and Conservation (DNRC), and private land within the 7km Complex. The 7km Complex contains approximately 26,000 acres of prairie dog towns (12,346 BLM acres; 5,800 CMR acres; 2,012 DNRC acres; and 5,821 private acres). Management actions would be directed to cooperatively maintain this amount of prairie dog habitat. Prairie dogs on BLM land outside the 7km Complex are nonessential to black-footed ferret recovery and would be maintained at the existing level (1988 survey) or controlled based on values other than the ferret.

    The BLM would monitor prairie dog towns for expansion and all allotments within the 7km Complex with prairie dog towns would be categorized as “I” (Improved). The BLM would control prairie dog expansion on BLM lands within the 7km Complex when the acreage exceeds the 1988 levels. The BLM would maintain the prairie dog towns on the BLM lands outside the 7km Complex at the existing level for recreational viewing, associated species' benefits, and prairie dog shooting. The BLM may reduce or eradicate some small, isolated prairie dog towns.

    Prairie dog reduction methods may include using EPA-registered toxicants or nontoxic methods for prairie dog control (i.e., barriers, water, vegetation enhancement, prairie dog sterilization, biological control, etc.). Management actions would follow guidance set forth in the Black-footed Ferret Recovery Plan (USFWS 1988a) to avoid killing ferrets.

When poisoning is scheduled on a prairie dog town which includes state and private land, a cooperative effort would be made to control the entire town. The cost of poisoning for state and private land would be the responsibility of the private landowner or the state land permittee.

The loss of prairie dog habitat on private land may be compensated for by developing additional habitat on BLM land in the vicinity of the habitat loss. Prairie dog expansion within the 7km Complex above the level recorded in the 1988 survey would not be allowed on BLM land without AUM mitigation. Any loss of livestock forage due to prairie dog habitat increases on BLM lands above the 1988 level would be mitigated through land treatments (mechanical, fire, etc.).

Under Alternative A, prairie dogs in the Prairie Dog Towns within the 7km Complex ACEC would be managed to maintain adequate population levels for black-footed ferret habitat and prairie dogs would be expected to maintain populations within the ACEC. Prairie dog towns outside the ACEC would be at risk because of a lack of management actions to conserve prairie dog populations.

- *Valley Resource Area (Valley County)* – No restriction would be placed on surface-disturbing activities other than the NSO stipulation noted above. The BLM would maintain prairie dog towns on BLM land (800 acres) based on the values or problems encountered.

- *West HiLine (the portion of the planning area not in Phillips and Valley Counties)* – No restriction would be placed on surface-disturbing activities other than the NSO stipulation noted above. One prairie dog town located in T. 33 N., R. 22 E., Section 28 would be managed to provide habitat for associated species and some recreational shooting. Special status species would be given priority should control measures be considered, and appropriate mitigation would be developed prior to control efforts. Prairie dog towns smaller than 10 acres would not be actively managed.

Birds

- *Greater Sage-Grouse:* Alternative A does not specifically require BLM to develop standards for greater sage-grouse habitat but states the BLM will use the national and Montana greater sage-grouse conservation strategies to address greater sage-grouse habitat at the watershed or project planning level. In addition, project-specific land treatments would be designed to maintain desired canopy coverage of sagebrush between 15% and 50% within sage-grouse nesting and wintering areas, and also maintain an effective height of 12 inches. Greater sage-grouse habitat would also be managed for succulent vegetation including a variety of forbs. These strategies may not be appropriate to greater sage-grouse habitat in the planning area and may call for more stringent requirements than vegetation potential could support. Also, these strategies are applied locally and do not address large-scale impacts across the planning area.

  Wildfires that remove large tracts of big sagebrush could be detrimental to greater sage-grouse populations. Prescribed burns may also impact greater sage-grouse habitat but may also enhance some habitats if properly located. The number of acres that could be burned under Alternative A is probably not detrimental to greater sage-grouse habitat and fuel buildup due to full suppression in grassland and sagebrush habitats does not accumulate from year to year; therefore, full suppression in big sagebrush habitats is beneficial for short-term and long-term persistence of greater sage-grouse habitat. Silver sagebrush habitats, typically located north of Highway 2 in Blaine, Phillips and Valley Counties, are less vulnerable to wildfire. During the spring, with adequate soil moisture fire could enhance silver sagebrush sprouting.

  Livestock grazing could impact the suitability and extent of greater sage-grouse habitats in the planning area by altering greater sage-grouse habitat components. Livestock grazing management could degrade greater sage-grouse habitats through removal of residual vegetation needed to minimize nest predation and transport of noxious weeds. Aside from transporting noxious weeds, the most impact to wildlife habitats from livestock is anticipated in concentrated areas such as water sources and riparian areas. Proper management of livestock grazing through the implementation of grazing standards and guidelines could minimize adverse impacts to greater sage-grouse or create beneficial impacts to sage-grouse by increasing forage production when managed to create heterogeneity in vegetation at larger scales. Current population trends and habitat assessments suggest grazing management under Alternative A does not impact greater sage-grouse populations in the planning area.

Alternative A does not provide specific guidance or management actions for the protection of priority habitat areas from habitat loss and fragmentation. Alternative A also does not include stipulations for the development of wind energy in greater sage-grouse habitats.

Overall, surface disturbance in sagebrush habitats under Alternative A may adversely impact greater sage-grouse. Projected surface-disturbing and disruptive activities under Alternative A may result in long-term negative impacts to greater sage-grouse in the planning area.

- *Migratory Birds:* No specific management actions for migratory birds are outlined in Alternative A. Impacts from other resource uses and use stipulations are described below. Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitats: forest and woodland species, grassland species, riparian and wetland species, and sagebrush species. The described impacts also apply to special status bird species associated with those habitat types (see Impacts Common to All Alternatives).

  - *Forest and Woodland Species* – No specific management actions for special status species in forests and woodlands are proposed in the alternatives; however, management actions and constraints in the Forests and Woodlands section are found in management actions for fire and fuels management. BLM actions for silviculture treatments, forest products, and insect control result in short-term disturbance. Because of their diverse habitat requirements, some migratory birds are adversely impacted and some benefit from these management actions. In general, because of the limited acreage treated in the planning area species that favor dense, older forests will predominate in the short term and species which require early successional habitats could be affected negatively. However, the increased risk of high severity fire would increase the long-term effects for species associated with dense, older forests.

  - *Grassland Species* –Alternative A contains no specific management actions for migratory birds that utilize grassland. These species would be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, noxious weed control, and livestock and wildlife grazing. The number of acres impacted by short-term and long-term surface disturbance would directly and indirectly affect populations of these species. Direct effects due to habitat loss are amplified by avoidance of areas with long-term disturbance. Impacts from oil and gas activities are expected to be the major disturbance action in grassland habitats in the planning area. The loss of 3,770 acres to long-term disturbance (Table 4.95) and avoidance of disruptive activities would result in declines in grassland bird populations.

    The suite of grassland-associated special status migratory birds are also impacted by changes to vegetation heterogeneity, both species composition and structure. These species have differing habitat needs and heterogeneity in grasslands throughout the planning area would provide habitat for the entire suite of special status species. The major disruptive activities that alter heterogeneity in the planning area include noxious weeds, widespread heavy grazing, or widespread light grazing. Grazing management for rangeland health under the current standards and guidelines for Alternative A would benefit grassland-associated species, although weed infestations could worsen under Alternative A through an increase in the number of roads from oil and gas activities in areas available to be leased or on leases currently held.

  - *Riparian and Wetland Species* – No specific management actions are noted for riparian and wetland-associated species, but actions to protect and conserve water quantity and quality in the planning area would benefit these species. Wetland-associated species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats as noted above. Under Alternative A, the BLM would limit oil and gas activities through a CSU stipulation within 500 or 1,000 feet of lotic and lentic systems. This would be a benefit to most riparian and wetland-associated species. Actions associated with waterfowl habitat and colonial waterbirds would also benefit a number of wetland-associated migratory birds.

  - *Sagebrush Species* – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed previously. Under Alternative A, a 1/4 mile NSO around greater sage-grouse leks would protect nesting habitat. This alternative would exclude surface occupancy on 18,799

acres of BLM lands with high value for greater sage-grouse. This action would eliminate short-term direct impacts and long-term indirect impacts associated with oil and gas leasing in small areas around greater sage-grouse leks and would benefit all sagebrush-associated species located in those areas. Degradation of sagebrush habitat would continue in areas away from greater sage-grouse leks and would potentially have short-term and long-term direct and indirect impacts to sagebrush-associated birds, particularly in areas associated with high densities of disturbances. Grazing management for rangeland health under the current standards and guidelines for all alternatives would benefit sage-associated species. No actions in Alternative A minimize habitat fragmentation and degradation and impacts to sagebrush-associated species, including special status species, would continue to increase as incremental development of surface-disturbing and disruptive actions continues on BLM land.

- *Waterfowl:* An estimated 1,500 acres of water sources beneficial to waterfowl currently exist in the planning area. Alternative A suggests having one water development/mi² in the planning area. This would provide a long-term benefit to some waterfowl. Alternative A would also implement grazing management directed towards improving waterfowl nesting cover on allotments with existing or potential water production in the portion of the planning area managed under the Judith-Valley-Phillips RMP. High value waterfowl areas would be evaluated to determine the need for fencing to improve waterfowl habitat in the portion of the planning area managed under the West HiLine RMP. Both of these actions would benefit long-term waterfowl reproductive success in the planning area.

Cumulative Impacts

Table 4.100 summarizes the anticipated short-term and long-term surface disturbance from all actions in the planning area. The amount of future long-term surface disturbance does not vary much by alternative and mostly reflects future oil and gas-associated disturbances.

Table 4.100
Future Surface Disturbance on All Lands in the HiLine Planning Area by Alternative (Acres)

	Alternative A (Current Management)	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E (Preferred Alternative)***
Short-Term Disturbance	223,654	241,116	245,228	246,659	245,872
Reclaimed Disturbance	204,841	223,389	226,807	227,807	227,227
Long-Term Disturbance	18,813	17,727	18,421	18,852	18,645

The management actions for Alternative A slowly degrade existing conditions for wildlife in portions of the planning area through incremental development of surface-disturbing and disruptive actions regardless of land ownership and the limited beneficial impacts of the current BLM stipulations to mitigate impacts to wildlife at regional scales. This would result in long-term declines in a number of wildlife populations in large portions of the planning area, particularly the high, moderate, and low oil and gas development potential areas, through direct impacts (increased mortality of individuals) and indirect effects (increased fragmentation and avoidance of impacted areas) as measured by the amount of surface-disturbing activity densities. Oil and gas mean well densities in the high, moderate, and low development potential areas (Table 4.101) and mean road densities in the high and moderate development potential areas (Table 4.102) would exceed thresholds for significant impacts to big game populations resulting in impacts to 166,310 acres or 30% of all antelope winter range, and 185,603 acres or 24% of all mule deer winter range. The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.97).

Mean well densities would also exceed thresholds for impacts to greater sage-grouse in the high, moderate, and low development potential areas. This would result in significant declines in sage-grouse populations as measured by the number of males at leks and loss of large (>25 males) leks. Approximately 76 leks are affected by well densities found in the high, moderate, and low development potential areas comprising 31% of all known leks in the planning area.

The greatest impact would occur in the high development potential areas, particularly in the Bears Paw South area, where current important wildlife habitats overlap with high development potential. Mean well densities in the high development potential areas would rise from the current 0.80 wells/mi² to 3.63 wells/mi² (Table 4.101) and road densities would increase from 0.98 to 2.13 miles of road/mi² (Table 4.102).

There are few areas in the planning area where incremental development would be avoided. Wildlife habitat in the very low development potential area would continue to remain at risk as the percentage of lands affected by development increase throughout the life of the plan.

Closure or NSO would only affect areas not currently leased or areas leased after the current lease expires. Currently, 80% of the high, 87% of the moderate, 57% of the low, and 12% of the very low development potential areas are leased, limiting the ability to apply the stipulations proposed in Alternative A, but activities on existing leases would be managed using BMPs (Appendix E.2).

Wind energy rights-of-way would be excluded from 188,871 acres of BLM land, which would limit the cumulative impact from wind energy development in those areas. However, Alternative A does not provide management actions that would limit fragmentation of important habitat areas, and wind energy developments could have short-term and long-term direct and indirect impacts on high value wildlife habitats and wildlife populations associated with those habitats. Potential impacts could include direct loss of high value habitat within a project area and indirect subsequent population declines through avoidance of a wind farm and infrastructure. The degree of indirect impacts would vary by species depending on their reaction to a wind project. Direct mortality would also be expected during operations of the wind farm, particularly for grassland birds in some areas.

The impacts noted above would be additive to current and continued loss of habitat through conversion to cropland, particularly in those areas where land ownership is fragmented and crop production is adjacent to or nearby BLM land.

Table 4.101
Total Well Density (Wells per Square Mile) by Alternative

Development Potential	*Existing Well Density*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
High	0.80	3.63	2.89	3.53	3.66	3.56
Moderate	1.25	2.63	2.32	2.56	2.64	2.61
Low	0.89	1.12	1.10	1.11	1.12	1.12
Very Low	0.03	0.05	0.04	0.05	0.05	0.05

Table 4.102
Total Road Density (Miles per Square Mile) by Alternative

Development Potential	*Existing Road Density*	*Alternative A (Current Management)*	*Alternative B*	*Alternative C*	*Alternative D*	*Alternative E (Preferred Alternative)*
High	0.98	2.13	1.90	2.10	2.14	2.11
Moderate	1.60	2.44	2.34	2.41	2.44	2.43
Low	0.93	1.28	1.28	1.28	1.28	1.28
Very Low	0.97	0.99	0.99	0.99	0.99	0.99

Impacts under Alternative B

Estimated short-term disturbance from all surface-disturbing activities is 52,170 acres (Table 4.95. Approximately 49,485 acres would be reclaimed, resulting in 2,685 acres of long-term surface disturbance from all surface-disturbing activities in Alternative B. The effects of each resource use are described below.

Fire Management and Ecology, and Forests and Woodlands: About 7,820 acres of forested acres could be mechanically treated for forest health. An additional 26,660 acres could be treated with prescribed burning. This is about 1.4% of all forested habitat managed by the BLM in the planning area. Short-term direct impacts to wildlife from these treatments may be severe in treated areas. Long-term indirect effects to wildlife would be beneficial because of the decreased risk of high severity unplanned wildfire and an increase of early successional habitats favored by some species of wildlife. About 6,000 acres of grass/sage could also be treated with prescribed burns. This would promote heterogeneity in these habitats and long-term indirect effects would be beneficial to most wildlife species as long as there was careful planning for burns in sagebrush habitats to avoid impacting the integrity of the complete sage habitats.

Fluid Minerals: The number of new wells on BLM minerals anticipated under Alternative B is 647 wells. Most of these wells (283) would be located in the moderate development potential area. This would result in 4,440 acres of direct short-term habitat disturbance and 1,544 acres of direct long-term habitat disturbance. Most of this disturbance would occur in grassland/sagebrush/shrubland habitats (approximately 92%, based on the percentage of habitat types in the planning area).

Although many of the short-term effects to wildlife habitat and populations are mediated by reclamation, those reclaimed areas adjacent to or surrounding long-term habitat disturbance do not necessarily result in reclaimed wildlife habitat. Many species often avoid areas of long-term surface disturbance and disruption resulting in long-term indirect effects. The number of wells anticipated in all potential areas are also expected to result in an increase in the amount of BLM land within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.96).

Approximately 3,173,637 acres of BLM surface lands would be closed to oil and gas leasing under Alternative B to protect a variety of resource values, not just wildlife. An additional 258,560 acres would be available for leasing with an NSO stipulation, of which 52% are located in the very low oil and gas development potential area. These protections would benefit all wildlife species located in these areas by minimizing surface-disturbing activities and associated avoidance as noted above.

Although these stipulations may mitigate impacts at local scales, impacts to wildlife often happen at much larger scales. Large-scale impacts to wildlife and wildlife habitats are best described by the density of impacts on the landscape. Under Alternative B, mean well densities on BLM land exceed the upper threshold only in the moderate oil and gas development potential area. Mean well densities in the high and moderate development potential areas would approach 2.64 and 2.36 wells/mi². These areas would exceed the lower threshold of 0.26 wells/mi² and some effects to big game populations could be expected. Mean well densities in the very low development potential area would remain well below the lower threshold for effects to big game. Road densities would exceed 1.69 miles of road/mi² only in the moderate development potential areas (Table 4.99). A significant decline in populations of big game animals would be expected on BLM land within the moderate development potential areas under Alternative B because of the density of wells and roads.

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.44 wells/mi² to 2.64 wells/mi² (a 587% increase) and road densities would increase from 0.47 to 1.14 miles of road/mi². This would result in an increase in direct and indirect loss of habitat for big game in the high development potential areas but mean well densities on BLM land would not exceed the upper threshold. However, overall well densities in the area would exceed thresholds (see cumulative impacts) and big game populations would be expected to be impacted despite constraints on BLM land.

Alternative B proposes management actions to conserve priority habitat areas for grassland birds/greater sage-grouse (474,035 acres) and greater sage-grouse (1,028,661 acres). Management of priority areas for grassland birds and greater sage-grouse minimizes the adverse impacts of habitat fragmentation and minimizes short-term direct impacts and long-

term indirect impacts from disturbances. Conservation of these priority areas is expected to benefit many other animal species occurring there.

Alternative B would close most wildlife habitat to oil and gas leasing and also provides a number of stipulations to minimize disturbance impacts from oil and gas activities at local scales through stipulations limiting timing or distance from some wildlife resource values. These are addressed below. The acreage figures are not additive as some resource values overlap.

- *Big Game:* Alternative B would close big game winter range areas to oil and gas leasing, which includes critical winter range areas. This would minimize surface-disturbing and disruptive activities in approximately 2,134,337 acres of winter range and minimize direct and long-term indirect effects to big game populations in all big game winter range.

  Bighorn sheep habitat and bighorn sheep lambing areas are closed to oil and gas leasing. This would minimize surface-disturbing and disruptive activities in 46,016 acres of bighorn sheep habitat and would minimize direct and long-term indirect effects on bighorn sheep populations.

- *Black-footed Ferret:* Lands within 1/2 mile of black-footed ferret habitat would be closed to leasing to minimize surface-disturbing and disruptive activities. This would result in approximately 168,165 acres where direct impacts would be minimized.

- *Black-tailed Prairie Dog:* Lands within 1/2 mile of black-tailed prairie dog habitat would be closed to leasing to minimize surface-disturbing and disruptive activities. This would result in approximately 168,165 acres surrounding prairie dog habitat where direct impacts would be minimized.

- *Colonial Waterbirds*: Lands within 1/4 mile of a waterbird colony would be closed to oil and gas leasing. This would result in 5,547 acres surrounding waterbird colonies where surface-disturbing and disruptive activities would not be allowed. Most of this protection (95%) would apply in the very low development potential area. Additionally, to minimize short-term disturbances during the breeding season, a timing stipulation would limit activities within 1 mile of a waterbird colony from April 1 to July 15.

- *Game Birds:* Lands within 1/2 mile of a sharp-tailed grouse lek would be closed to oil and gas leasing. This would minimize long-term impacts to 82,971 acres of habitat surrounding leks. Additionally, to minimize short-term disturbances during the breeding season, a timing stipulation would limit activities within 1 mile of a sharp-tailed grouse lek. The timing stipulation would mitigate short-term direct effects to breeding activities on 784 acres of habitat.

- *Greater Sage-Grouse:* Lands within two miles of greater sage-grouse leks and all greater sage-grouse habitat would not be leased under Alternative B. Greater sage-grouse winter habitats would also not be leased. This would greatly reduce impacts to greater sage-grouse in the planning area by eliminating disturbances from oil and gas activities on 1,579,161 acres of BLM land.

- *Least Tern:* Lands within 1/2 mile of essential least tern habitat would be closed to leasing. This would protect least tern habitat and nesting activities in the planning area should this species be found nesting on BLM land.

- *Mountain Plover:* Lands within 1/4 mile of mountain plover habitat would be closed to leasing to minimize surface-disturbing and disruptive activities. This would result in approximately 325,476 acres surrounding mountain plover habitat where direct impacts would be minimized. A timing stipulation would mitigate disruptive impacts within 1/2 mile of mountain plover habitat from April 1 to July 31, resulting in an additional 5 acres of land where impacts would be minimized.

- *Piping Plover:* Lands within 1/2 mile of essential least tern habitat would be closed to leasing. This would result in approximately 1,442 acres of piping plover habitat on BLM land where direct and indirect long-term impacts would be avoided.

- *Raptors:* Lands within 1/2 mile of a raptor nest (including all special status species) that has been active within the last 7 years would be closed to oil and gas leasing. This would result in 22,946 acres of habitat surrounding nests where long-term direct and indirect effects to reproductive success of the raptors would be minimized. A timing stipulation would mitigate disruptive impacts within 1 mile of a raptor nest from March 1 to September 1, resulting in an additional 412 acres of land where impacts would be minimized.

- *Swift Fox:* Oil and gas activities would be limited by standard lease terms. Activities near swift fox dens could be moved 200 meters (656 feet) or delayed for 60 days to protect reproductive activities associated with swift fox dens. Because the location of dens is unpredictable and highly variable in the planning area this would ensure protection of denning activities for all known dens on an annual basis.

Livestock Grazing and Vegetation – Rangeland: Changes to rangeland vegetation would be similar across all alternatives. These changes are primarily derived from grazing on these habitats and current grazing management would be beneficial to wildlife by introducing large-scale heterogeneity in grassland habitats. Under Alternative B, a minimum rest period from grazing following any major disturbance to vegetation communities would be determined through a site-specific planning process. This would benefit wildlife species by tailoring management for specific resource needs in the burned area. Heterogeneity in grassland habitats would be maximized with this management action as long as grazing within the disturbed areas does not impact soil resources and contribute to increased soil erosion.

Noxious Weeds and Other Non-Native Invasive Species: Road density is a relative measure of the noxious weed risk because many weeds are spread through vehicle traffic. Management of noxious weeds would be similar through all alternatives but effective management would depend on the amount of treatment needed to control infestations. The risk of noxious weed infestation in Alternative B is the least of all alternatives. It is not known if control efforts would be able to minimize impacts to wildlife habitat.

OHV Use and Travel and Transportation Management: OHV use off-road is eliminated under Alternative B and motorized game retrieval off road is not allowed across the planning area. This would minimize impacts to vegetation and soil resources and limit disruptions to wildlife from OHVs driven off of established roads, primitive roads and trails.

Renewable Energy: Under Alternative B about 2,188,388 acres of BLM land would be exclusion areas for wind energy rights-of-way. This includes greater sage-grouse protection priority and Grassland Bird/Greater Sage-Grouse Priority Areas, winter range and crucial winter range, and large reservoir waterfowl complexes in addition to ACEC areas, traditional cultural properties, VRM Class I and II areas, and developed recreations sites. Impacts to wildlife and special status species from wind energy developments would be minimal under this alternative because short-term and long-term, direct and indirect impacts would be avoiding in most areas with value to fish and wildlife, included large areas of intact habitat in the planning area.

Population impacts to Sprague's pipits from wind developments in Grassland Bird/Greater Sage-Grouse Priority Areas would be eliminated and would result in protection of a portion of the Sprague's pipit habitat in the planning area that contains high densities of Sprague's pipits and a large proportion of the global population of this species (Hendricks, et al. 2008). Impacts to pipits and other grassland birds from wind development would be the same as noted in Alternative A for those developments that take place in high value grassland bird habitat outside areas closed to wind development.

Population impacts to greater sage-grouse from wind developments in Grassland Bird/Greater Sage-Grouse Priority Areas and the sage-grouse protection priority areas would be eliminated and would result in protection of a portion of the greater sage-grouse habitat in the planning area that contains high densities of greater sage-grouse. Impacts to greater sage-grouse and other sage associated birds from wind development would be the same as noted in Alternative A for those developments that take place in high value sage-grouse habitat outside areas closed to wind development.

Soils: Alternative B does not allow surface occupancy and use (NSO) on soils with a severe erosion hazard, badlands, rock outcrops, or slopes susceptible to mass failure. This would mitigate impacts to soil resources on approximately 10,802 acres in the planning area and would be beneficial for wildlife in the planning area by minimizing short-term direct impacts and long-term indirect impacts to wildlife habitat associated with these soil features.

Special Designations: Alternative B would not retain the Prairie Dog Towns within the 7km Complex ACEC. All other ACECs would be retained. The impacts to black-tailed prairie dogs because of this change are not apparent because all

prairie dog towns in the planning area would be afforded similar protections as those in this ACEC, negating the need for special management for a subset of the prairie dogs located in the Prairie Dog Towns within the 7km Complex. The Grassland Bird/Greater Sage-Grouse Priority Areas ACEC and Greater Sage-Grouse Protection Priority Area ACEC, Malta Geological Area ACEC and the Zortman/Landusky Mine Reclamation ACEC would be beneficial for wildlife within these areas by minimizing short-term and long-term direct and indirect effects from surface-disturbing and disruptive activities to wildlife through special management.

Vegetation – Riparian and Wetland: Alternative B provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and other actions. Under Alternative B, the BLM would limit surface-disturbing and disruptive activities within 1/4 mile of lotic and lentic systems. This would be a benefit to most riparian and wetland-associated species.

Alternative B also protects or enhances riparian, wetland, and streamside habitats. No pits would be placed in natural wetlands. Pits currently existing in natural wetlands may be filled if it would restore the wetland, and other wetlands that have been drained would be restored. This would benefit wetland-associated wildlife by minimizing habitat destruction or disturbance and providing for restoration of habitats that currently are not functioning.

Wilderness Characteristics: Under Alternative B, wildlife would have the most acres of protections of all alternatives.

The 386,462 acres of lands found to have wilderness characteristics would be managed to preserve and enhance their wilderness characteristics. These areas would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations.

Eastern Breaks and Badlands (10,714 acres)

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,714 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Elk Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,549 acres of elk winter range. This would eliminate any impacts to elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

Prairie Grasslands (139,654 acres)

- *Antelope Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 50,553 acres of antelope winter range. This would eliminate any impacts to antelope on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 11,326 acres (22%) is leased for energy development.

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 125,530 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 24,814 acres (20%) is leased for energy development.

- *Critical Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 44,063 acres of crucial winter range. This would eliminate any impacts to crucial winter range habitat due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 40 acres (<1%) is leased for energy development.

- *Prairie Dog Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 200 acres of black-tailed prairie dog habitat. This would eliminate any impacts to prairie dogs due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Greater Sage-Grouse (winter range, leks, nesting):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 4 greater sage-grouse leks. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. None of these leks are on lands currently leased for energy development.

  Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 95,281 acres of greater sage-grouse habitat. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 12,071 acres (13%) is leased for energy development.

  Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 6,393 acres of greater sage-grouse winter range. This would eliminate any impacts to sage-grouse winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 4,452 acres (70%) is leased for energy development.

- *Sharp-tailed Grouse (leks):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 13 sharp-tailed grouse leks. This would eliminate any impacts to sharp-tailed grouse leks due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 2 of these leks are on lands that are leased for energy development.

- *Important Grassland Bird Nesting Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 124,342 acres of important grassland bird nesting habitat. This would eliminate any impacts to grassland bird nesting habitat due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 20,720 acres (17%) is leased for energy development.

Sagebrush Grasslands (203,714 acres)

- *Antelope Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 154,633 acres of antelope winter range. This would eliminate any impacts to antelope on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 127,043 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Elk Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 19,105 acres of elk winter range. This would eliminate any impacts to elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Prairie Dog Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 3,100 acres of black-tailed prairie dog habitat. This would eliminate any impacts to prairie dogs due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Greater Sage-Grouse (winter range, leks, nesting):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 19 greater sage-grouse leks. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. None of these leks are on lands currently leased for energy development.

  Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 180,984 acres of greater sage-grouse habitat. This would eliminate any impacts to sage-

grouse due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 180,245 acres of greater sage-grouse winter range. This would eliminate any impacts to sage-grouse winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Sharp-tailed Grouse (leks):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 6 sharp-tailed grouse leks. This would eliminate any impacts to sharp-tailed grouse leks due to impacts from oil, gas and wind energy development and other land use authorizations. None of these leks are on lands currently leased for energy development.

Island Mountain Range (4,118 acres)

- *Big Game Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 4,115 acres of mule deer and elk winter range. This would eliminate any impacts to mule deer and elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

  Alternative B would manage the entire area as a semi-primitive nonmotorized. This would eliminate any impacts to mule deer and elk on 4,115 acres of winter range.

Western Breaks and Badlands (28,262 acres)

- *Antelope Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 3,884 acres of antelope winter range. This would eliminate any impacts to antelope on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 2,900 acres (75%) is leased for energy development.

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 28,262 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 22,441 acres (79%) is leased for energy development.

- *Bighorn Sheep (distribution, lambing):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 3,263 acres of bighorn sheep habitat. This would eliminate any impacts to bighorn sheep due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 710 acres (22%) is leased for energy development.

  Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 1,034 acres of bighorn sheep lambing habitat. This would eliminate any impacts to bighorn sheep due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Prairie Dog Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 54 acres of black-tailed prairie dog habitat. This would eliminate any impacts to prairie dogs due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 16 acres (29%) is leased for energy development.

- *Greater Sage-Grouse (winter range, leks, nesting):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 14 greater sage-grouse leks. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. Currently all of these leks are on lands that are leased for energy development.

Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,621 acres of greater sage-grouse habitat. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 9,142 acres (86%) are leased for energy development.

Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 4,293 acres of Greater sage-grouse winter range. This would eliminate any impacts to sage-grouse winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 4,094 acres (95%) is leased for energy development.

Wildlife: In addition to the actions noted above, specific management actions and impacts for wildlife categories are described below.

Mammals

- *Bighorn Sheep:* Alternative B provides for management actions to minimize disease transmission from domestic sheep to bighorn sheep. New domestic sheep or goat allotments would not be allowed in bighorn sheep habitat, and new sheep or goat allotments or conversion from cows to sheep or goats would not be allowed within 20 miles of occupied bighorn sheep habitat. This alternative would maximize the distance between domestic sheep and goats and wild sheep, and would minimize the risk of disease transmission between them and greatly reduce the risk of long-term direct impacts to bighorn sheep populations in the planning area.

- *Black-footed Ferret: A*ctions and impacts noted above for black-tailed prairie dogs would affect black-footed ferrets indirectly through impacts to their habitats. No management actions specific to black-footed ferrets are proposed in Alternative B because of the failure of reintroduction efforts to establish a current population of ferrets on BLM land; however, the BLM would manage prairie dog habitat to maintain prairie dog populations and distribution and also provide habitat for ferrets and other special status species. Impacts to ferret habitat are noted in the prairie dog section above.

- *Black-tailed Prairie Dog:* Management for black-tailed prairie dogs would be accomplished through the Fish, Wildlife and Parks Region 6 Prairie Dog Abundance and Distribution Objectives Plan (MFWP 2006a). This plan provides acreages for black-tailed prairie dogs within three complex types as follows:

  - One Category 1 complex of at least 5,000 acres of active prairie dog towns spaced no more than 1.5 km apart. This Category 1 complex would not be actively managed to exceed 10,000 acres.

  - Six to eight Category 2 complexes of 1,000 or more acres of active prairie dog towns. Two or three of these complexes would follow the 1.5 km rule and the remainder would follow the 7 km rule.

  - Category 3 prairie dog towns would be scattered throughout the historic prairie dog range in Region 6.

  Impacts to prairie dogs under Alternative B would be expected to be minimal and proposed management actions would be beneficial for prairie dogs and other species associated with prairie dog towns such as mountain plovers because of the acreage amounts and the distribution of prairie dogs throughout their current range in the planning area.

Birds

- *Greater Sage-Grouse:* Alternative B would require the BLM to use the national and Montana greater sage-grouse conservation strategies as standards in the planning area except for habitat standards which would be derived from regional standards. Regional standards for greater sage-grouse habitat would be cooperatively developed from recent habitat inventories and population parameters in the planning area along with relevant range-wide research findings. Management under Alternative B would also emphasize restoration and

rehabilitation of sagebrush in areas capable of but no longer supporting sagebrush to contribute to the distribution and connectivity of habitat patches. Greater sage-grouse habitats associated with silver sagebrush north of the Milk River would be enhanced to improve habitat conditions for nesting and brood rearing.

A large block of priority greater sage-grouse habitat would be managed as a protection priority area ACEC to minimize surface-disturbing activities (930,265 acres). Alternative B also provides specific guidance or management actions for the protection of the priority habitat area from habitat loss and fragmentation. The large block of priority habitat would be managed to maintain greater sage-grouse habitat by limiting surface-disturbing and disruptive activities, thereby reducing the impacts from habitat loss and fragmentation under Alternative B.

The spread of noxious weeds is probably the second greatest impact to greater sage-grouse habitat on BLM lands in the planning area (after surface-disturbing and disruptive activities as noted above). Noxious weeds contribute to loss of greater sage-grouse habitats, increase soil erosion, reduce water quantity and quality, and reduce structural and species diversity. The relative risk of noxious weed infestation between alternatives can be evaluated by the amount of roads anticipated by alternative. Alternative B has the least risk of infestation compared to the other alternatives through the closure of oil and gas leasing in large portions of the planning area, and the resulting reduction in potential well pads and roads being constructed. Closing the Greater Sage-Grouse Protection Priority Area to oil and gas leasing (930,265 acres) also minimizes the potential for the spread of noxious weeds in the planning area.

All alternatives provide for approximately 300 acres of habitat to be treated through fire in grassland and shrubland. Burning can adversely impact nesting habitats due to the extensive time it takes for sagebrush canopy to recover. However, the number of acres burned under Alternative B is probably not detrimental to overall greater sage-grouse habitat in the planning area and full suppression in most sagebrush habitats is beneficial for short-term and long-term persistence of greater sage-grouse habitat through maintenance of large blocks of sagebrush habitat.

All new powerlines on BLM land within 1 mile of greater sage-grouse leks would be buried. This would improve habitat quality in areas near leks and would potentially enhance greater sage-grouse populations.

Wind power is restricted throughout the planning area under Alternative B to areas where wind energy is compatible with other specific resource values, and is specifically restricted in the greater sage-grouse and Grassland Bird/Greater Sage-Grouse Priority Areas, ACECs, and WSAs. Developing minerals and wind energy facilities on BLM land under Alternative B could result in long-term adverse impacts to greater sage-grouse by destroying and fragmenting sagebrush habitats. These stipulations would limit the disturbance associated with wind power generation in greater sage-grouse priority areas and where other resources conflict with wind energy development, and short-term and long-term impacts to greater sage-grouse from wind power under Alternative B are expected to be minimal.

Overall, protection under Alternative B to minimize disturbances and protect habitat for greater sage-grouse would provide short-term and long-term beneficial impacts to greater sage-grouse on BLM land.

- *Migratory Birds:* Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitats: forest and woodland species, grassland species, riparian and wetland species, and sagebrush species.

  - *Forest and Woodland Species* – BLM actions for silviculture treatments, forest products, and wildfire control result in short-term disturbance. Because of their diverse habitat requirements, some migratory birds are adversely impacted and some benefit from these management actions. Alternative B would provide greater amounts of these treatments and would benefit migratory birds associated with early successional habitats.

  - *Grassland Species* – Under Alternative B, grassland-associated migratory birds would be protected by limits on surface-disturbing and disruptive activities in the priority areas ACEC through a closure to oil and gas leasing on the large blocks of intact grassland habitat (461,220 acres of BLM land). However, there

would be no specific stipulations for grassland-associated birds outside the priority areas ACEC. The potential long-term disturbance of 17,727 acres (Table 4.100) could result in declines in bird populations, particularly in the high, moderate, and low oil and gas development potential areas. Road maintenance in mountain plover habitat would be limited in Alternative B between April 1 and July 31 unless surveys are initiated prior to maintenance to avoid impacts to young plovers, which would mitigate the potential loss of young birds due to road maintenance activities.

The suite of grassland-associated special status migratory birds is impacted by changes to vegetation heterogeneity, both in species composition and structure. Heterogeneity in grasslands throughout the planning area would provide habitat for the entire suite of special status species. The major disruptive activities that alter heterogeneity in the planning area include noxious weeds, widespread heavy grazing, or widespread light grazing. Grazing management for rangeland health under the current Standards and Guidelines would benefit grassland-associated species. Weed infestations would be limited under Alternative B through an increase in the acreage with no oil and gas leasing in the Greater Sage-Grouse Protection Priority Area and Grassland Bird/Greater Sage-Grouse Priority Areas.

The impacts of disruptive activities on migratory birds occur primarily during the breeding period in all general habitat types noted above. In the planning area this generally applies to activities occurring from April 15 to July 15.

- *Riparian and Wetland Species* – Although there are no specific management actions for migratory birds that use riparian areas and wetlands in Alternative B, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative B, the BLM would close leasing within 1/2 mile of a waterbird colony. This would be a benefit to most riparian and wetland-associated species. Actions associated with waterfowl habitat and colonial waterbirds would also benefit a number of wetland-associated migratory birds.

- *Sagebrush Species* – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed above. This action would close 1,579,161 acres of BLM lands with high value for greater sage-grouse to oil and gas leasing. This action would eliminate short-term direct impacts and long-term indirect impacts associated with oil and gas leasing in a majority of the sagebrush habitat in the planning area and would be beneficial for all sagebrush-associated species. This would also benefit sagebrush-associated birds by avoiding short-term direct impacts and long-term indirect impacts in these areas.

- *Waterfowl:* Upland and emergent vegetation in pastures surrounding reservoirs established or rebuilt for waterfowl values would be managed under Alternative B to provide adequate nesting and brood rearing cover for waterfowl. This action would provide long-term benefits for waterfowl production and populations in areas where waterfowl are a priority for wildlife management. Waterfowl habitats would also be improved to provide long-term benefits to waterfowl populations through actions limiting pit development outside of natural wetlands as well as restoration of currently degraded wetlands.

Cumulative Impacts

Management actions proposed under Alternative B would close 3,173,637 acres of BLM minerals to oil and gas leasing. An additional 258,560 acres would have an NSO stipulation. These management actions for BLM minerals would curtail direct and indirect short-term and long-term effects to wildlife on 99% of BLM land. Two large blocks of relatively intact habitat would be managed as ACECs to maintain habitat integrity for greater sage-grouse (930,265 acres) and grassland birds/greater sage-grouse (461,220 acres). Management of these areas would strive to maintain or improve current habitat conditions and would greatly enhance habitat integrity and connectivity providing long-term benefits to wildlife species in those areas. These actions would help ensure viable populations at a regional scale and provide connectivity to allow for potential range shifts if habitat conditions change.

Despite closure of significant portions of BLM land, wildlife habitat conditions would slowly degrade in the high, moderate, and low oil and gas development potential areas through incremental development of surface-disturbing and disruptive actions combined with the current level of disturbance. Under Alternative B, mean well densities in each of

the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.04 wells per square mile) (Table 4.101). Road densities would exceed the upper threshold in the high and moderate development potential areas and the lower threshold in the low and very low development potential areas (Table 4.102). Mean well densities in the high, moderate, and low development potential areas and road densities in the high and moderate development potential areas would exceed thresholds for significant impacts to big game populations, resulting in impacts to 166,300 acres or 30% of all antelope winter range and 185,600 acres or 24% of all mule deer winter range. A significant decline in populations of big game animals would be expected within the high, moderate, and low development potential areas under Alternative B because of direct impacts (increased mortality of individuals) and indirect effects (increased fragmentation and avoidance of impacted areas) as measured by the amount of surface-disturbing activity densities. The number of wells anticipated in all potential areas are also expected to result in an increase of the amount of land within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.97).

Mean well densities would also exceed thresholds for greater sage-grouse in the high, moderate, and low development potential areas. This would result in significant declines in greater sage-grouse populations as measured by the number of males at leks and loss of most large (>25 males) leks. Approximately 76 leks are affected by well densities found in the high, moderate, and low development potential areas comprising 31% of all known leks in the planning area.

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.80 wells/mi² to 2.89 wells/mi² (a 361% increase) and road densities would increase from 0.98 to 1.90 miles of road/mi² (194% increase), even with closure of 97% of BLM minerals in this area (Tables 4.101 and 4.102). About 84% of the area is currently leased (149,214 acres).

Approximately 164 greater sage-grouse leks (31% of all leks in the planning area) would be within 5.3 miles (8.5 km) of areas with mean well densities in excess of 1 well/mi², a level at which impacts would be expected based on work by Harju (2009). Furthermore, 49 of those leks would be within 5.3 miles of areas with mean well densities in excess of 2 wells/mi², a density threshold where no large leks would be expected to remain and significant declines in sage-grouse populations would be expected.

Closure would only affect areas not currently leased or areas leased after the current leases expire. Currently, 80% of the high, 87% of the moderate, 57% of the low, and 12% of the very low development potential areas are leased, limiting the ability of the stipulations proposed in Alternative B, but activities on existing leases would be managed using BMPs (Appendix E.2).

Wind energy rights-of-way would be excluded from 2,188,388 acres of BLM land (primarily greater sage-grouse and Grassland Bird/Greater Sage-Grouse Priority Areas, ACECs, and WSAs) which would limit the impacts from wind energy development in those areas. Alternative B provides management actions that would limit fragmentation of important habitat areas, and short-term and long-term direct and indirect impacts from wind energy developments would be minimized.

The impacts addressed above would be additive to current and continued loss of habitat through conversion to cropland, particularly in those areas where land ownership is highly fragmented and crop production is adjacent to or nearby BLM lands.

Impacts under Alternative C

Estimated short-term disturbance from all surface-disturbing activities is 56,277 acres. Approximately 52,898 acres would be reclaimed, resulting in 3,379 acres of long-term surface disturbance from all surface-disturbing activities in Alternative C. The effects of each major resource use are described below.

Fire Management and Ecology, and Forests and Woodlands: The effects would be the same as in Alternative B.

Fluid Minerals: The number of new wells on BLM minerals anticipated under Alternative C is 1,617 wells. Most of these wells (832) would be located in the moderate development potential area. This would result in 8,547 acres of

short-term habitat disturbance and 2,238 acres of long-term habitat disturbance. Most of this disturbance would occur in grassland/sagebrush/shrubland habitats (approximately 92%, based on the percentage of habitat types in the planning area).

Although many of the short-term effects to wildlife habitat and populations are mediated by reclamation, those reclaimed areas adjacent to or surrounding long-term habitat disturbance do not necessarily result in reclaimed wildlife habitat. Many species often avoid areas of long-term surface disturbance and disruption resulting in long-term indirect effects. The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.96).

Approximately 218,586 acres would be closed to oil and gas leasing under Alternative C to protect a variety of resource values, not just wildlife. An additional 1,291,160 acres would be available for leasing with an NSO stipulation, of which 82% are located in the very low oil and gas development potential area. These protections would benefit all wildlife species located in these areas by minimizing surface-disturbing activities and associated avoidance as noted above.

Although these stipulations may mitigate impacts at local scales, impacts to wildlife often happen at much larger scales. Large-scale impacts to wildlife and wildlife habitats are best described by the density of impacts on the landscape. Thresholds for densities of roads and oil and gas wells have been described for big game (Hebblewhite 2008), and long-term impacts to big game species are expected at well densities from 0.26 to 1.04 wells per square mile and with road densities between 0.29 and 1.69 miles of road/mi². Road effects are discussed in this section since most road development in the planning area is anticipated to be associated with oil and gas activities. Impacts to populations are often not immediate and may manifest in population level responses a number of years after the initial disturbance.

Under Alternative C, mean well densities on BLM land in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.02 wells per square mile) (Table 4.98). Road densities would exceed the upper threshold in the moderate development potential area and the lower threshold in the high and low development potential areas (Table 4.99). A significant decline in populations of big game animals would be expected within all potential areas except in the very low development potential area because of the density of wells and roads.

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.44 wells/mi² to 2.14 wells/mi² (a 408% increase) and road densities would increase from 0.47 to 1.15 miles of road/mi². This would result in a direct and indirect loss of most habitat for big game in the high development potential areas.

There are few areas where incremental development would be avoided, and wildlife habitat in the very low development potential area would remain at risk as the percentage of lands affected by development continues to increase throughout the life of the plan.

Alternative C provides a number of stipulations to minimize disturbance impacts from oil and gas activities at local scales through stipulations limiting timing or distance from key wildlife resource values. These are addressed below under each wildlife category for BLM lands. The acreage figures are not additive as some resource values overlap.

- *Big Game:* Alternative C has an NSO restriction on oil and gas activities in crucial big game winter range areas. This stipulation would limit short-term and long-term impacts on 66,012 acres of crucial winter range.

  Alternative C also includes a winter range timing stipulation which limits surface-disturbing and disruptive activities in winter range from December 1 to May 15. This mitigation would eliminate short-term direct disturbance on 633,850 acres of winter ranges during critical time periods for animal stress but would allow long-term direct and indirect disturbances to occur on winter ranges. This would lead to long-term changes in big game populations if well densities exceed thresholds for winter range. Mean well densities under this alternative would exceed a threshold of 1.06 wells/mi² on approximately 142,098 acres of winter range in the high, moderate, and low development potential areas (22% of all winter range).

A CSU stipulation is also placed on bighorn sheep habitat in the planning area to minimize impacts to bighorn sheep habitat. This would mitigate disturbance on 3,045 acres of bighorn sheep, but would allow long-term direct and indirect disturbances to occur. Bighorn sheep lambing areas would be protected by an NSO stipulation. This would minimize surface-disturbing and disruptive activities on 7,625 acres of bighorn sheep habitat and would minimize direct and long-term indirect effects on bighorn sheep populations.

- *Black-footed Ferret:* The effects would be the same as described in Alternative A.

- *Black-tailed Prairie Dog:* The effects would be the same as described in Alternative A.

- *Colonial Waterbirds:* Direct and indirect long-term impacts to waterbird colonies are mitigated by an NSO stipulation for activities within 1/2 mile of a waterbird colony. This would result in 5,547 acres surrounding waterbird colonies where surface-disturbing and disruptive activities would not be allowed. Most of this protection (91%) would apply in the very low development potential area. Additionally, to minimize short-term disturbances during the breeding season, a timing stipulation would limit activities within 1 mile of a waterbird colony from April 1 to July 15. This would result in an additional 2,934 acres surrounding waterbird colonies, not covered by other stipulations, where this stipulation would be applied.

- *Game Birds:* Lands within 1/4 mile of a sharp-tailed grouse lek have an NSO stipulation for surface-disturbing activities and a timing stipulation for surface-disturbing or disruptive activities from March 15 to June 30 within 1/2 mile of a sharp-tailed grouse lek. The NSO stipulation would minimize long-term impacts to 16,995 acres of habitat surrounding leks. The timing stipulation would mitigate short-term direct effects to breeding activities on 31,141 acres of habitat, but would allow long-term direct and indirect disturbances to occur within nesting habitat, potentially leading to population impacts.

- *Greater Sage-Grouse:* Lands within 1 mile of greater sage-grouse leks would have an NSO stipulation under Alternative C. The NSO stipulation around leks would minimize disturbances to breeding activities and avoid impacts to those birds nesting within 1 mile of a lek on 117,890 acres of BLM land. A timing restriction on oil and gas activities would also be applied to greater sage-grouse winter range from December 1 to May 15 to minimize disruptive activities that would result in increased mortality and disturbance. This stipulation would mitigate short-term impacts to greater sage-grouse on winter ranges but would not address long-term indirect impacts to greater sage-grouse from activities that would occur outside the timing restriction.

  A CSU stipulation would be applied to greater sage-grouse habitat and would require a plan to maintain functionality of greater sage-grouse habitat, avoid or minimize habitat loss, and minimize disturbances. Also, submersible pumps would be required on all wells, and noise levels from production facilities would be lower than 49 decibels at 300 feet within greater sage-grouse habitat to minimize disturbances associated with elevated noise levels at these facilities. The CSU stipulation would minimize impacts to all habitat regardless of the distance from a lek. This would be applied to 403,751 acres of greater sage-grouse habitat not covered by other, greater stipulations. The CSU does not limit well density, so sage-grouse habitats may be subject to continued incremental degradation of habitat through increased density of disturbances.

  Alternative C also provides specific guidance or management actions for the protection of the priority habitat area from habitat loss and fragmentation. The large block of priority habitat area would have a NSO stipulation to maintain greater sage-grouse habitat by limiting surface-disturbing and disruptive activities, thereby reducing the impacts from habitat loss and fragmentation. This stipulation would provide mitigation that may allow current greater sage-grouse populations to exist in the priority area because well densities up to one/mi² have been noted to not have an impact on greater sage-grouse populations. However, Harju, et al. (2009) noted that some areas they investigated showed impacts to greater sage-grouse populations when any well pads were placed in the landscape. Approximately 98% of the priority area is within 8.5 km (5.28 miles) of a greater sage-grouse lek and even at densities of one well per section, some impacts to leks and local populations would be expected, particularly the loss of large leks.

  Impacts to leks located in the high, moderate, and low oil and gas development potential areas would be similar to those described in Alternative A.

- *Least Tern:* An NSO stipulation would be implemented within 1/2 mile of essential least tern habitat to limit surface-disturbing activities. This would provide long-term protection for nesting habitat and long-term protection from disruptions within 1/2 mile of nesting habitats during the breeding season should this species be found nesting on BLM land.

- *Mountain Plover:* An NSO stipulation would be implemented within mountain plover habitat to limit surface-disturbing activities. This would result in approximately 87,869 acres of mountain plover habitat where direct long-term impacts would be avoided. In addition, a timing stipulation would mitigate disruptive impacts within 1/4 mile of mountain plover habitat from April 1 to July 31, resulting in an additional 3,985 acres of land where impacts would be minimized.

- *Piping Plover:* The effects would be the same as described under Alternative A.

- *Raptors:* An NSO stipulation would restrict surface-disturbing and disruptive impacts within 1/4 mile of a raptor nest which has been active within the last 7 years. This would result in 7,067 acres of habitat surrounding nests where long-term direct and indirect effects to reproductive success of the raptors would be minimized.

- *Swift Fox:* The effects would be the same as described under Alternative B.

Livestock Grazing and Vegetation – Rangeland: The effects would be the same as described under Alternative B.

Noxious Weeds and Other Non-Native Invasive Species: The effects would be the same as under Alternative A.

OHV Use and Travel and Transportation Management: No areas would be open to off-road travel under Alternative C. The Sweet Grass Hills ACEC would continue to be closed to OHV use and two areas currently open to OHV use would be closed. Alternative C does allow for motorized game retrieval off road in portions of the planning area during specified times. Closure of the planning area to OHV use would minimize direct impacts to vegetation and soil resources, and thus wildlife habitat, and would also eliminate indirect impacts to wildlife resources in a very small portion of the planning area currently open to OHV use (124 acres). Game retrieval would potentially provide short-term direct disturbance to some wildlife species. Long-term indirect impacts may occur if game retrieval leads to the establishment of new roads, primitive roads and trails.

Renewable Energy: Under Alternative C about 1,324,957 acres of BLM land would be exclusion areas for wind energy rights-of-way. This includes greater sage-grouse protection priority and Grassland Bird/Greater Sage-Grouse Priority Areas (but with fewer acres under this alternative than Alternative B), crucial winter range (but not general winter range), and large reservoir waterfowl complexes in addition to ACEC areas, traditional cultural properties, VRM Class I areas, and developed recreation sites.

There may be some impacts to wildlife from wind energy developments under this alternative because short-term and long-term, direct and indirect impacts as noted in Alternative A may occur in areas with value to fish and wildlife and special status species, including portions of large areas of intact habitat in the planning area that are closed in Alternative B (568,809 acres). However, specific impacts would depend on the location of the wind energy development in relation to the location of high value wildlife habitat. Impacts would not occur in the greater sage-grouse protection priority and Grassland Bird/Greater Sage-Grouse Priority Areas as delineated in this alternative (298,772 acres) and general winter range (1,110,000 acres).

Soils: Alternative C considers a CSU on surface-disturbing activities for soils with severe erosion hazard and an NSO on badlands, rock outcrops, and slopes susceptible to mass failure. This would mitigate impacts to soil resources on approximately 331,807 acres in the planning area and would be beneficial for wildlife by minimizing short-term direct impacts and long-term indirect impacts to wildlife habitat associated with these soil features.

Special Designations: All current ACECs would be retained. In addition, the Malta Geological Area ACEC, Zortman/Landusky Mine Reclamation ACEC, Woody Island ACEC, and Frenchman ACEC would be designated. Alternative C eliminates the Prairie Dog Towns within the 7km Complex ACEC for black-tailed prairie dogs. The impacts to black-tailed prairie dogs because of this change are not apparent because all prairie dog towns in the planning

area are now afforded similar protections as those in this ACEC, negating the need for special management for a subset of the prairie dogs located in the Prairie Dog Towns within the 7km Complex ACEC. Short-term and long-term impacts to wildlife would be beneficial for wildlife within these ACECs by minimizing short-term and long-term direct and indirect effects from surface-disturbing and disruptive activities to wildlife found within these ACECs. In addition, changes to management actions such as closing areas to oil and gas leasing and renewable energy in current ACECs increases the benefits for the wildlife resources for which many of the ACECs were designated.

Vegetation – Riparian and Wetland: Alternative C provides some protection of surface water from impacts associated with soil erosion and runoff from disturbed areas, and from other actions with an NSO stipulation within 500 feet of streams, lakes, reservoirs, canals, and associated riparian habitats. This would mitigate short-term direct and long-term indirect impacts to 510,481 acres of wildlife habitat associated with wetland/riparian features not protected by other resource stipulations.

Wilderness Characteristics: The 228,419 acres of lands found to have wilderness characteristics would be managed to preserve and enhance their wilderness characteristics.

Eastern Breaks and Badlands (10,714 acres)

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,714 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Elk Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,549 acres of elk winter range. This would eliminate any impacts to elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

Prairie Grasslands (81733 acres)

- *Antelope Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 50,553 acres of antelope winter range. This would eliminate any impacts to antelope on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 11,326 acres (22%) is leased for energy development.

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 125,530 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 24,814 acres (20%) is leased for energy development.

- *Critical Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 44,063 acres of crucial winter range. This would eliminate any impacts to crucial winter range habitat due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 40 acres (<1%) is leased for energy development.

- *Prairie Dog Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 200 acres of black-tailed prairie dog habitat. This would eliminate any impacts to prairie dogs due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Greater Sage-Grouse (winter range, leks, nesting):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 4 greater sage-grouse leks. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. None of these leks are on lands currently leased for energy development.

Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 95,281 acres of greater sage-grouse habitat. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 12,071 acres (13%) is leased for energy development.

Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 6,393 acres of greater sage-grouse winter range. This would eliminate any impacts to sage-grouse winter range due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 4,452 acres (70%) is leased for energy development.

- *Sharp-tailed Grouse (leks):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 13 sharp-tailed grouse leks. This would eliminate any impacts to sharp-tailed grouse leks due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 2 of these leks are on lands that are leased for energy development.

- *Important Grassland Bird Nesting Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 124,342 acres of important grassland bird nesting habitat. This would eliminate any impacts to grassland bird nesting habitat due to impacts from oil, gas and wind energy development and other land use authorizations. Currently 20,720 acres (17%) is leased for energy development.

Sagebrush Grasslands (131,854 acres)

- *Antelope Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 154,633 acres of antelope winter range. This would eliminate any impacts to antelope on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 127,043 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Elk Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 19,105 acres of elk winter range. This would eliminate any impacts to elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Prairie Dog Habitat:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 3,100 acres of black-tailed prairie dog habitat. This would eliminate any impacts to prairie dogs due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Greater Sage-Grouse (winter range, leks, nesting):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 19 greater sage-grouse leks. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. None of these leks are on lands currently leased for energy development.

  Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 180,984 acres of greater sage-grouse habitat. This would eliminate any impacts to sage-grouse due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

  Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 180,245 acres of greater sage-grouse winter range. This would eliminate any impacts to sage-

grouse winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Sharp-tailed Grouse (leks):* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 6 sharp-tailed grouse leks. This would eliminate any impacts to sharp-tailed grouse leks due to impacts from oil, gas and wind energy development and other land use authorizations. None of these leks are on lands currently leased for energy development.

Island Mountain Range (4,118 acres)

- *Big Game Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 4,115 acres of mule deer and elk winter range. This would eliminate any impacts to mule deer and elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

  Alternative B would manage the entire area as a semi-primitive nonmotorized. This would eliminate any impacts to mule deer and elk on 4,115 acres of winter range.

Wildlife: In addition to the actions noted above, specific management actions and impacts for wildlife categories are described below.

Mammals

- *Bighorn Sheep:* Alternative C provides for stipulations to minimize disease transmission from domestic sheep to bighorn sheep. No new domestic sheep or goat allotments would be allowed in bighorn sheep habitat, and allotments between current bighorn sheep range and current sheep allotments would be reviewed and reclassified based on habitat, movement potential, and current science and guidelines to minimize contact between domestic sheep and bighorn sheep.

- *Black-footed Ferret:* The effects would be the same as those described under Alternative B.

- *Black-tailed Prairie Dog:* The effects would be the same as those described under Alternative B.

Birds

- *Greater Sage-Grouse:* Alternative C would require the BLM to use the national and Montana greater sage-grouse conservation strategies as standards in the planning area except for habitat standards which would be derived from regional standards. Regional standards for greater sage-grouse habitat would be cooperatively developed from recent habitat inventories and population parameters in the planning area along with relevant range-wide research findings. Management under Alternative C would also emphasize restoration and rehabilitation of sagebrush in areas capable of but no longer supporting sagebrush to contribute to the distribution and connectivity of habitat patches. Greater sage-grouse habitats associated with silver sagebrush north of the Milk River would be enhanced to improve habitat conditions for nesting and brood rearing. This is the same as in Alternative B.

  Under Alternative C, 930,265 acres of priority greater sage-grouse habitat would be managed to maintain greater sage-grouse habitat and populations by limiting habitat loss and fragmentation. The priority area would limit surface-disturbing and disruptive activities by an NSO stipulation for oil and gas leasing, excluding the area from wind energy rights-of-way, and avoiding rights-of-way in the area. Outside the priority areas, lands within 1 mile of greater sage-grouse leks would have an NSO stipulation. A CSU stipulation would be applied to greater sage-grouse habitat and would require a plan to maintain functionality of greater sage-grouse habitat, avoid or minimize habitat loss, and minimize disturbances.

  Alternative C would require an NSO stipulation within 1 mile of occupied leks to minimize impacts to breeding greater sage-grouse. The distance associated with this NSO stipulation would limit disruptions in 117,890 acres around greater sage-grouse leks and should provide enough protection to limit changes to greater sage-grouse

populations from disruptions at the lek site. Greater sage-grouse nesting habitats are protected by a CSU stipulation that would minimize or mitigate disruptive activities.

Alternative C includes some stipulations for the development of wind energy. Wind power is restricted throughout the planning area to areas where wind energy is compatible with other specific resource values and is specifically excluded in the greater sage-grouse and Grassland Bird/Greater Sage-Grouse Priority Areas, ACECs, and WSAs. Impacts to greater sage-grouse from wind energy development are similar in Alternative C and Alternative B. These stipulations would limit the disturbance associated with wind power generation in greater sage-grouse priority areas and where other resources conflict with wind energy development, and short-term and long-term impacts to greater sage-grouse from wind power under Alternative C are expected to be low.

Developing minerals and wind energy facilities on BLM land under Alternative C could result in long-term adverse impacts to greater sage-grouse by destroying and fragmenting sagebrush habitats but the impacts are mitigated by the establishment of greater sage-grouse priority areas and stipulations to surface-disturbing and disruptive activities under Alternative C.

As noted in Alternative B, the relative risk of noxious weed infestation between alternatives can be measured by the amount of roads expected under each alternative. Alternative C has a lower risk of noxious weed infestation than all the alternatives other than Alternative B, resulting in lower risks to greater sage-grouse habitats.

Changes to vegetation structure and composition from fire and grazing are the same as described in Alternative B.

All new powerlines within 1/2 mile of greater sage-grouse leks would be buried on BLM land. This action would result in benefits for greater sage-grouse population compared to not having powerlines removed but would not result in benefits for breeding habitats away from leks or as much of a benefit as noted in Alternative B because fewer miles of powerlines would be removed from greater sage-grouse habitat.

Protection for greater sage-grouse winter habitats from disruptive activities would limit activities on greater sage-grouse winter range by having a timing stipulation which would limit activities on greater sage-grouse winter range from December 1 to May 15 and an NSO stipulation for areas of crucial winter range which would limit the number of surface disturbances from oil and gas activities.

Alternative C would require the BLM to manage sagebrush habitats so that mid-scale shrub cover would include a mix of height classes with herbaceous understory adequate for meeting greater sage-grouse requirements. This is similar to management proposed under Alternative B, but the scale of management is reduced to the watershed level. Short-term impacts would be similar to Alternative B, but long-term indirect impacts to greater sage-grouse may be increased by managing at smaller scales and potentially missing large-scale changes in habitat connectivity through fragmentation and loss.

- *Migratory Birds:* No specific management actions for migratory birds are outlined in Alternative C.

  Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitats: forest and woodland species, grassland species, riparian and wetland species, and sagebrush species.

  - *Forest and Woodland Species* – The effects would be the same as described under Alternative B.

  - *Grassland Species* – Grassland-associated migratory birds would be protected by limits on surface-disturbing and disruptive activities in the priority areas through a NSO stipulation on the large blocks of intact grassland habitat (298,772 acres of BLM land). However, there would be no stipulations for grassland-associated birds outside the priority areas. An NSO stipulation within mountain plover habitat and a timing stipulation within 1/4 mile of mountain plover habitat from April 1 to July 31 would protect 91,854 acres of habitat for this species and other special status species associated with the same habitats.

- Grazing management for rangeland health under the current Standards and Guidelines for Alternative C would benefit grassland-associated species and the impacts are similar to Alternative B. Weed infestations would be limited under Alternative C through limitations on acreage with no oil and gas leasing in the Greater Sage-Grouse Protection Priority Area and Grassland Bird/Greater Sage-Grouse Priority Areas with CSU stipulations to protect grassland birds, but the total amount of habitat protected is less than in Alternative B.

- *Riparian and Wetland Species* – Although there are no specific management actions for migratory birds that use riparian areas and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats as noted above. Under Alternative C, the BLM would limit surface-disturbing and disruptive activities through a CSU stipulation within 300 feet of lotic and lentic systems. This would benefit most riparian and wetland-associated species. Actions associated with waterfowl and colonial waterbird habitat would also benefit a number of wetland-associated migratory birds.

- *Sagebrush Species* – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse. Management actions in Alternative C would include an NSO stipulation for oil and gas leasing of BLM lands with high value for greater sage-grouse (1,028,661 acres). This action would eliminate short-term direct impacts and long-term indirect impacts associated with oil and gas leasing in a large percentage of the sagebrush habitat in the planning area and would be beneficial for all sagebrush-associated species. Alternative C also provides for an NSO stipulation within 1 mile of a greater sage-grouse lek (117,890 acres) and a CSU stipulation within all greater sage-grouse nesting habitat (403,751 acres). Both actions would also benefit sagebrush-associated birds by limiting short-term direct impacts and long-term indirect impacts in these areas.

- *Waterfowl:* The effects to waterfowl under Alternative C would be the same as described under Alternative B.

Cumulative Impacts

Management actions proposed under Alternative C would close 218,586 acres of BLM minerals to oil and gas leasing. An additional 1,291,160 acres would have an NSO stipulation. Two large blocks of relatively intact habitat would be managed to maintain habitat integrity for greater sage-grouse (930,265 acres) and grassland birds (298,772 acres). Management of these areas would strive to maintain or improve current habitat conditions and would greatly enhance habitat integrity and connectivity, providing long-term benefits to wildlife species in those areas. These actions would help ensure viable populations at a regional scale and provide connectivity to allow for potential range shifts if habitat conditions change.

Wildlife habitat conditions would slowly degrade in the high, moderate, and low oil and gas development potential areas through incremental development of surface-disturbing and disruptive actions combined with the current level of disturbance. Under Alternative C, mean well densities on BLM land in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.05 wells per square mile) (Table 4.101). Road densities would exceed the upper threshold in the high and moderate development potential areas and the lower threshold in the low and very low development potential areas (Table 4.102). A significant decline in populations of big game animals would be expected within the high, moderate, and low development potential areas because of direct impacts (increased mortality of individuals) and indirect effects (increased fragmentation and avoidance of impacted areas) as measured by the amount of surface-disturbing activity densities. Incremental development would continue outside areas where development is precluded or densities are controlled. Wildlife habitat in these areas would remain at risk as the percentage of lands affected by development continues to increase throughout the life of the plan. The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.97).

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.80 wells/mi² to 3.53 wells/mi² (a 441%

increase) and road densities would increase from 0.98 to 2.10 miles of road/mi² resulting in loss of most current wildlife habitat in that area.

Stipulations would only affect areas not currently leased or areas leased after the current leases expire. Currently, 80% of the high, 87% of the moderate, 57% of the low, and 12% of the very low development potential areas are leased, limiting the ability the stipulations proposed in Alternative C, but activities on existing leases would be managed using BMPs (Appendix E.2).

Wind energy rights-of-way would be excluded from 1,324,957 acres of BLM surface ownership which would limit the cumulative impacts from wind energy development in those areas. Alternative C provides management actions that would limit fragmentation of important habitat areas, and short-term and long-term direct and indirect impacts from wind energy developments would be minimized.

The impacts addressed above would be additive to current and continued loss of habitat through conversion to cropland, particularly in those areas where land ownership is highly fragmented and crop production is adjacent to or nearby BLM lands.

Impacts under Alternative D

Estimated short-term disturbance from all surface-disturbing activities is 57,708 acres. Approximately 53,898 acres would be reclaimed, resulting in 3,810 acres of long-term surface disturbance from all surface-disturbing activities in Alternative D. The effects of each resource use are described below.

Fire Management and Ecology, and Forests and Woodlands: The effects would be the same as noted in Alternative B.

Fluid Minerals: The number of new wells on BLM minerals anticipated under Alternative D is 1,894 wells. Most of these wells (1,001) would be located in the moderate development potential area. This would result in 9,663 acres of short-term habitat disturbance and 2,436 acres of long-term habitat disturbance. Most of this disturbance would occur in grassland/sagebrush/shrubland habitats (approximately 92%, based on the percentage of habitat types in the planning area).

Although much of the short-term effects to wildlife habitat and populations are mediated by reclamation, those reclaimed areas adjacent to or surrounding long-term habitat disturbance do not necessarily result in reclaimed wildlife habitat. Many species often avoid areas of long-term surface disturbance and disruption resulting in long-term indirect effects.

Approximately 74,674 acres of BLM minerals would be closed to oil and gas leasing under Alternative D to protect a variety of resource values. An additional 357,456 acres would be available for leasing with an NSO stipulation. Eighty five percent (85%) of this acreage is located in the very low oil and gas development potential area. These protections would benefit all wildlife species located in these areas by minimizing surface-disturbing activities and associated avoidance as noted above.

Although these stipulations may mitigate impacts at local scales, impacts to wildlife often happen at much larger scales. Large-scale impacts to wildlife and wildlife habitats are best described by the density of impacts on the landscape. Thresholds for densities of roads and oil and gas wells have been described for big game (Hebblewhite 2008), and long-term impacts to big game species are expected at well densities from 0.26 to 1.04 wells per square mile and with road densities between 0.29 and 1.69 miles of road/mi². Road effects are discussed in this section since most road development in the planning area is anticipated to be associated with oil and gas activities. Impacts to populations are often not immediate and may manifest in population level responses a number of years after the initial disturbance.

The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.96).

Under Alternative D, mean well densities on BLM land in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.03 wells per square mile) (Table 4.98).

Road densities would exceed the upper threshold in the moderate development potential area and the lower threshold in the high and low development potential areas (Table 4.99). A significant decline in populations of big game animals would be expected within all potential areas except in the very low development potential area because of the density of wells and roads.

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.44 wells/mi² to 2.38 wells/mi² (a 541% increase) and road densities would increase from 0.47 to 1.23 miles of road/mi² (262% increase). This would result in a direct and indirect loss of most habitat for big game in the high development potential areas.

Alternative D provides a number of stipulations to minimize disturbance impacts from oil and gas activities at local scales through stipulations limiting timing or distance from key wildlife resource values. These are addressed below under each wildlife category. The acreage figures are not additive as some resource values overlap.

- *Big Game:* Alternative D has a CSU stipulation that limits well density in crucial winter range to limit long-term indirect effects to big game populations with identified crucial winter range (currently only mule deer). This would apply to 12,816 acres.

  Alternative D also includes a winter range timing stipulation which limits surface-disturbing and disruptive activities in winter range from December 1 to March 31. This stipulation would still allow long-term indirect disturbances to occur which could impact big game populations if well densities exceed threshold levels in winter range. Expected mean well densities would exceed the threshold of 1.06 wells/mi² in 233,020 acres of winter range located in the high, moderate, and low development potential areas, resulting in long-term indirect effects to big game populations.

  There are no stipulations for surface-disturbing or disruptive activities on bighorn sheep habitat in the planning area and the effects would be the same as described in Alternative A. Bighorn sheep lambing areas would be protected by a timing stipulation from May 1 to June 30 (1,652 acres) which would minimize short-term direct effects, but long-term indirect effects would occur and impact bighorn sheep populations if well densities exceeded a tolerance threshold; however, the expected well density in lambing areas does not exceed 1.06 wells/mi².

- *Game Birds:* Lands within 1/4 mile of a sharp-tailed grouse lek have a CSU stipulation for surface-disturbing activities and a timing stipulation for surface-disturbing or disruptive activities from March 15 to June 30 within 1/4 mile of a sharp-tailed grouse lek. The CSU stipulation would mitigate some long-term impacts to 18,062 acres of habitat surrounding leks, but long-term direct and indirect effects would continue due to the presence of disturbances near leks. The timing stipulation would mitigate short-term direct effects to breeding activities on 18,062 acres of habitat. Both the CSU and timing stipulations would allow long-term direct and indirect disturbances to occur within nesting habitat, potentially leading to population impacts.

- *Raptors:* A CSU stipulation would minimize surface-disturbing and disruptive impacts within 1/4 mile of a raptor nest which has been active within the last 7 years. The CSU stipulation would mitigate some long-term impacts to 5,374 acres of habitat surrounding nests, but long-term direct and indirect effects would continue due to the presence of disturbances near nests.

- *Colonial Waterbirds:* Direct and indirect long-term impacts to waterbird colonies are mitigated by an NSO stipulation for activities within 1/4 mile of a waterbird colony. This would result in 1,545 acres surrounding waterbird colonies where surface-disturbing and disruptive activities would not be allowed. Most of this protection (95%) would apply in the very low development potential area. Additionally, to minimize short-term disturbances during the breeding season, a timing stipulation would limit activities within 1/2 mile of a waterbird colony from April 1 to July 15. This would result in an additional 2,316 acres surrounding waterbird colonies, not covered by other stipulations, where this stipulation would be applied.

- *Greater Sage-Grouse:* Alternative D has a restriction on oil and gas activities in greater sage-grouse nesting areas by excluding drilling from March 1 to June 15. This mitigation would eliminate short-term direct disturbance on 116,553 acres in sage-grouse nesting habitat. Short-term effects would be mitigated by avoiding

direct impacts to nesting habitats with the timing stipulation but indirect long-term effects would still be present from surface-disturbing activities initiated outside the timing stipulation. An NSO within 0.6 miles of occupied leks was established to protect breeding activities at leks from long-term direct impacts. Six-tenths of a mile is the distance from a lek that a majority of the breeding males spend during the time they are not actively on the lek, and this distance was included to protect disturbances to those males (Colorado Greater Sage-grouse Steering Committee 2008). Breeding males could still be disrupted by disturbances outside that distance and the stipulation has not been determined to provide protection of breeding activities, and effects to individual lek populations would be expected with this mitigation. There are no stipulations on well density anywhere in the planning area under Alternative D and this would lead to long-term changes in sage-grouse populations if well densities exceed thresholds for long-term disturbances. Mean well densities would exceed a threshold of approximately 1 well/mi² on approximately 144,719 acres of sage-grouse habitat in the high, moderate, and low development potential areas (9% of all grouse habitat) under this alternative. Impacts to leks located in the high, moderate, and low oil and gas development potential areas would be similar to those described in Alternative A.

Greater sage-grouse winter habitats are protected from disruptive activities through stipulations in place to protect wildlife winter ranges. The timing stipulation for drilling activities on wildlife winter range is from December 1 to March 31. Short-term disruptive impacts are expected to be minimized by the timing protection under Alternative D, but long-term effects would be expected because of the effects on actions initiated in winter range outside the timing stipulation.

Under this alternative oil and gas activities would be expected to impact greater sage-grouse throughout the planning area where oil and gas activities occur in greater sage-grouse habitat and would result in widespread declines in greater sage-grouse populations.

- *Black-footed Ferret:* An NSO stipulation would be implemented within black-footed ferret habitat to limit surface-disturbing activities. This would result in approximately 19,966 acres of black-footed ferret habitat where direct impacts would be avoided.

- *Black-tailed Prairie Dog:* An NSO stipulation would be implemented within black-tailed prairie dog habitat to limit surface-disturbing activities. This would result in approximately 19,966 acres surrounding prairie dog habitat where direct impacts would be minimized. Potential long-term indirect impacts could occur when disturbances located immediately adjacent to black-tailed prairie dog habitat have effects that extend beyond the initial direct impact and extend into prairie dog habitat.

- *Least Tern:* The effects would be the same as described under Alternative A.

- *Mountain Plover:* An NSO stipulation would be implemented within mountain plover habitat to limit surface-disturbing activities. This would result in approximately 275,504 acres of mountain plover habitat where direct long-term impacts would be avoided. In addition, a timing stipulation would mitigate disruptive impacts within mountain plover habitat from April 1 to July 31.

- *Piping Plover:* A timing stipulation would be implemented from May 15 to July 31 within 1/4 mile of essential piping plover habitat to limit surface-disturbing activities. Direct effects would be mitigated by avoiding impacts to nesting habitats with the timing stipulation, but indirect long-term effects would still be present from surface-disturbing activities initiated outside the timing stipulation. This would result in approximately 189 acres of piping plover habitat where long-term indirect impacts would be not avoided.

- *Swift Fox:* The effects would be the same as described under Alternative B.

Livestock Grazing and Vegetation – Rangeland: The effects would be the same as described under Alternative B.

Noxious Weeds and Other Non-Native Invasive Species: The effects would be the same as under Alternative A.

OHV Use and Travel and Transportation Management: Three areas would be open to off-road vehicle use in Alternative D. There would be no areas closed to OHV use. Alternative D does allow for motorized game retrieval off

road in the planning area during specified time periods. The areas open to off-road vehicle use would have direct impacts to vegetation and soil resources and thus wildlife habitat and would also have indirect impacts to wildlife resources in a very small portion of the planning area (305 acres). Motorized game retrieval off road would potentially provide short-term direct disturbance to some wildlife species. Long-term indirect impacts may occur if game retrieval leads to the establishment of new roads, primitive roads and trails.

Renewable Energy: Under Alternative D about 292,992 acres of BLM land would be exclusion areas for wind energy rights-of-way. This includes only large reservoir waterfowl complexes in addition to ACEC areas, traditional cultural properties, VRM Class I areas, and developed recreation sites. Greater sage-grouse protection priority and Grassland Bird/Greater Sage-Grouse Priority Areas, general winter range and crucial winter range would not be exclusion areas for wind energy rights-of-way.

Impacts to wildlife under Alternative D, including special status species, would be the same as described for Alternative A.

Soils: Alternative D would apply standard lease terms to soil resources. This stipulation would limit the effectiveness of soil resource protection on highly erosive soils and be detrimental to wildlife dependent on habitats defined by those soil types. Direct and indirect long-term effects to those wildlife resources would be prevalent throughout the planning area.

Special Designations: The effects would be the same as noted in Alternative C with the exception of the Zortman/Landusky Mine Reclamation, which would not be designated an ACEC. The lack of an ACEC designation for this area would have long-term direct and indirect effects on wildlife currently found in this reclamation area, such as bighorn sheep, by potentially negating long-term reclamation of wildlife habitats impacted by past mining operations.

Vegetation – Riparian and Wetland: Alternative C provides protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions with a CSU stipulation within 300 feet of streams, lakes, reservoirs, canals, and associated riparian habitats. This would partially mitigate short-term and long-term direct impacts to 328,990 acres of wildlife habitat associated with wetland/riparian features not protected by other resource stipulations. Long-term indirect effects to these habitat types and associated populations of wildlife may still occur because of impacts occurring within the riparian zone under the CSU stipulation.

Wildlife: In addition to the actions noted above, specific management actions and impacts for wildlife categories are described below.

Mammals

- *Bighorn Sheep:* Alternative D provides for management actions to minimize disease transmission from domestic sheep to bighorn sheep. No new domestic sheep or goat allotments would be allowed in bighorn sheep habitat, and new sheep or goat allotments would not be allowed within 5 miles of occupied bighorn sheep habitat to minimize contact between domestic sheep and bighorn sheep. These management actions may be detrimental to bighorn sheep because they do not provide adequate management to minimize disease transmission between wild and domestic sheep. The potential for disease transmission remains high despite these actions.

- *Black-footed Ferret:* No management actions specific to black-footed ferrets are proposed in Alternative D because of the failure of reintroduction efforts to establish a current population of ferrets on BLM lands; however, the BLM would manage prairie dog habitat to maintain prairie dog populations and distribution and also provide habitat for ferrets and other special status species. Impacts to ferret habitat are noted in the prairie dog section above.

- *Black-tailed Prairie Dog:* Black-tailed prairie dog colonies would be managed on a case-by-case basis at the project level. This would result in continued degradation of prairie dog colonies and habitat for other special status species associated with black-tailed prairie dog colonies because of the potential loss of large complexes of prairie dogs, large prairie dog colonies, and the overall distribution of prairie dogs in the planning area.

Birds

- *Greater Sage-Grouse:* Alternative D would require the BLM to manage sagebrush habitats using national and Montana greater sage-grouse conservation strategies to address greater sage-grouse habitat needs during watershed planning and project-level analysis. This is the same as in Alternative A. Short-term impacts and long-term indirect impacts to greater sage-grouse may be increased by managing at smaller scales and potentially missing large-scale changes in habitat connectivity through fragmentation and loss. Impacts to sage-grouse habitats by BLM actions under Alternative D are exacerbated by a lack of sagebrush restoration in this alternative which would result in even greater impacts to sage-grouse populations.

  No large blocks of priority greater sage-grouse habitat would be managed to minimize surface-disturbing activities. Stipulations affecting surface-disturbing and disruptive activities to minimize impacts from these activities on greater sage-grouse are the least protective of all alternatives.

  Developing minerals on BLM land under Alternative D could result in long-term adverse impacts to greater sage-grouse by destroying and fragmenting sagebrush habitats.

  As noted in Alternative B, the relative risk of noxious weed infestation between alternatives can be measured by the amount of roads expected under each alternative. Alternative D has the highest risk of noxious weed infestation of all the alternatives, resulting in the greatest risks to greater sage-grouse habitats.

  Changes to vegetation structure and composition from fire and grazing are the same as described in Alternative B

  Alternative D would require an NSO within 0.6 miles of occupied leks to minimize impacts to greater sage-grouse. The distance associated with this NSO stipulation may not adequately protect greater sage-grouse leks from disruptive activities and it is the least protective of all alternatives. Greater sage-grouse nests are protected by a timing stipulation within 1 mile of a lek that would minimize or mitigate disruptive activities in greater sage-grouse breeding habitat during the nesting season. Surface disturbances would still be allowed outside this timeframe, resulting in increased loss and disruption of greater sage-grouse habitats compared to the other alternatives.

  All powerlines within 1 mile of greater sage-grouse leks would be fitted with raptor anti-perching devices on BLM land. Although this would help limit direct mortality to greater sage-grouse from raptors, the impacts of the structure would still remain. Even when these structures are fitted with anti-perching devices, the grouse may perceive the structures as a predation risk without direct mortality, particularly when they are near breeding areas (Frid and Dill 2002).

  Impacts to greater sage-grouse winter habitats would be mitigated through a timing stipulation which would limit activities on 1,072,126 acres of greater sage-grouse winter range from December 1 to March 31. The length of protection from disruptive activities is one month shorter in Alternative D than in Alternative C. Impacts from a shorter protection time period may not be evident in most years, but some years impacts occurring in April on winter range may be detrimental and long-term for greater sage-grouse populations. A CSU stipulation for areas of crucial winter range which would limit the number of surface disturbances from oil and gas activities to less than 2 disturbances per 640 acres of crucial winter range is the same as in Alternative C. Currently, no crucial winter range areas have been identified in the planning area.

- *Migratory Birds:* No specific management actions for migratory birds are outlined in Alternative D.

  Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitats: forest and woodland species, grassland species, riparian and wetland species, and sagebrush species.

  - *Forest and Woodland Species* – The effects would be the same as described in Alternative B.

- *Grassland Species* – Under Alternative D, there are no specific management actions for migratory birds that utilize grassland. These species would be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, noxious weed control, and livestock and wildlife grazing. Under Alternative D, grassland habitats could be impacted by long-term surface disturbance on BLM land in the planning area. The potential long-term disturbance of 18,852 acres (Table 4.100) could result in declines in bird populations, particularly in the high, moderate, and low oil and gas development potential areas. An NSO stipulation within 1/4 mile of mountain plover habitat (the same as Alternative C) and a timing stipulation within mountain plover habitat from April 1 to July 31 would protect habitat for this species and other special status species.

  Grazing management for rangeland health under the current Standards and Guidelines would benefit grassland-associated species, and the impacts are similar to Alternative C. Weed infestations would be greatest under Alternative D because of the amount of land available for oil and gas leasing and limited restriction on surface-disturbing and disruptive activities.

  The impacts of disruptive activities on migratory birds occur primarily during the breeding period in all general habitat types noted above. In the planning area this generally applies to activities occurring from April 15 to July 15. No stipulations on disruptive activities specifically noted for migratory birds are noted in Alternative D. This could have detrimental impacts to all species of migratory birds across the planning area.

- *Riparian and Wetland Species* – Although there are no specific management actions for migratory birds that use riparian and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats as noted above. Under Alternative D, the BLM would limit surface-disturbing and disruptive activities through a CSU stipulation within 300 feet of lotic and lentic systems. This would be a benefit to most riparian and wetland-associated species. Actions associated with waterfowl and colonial waterbird habitat would also benefit a number of wetland-associated migratory birds as well.

- *Sagebrush Species* – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse. Management actions in Alternative D would place an NSO stipulation within 0.6 miles of a lek. This stipulation would protect 95,895 acres of BLM lands with high value for sage-associated migratory birds from disturbances. Alternative D also provides a timing stipulation within 1 mile of greater sage-grouse leks from March 1 to June 30. The timing stipulation would mitigate short-term direct effects to sagebrush habitats on 89,000 acres of habitat, but long-term direct and indirect disturbances would continue to occur within sagebrush habitat, potentially leading to population impacts of sagebrush-associated species.

- *Waterfowl:* The effects to waterfowl would be the same as described under Alternative B.

Cumulative Impacts

The management actions for Alternative D slowly degrade existing conditions for wildlife in most of the planning area through incremental development of surface-disturbing and disruptive actions and the limited beneficial impacts of the current stipulations to protect wildlife at regional scales. Under Alternative D, mean well densities on BLM land in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.05 wells per square mile) (Table 4.101). Road densities would exceed the upper threshold in the high and moderate development potential areas, and the lower threshold in the low and very low development potential areas (Table 4.102). This would result in long-term declines in a number of wildlife populations in large portions of the planning area, particularly the high, moderate, and low oil and gas development potential areas, through direct impacts (increased mortality of individuals) and indirect effects (increased fragmentation and avoidance of impacted areas) as measured by the amount of surface-disturbing activity densities. Mean well densities in the high, moderate, and low development potential areas and road densities in the high and moderate development potential areas would exceed thresholds for significant impacts to big game populations resulting from the loss of big game habitat. The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas

being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.97).

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities would rise from the current 0.80 wells/mi² to 3.66 wells/mi² (a 458% increase) and road densities would increase from 0.98 to 2.14 miles of road/mi² (218% increase).

Stipulations would only affect areas not currently leased or areas leased after the current leases expire. Currently, 80% of the high, 87% of the moderate, 57% of the low, and 12% of the very low development potential areas are leased, limiting the ability of the stipulations proposed in Alternative D, but activities on existing leases would be managed using BMPs (Appendix E.2).

There are few areas where incremental development would be avoided and wildlife habitat in the very low development potential area would remain at risk as the percentage of lands affected by development continues to increase throughout the life of the plan.

Wind energy rights-of-way would be excluded from 292,992 acres of BLM surface ownership which would limit the cumulative impact from wind energy development in those areas. However, Alternative D does not provide management actions that would limit fragmentation of important habitat areas, and wind energy developments could have short-term and long-term, direct and indirect impacts on high value wildlife habitats and wildlife populations associated with those habitats.

The impacts noted above would be additive to current and continued loss of habitat through conversion to cropland, particularly in those areas where land ownership is fragmented and crop production is adjacent to or nearby BLM lands.

Impacts under Alternative E (Preferred Alternative)

The estimated short-term disturbance from all surface-disturbing activities is 56,922 acres. Approximately 53,320 acres would be reclaimed, resulting in 3,602 acres of long-term surface disturbance from all surface-disturbing activities in Alternative E. The effects of each resource use are described below.

Fire Management and Ecology, and Forests and Woodlands: About 7,820 acres of forested acres could be mechanically treated for forest health. An additional 26,660 acres could be treated with prescribed burning. This is about 1.4% of all forested habitat managed by the BLM in the planning area. Short-term direct impacts to wildlife from these treatments may be severe in treated areas. Long-term indirect effects to wildlife would be beneficial because of the decreased risk of high severity unplanned wildfire and an increase of early successional habitats favored by some species of wildlife. About 6,000 acres of grass/sage could be treated with prescribed burns. This would promote heterogeneity in these habitats and long-term indirect effects would be beneficial to most wildlife species as long as there was careful planning for burns in sagebrush habitats to avoid impacting the integrity of the complete sage habitats.

Fluid Minerals: The number of new wells on BLM minerals anticipated under Alternative E is 1,756 wells. Most of these wells (931) would be located in the moderate development potential area. This would result in 9,068 acres of short-term habitat disturbance and 2,337 acres of long-term habitat disturbance. Most of this disturbance would occur in grassland/sagebrush/shrubland habitats (approximately 92%, based on the percentage of habitat types in the planning area).

Although much of the short-term effects to wildlife habitat and populations are mediated by reclamation, those reclaimed areas adjacent to or surrounding long-term habitat disturbance do not necessarily result in reclaimed wildlife habitat. Many species often avoid areas of long-term surface disturbance and disruption resulting in long-term indirect effects. The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.96).

Approximately 152,702 acres of BLM minerals would be closed to oil and gas leasing under Alternative E to protect a variety of resource values. An additional 1,711,378 acres would be available for leasing with an NSO stipulation. Of

this acreage, 75% is located in the very low oil and gas development potential area. These protections would benefit all wildlife species located in these areas by minimizing surface-disturbing activities and associated avoidance as noted above.

Although these stipulations may mitigate impacts at local scales, impacts to wildlife often happen at much larger scales. Large-scale impacts to wildlife and wildlife habitats are best described by the density of impacts on the landscape. Thresholds for densities of roads and oil and gas wells have been described for big game (Hebblewhite 2008), and long-term impacts to big game species are expected at well densities from 0.26 to 1.04 wells per square mile and with road densities between 0.29 and 1.69 miles of road/mi². Road effects are discussed in this section since most road development in the planning area is anticipated to be associated with oil and gas activities. Impacts to populations are often not immediate and may manifest in population level responses a number of years after the initial disturbance.

Under Alternative E, mean well densities on BLM land in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.05 wells per square mile) (Table 4.98). Road densities would exceed the upper threshold in the moderate development potential area and the lower threshold in the high and low development potential areas (Table 4.99). A significant decline in populations of big game animals would be expected within high, moderate and low potential areas under Alternative E except in the very low development potential areas because of the density of wells and roads.

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where mean well densities on BLM land would rise from the current 0.45 wells/mi² to 2.36 wells/mi² (a 428% increase) and road densities would increase from 0.47 to 1.21 miles of road/mi². This would result in a direct and indirect long-term loss of most habitat for big game in the high development potential areas.

Alternative E provides a number of stipulations to minimize disturbance impacts from oil and gas activities at local scales through stipulations limiting timing or distance from key wildlife resource values. These are addressed below under each wildlife category for BLM lands. The acreage figures are not additive as some resource values overlap.

- *Big Game:* Alternative E has a CSU stipulation that limits well density in crucial winter range to limit long-term indirect effects to big game populations with identified crucial winter range (currently only mule deer). This stipulation would apply to 25,609 acres.

  Alternative E also includes a winter range timing stipulation that limits surface-disturbing and disruptive activities in winter range from December 1 to May 15. The timing stipulation would still allow long-term indirect disturbances to occur which could impact big game populations if well densities exceed threshold levels in winter range. Expected mean well densities would exceed the threshold of 1.06 wells/mi² in 193,450 acres of winter range located in the high, moderate, and low development potential areas not protected by a stricter stipulation for another resource, resulting in long-term indirect effects to big game populations. The later date in this alternative would protect wintering big game from direct disturbance longer in the year. This may be particularly important if winter conditions persist later in the spring when animals are most often at the lowest condition level and most susceptible to increased stress.

  There are no stipulations for surface-disturbing or disruptive activities on bighorn sheep habitat in the planning area and the effects would be the same as described in Alternative A. Bighorn sheep lambing areas would be protected by a timing stipulation from May 1 to June 30 which would minimize short-term direct effects, but long-term indirect effects would occur and impact bighorn sheep populations if well densities exceeded a tolerance threshold; however, the expected well density in lambing areas does not exceed 1.06 wells/mi².

- *Black-footed Ferret:* An NSO stipulation would be implemented within 1/2 mile of essential black-footed ferret habitat to limit surface-disturbing activities. This would result in approximately 82,517 acres of black-footed ferret habitat on BLM lands where direct and indirect impacts would be avoided.

- *Black-tailed Prairie Dog:* Lands within 1/2 mile of black-tailed prairie dog habitat would be closed to leasing to minimize surface-disturbing and disruptive activities. This would result in approximately 82,517 acres surrounding prairie dog habitat where direct impacts would be minimized.

- *Colonial Waterbirds:* Direct and indirect long-term impacts to waterbird colonies are mitigated by an NSO stipulation for activities within 1/2 mile of a waterbird colony. This would result in 5,547 acres surrounding waterbird colonies where surface-disturbing and disruptive activities would not be allowed. Most of this protection (95%) would apply in the very low development potential areas. Additionally, to minimize short-term disturbances during the breeding season, a timing stipulation would limit activities within 1 mile of a waterbird colony from April 1 to July 15. This would result in an additional 7,425 acres surrounding waterbird colonies, not covered by other stipulations, where this stipulation would be applied.

- *Game Birds:* Lands within 1/4 mile of a sharp-tailed grouse lek have an NSO stipulation for surface-disturbing activities and a timing stipulation for surface-disturbing or disruptive activities from March 15 to June 15 within 1/2 mile of a sharp-tailed grouse lek. The NSO stipulation would minimize long-term impacts to 20,809 acres of habitat surrounding leks. The timing stipulation would mitigate short-term direct effects to breeding activities on 51,700 acres of habitat, but would allow long-term direct and indirect disturbances to occur within nesting habitat, potentially leading to population impacts.

- *Greater Sage-Grouse:* Lands within 1 mile of greater sage-grouse leks would have an NSO stipulation under Alternative E. The NSO stipulation around leks would minimize disturbances to breeding activities and avoid impacts to those birds nesting within 1 mile of a lek on 77,874 acres of BLM lands not covered by a more restrictive stipulation.

  A CSU stipulation would be applied to greater sage-grouse habitat and would require a plan to maintain functionality of greater sage-grouse habitat, avoid or minimize habitat loss, and minimize disturbances. The CSU stipulation would provide mitigation in all seasonal habitat. This would minimize impacts to all habitat regardless of the distance from a lek and would be applied to 996,710 acres of BLM land outside the priority area not covered by more restrictive stipulations. The CSU does not limit well density in areas outside the priority area.

  Greater sage-grouse winter habitats would be protected from disruptive activities by a timing stipulation which would limit activities on greater sage-grouse winter range from December 1 to May 15.

  Alternative E also provides specific guidance or management actions for the protection of the priority habitat area from habitat loss and fragmentation. The large block of priority habitat area would have a CSU stipulation to maintain greater sage-grouse habitat by limiting surface-disturbing and disruptive activities, thereby reducing the impacts from habitat loss and fragmentation. This CSU is the same as described above except this CSU also limits well densities to one/mi². These stipulations would provide mitigation that may allow current greater sage-grouse populations to exist in the priority area because well densities up to one/mi² have been noted to not have an impact on greater sage-grouse populations. However, Harju, et al. (2009) noted that some areas they investigated showed impacts to greater sage-grouse populations when any well pads were placed in the landscape. Approximately 98% of the priority area is within 8.5 km (5.28 miles) of a greater sage-grouse lek and even at densities of one well per section, some impacts to leks and local populations would be expected, particularly the loss of large leks.

  Impacts to leks located in the high, moderate, and low oil and gas development potential areas would be similar to those described in Alternative A.

  Given the intent of the protection priority area to maintain or improve current conditions, which largely means preventing detrimental land uses and minimizing undesirable ecological processes (Wisdom, et al. 2005), the potential impacts to greater sage-grouse described above prevent the accomplishment of that goal.

- *Least Tern:* An NSO stipulation would be implemented within 1/4 mile of essential least tern habitat to limit surface-disturbing activities. This would protect least tern habitat and nesting activities in the planning area should this species be found nesting on BLM land.

- *Mountain Plover:* An NSO stipulation would be implemented within mountain plover habitat to limit surface-disturbing activities. This would result in approximately 251,532 acres of mountain plover habitat where direct long-term impacts would be avoided. In addition, a timing stipulation would mitigate disruptive impacts within

1/4 mile of mountain plover habitat from April 1 to July 15, resulting in an additional 19,553 acres of land where impacts would be minimized.

- *Piping Plover: A*n NSO stipulation would be implemented within 1/4 mile of essential piping plover habitat to limit surface-disturbing activities. This would apply to approximately 614 acres of piping plover habitat overlying federal minerals not covered by other more restrictive stipulations. Long-term effects to piping plover populations are not expected with these mitigations in place.

- *Raptors: A*n NSO stipulation would restrict surface-disturbing and disruptive impacts within 1/4 mile of a raptor nest which has been active within the last 7 years. This would result in 7,105 acres of habitat surrounding nests where long-term direct and indirect effects to reproductive success of the raptors would be minimized.

- *Swift Fox:* Oil and gas activities would be limited by standard lease terms. Activities near swift fox dens could be moved 200 meters (656 feet) or delayed for 60 days to protect reproductive activities associated with swift fox dens. Because the location of dens is unpredictable and highly variable in the planning area this stipulation would ensure protection of denning activities for all known dens on an annual basis.

Livestock Grazing and Vegetation – Rangeland: Changes to rangeland vegetation would be similar across all alternatives. These changes are primarily derived from grazing on these habitats and current grazing management would be beneficial to wildlife by introducing large-scale heterogeneity in grassland habitats. Under Alternative E, a minimum rest period from grazing following any major disturbance to vegetation communities would be determined through a site-specific planning process. This would benefit wildlife species by tailoring management-specific resource needs in the burned area. Heterogeneity in grassland habitats would be maximized with this management action as long as grazing within the disturbed areas does not impact soil resources and contribute to increased soil erosion.

Noxious Weeds and Other Non-Native Invasive Species: Road density is a relative measure of the risk of noxious weeds because many weeds are spread through vehicle traffic (Gelbard and Belnap 2003). Management of noxious weeds would be similar through all alternatives but effective management would be dependent on the amount of treatment needed to control infestations. The risk of noxious weed infestation in Alternative E is similar to all alternatives other than Alternative B, and would at least nearly double the current road density in the high, moderate, and low development potential areas. It is not known if control efforts would minimize impacts to wildlife habitat.

OHV Use and Travel and Transportation Management: Impacts from motorized off-road vehicle use are limited to 124 acres in two open areas in the planning area. The impacts on wildlife are limited in these small areas. Alternative E does not allow for motorized game retrieval off road (unless designated through travel management planning), minimizing impacts to vegetation and soil resources as well as limiting disruptions to wildlife from motorized vehicles.

Renewable Energy: Under Alternative E about 1,539,673 acres of BLM land would be exclusion areas for wind energy rights-of-way. This includes greater sage-grouse protection priority (930,265 acres) and Grassland Bird/Greater Sage-Grouse Priority Areas (298,772 acres), crucial winter range (110,018 acres), and large reservoir waterfowl complexes (42,900 acres) in addition to ACEC areas, traditional cultural properties, VRM Class I areas, and developed recreation sites.

There may be some impacts to wildlife and special status species from wind developments under this alternative because short-term and long-term, direct and indirect impacts may occur in areas with value to fish and wildlife in areas open to wind energy rights-of-way. However, specific impacts would depend on the location of the wind development in relation to the location of high value wildlife habitat. Impacts would not occur in the greater sage-grouse protection priority and Grassland Bird/Greater Sage-Grouse Priority Areas, and in crucial winter range.

Soils: Alternative E considers a CSU on surface-disturbing activities for soils with severe erosion hazard and an NSO on badlands, rock outcrops, and slopes susceptible to mass failure. This would mitigate impacts to soil resources on approximately 119,489 acres in the planning area and would be beneficial for wildlife by minimizing short-term direct impacts and long-term indirect impacts to wildlife habitat associated with these soil features.

Special Designations: All current ACECs would be retained. In addition, the Malta Geological ACEC, Zortman/Landusky Mine Reclamation ACEC, Woody Island ACEC, and Frenchman ACEC would be designated. Alternative E would eliminate the Prairie Dog Towns within the 7km Complex ACEC for black-tailed prairie dogs. The impacts to black-tailed prairie dogs because of this change are not apparent because all prairie dog towns in the planning area are now afforded similar protections as those in this ACEC, negating the need for special management for a subset of the prairie dogs located in the Prairie Dog Towns within the 7km Complex ACEC. Short-term and long-term impacts to wildlife would be beneficial for wildlife within these ACECs by minimizing short-term and long-term direct and indirect effects from surface-disturbing and disruptive activities to wildlife found within these ACECs. In addition, changes to management actions such as closing areas to oil and gas leasing and renewable energy in current ACECs increases the benefits for the wildlife resources.

Vegetation – Riparian and Wetland: Alternative E provides protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions with an NSO stipulation and a CSU stipulation within 300 feet of streams, lakes, reservoirs, canals, and associated riparian habitats. This would partially mitigate short-term and long-term direct impacts to 439,751 acres wildlife habitat associated with wetland/riparian features not protected by other resource stipulations. Long-term indirect effects to these habitat types and associated populations of wildlife may still occur because of continued impacts occurring within the riparian zone under the CSU stipulation.

Wilderness Characteristics: The 10,714 acres of lands managed for wilderness characteristics would be managed to preserve and enhance their wilderness characteristics.

Eastern Breaks and Badlands (10,714 acres)

- *Mule Deer Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,714 acres of mule deer winter range. This would eliminate any impacts to mule deer on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

- *Elk Winter Range:* Alternative B would be managed as avoidance areas for rights-of-way, leases, permits, and other land use authorizations for 10,549 acres of elk winter range. This would eliminate any impacts to elk on winter range due to impacts from oil, gas and wind energy development and other land use authorizations. None of the area is currently leased for energy development.

Wildlife: In addition to the actions noted above, specific management actions and impacts for wildlife categories are described below.

Mammals

- *Bighorn Sheep:* Alternative E provides for stipulations to minimize disease transmission from domestic sheep to bighorn sheep. No new grazing permits authorizing sheep or goat allotments would be allowed in bighorn sheep range. Sheep and goat allotments in areas with risk of contact with bighorn sheep and domestic sheep and/or goats in the planning area would be reviewed and managed, or reclassified if necessary, to achieve effective separation (both temporal and/or spatial) between domestic sheep and/or goats and bighorn sheep. Contact risk would be based on habitat, distance between bighorn sheep range (current and anticipated), sheep and goat allotments, movement potential, and current science and guidelines. Domestic sheep/goats would not be allowed within bighorn sheep range unless mechanisms are in place to achieve effective separation from wild sheep.

- *Black-footed Ferret: A*ctions and impacts noted for black-tailed prairie dogs are actions and impacts that would affect black-footed ferrets indirectly through impacts to their habitats. No management actions specific to black-footed ferrets are proposed in Alternative E because of the failure of reintroduction efforts to establish a current population of ferrets on BLM lands; however, the BLM would manage prairie dog habitat to maintain prairie dog populations and distribution and also provide habitat for ferrets and other special status species. Impacts to ferret habitat are noted in the prairie dog section.

- *Black-tailed Prairie Dog:* Management for black-tailed prairie dogs under Alternative E would be accomplished through the Fish, Wildlife and Parks Region 6 Prairie Dog Abundance and Distribution Objectives Plan (MFWP 2006a). This plan provides acreages for black-tailed prairie dogs within three complex types as follows:

  - One Category 1 complex of at least 5,000 acres of active prairie dog towns spaced no more than 1.5 km apart. This Category 1 complex would not be actively managed to exceed 10,000 acres.

  - Six to eight Category 2 complexes of 1,000 or more acres of active prairie dog towns. Two or three of these complexes would follow the 1.5 km rule and the remainder would follow the 7 km rule.

  - Category 3 prairie dog towns would be scattered throughout the historic prairie dog range in Region 6.

  Impacts to prairie dogs under Alternative E would be expected to be minimal and proposed management actions would be beneficial for prairie dogs and other species associated with prairie dog towns such as mountain plovers because of the acreage amounts and the distribution of prairie dogs throughout their current range in the planning area.

Birds

- *Greater Sage-Grouse:* Alternative E would require the BLM to use the national and Montana greater sage-grouse conservation strategies as standards in the planning area except for habitat standards which would be derived from regional standards. Regional standards for greater sage-grouse habitat would be cooperatively developed from recent habitat inventories and population parameters in the planning area along with relevant range-wide research findings. Management under Alternative E would also emphasize restoration and rehabilitation of sagebrush in areas capable of but no longer supporting sagebrush to contribute to the distribution and connectivity of habitat patches. Greater sage-grouse habitats associated with silver sagebrush north of the Milk River would be enhanced to improve habitat conditions for nesting and brood rearing.

  Under Alternative E, large blocks of priority greater sage-grouse habitat would be managed as protection priority areas to minimize surface-disturbing activities. Alternative E also provides specific guidance or management actions for the protection of priority habitat areas from habitat loss and fragmentation. Large blocks of priority habitat area would be managed to maintain greater sage-grouse habitat by limiting surface-disturbing and disruptive activities, thereby reducing the impacts from habitat loss and fragmentation under Alternative E.

  The spread of noxious weeds is probably the second greatest impact to greater sage-grouse habitat on BLM lands in the planning area (after surface-disturbing and disruptive activities as noted above). Noxious weeds contribute to loss of greater sage-grouse habitats, increase soil erosion, reduce water quantity and quality, and reduce structural and species diversity. The relative risk of noxious weed infestation between alternatives can be evaluated by the amount of roads anticipated by alternative. The risk of infestation in Alternative E is nearly double current levels based on the number of potential well pads and roads being constructed (Table 4.101).

  All alternatives provides for approximately 300 acres of habitat to be treated through fire in grassland and shrubland. Burning can adversely impacts nesting habitats due to the extensive time it takes for sagebrush canopy to recover. However, the number of acres burned in Alternative E is probably not detrimental to overall greater sage-grouse habitat in the planning area, and full suppression in most sagebrush habitats is beneficial for short-term and long-term persistence of greater sage-grouse habitat through maintenance of large blocks of sagebrush habitats.

  All new powerlines within 1 mile of greater sage-grouse leks would be buried on BLM land. These stipulations would improve habitat quality in areas near leks and would potentially enhance greater sage-grouse populations.

Wind power is restricted throughout the planning area in Alternative E to areas where wind energy is compatible with other specific resource values and is specifically excluded in the greater sage-grouse and Grassland Bird/Greater Sage-Grouse Priority Areas, ACECs, and WSAs in the planning area. Developing minerals and wind energy facilities on BLM land under Alternative E could result in long-term adverse impacts to greater sage-grouse by destroying and fragmenting sagebrush habitats. These stipulations would limit the disturbance associated with wind power generation in greater sage-grouse priority areas and where other resources conflict with wind energy development, and long-term and short-term impacts to greater sage-grouse from wind power under Alternative E are expected to be minimal.

Overall, protection to minimize disturbances and protect habitat for greater sage-grouse under Alternative E would provide short-term and long-term beneficial impacts to greater sage-grouse on BLM land.

- *Migratory Birds:* No specific management actions for migratory birds are outlined in Alternative E.

  Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitats: forest and woodland species, grassland species, Riparian and wetland species, and sagebrush species.

  - *Forest and Woodland Species* – BLM actions for silviculture treatments, forest products, and wildfire control result in short-term disturbance. Because of their diverse habitat requirements, some migratory birds are adversely impacted and some benefit from these management actions. Alternative E would provide greater amounts of these treatments and would benefit migratory birds associated with early successional habitats.

  - *Grassland Species* – Grassland-associated migratory birds would be protected by limits on surface-disturbing and disruptive activities in the priority area through a CSU stipulation on the large blocks of intact grassland habitat (298,772 acres of BLM land). However, there would be no specific stipulations for grassland-associated birds outside the priority area. The potential long-term disturbance of 18,645 acres (Table 4.100) could result in declines in bird populations. An NSO stipulation within mountain plover habitat and a timing stipulation within 1/4 mile of mountain plover habitat from April 1 to July 15 would protect 271,085 acres of habitat for this species and other special status species associated with the same habitats. Road maintenance in mountain plover habitat would not occur between April 1 and July 15 unless the road is surveyed for plover presence prior to maintenance activities and avoidance measures are implemented if mountain plovers are present. This would mitigate the potential loss of young birds due to road maintenance activities.

  - *Riparian and Wetland Species* – Although there are no specific management actions for migratory birds that use riparian areas and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats as noted above. Under Alternative E, the BLM would limit surface-disturbing and disruptive activities through a CSU stipulation within 500 feet of lotic and lentic systems. This would be a benefit to most riparian and wetland-associated species. Actions associated with waterfowl and colonial habitat would also benefit a number of wetland-associated migratory birds as well.

  - *Sagebrush Species* – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse including the action which would require a CSU stipulation on 930,265 acres of BLM lands with high value for greater sage-grouse. This would limit well density to one well per square mile and require project proponents within this area to provide plans of operation with detailed mitigation for greater sage-grouse effects. These actions would minimize short-term direct impacts and long-term indirect impacts associated with oil and gas leasing in a majority of the sagebrush habitat in the planning area and would be beneficial for all sagebrush-associated species in the priority area. Alternative E also provides for an NSO stipulation within 1 mile of greater sage-grouse leks and a CSU within all greater sage-grouse nesting habitat. Both actions would also benefit sagebrush-associated birds by limiting short-term direct impacts and long-term indirect impacts in these areas.

- *Waterfowl:* Upland and emergent vegetation in pastures surrounding reservoirs established or rebuilt for waterfowl values would be managed to provide adequate nesting and brood rearing cover for waterfowl under Alternative E. This action would provide long-term benefits for waterfowl production and populations in areas where waterfowl are a priority for wildlife management. Waterfowl habitats would also be improved to provide long-term benefits to waterfowl populations through actions limiting pit development outside of natural wetlands as well as restoration of currently degraded wetlands.

Cumulative Impacts

Management actions proposed under Alternative E would close 152,702 acres of BLM minerals to oil and gas leasing, curtailing direct long-term and short-term effects to wildlife on those BLM land. In addition, two large blocks of relatively intact habitat would be managed to maintain habitat integrity for greater sage-grouse (930,265 acres) and grassland birds (298,772 acres). Management of these areas would strive to maintain or improve current habitat conditions and would greatly enhance habitat integrity and connectivity, providing long-term benefits to all wildlife species in these areas. These areas would ensure viable populations at a regional scale and provide connectivity to allow for potential range shifts if habitat conditions change.

Wildlife habitat conditions would slowly degrade in the high, moderate, and low oil and gas development potential areas through incremental development of surface-disturbing and disruptive actions combined with the current level of disturbance.

Under Alternative E, mean well densities on all lands in each of the oil and gas development potential areas would exceed 1.04 wells/mi² except in the very low development potential areas (0.05 wells/mi²) (Table 4.101). Road densities would exceed the upper threshold (1.69 miles/m^2) in the high and moderate development potential areas and the lower threshold (.29 miles/m^2) in the low and very low development potential areas (Table 4.102). This would result in long-term declines in a number of wildlife populations in large portions of the planning area, particularly the high, moderate, and low oil and gas development potential areas (891,151 acres of BLM minerals), through direct impacts (increased mortality of individuals) and indirect effects (increased fragmentation and avoidance of impacted areas) as measured by the amount of surface-disturbing activity densities. The number of wells anticipated in the high and moderate potential areas are also expected to result in most of these potential areas being within 1,000 meters of an existing well (avoidance zone for big game) based on the number of anticipated wells and the amount of lands currently outside the avoidance zone in each potential area (Table 4.97).

The greatest impact during the life of the plan would occur in the high development potential areas, including the Bears Paw South area, where overall mean well densities would rise from the current 0.80 wells/mi² to 3.56 wells/mi² (445% increase) and road densities would increase from 0.98 to 2.11 miles of road/mi² (215% increase).

Stipulations would only affect areas not currently leased or areas leased after the current leases expire. Currently, 80% of the high, 87% of the moderate, 57% of the low, and 12% of the very low development potential areas are leased, limiting the ability of the stipulations proposed in Alternative C, but activities on existing leases would be managed using BMPs (Appendix E.2).

Wind energy rights-of-way would be excluded from 1,539,673 acres of BLM surface ownership which would limit the cumulative impacts from wind energy development in those areas. Alternative E provides management actions that would limit fragmentation of important habitat areas, and short-term and long-term direct and indirect impacts from wind energy developments would be minimized.

The impacts addressed above would be additive to current and continued loss of habitat through conversion to cropland, particularly in those areas where land ownership is highly fragmented and crop production is adjacent to or nearby BLM lands.

Unavoidable Adverse Impacts

NEPA §102(2)C requires disclosure of any adverse environmental effects that cannot be avoided should the proposed plan be implemented. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts would occur as a result of implementing the HiLine RMP. Others are a result of public use of BLM land within the planning area.

Cultural Resources

Adverse impacts to cultural resources which cannot be avoided and/or mitigated include those impacts that occur to unknown cultural resources, such as unrecorded and/or buried sites which could be damaged, destroyed, vandalized and/or looted.

Fire Management and Ecology

Invasive Nonnative Plant Species (INPS) may establish and persist in areas that have had vegetation treatments, regardless of Integrated Pest Management actions and treatments.

In some areas such as the Little Rocky Mountains, vegetation treatments have facilitated off-road vehicle travel because of reduced fuel loads on the forest floor. In some cases new ATV trails have been created in treated areas. The increased levels of treatments proposed under Alternative E (Preferred Alternative) could indirectly cause increased levels of off-road ATV travel. Travel management planning would be important to complete in these susceptible areas.

Fish

Additional natural gas development in the vicinity of fish-bearing streams would only add to the effects currently present from existing gas development. Stream crossings for gas field vehicles on private land would probably not change and increased use would only add to the problem. Dust generated from adjacent roads, primitive roads and trails also would contribute to sedimentation in streams. Effects would be greatest in Alternatives A and D, and least in Alternative B. Sedimentation would affect the special status species dace assemblage of which little is known. Total effects of natural gas development on these species may never be known due to lack of historical surveys and data sets.

Forests and Woodlands

Non-native and exotic plants tend to invade disturbed areas. These undesirable plant species tend to establish themselves in areas following mechanical treatments and prescribed fires. However, with monitoring followed by aggressive treatments long-term invasion can be avoided or mitigated.

Mechanical treatments “change” the way the forested landscape appears to some observers. The effect of timber cutting to observers is immediate following the activity. For planning purposes the forests are managed on a 100 year rotation; however, for the life of the plan (20 years) the forest will likely look “different” and to some it may be considered a long-term impact. However, with respect to the more realistic timeframe of forest management there is very little to no long-term adverse impact.

In many areas mechanical treatments that involve temporary roads, primitive roads and trails tend to attract off-road vehicle travel because a “pathway” now exists. While the majority of riders are respectful and stay on authorized trails some do not. These unauthorized uses contribute to increased soil compaction, rutting and weed infestations that can cause long-term adverse impacts.

Paleontological Resources

Inadvertent damage, destruction, vandalism, and/or looting of paleontological resources from increased public use and surface-disturbing activities would be unavoidable. Although mitigation measures would include identification and

mitigation of resources prior to surface-disturbing activities, some unanticipated discoveries of unknown paleontological resources would occur. The number of sites anticipated to be inadvertently damaged is unknown. There is a high probability that the theft, damage and/or destruction of paleontological resources will go undetected or the delay in detection will prohibit successful prosecution of the theft, damage and/or destruction.

Soils and Vegetation – Rangeland

Vehicle travel during moist or wet soil conditions could lead to soil rutting and compaction within the travelway of roads and adjacent to roads. This would have the potential to increase surface runoff and soil erosion. Soil erosion and loss of soil quality would occur in open OHV areas. Prescribed and wildfires cause short-term localized runoff, soil erosion, and sedimentation.

Transportation

Certain resources management actions could adversely impact the transportation program by placing limitations on transportation development.

Short-Term Uses versus Long-Term Productivity

NEPA §102(C) requires discussion of the relationship between local, short-term uses of man's environment and the maintenance and enhancement of long-term productivity of resources.

Economics

Consumptive uses such as mineral production and timber harvest would be considered short-term uses that may influence and/or reduce long-term productivity of the land and mineral resources for future production. The development of minerals within the planning analysis period would preclude the use of those minerals in the future.

Fire Management and Ecology

Vegetation treatments can cause short-term adverse impacts to soils, air quality, and other sensitive resources, but maintenance or restoration of desired ecological conditions would improve landscape health in the long term.

Fish

Damage to riparian areas by livestock grazing would continue over the short term until management actions such as fencing, riparian pastures, and alternative livestock grazing are put into place. Proper management could restore riparian areas over the long term. Those fish-bearing streams without blockage of fish movement could improve as riparian vegetation is restored, streambanks stabilize, and stream flows return to a more natural condition. Enhancing or restoring riparian composition and structure beyond PFC in Alternative E, and activity planning on an aggregate basis with special protective measures for riparian areas with unique values in Alternative B would have the highest probability of restoring long-term productivity to fish-bearing streams.

Forests and Woodlands

Alternatives B, C, D, and E all require that any forest management activity require a silvicultural prescription that looks at the proposed management activities and how they will be carried out to maintain the productivity of the site, accommodate all resource values including biological diversity as well as producing a free-growing stand capable of meeting the management objectives.

In the very short-term (2-5 years) immediately following treatments, site productivity may be lower than before treatments due to the impacts of heavy equipment, prescribed fire, or the invasion of exotic plants. However, in the long

term, productivity of the native species and trees will likely increase due to a decrease in the stocking level and increased amount of available moisture and sunlight to the forest floor and vegetation.

Noxious Weeds and Other Invasive Non-Native Species

Vegetation treatments and other authorized activities could cause short-term displacement of wildlife due to the treatment activity and localized effects on non-target vegetation used for food and cover, expose soils, and as a result increase erosion and stream sedimentation. These are short-term effects on small localized sites that only occur during the activity or treatment and while the treated area regenerates or recovers. The goal of these activities is to enhance long-term productivity and sustainability by controlling or eradicating invasive species and encouraging the production of desirable soil and vegetation conditions.

Paleontological Resources

The RMP will allow scientific research of paleontological specimens. This research will have an irreversible impact on paleontological resources. The excavation of a paleontological locale could consume 2-3 years of work but the long-term payoff is the knowledge gained from the excavation and analysis. In the long term the research will have a beneficial effect on not only the research being completed locally but also the scientific field as a whole.

Recreation

Short-term surface disturbance from harvesting timber and underburning the slash and vegetation left after the harvest would produce smoke, remove vegetation, increase soil erosion, and generally degrade the scenery. Although this land treatment would have a short-term effect in reducing recreational opportunities and degrading the quality of the recreational experience, the long-term benefits from improving the health of land and its associated improved recreational opportunities and experiences far outweigh the smaller negative effects from harvesting the timber and underburning. Generally, the long-term benefits to improving the health of the land would include improving vegetation composition and wildlife habitat which, in turn, may improve the scenery and should increase the recreational opportunities for wildlife viewing, hiking and hunting.

Soils and Vegetation – Rangeland

Treatments and management activities to emphasize healthy forest conditions and to restore desired ecological conditions of rangelands would subject these acres to short-term soil erosion and compaction effects. Meeting the desired future condition in the long term with these treatments would contribute to properly functioning watersheds that support productive plant communities and would improve soil quality in the long term. Also, on these treated acres the risk of high severity wildfires would be reduced.

Oil and gas activities affect soil and vegetation quality in both the short and long-term. Well pads and pipelines undergo interim and final reclamation to return soil and vegetation quality in the short term. Access roads and production areas require a long-term commitment of the soil and vegetation resource, affecting these in the long term. At the time of final abandonment, access roads and production areas undergo final reclamation to return soil and vegetation quality.

Irreversible and Irretrievable Commitment of Resources

Economics

The use of non-renewable resources would eliminate the potential economic uses of those resources in the future for the same or different purposes. This is generally assumed to apply to use of mineral resources.

Fish

Loss of fish passage in small, cool prairie streams may have permanent effects that may not be reversible. Many streams that have had trails with rock crossings developed now have no means of fish passage. Periods of drought have compounded the problem by eliminating some surviving fish populations in upstream pools. Once gone, those populations may not be replaced. Crossings on BLM land may be rehabilitated at some point in the future, but those on private land probably would remain in place due to their use as farm and ranch roads. Effects would be greatest under Alternatives A and D, and least in Alternative B. Loss of habitat for the special status species dace assemblage could result in their being listed by the ESA sometime in the future.

Fluid Minerals

The only irreversible/irretrievable aspect when considering fluid mineral leasing and development has to do with the fact that the oil and gas resource is a non-renewable resource. Once the product has been produced, it will not be replaced.

Forests and Woodlands

Unplanned high severity events such as fire, windstorms, etc. can happen anytime that may likely alter soil properties and stand composition that are irreversible/irretrievable. However, utilizing sound silvicultural practices with monitoring to follow up treatments should not cause any irreversible/irretrievable problems.

Noxious Weeds and Other Invasive Non-Native Species

Loss of habitat for plant and animal species and loss of the forage for current and future wildlife and livestock would occur where control of invasive species is limited. Limited control could result in soil loss which would reduce the site potential of an infested area so that it will no longer support desired plant communities. Recovery to existing conditions would not be possible even with a major influx of resources for control and restoration. Site preparation and seeding would not bring the site back to full potential and the invasive species would continue to persist.

Paleontological Resources

Inadvertent damage, destruction, vandalism, and/or looting of paleontological resources from increased public use and surface-disturbing activities can be classified as both an irreversible and an irretrievable impact. Inadvertent damage and vandalism may render a paleontological resource irretrievable for a period of time until restoration efforts are completed. The destruction or looting of a paleontological specimen is an irreversible impact to the resource. The destruction and looting removes the specimen from public ownership and prevents researchers from garnering knowledge from the location and specimen.

The RMP would allow scientific research of paleontological specimens. This research would have an irreversible impact on paleontological resources; however, the knowledge gained from that research would have a beneficial effect on the scientific field as a whole.

Recreation

Locatable, leasable, and salable solid minerals create small to moderate open pits from extracting the mineral from the landscape. Dispersed recreation opportunities associated with the open pit prior to excavation would be lost and considered irretrievable until such time that the pits are reclaimed. The dispersed recreation opportunities lost would be greatest during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking and horseback riding.

The sale of BLM land with legal access would result in the loss of dispersed recreational opportunities associated with the specific BLM land and would be considered an irreversible action. The dispersed recreation opportunities lost would

be greatest during the fall hunting season and to a lesser degree during the spring and summer for publics who enjoy pleasure driving, hiking and horseback riding.

Soils and Vegetation – Rangeland

Soil formation requires thousands of years. Erosion of topsoil would result in an irretrievable loss of soil quality. Eroded soil entering surface waters as sediment would be irreversible.

Frenchman Area, Phillips County Photo by Kathy Tribby