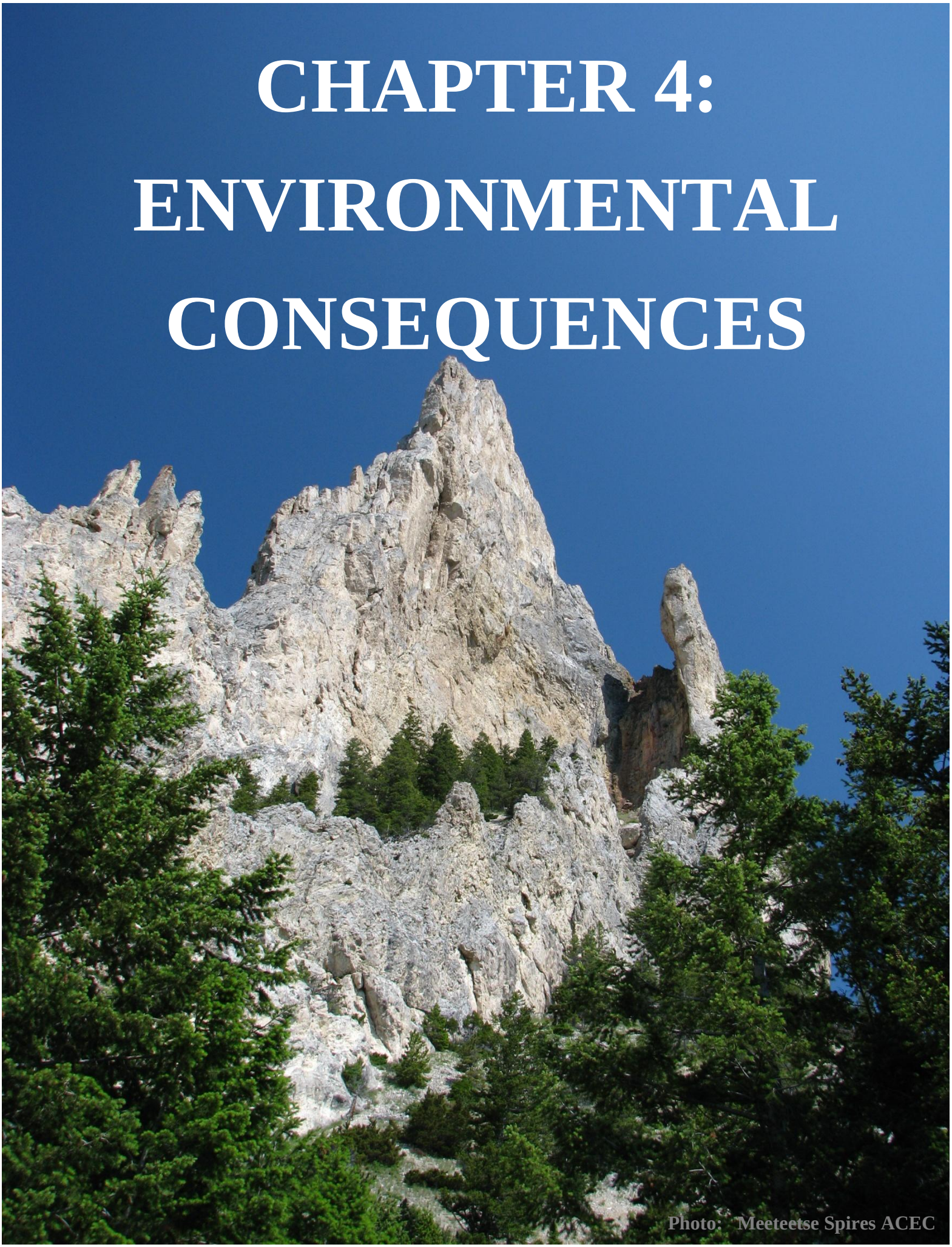
CHAPTER 4: ENVIRONMENTAL CONSEQUENCES



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4 Chapter 4: Environmental Consequences

4.1 Introduction

Chapter 3 provides information on the current condition of resources, resource uses, and programs in the Billings Field Office (BiFO) decision area that could be affected by the revised RMP alternatives described in Chapter 2. This chapter is organized into Resources, Resource Uses, Special Area Designations, and Social and Economic. Each of these sections is further divided into resources or program areas. This is the organization prescribed in the BLM guidance (USDI-BLM 2005). Existing conditions described herein are used as the baseline against which impacts of the different alternatives are analyzed and compared in Chapter 4.

This chapter describes the environmental consequences that could result from implementing each of the four RMP/EIS Alternatives, as described in Chapter 2. The purpose of this chapter is to analyze and disclose potential significant impacts the federal action would have on the human and natural environment. An impact is defined as a modification of the existing environment that is brought about by an outside action. The federal action for this Environmental Impact Statement (EIS) is the Bureau of Land Management's (BLM) selection of an Alternative on which future land use actions would be based.

The potential consequences of each Alternative are described in this chapter as impacts using the same order of resource topics presented in Chapter 3. Identical organization for chapters 3 and 4 allows the reader to compare existing (baseline) resource conditions (Chapter 3) to potential impacts (Chapter 3) for the same resources. Each resource or resource use in this Chapter is organized as described below. Discussions of cumulative impacts, irretrievable and irreversible commitment of resources, unavoidable adverse impacts, and the relationship between local short-term and long-term uses concludes this chapter.

4.1.1 Analysis Background

4.1.1.1 Approach to the Analysis

This impact analysis identified effects that result from a management action and discusses whether those effects would enhance and improve a given resource or would have the potential to degrade a resource. The analysis describes the actions that have direct and immediate effects, as well as those that result in indirect effects. If an activity or action is not addressed in a given section, no impacts are expected or the impact is expected to be negligible, based on existing knowledge.

The detailed impact analyses and conclusions are based on the BLM's knowledge of resources and the planning area, reviews of existing literature, an information provided by experts in the BLM, cooperating agencies, other agencies, interest groups, and concerned citizens. Impacts on resources and resource uses are analyzed and discussed in detail commensurate with resource issues and concerns identified throughout the process. Geographic information system (GIS)

analyses and data from field investigations were used to quantify effects when possible. However, in the absence of quantitative data, qualitative information and best professional judgment were used. Acreage calculations and other numbers used in this analysis are approximate and provided for comparison and analytic purposes; they do not necessarily reflect exact, on-the-ground measurements. At times, impacts are described using ranges of potential impacts or in qualitative terms.

Many management actions presented in Chapter 2 would not result in direct, on-the-ground changes. However, the analysis considers impacts that could eventually result in on-the-ground changes, by planning for uses, on BLM-administered surface estate and federal mineral estate during the life of the Resource Management Plan (RMP). Impacts could occur from management of both BLM-managed surface estate and federal mineral estate. BLM-administered federal minerals occur beneath surface estate managed by BLM as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). Some BLM management actions may affect only certain resources and Alternatives.

4.1.1.2 Impact Analysis Terminology

This chapter describes the direct, indirect, and cumulative impact of implementing the RMP/EIS No Action Alternative (Alternative A) and each of the three action Alternatives (Alternative B, Alternative C, and Alternative D – Preferred Alternative).

- Direct impacts are caused by an action and occur at the same time and place as the action.
- Indirect impacts are caused by the action and occur later or farther away, but are still reasonably foreseeable.
- Cumulative impacts are the effects on the environment that result from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions, regardless of which agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
- Irretrievable Commitment of Resources result from actions in which resources are considered permanently lost.
- Irreversible Commitment of Resources result from actions in which resources are considered permanently changed.

Impacts are also described as to their context, intensity, and duration.

- Context relates to environmental circumstances at the location and in the immediate vicinity of the impact, affected interests, and locality.
  - **Decision Area** is defined as the lands in the planning area where the BLM has authority to make land use and management decisions. This includes

split estate lands where the federal government has retained ownership of subsurface minerals.

  - **Planning Area** is defined as all lands in the Billings Field Office administrative boundary, regardless of ownership or jurisdiction.
  - **Study Area** is defined as the lands within the area to be analyzed (may vary from the decision area). The individual resource sections would define their study area as appropriate (e.g. the economic "study" area is the planning area as well as all of Big Horn and Park Counties in Wyoming).

- Intensity refers to the severity or extent of the impact or the magnitude of change from existing conditions.
  - **Negligible** is defined as an effect at the lower level of detection. Effects would not be readily noticeable.
  - **Low** or **Minor** is defined as an effect that is slight but detectable; there would be a small change
  - **Medium** or **Moderate** is defined as an effect that is readily apparent; there would be a measureable change that could result in a small but permanent change
  - **High** or **Major** is defined as an effect that is severe; there would be a highly noticeable, long-term or permanent measureable change.
- Duration refers to the permanence or longevity of the impacts and is depicted as short-term, mid-term, or long-term.
  - **Short-term** duration is defined as anticipated to begin and end within the first 5 years after the action is implemented.
  - **Mid-term** duration is defined as effects lasting between 5-10 years.
  - **Long-term** duration is defined as lasting more than 10 years.

4.1.1.3 Assumptions for Analysis

Assumptions regarding level of land use activity, resource condition, and resource response are made in the analysis. Potential impacts and their significance are determined based on these assumptions. The following assumptions were used in the analysis and apply to all RMP/EIS Alternatives, unless otherwise noted:

- Management actions proposed in the RMP/EIS Alternatives would apply to BLM-administered public lands and resources only. However, cumulative impact analyses consider potential actions by individuals or entities other than the BLM.
- The RMP/EIS Alternatives would be implemented as described in Chapter 2 and would be implemented in accordance with applicable laws, regulations, and standard management guidelines (Appendix A).

- BLM policies, including Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration, and Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management for Montana and the Dakotas (Miles City and Billings Field Offices) would be applied as appropriate across all RMP/EIS Alternatives. Rangeland health would be assessed according to the Standards, and the Guidelines would provide strategies to achieve Standards and other desired resource conditions and management objectives.
- Funding would be available to implement the Proposed RMP, as described in Chapter 2.
- Appropriate maintenance would be carried out to maintain the functional capability of all developments (e.g. roads, fences, and other facilities).
- Restrictions or prohibitions on activities in specific areas would protect sensitive resources.
- Throughout the planning area, BLM authorized activities associated with all resources and resource use programs would be subject to mitigation and minimization guidelines and best management practices (BMPs) (refer to Appendix B), including those specific Mitigation Measures and Conservation Actions for Greater Sage-Grouse (refer to Appendix AB). For analysis purposes, it has been assumed that these practices and conservation actions would be implemented during site-specific project planning where appropriate.
- Mitigation requirements would be applied as described and would prevent or limit direct impacts associated with land use activities or would result in reclamation of the land after the activity has been completed.
- Monitoring would be completed as indicated, and adjustments or revisions would be made as identified (adaptive management).
- The level of activity on BLM-administered land would increase. This expectation is based on historical trends, existing land use agreements such as leases or permits, and statements of interest in land use by individuals and industry organizations.
- Analysis in this document is based on life of this plan, which is 20 years, unless otherwise stated
- For impact analysis, it has been assumed that best management practices (BMPs would be implemented wherever appropriate (Appendix B). BMPs would be implemented at the discretion of the Billings Field Office on a project-specific basis, depending on the specific characteristics of the project area and the types of disturbance being proposed. They may not be appropriate to implement in all cases.

- The BLM, as a governmental agency, would maintain a special government-to-government relationship with federally recognized Indian Tribes. It is expected that over the life of the plan, the demand from American Indians to exercise their treaty rights on public lands would continue and potentially increase.

4.1.1.4 Methods and Assumptions for Surface Disturbance

4.1.1.4.1 Vegetation

Forest and Woodlands/Forestry and Woodland Products

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. Timber harvests have been conducted across the planning area to meet public demand for timber and woodland products.

For Alternative A, approximately 42 acres would be harvested per year, multiplied by 20 years for the life of the plan (Table 4-1). These acres were derived from actual acres treated between the years 1994 and 2010. They are an average per year for all commercial forest and woodland treatments. All Alternatives in this plan allow for timber harvest, though the volume of timber products varies by Alternative; therefore the amount of surface disturbance expected from each Alternative would vary. Surface disturbances were calculated by multiplying the expected surface disturbance per year over the 20 year life expectancy of this plan. Table 4-1 lists the acres of surface disturbance expected from forestry and woodland treatments.

Table 4-1 Surface Disturbance from Forest and Woodland Treatment by Alternative

	Surface Disturbance (acres)			
	Alternative A	Alternative B	Alternative C	Alternative D
Short-term Disturbance	840	1,340	2,240	1,780
Reclamation from Action	840	1,340	2,240	1,780
Long-term Disturbance	0	0	0	0

4.1.1.4.2 Rangelands

Mechanical treatments in the uplands could occur in the future to meet Standards for Rangeland Health. Range Improvement Project System (RIPS) database was queried and found that since 1940, 12 vegetation treatments have been applied to public lands in the planning area. The average treatment size was 198 acres per treatment, with one treatment occurring on average approximately once every 5.8 years. Therefore it is expected that over the life of this plan approximately three (3) treatments would occur, impacting approximately 594 acres. There would be no long-term disturbances as these projects would be intended to improve upland vegetation. Alternative A allows for the treatment of 6,418 acres of sage brush treatment over the life of this plan and an additional 160 acres of crested wheatgrass treatments annually. Alternatives B through D allow for the conversion of crested wheatgrass sites to native plant

communities, though Alternative B would not allow other treatments to take place. With the exception of Alternative B the 594 acres of other treatments are included in the acreage totals listed in Table 4-2.

Table 4-2 Surface Disturbance by Rangeland Vegetation Treatments by Alternative

	Surface Disturbance in Acres			
	Alternative A	Alternative B	Alternative C	Alternative D
Short-term Disturbance	7,172	22,414	8,094	12,594
Reclamation from Action	7,172	22,414	8,094	12,594
Long-term Disturbance	160	0	0	0

4.1.1.4.3 Invasive Species and Noxious Weeds

Treatment of invasive and noxious species has occurred and would continue to occur in the planning area over the life of this plan. Since 2006, 3,408 acres have been treated with an average of 682 acres treated per year. Since many of these infestations require multiple treatments over the course of several years, many acres reported one year would be treated and reported again in following years. Treatment of these species occurs in several different forms, each of which present different levels of surface disturbance; for example the use of mechanical treatments would have greater surface disturbance than the use of chemical treatments. The degree of surface disturbance is also dependent on the size of the infestation, the location of the infestation, and the intensity of treatment. The use of classical biological treatments creates no surface disturbance. Since 2006, these treatments have averaged 7.2 percent of all invasive and noxious weed treatments. For the purpose of this analysis surface disturbance would be treated equal, regardless of the treatment method, for example one acre of chemical treatment would have the same impact as one acre of manual treatment.

All Alternatives regarding invasive species, noxious weed management analyzed in this document list a minimum and maximum number of acres treated per year. The average of these two figures would be used to determine the number of acres treated per year, multiplied by the 20 year life expectancy of this plan. The level of use by treatment type would be determined by taking the percent of acres treated by type between 2006 and 2010. Table 4-3 lists the surface disturbance by treatment type expected over the 20 year life of this plan.

Table 4-3 Surface Disturbance from Invasive, Noxious Weed Treatments by Alternative (acres)

	Surface Disturbance in Acres			
	Alternative A	Alternative B	Alternative C	Alternative D
Chemical Treatment	41,990	7,100	31,950	17,040
Manual Treatment	769	130	585	312
Mechanical Treatment	6,210	1,050	4,725	2,520
Non-Classical Biological Treatment	5,914	1,000	4,500	2,400
Total	**54,883**	**9,280**	**41,760**	**22,272**

Reclamation from Action	54,883	9,280	41,760	22,272
Long-term Disturbance	0	0	0	0

4.1.1.4.4 Wildlife and Fisheries Habitat and Special Status Species

Various treatments have been applied across the decision area to improve wildlife and fisheries habitat. The majority of the acres impacted include food plots which are planted on an annual basis at the Sundance Lodge SRMA and Pompeys Pillar ACEC. Since 2006, an average of 84 acres per year has been planted collectively between the two areas. These treatments are expected to remain at this level over the life of this plan. Since 2006, three fisheries habitat improvement projects have been implemented with a total surface disturbance of less than 1.3 acres, with an average surface disturbance of approximately ¼ acre per year. Future fisheries habitat improvement projects are expected to continue at the current level, with an expected surface disturbance of approximately five (5) acres over the life of this plan

4.1.1.4.5 Fire Ecology and Management

Prescribed fire would occur in the future to reduce fuels, improve land health, and restore fire regimes. For Alternative A, it is assumed that a total of 312 acres would be treated each year multiplied by 20 years for the life of the plan (Table 4-4). These acres were derived from actual acres treated from the year 2006 through 2010. They are an average per year for all prescribed fire treatments (both grass/shrub and forested settings).

For Alternatives B through D, there is an assumption that 5 percent (21,708 acres) of the BLM managed surface acres in the decision area would be treated through the life of this plan. This acreage was derived from the 2003 *Fire/Fuels Management Plan Environmental Assessment/Plan* amendment for Montana/Dakotas.

Table 4-4 Surface Disturbance from Management-Ignited Prescribed Fire Potential by Alternative (Acres)

	Surface Disturbance in Acres			
	Alternative A	Alternative B	Alternative C	Alternative D
Short-term Disturbance	6,240	21,708	21,708	21,708
Reclamation from Action	6,240	21,708	21,708	21,708
Long-term Disturbance	0	0	0	0

4.1.1.4.6 Lands and Realty

Applications for rights-of-way could increase to accommodate energy development, especially oil and gas, as well as communication site usage for public safety and homeland security. From 2006-2010, 24 rights-of-way have been granted, for an approximate average of five (5) rights-of-way per year and an average of surface disturbance of 2.8 acres per right-of-way. For this analysis it would be assumed that five rights-of-way per year would be granted for the life of this plan for a total of 100 rights of way. The number of right-of-way applications received is

not expected to vary across all Alternatives. The disturbance acreage estimates in Table 4-4 are considered to be conservative as many rights-of-way are co-located to reduce impacts.

Authorizations from 2006-2010 can be broken down as follows:

- Road rights-of-way account for 33 percent of all rights-of way and average 1.636 acres per right-of-way
- Power line rights-of-way account for 12.5 percent of all rights-of way and average 4.82 acres per right-of-way
- Telephone and fiber optic rights-of-way account for 12.5 percent of all rights-of way and average 4.49 acres per right-of-way
- Oil and gas pipeline rights-of-way account for 33 percent of all rights-of way and average 2.92 acres per right-of-way
- Other rights-of-way, such as temporary storage sites, communication sites, and hiking trails account for 8.3 percent of all rights-of way and average 2.82 acres per right-of-way

Table 4-5 lists the number of rights-of-way by type expected to occur throughout the field office over the life of this plan.

Table 4-5 Numbers of Rights-of-Way and Acres of Disturbance

	Rights-of-Way	Short-term Acres Disturbed	Reclamation Acres	Long-term Disturbance Acres
Road Rights-of-Way	33	54	27	27
Power line Rights-of-Way	13	60	60	0
Telephone/Fiber Optic Rights-of-Way	13	56	56	0
Oil and Gas Pipeline Rights-of-Way	33	96	96	0
Other Rights-of-Way	8	23	23	0
Total	**100**	**289**	**262**	**27**

4.1.1.4.7 Livestock Grazing

Maintenance and/or reconstruction of water developments could occur in the future to meet Standards for Rangeland Health. The assumption for the number of water developments was developed from the numbers of reservoirs/pits, pipelines and wells that were developed or reconstructed in the decision area since 2000, using the Range Improvement Project System (RIPS) database. The pipeline estimate was determined using data from the previous 10 years and using an average number of miles of pipeline built and projecting that number out for the life of the plan (20 years). Pit and reservoir disturbance was estimated at 0.3 acres per project. Since 2000, four pits/reservoirs have been constructed or maintained. Well surface disturbance was estimated at 0.1 acres of surface disturbance per project. Since 2000, 12 wells have been

constructed or maintained. Table 4-6 lists the amount of surface disturbance expected from livestock grazing developments over the life of this plan.

Table 4-6 Surface Disturbance from Livestock Grazing Development by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D
Pipelines (linear miles)				
Short-term Disturbance	23	23	23	23
Reclamation from Action	23	23	23	23
Long-term Disturbance	0	0	0	0
Reservoirs/ Pits (acres)				
Short-term Disturbance	2.4	2.4	2.4	2.4
Reclamation from Action	2.4	2.4	2.4	2.4
Long-term Disturbance	0	0	0	0
Wells (acres)				
Short-term Disturbance	2.4	2.4	2.4	2.4
Reclamation from Action	2.4	2.4	2.4	2.4
Long-term Disturbance	0	0	0	0

The implementation of livestock watering facilities would increase livestock use around the watering facility. Additionally, these developments would change livestock distribution patterns. Increased livestock use around the water development could result in increased surface disturbance immediately surrounding the watering location. The extent of this disturbance is dependent on many factors including, but not limited to: number of livestock, grazing season, and the length of grazing season. These developments are typically intended to improve livestock distribution and allow livestock grazing in areas where livestock grazing is typically low. The extent of livestock distribution improvement is also dependent on multiple factors such as the size of the allotment/pasture, location of other water development(s), topography, grazing season of use, and kind and class of livestock.

4.1.1.4.8 Renewable Energy

While wind energy facilities are expected to be long-term uses of the landscape where they are constructed, proper reclamation of disturbance occurring from construction activities can reduce the footprint of the facilities. For analysis purposes, it is assumed an estimated 2 acres per turbine would be disturbed during construction (70 acres short term); an estimated 1 acre would be disturbed for the life of the project (35 acres long term). In addition, only 2 percent to 5 percent of the total land approved under wind energy authorizations is actually occupied by the turbine foundations and access roads. The remaining land is compatible with rural land use, such as farming and ranching. Based on the high end of the projected development range, a 1,400-acre, 35-turbine wind farm located entirely on BLM-administered land would result in long-term direct disturbance of 70 acres, with short-term direct disturbance estimated at 35 acres.

Other Resources/Resource Uses

Other resources and resource uses that have averaged less than 10 acres per year of surface disturbance from 2006-2010 have been assumed to have negligible surface disturbance impacts and have been excluded from this section.

4.1.1.5 Availability of Data and Incomplete Information

Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) require that agencies that evaluate, in an EIS, the reasonably foreseeable significant adverse effects on the human environment identify incomplete or unavailable information, if that information is essential to a reasoned choice among Alternatives (43 Code of Federal Regulations [CFR] 1502.22). As is typical in programmatic planning efforts, site-specific data are used to the extent possible but may not be entirely available. The best available information that is pertinent to management actions was used in developing this RMP/EIS. Considerable effort has been taken to acquire and convert resource data into digital format for use in this RMP/EIS. Data was acquired from both BLM and outside sources, such as the Montana Fish, Wildlife, and Parks (FWP). However, certain information was unavailable for use in developing this RMP/EIS. The following types of data were unavailable for all or portions of the planning area:

- Field inventory of soils and water conditions
- Field inventory of wildlife and special status species (SSS) occurrence and condition
- Native American traditional use areas
- Baseline recreation data
- Surveys for cultural or paleontological resources
- Information on interrelated projects/development occurring on state or private lands within the planning area

For these resources (and others for which information was unavailable or incomplete), estimates were made regarding the number, type, and significance, based on previous surveys and existing knowledge. Additionally, some impacts cannot be quantified, given the proposed management actions. Where this gap occurs, impacts are projected in qualitative terms. In many situations, subsequent project-level analysis would provide the opportunity to collect and examine the site-specific inventory data required to determine appropriate application of RMP-level guidance. In addition, ongoing inventory efforts by BLM and other agencies within the planning area continue to update and refine information that would be used to implement this RMP.

4.2 Impacts to Physical, Biological, and Heritage Resources

4.2.1 Air

Air resource impacts associated with resource management actions are caused by changes in emissions from many types of sources. Emission sources primarily include equipment operation, construction activities, and travel and transport. This section quantifies emissions from each Alternative and provides a qualitative discussion of air quality impacts. As described in Chapter 3, air quality within rural areas under BLM jurisdiction is good.

4.2.1.1 Methods and Assumptions

For each Alternative, emissions were estimated for criteria air pollutants and hazardous air pollutants (HAPs). Greenhouse gas (GHG) emissions were also estimated and are described in Section 4.2.2. Criteria air pollutants include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter with a diameter less than or equal to 10 micrometers (PM_{10}), particulate matter with a diameter less than or equal to 2.5 micrometers ($PM_{2.5}$), and sulfur dioxide (SO_2). Due to a lack of lead-emitting sources, lead emissions were not estimated. One additional pollutant type, volatile organic compounds (VOCs), was included in the emission inventory since it reacts with nitrogen oxides (NO_x) to form ozone in the atmosphere. NO_x and VOCs are known as ozone precursors. Concentrations of criteria air pollutant may not exceed NAAQS (EPA 2010c), Montana Ambient Air Quality Standards (MAAQS), or Wyoming Ambient Air Quality Standards (WAAQS).

Emissions from most sources were estimated based on activity levels associated with each Alternative and emission factors provided by USEPA in “AP 42” (USEPA 2011f) or included in emission standards developed by USEPA or the Montana Department of Environmental Quality (MDEQ). Detailed emission calculations are provided in the Air Resource Technical Support Document (ARTSD) (BLM 2013). To protect air quality in oil and gas development and production areas, BLM included a management action to require use of Tier 4 drill rig engines. These engines are currently being manufactured and have much lower exhaust emissions than many older engines currently in use. Consequently, Tier 4 emission standards were used to calculate emissions from drill rigs.

With regard to the Bull Mountains Coal Mine operated by Signal Peak Energy LLC (SPE), emissions were estimated based on maximum production of 15 million tons per year. For most pollutants, emissions were based on emission limits included in the facility’s air quality permit issued by MDEQ (MDEQ 2009). Emissions for pollutants not included in the permit were estimated using USEPA emission factors.

Alternative emission estimates were conservatively estimated based on currently mandated emission limits and initial mitigation measures as described in the Air Resource Management Plan (ARMP) provided in Appendix T. Emissions on a production unit basis will decrease over time due to new emission standards for oil and gas activities that were promulgated by USEPA on August 16, 2011 (GPO 2012). These regulations will decrease emissions of VOCs, HAPs,

and methane from the national oil and gas sector by approximately 25, 30, and 26 percent, respectively. Similar reductions are expected to occur within the planning area.

Near-field modeling was performed to assess impacts close to oil and gas well pad activities associated with construction, drilling, completion, and production. Regional far-field modeling will be performed as discussed below and in the ARMP (Appendix T).

4.2.1.2 Environmental Consequences

The largest impacts to air resources would be caused by emissions from fire management, coal mining, and oil and gas activity. Additional activities that could affect emissions include the following resource programs.

- Soil Management
- Vegetation Management
- Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management

Other programs were determined to have small emissions with little or no impact on air resources.

Total maximum annual emissions for criteria air pollutants and hazardous air pollutants (HAPs) are summarized in Table 4-7 in units of short tons per year (tpy).

Table 4-7 Estimated Maximum Annual Criteria and Hazardous Air Pollutant Emissions from Alternatives

	Annual Emissions (tpy) [1]						
	Criteria Air Pollutants and Precursors						
Alternative	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAPs
A	537	81	271	4	488	83	29
B	1,577	110	324	12	597	173	34
C	1,581	111	325	12	606	174	34
D	1,578	110	324	12	603	174	34

tpy = short tons per year

1 Smoke emissions from wildfires are excluded from this table, but are provided in detailed calculations within the ARTSD (BLM 2013).

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 4-8. Criteria pollutant emissions associated with management actions included in this RMP are less than 1 percent to

4 percent of total emissions in Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland, and Yellowstone counties, as reported by USEPA in its National Emission Inventory (NEI) for calendar year 2008. The NEI emissions include stationary sources, non-road sources, and vehicle sources.

Table 4-8 Estimated Maximum Annual Criteria and Hazardous Air Pollutant Emissions as a Percentage of Existing Emissions

Alternative	Percentage of Total Emissions within BiFO Counties					
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$
Alternative Emissions Excluding Wildfire Smoke [1]						
A	1.0%	0.5%	3.0%	0.1%	1.5%	1.8%
B	2.9%	0.7%	3.6%	0.1%	1.8%	3.8%
C	2.9%	0.7%	3.6%	0.1%	1.9%	3.8%
D	2.9%	0.7%	3.6%	0.1%	1.8%	3.8%
Alternative Emissions Excluding Wildfire Smoke and Coal Mining						
A	1.0%	0.4%	3.0%	0.0%	1.4%	1.8%
B	2.9%	0.5%	3.6%	0.1%	1.7%	3.8%
C	2.9%	0.5%	3.6%	0.1%	1.8%	3.8%
D	2.9%	0.5%	3.6%	0.1%	1.8%	3.8%

1 Wildfire smoke is excluded since it is caused by natural events and is not included as part of the NEI.

Under each of the Alternatives, coal mining would continue and coal production would not increase above the maximum production limit included in the facility's air quality permit. Coal mine emissions are already occurring at the SPE mine and are included in the 2008 NEI. If coal mine emissions are subtracted from the Alternatives emission inventories to better estimate potential emission increases, the percentage of NO_x emissions would be reduced to approximately 0.5 percent of the 2008 NEI emissions. The percentages in the last half of the table represent the increase in regional emissions if coal mine production continues at 2008 levels.

The need for a Clean Air Act general conformity analysis was considered for BLM-authorized activities within the Sundance Lodge SRMA, which is located within an area near Laurel that is classified as an SO_2 nonattainment area. The Sundance Lodge SRMA consists of approximately 380 acres and would allow no motorized vehicle use on trails. General conformity regulations ensure that the actions taken by federal agencies in nonattainment areas do not interfere with state plans to meet national standards for air quality. Any BLM action that could cause emissions greater than stipulated thresholds must be analyzed in accordance with the USEPA's general conformity procedures. For SO_2, the emission threshold is an increase of 100 tpy or more of SO_2 emissions within the nonattainment area. Sources of SO_2 in this area would include engines in stationary equipment and in vehicles. BLM-authorized SO_2 emissions from these sources would be less than 100 tpy. In fact, as shown in Table 4-8, SO_2 emissions within the entire planning area are estimated to be less than 100 tpy under every alternative. Consequently, a general conformity analysis is not needed as part of this RMP. Any future

BLM proposed activity not included in this RMP that could potentially cause SO_2 emissions of at least 100 tpy would be reviewed under general conformity requirements.

4.2.1.3 Impacts to Air Quality

4.2.1.3.1 Near-Field Air Pollutant Concentrations for Criteria Air Pollutants

Near-field dispersion modeling was performed for oil and gas development and production using the AERMOD model, which is the USEPA guideline model for estimating near-field air quality impacts for most air quality pollutants and for many HAPs. 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) were not modeled because AERMOD cannot model the chemical transformations associated with atmospheric ozone formation. Ozone will be modeled using photochemical grid modeling when sufficient emission and monitoring data become available to perform regional photochemical modeling. Detailed information describing AERMOD emissions, meteorology, modeling parameters, and data processing is provided in the Billings Field Office RMP Air Resource Technical Support Document (BLM 2012).

Three well pad development scenarios (construction, drilling, and completion) were modeled at a central well pad. Well development activities are temporary and 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 16 days of active drilling. Well completion would occur next with active completion taking 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 NAAQS and MAAQS are done by adding modeled concentrations 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 4-9. Alternative A near-field modeling represents all alternatives because the level of potential oil and gas development is consistent among all alternatives.

Table 4-9 summarizes maximum concentration results based on model runs performed for five years (2007-2011) and for each of the three modeled scenarios. Additional modeling results are included in the ARTSD (BLM 2013). For example, PM_{10} and $PM_{2.5}$ maximum concentrations

are predicted to occur during the construction scenario using year 2010 meteorology. By comparing the "Modeled Concentration" column to the "Background Concentration" column, the relative contribution of modeled emissions can be seen. With the exceptions of 1-hour NO_2 and 24-hr PM_{10}, background concentrations are much greater than modeled concentrations due to oil and gas sources.

The near-field dispersion modeling for drilling, completion, well pad construction, and production shows compliance with the NAAQS.

Table 4-9 Near-Field Criteria Air Pollutant Summary for All Alternatives

Near-Field Criteria Air Pollutant Summary for All Alternatives									
Pollu-tant	Avg. Period	Model Output Rank	Modeled Concen-tration (µg/m³)	PSD Increment (µg/m³) Class I	PSD Increment (µg/m³) Class II	Background Concen-tration [1] (µg/m³)	Total Concen-tration (µg/m³)	NAAQS or MAAQS (µg/m³)	Percent of NAAQS or MAAQS
CO	1-hour	H2H	299	None	None	7,213	7,512	26,450 [6]	28%
	8-hour	H2H	221	None	None	2,175	2,396	10,000	24%
NO_2	1-hour	H8H [2]	57	None	None	40	97	188	52%
	Annual	H1H [3]	0.32	2.5	25	6	6.3	94 [6]	7%
PM_{10}	24-hour	H2H	82	8	30	30	112	150	74%
	Annual	H2H	1.1	4	17	8	9.1	50 [6]	18%
$PM_{2.5}$	24-hour	H8H [4] (H2H)	5.5 (13.6) [7]	2	9	22.5	28	35	79%
	Annual	H1H	0.2	1	4	5.5	5.7	15	38%
SO_2	1-hour	H4H [5]	12	None	None	35	47	196	24%
	24-hour	H2H	0.4	5	91	11	11.4	365 [6]	4%
	Annual	H1H	1.9E-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/m³ = 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 percent conversion of modeled NO_x to NO_2.
[3] Post processed using the annual NO_2 Tier 2 method using 75 percent 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

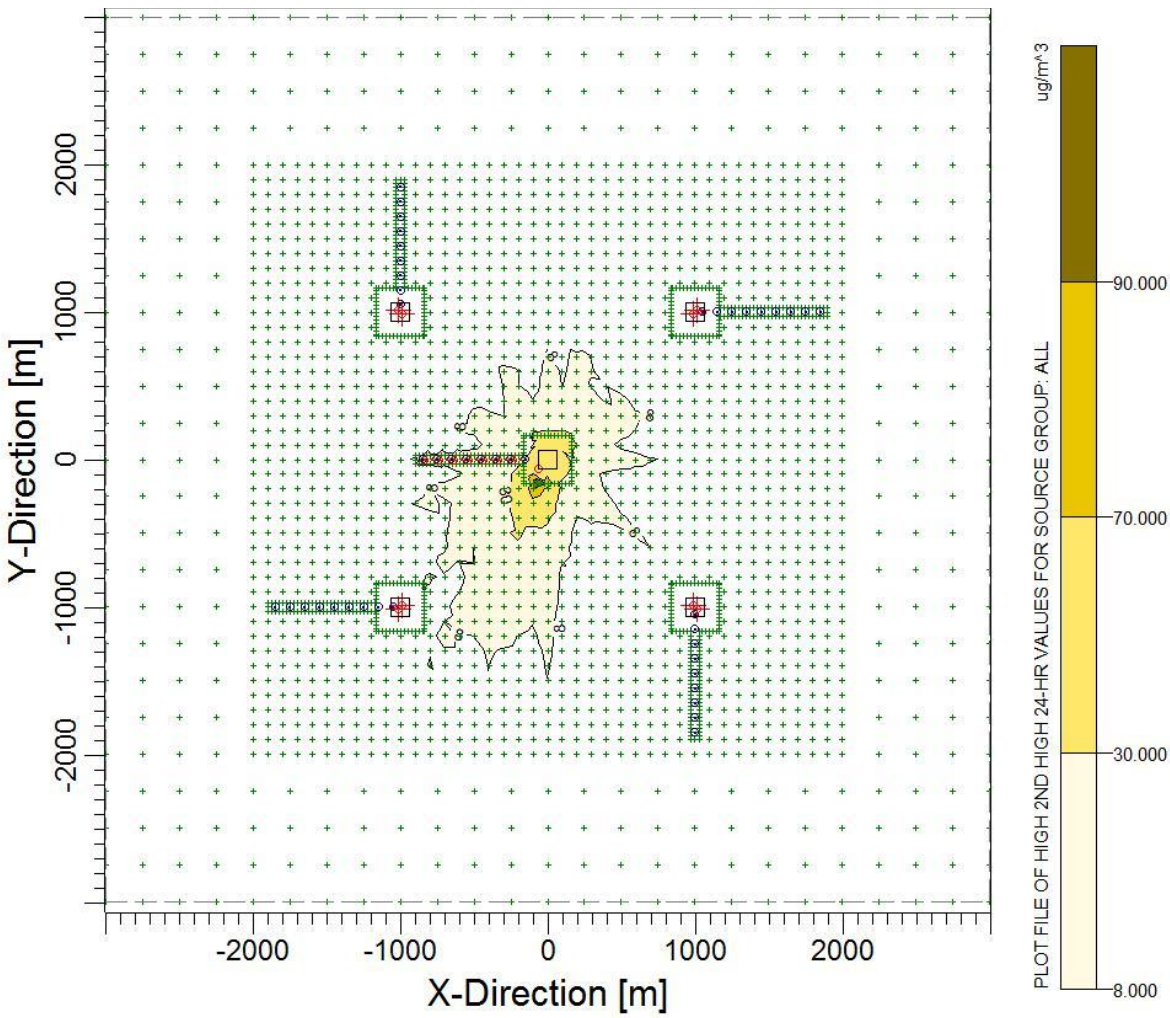
Modeled concentrations can also be compared to PSD increments, which are designed to prevent good air quality from deteriorating to the level set by the NAAQS. In areas attaining the NAAQS, PSD increment analysis is required prior to construction of a major stationary source of air pollutants, which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

USEPA 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. Temporary concentrations above the Class I increments are also possible during construction, and for $PM_{2.5}$ during drilling and completion if these activities would be located very near a Class I area.

Air pollutant concentrations generally decrease as distance from the source increases. Figure 4-1 provides an illustration of 24-hr PM_{10} modeled concentrations predicted on the day during 2010 with the greatest modeled concentration. 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 1,500 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 4-1. Example of Extent of Area Exceeding the PM_{10} 24-hour Class I Increment During Construction



4.2.1.3.2 Near-Field Air Pollutant Concentrations for HAPs

In addition to the criteria air pollutant modeling, near-field 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 USEPA 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. Similar to the NAAQS modeling, HAP modeling consisted of drilling and completing natural gas wells, in addition to well pad construction activities. 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 4-10 provides a breakdown of the health effects for each modeled HAP.

Table 4-10 Health Effects of Modeled HAPs

Health Effects of Modeled HAPs			
HAP	Short-Term (Acute)	Long-Term (Non-Carcinogen)	Long-Term (Carcinogen)
Benzene	X	X	X
Ethyl Benzene	X	X	X
Formaldehyde	X	X	X
N-Hexane	X	X	
Toluene	X	X	
Xylene	X	X	

Table 4-11 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 4-12 presents the results of HAP modeling of potential chronic effects and compares them to RfCs.

Table 4-11 Acute Short-Term HAP Modeling Results for All Alternatives

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	1.51	1,300	<1%
Ethyl Benzene	0.22	350,000	<1%
Formaldehyde	8.21	55	10%
N-Hexane	10.36	390,000	<1%
Toluene	1.16	37,000	<1%
Xylene	0.79	22,000	<1%

Table 4-12 Chronic Non-Carcinogenic HAP Modeling Results for All Alternatives

Chronic Non-Carcinogenic HAP Modeling Results for All Alternatives			
HAP	Modeled Annual Concentration (µg/m³)	RfC (µg/m³)	Percent of RfC
Benzene	0.02	30	<1%
Ethyl Benzene	0.05	1,000	<1%
Formaldehyde	0.02	10	<1%
N-Hexane	0.25	700	<1%
Toluene	0.03	5,000	<1%
Xylene	0.01	100	<1%

Of the HAPs evaluated, only benzene, ethyl benzene, and formaldehyde are identified by USEPA 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 4-13 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 4-13 Carcinogenic HAP Modeling Results for All Alternatives

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	0.022	7.80×10-6	0.0949	0.02	No
Ethyl Benzene	0.050	2.50×10-6	0.0949	0.01	No
Formaldehyde	0.025	1.30×10-5	0.0949	0.03	No
		Maximally Exposed Individual (MEI)			
Benzene	0.022	7.80×10-6	0.71	0.12	No
Ethyl Benzene	0.050	2.50×10-6	0.71	0.09	No
Formaldehyde	0.025	1.30×10-5	0.71	0.23	No

4.2.1.3.3 Far-Field Criteria Air Pollutant Concentrations

Due to the relatively low density of expected oil and gas activity in the planning area, criteria air pollutant concentrations are expected to remain low throughout the area. 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 percent of the standard.

NO_x and VOC emissions contribute to ozone formation. Cumulative emission increases are estimated to be up to 0.5 percent for NO_x and up to 3.6 percent for VOCs, depending on the alternative. However, more stringent VOC emission controls for oil and gas sources will decrease VOC emissions below the levels shown in Table 4-18. Predicted emission increases would be unlikely to cause or contribute to a violation of the ozone NAAQS.

A qualitative description of potential air quality impacts is provided below for each of the criteria air pollutants. Impacts to air pollutant concentrations are direct impacts with durations similar to the duration of emission-producing activities. The impacts are reversible because they decline or disappear when emissions cease. For each criteria pollutant, impacts are expected to be below the NAAQS and MAAQS

- CO — CO concentrations throughout Montana are low. The Billings CO monitor indicates that 1-hour and 8-hour CO concentrations are approximately 7 percent and 14 percent, respectively, of the NAAQS. A 1–3 percent emission increase in the planning area would cause a negligible or minor increase in CO concentrations.

- NO_2 — NO_2 ambient concentrations are approximately 8 percent and 4 percent of the 1-hour and annual NAAQS, respectively. An emission increase of less than 1 percent 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, such as drill rigs, operate temporarily.

- SO_2 — SO_2 concentrations throughout Montana are low, except for localized areas near oil refineries in the Billings and Laurel areas. Because increased SO_2 emissions would be less than 1 percent of planning area emissions and would be dispersed over large areas, these emissions would cause a negligible or minor increase in SO_2 concentrations.

- PM_{10} — PM_{10} concentrations monitored at the Birney monitor outside the planning area are approximately 43 percent of the NAAQS. An emission increase of less than 2 percent compared to planning area emissions 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 the Billings monitor are approximately 41 percent and 36 percent of the 24-hour and annual NAAQS, respectively. An emission increase of less than 4 percent 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_{10} concentration increases may be moderate or could be high if adverse weather conditions occur.
- Lead — Lead emissions would be negligible.

Future photochemical grid modeling (PGM) results will inform BLM air quality management actions, as described in the ARMP in Appendix T.

4.2.1.3.4 Far-Field AQRV Impacts

Impacts to air quality related values (AQRVs) at sensitive areas were considered, including nearby Class I areas such as National Parks and sensitive Class II areas. Yellowstone National Park is located approximately 10 miles (16 km) from the southwest corner of the planning area while the Gates of the Mountains Wilderness is approximately 70 miles (112 km) from the northwest corner of the planning area and the UL Bend Wilderness is located approximately 40 miles (64 km) north of the planning area. A tribal Class I area, the Northern Cheyenne Indian Reservation (IR), is located along the planning area's eastern border, but is separated from planning area activities by the large Crow Indian Reservation. Potential sensitive Class II areas are also located within the planning area, as provided by Table 3-3. A qualitative assessment of atmospheric deposition and visibility impacts is included below.

The best modeling method to determine far-field AQRV impacts for large modeling domains is PGM, which can model long-range regional transport and chemical transformation 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 T, the BLM is actively acquiring needed data to perform PGM, which is expected to be completed after this RMP is complete.

Atmospheric Deposition

Sulfur and nitrogen deposition impacts would likely be below the levels of concern (5.0 kg/ha/yr and 3.0 kg/ha/yr, respectively). Total BLM-authorized NO_x and SO_2 emissions are relatively small (approximately 111 and 12 tpy, respectively), with expected increases from oil and gas activities of 35.1 and 0.1 tpy, respectively. Emissions from oil and gas activities would represent NO_x and SO_2 emission increases of 0.2 percent and less than 0.001 percent over current emissions in the planning area. Furthermore, oil and gas emissions would be emitted over a large area and would disperse away from the Yellowstone National Park, which is the

closest Class I area. Winds at Yellowstone Lake near the center of the park are primarily from the southwest and west, while winds in the Billings area are primarily from the southwest for all months except for May, June, and July when they blow from the north. Consequently, pollutants emanating from within the planning area would typically disperse to the northeast or due south. With regard to the Northern Cheyenne Indian Reservation, BLM-authorized activities within the planning area would occur southwest or northwest of the Northern Cheyenne Indian Reservation.

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 low; and
- Emission sources would be spread over a large geographic area of approximately 900,000 acres.

Under the highest-emission Alternative, total emissions of NO_x and SO_2 are estimated to be 123 tpy. As explained earlier, these emissions overstate emission increases. Due to geological and surface ownership constraints, BLM emissions would occur more than 25 miles (40 km) from Yellowstone National Park (the closest mandatory Class I area boundary). Fire emissions would account for approximately 50 percent of total NO_x and SO_2 emissions and would be emitted throughout the planning area, while coal mine emissions account for 20 percent to total emissions and would be located approximately 60 miles (96 km) from the park. The mine is located approximately 75 miles (120 km) from the Northern Cheyenne IR Class I area.

Montana has a state visibility standard of 3×10^{-5}/m, which is equivalent to a visual range of approximately 21 miles. The average standard visible range at the Northern Cheyenne IR IMPROVE monitor was 58 miles during the average haziest 20 percent of days and 171 miles during the clearest 20 percent of days. Similar standard visual range data are 76 and 182 miles at Yellowstone National Park, and 57 and 168 miles at the UL Bend Wilderness.

4.2.1.3.5 ARMP and Adaptive Management Strategy for Oil and Gas Resources

The ARMP for oil and gas activities is provided in Appendix T. The ARMP describes the air quality adaptive management strategy that will be used to assess future impacts to air quality and AQRVs. The goal of the strategy is to maintain the good air quality that the planning area 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 Air Quality Technical Workgroup (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 Montana Department of Environmental Quality (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 (USEPA) 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 T.

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 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 review
- 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

4.2.1.4 Impacts Common to All Alternatives

4.2.1.4.1 Impacts from Soil Management

Soil management occurs as an integral part of many different activities, including oil and gas development, road maintenance, mining, fire management, forestry management, livestock

grazing, and vegetation management. Consequently, emissions related to soil management are included in emission inventories for these other activities.

Management of soil resources throughout the decision area would require submission of an approved reclamation plan before beginning surface-disturbing activities. These plans would reflect the complexity, environmental concerns, and reclamation potential of the site. Reclamation would reduce fugitive dust emissions by re-vegetating areas after project completion. Additionally, projects to promote soil stabilization, including emergency stabilization and rehabilitation following wildfire, would have a beneficial long-term impact to air quality by reducing susceptibility to wind erosion, but could create short-term increases in fugitive dust and exhaust emissions during and immediately following project implementation.

4.2.1.4.2 Impacts from Vegetation Management

Vegetation treatments improve overall land health using manual, mechanical, chemical, and biological treatment techniques. Emissions associated with vegetation management activities were calculated based on the amount of surface disturbance and primarily reflect fugitive dust and equipment exhaust emissions. Emissions from chemical substances were not estimated. Vegetation management projects would have a long-term beneficial air quality impact by reducing susceptibility to wind erosion. However, short-term increases in fugitive dust and equipment exhaust emissions would occur during and immediately following vegetation management activities.

4.2.1.4.3 Impacts from Fire Management

Fire management activities include preventive activities such as forest thinning and prescribed fires, as well as fighting wildfires. Smoke contains all criteria air pollutants (CO, NO_x, VOC, SO_2, PM_{10}, and $PM_{2.5}$), many HAPs, and large quantities of GHGs in the form of CO_2. Prescribed burns are begun only when atmospheric conditions provide safe fire control conditions and when ambient concentrations of fire-related pollutants will be acceptable. Smoke management coordination with the Montana/Idaho Airshed Group would ensure that air quality standards are met when prescribed burns are performed.

Wildfire smoke quantities and pollutant concentrations vary with the amount and type of fuel burned and atmospheric conditions. Based on a 10-year average (2000-2009), the planning area experiences approximately 13 wildfires per year. Wildfires cause short-term emissions due to smoke and the use of heavy equipment during fire suppression activities. Long-term wildfire impacts include increased fugitive dust emissions due to lack of vegetation. In addition, intense wildfires can alter soil chemistry and reduce natural vegetative growth. Fire mitigation activities following wildfires cause increased equipment exhaust and fugitive dust emissions.

During large wildfires, small particulate matter ($PM_{2.5}$) could spread over many miles and affect areas outside the planning area, including Class I areas such as Yellowstone Park, the North Absaroka Wilderness, and the Northern Cheyenne Indian Reservation. In addition to increased concentrations of particulate, CO, VOC, and HAPs, large wildfires adversely affect visibility. Individual wildfire impacts can last from a few days to several weeks, while impacts from multiple fires within the region can occur throughout the fire season.

4.2.1.4.4 Impacts from Energy and Mineral Resources

Coal

Five coal fields are known within the planning area and one mine is currently in operation. Coal mining would contribute to the generation of fugitive dust (PM_{10} and $PM_{2.5}$) at surface facilities from coal handling, unit train loading, wind erosion of coal and other material stockpiles, and vehicle traffic. Other pollutants would include exhaust emissions from trucks, maintenance equipment, other motor vehicles, and trains. In addition, GHGs can be released from mine ventilation. Potential impacts to air quality would continue to occur at the Bull Mountains Mine No.1 surface facilities operated by Signal Peak Energy (SPE). Although coal mine potential has been identified at other locations within the planning area, coal mining within the planning area is not expected to increase during the life of this RMP. Emissions from the SPE mine have not resulted in any exceedances of air quality standards.

Fluid Minerals

The RFD for the decision area indicates that 2–4 new federal conventional oil and gas wells may be drilled per year, with a total of up to 80 new federal wells drilled over the lifetime of the plan. Development of new coalbed methane natural gas wells is not expected. Although the number of acres open to standard leasing conditions is restricted under some Alternatives, the total number of wells is not expected to be reduced under any Alternative. With only 2–4 wells drilled per year on federal mineral estate, wells could be relocated to other non-restricted areas. Consequently, emissions from oil and gas activities are consistent across all Alternatives.

Due to the low level of oil and gas development, annual emissions from aggregated oil and gas activities would be less than the 250-ton-per-year threshold for a single source under the Prevention of Significant Deterioration Program. Oil and gas emissions and are not expected to cause noticeable increases in ambient concentrations. Oil and gas emissions were estimated conservatively and could be reduced through project level permitting by federal, state, or tribal regulatory agencies. In addition, new sources would be subject to emission control requirements under USEPA's non-road engine standards, New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAP), as well as new emission control requirements mandated by the MDEQ and the WDEQ. For example, the EPA's proposed oil and gas sector NSPS/NESHAP regulation is expected to substantially reduce VOC and HAP emissions. The BLM would not authorize any activity that does not conform to all applicable local, state, tribal, and federal air quality laws, regulations, standards, and implementation plans.

Locatable Minerals

Locatable mineral mining on BLM land includes bentonite mining in Carbon County. This activity would contribute to the generation of fugitive dust (PM_{10} and $PM_{2.5}$) at surface facilities from material handling, wind erosion from material stockpiles, and vehicle traffic. Additional pollutants would include CO, NO_x, SO_2, VOCs, and HAPs from engines.

4.2.1.4.5 Impacts from Forestry and Woodland Products

Short-term fugitive dust emissions would occur primarily while timber harvests are in progress. Emissions of CO, NO_x, PM_{10}, $PM_{2.5}$, SO_2, VOCs, and HAPs would be released from vehicles and equipment used in timber harvest and transport. Over the long term, revegetation and land reclamation would reduce fugitive dust.

4.2.1.4.6 Impacts from Lands and Realty

Air quality impacts from land use authorizations are expected to be minor. New road Rights-of-Way (ROWs) cause short-term (construction) and long-term (use) impacts and emissions depend on the type of road surface, length and width of the road, and the number of vehicles and speed at which they travel. Utility ROWs generally have smaller long-term air quality impacts than road ROWs because vegetation is restored and only a small number of vehicles would travel through the right-of-way for maintenance purposes.

Emissions from ROW authorizations were not calculated because land disturbances are expected to be small. On average, less than 15 acres of short-term surface disturbance are expected each year and no more than 27 acres of long-term disturbance are expected during the life of the RMP. Emissions for surface disturbing activities associated with roads for oil and gas activities are included in the oil and gas emission calculations.

4.2.1.4.7 Impacts from Livestock Grazing

Livestock grazing has the potential to affect air quality due to land disturbance for range improvements and vehicle usage to access and transport livestock. Rangeland health standards would be used to determine if soil and site stability are being achieved. Adjustments to the grazing authorization would be made as needed to ensure soils remain stable.

4.2.1.4.8 Impacts from Recreation and Visitor Services

Recreation has the potential to affect air quality due to vehicle access to recreation areas and use of OHVs. The BLM would manage Special Recreation Management Areas (SRMAs) to promote and enhance recreational use of public lands. The greatest recreational activity impact to air quality would be from OHV use, which causes engine exhaust emissions and fugitive dust emissions. Fugitive dust emissions would be greatest in heavily used areas and during times of drought, when soil is drier and the potential to generate dust is greater.

Organized OHV events, such as the annual Elk Basin Motorcycle Race, sponsored by the Billings Motorcycle Club under a Special Use Permit in Carbon County, has the potential to produce short-term emissions. The race is typically run in June while soil moisture is low and dust is less likely to be entrained in the air.

Other recreational uses that do not include the use of motorized vehicles such as hiking, mountain biking, and horseback riding, also contribute to increased PM_{10} and $PM_{2.5}$ emissions. These localized short-term emissions are considered to be negligible.

Farming would continue to be practiced at the Sundance Lodge SRMA. This would increase equipment exhaust and fugitive dust in the area. However these impacts are expected to be minor. Additionally, some agricultural land is treated by prescribed fire on an annual basis.

4.2.1.4.9 Impacts from Trails and Travel Management

Air quality impacts from trails and travel management would result from fugitive dust and exhaust emissions from motorized travel and road maintenance. Travel-related impacts depend on the route/trail surface material and condition, type of vehicle, size of vehicle, and vehicle speed. Although the Alternatives differ in terms of the number of routes that would remain open, open with restrictions, or closed, emissions largely depend on total vehicle miles traveled. Because the public may shift use to other roads in the same area or move to a different area to recreate, emissions are conservatively estimated to remain consistent for the planning area regardless of road closure and restrictions.

Fugitive dust from wind erosion would decrease in areas where road closures allow native plants to re-colonize previously disturbed areas. Limiting authorized travel to administrative use would reduce traffic and emissions on these routes. The net effect of limiting and/or closing routes would be localized and would not be expected to offset increases where use is more concentrated.

Construction or maintenance of higher standard unpaved routes has the potential to allow greater travel speeds and increased fugitive dust. Unimproved and unmaintained routes generally reduce speeds and fugitive dust.

Emissions from trails and travel management are largely represented in the Alternative emission inventories in the following categories: BLM travel, BLM road maintenance, recreation and visitor services, and resource-specific management activities such as fire management and vegetation management.

4.2.1.5 Alternative A

Alternative A emissions are summarized in Table 4-14, and detailed emission calculations are provided in Appendix Y. Fire management activities would cause the greatest CO, SO_2, and $PM_{2.5}$ emissions, while oil and gas development and production would account for the largest NO_x, VOC, and HAP emissions. Recreational visits would cause the greatest PM_{10} emissions.

Table 4-14 Estimated Alternative A Maximum Annual Criteria and Hazardous Air Pollutant Emissions

Resource or Resource Use	Emissions (tpy)						
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAP
Oil Development and Production	67.4	30.6	241.1	0.5	11.9	4.1	15.2
Natural Gas Development and Production	10.8	4.6	3.1	0.1	1.7	0.4	0.3
BLM Travel	1.3	0.5	0.6	0.0	54.9	5.5	0.1
BLM Road Maintenance	0.2	0.5	0.0	0.0	1.7	0.2	0.0
Coal Mining	11.3	23.7	1.2	0.0	29.9	3.0	—
Fire Management [1]	433.2	19.4	23.2	3.9	55.7	38.0	13.3
Forestry Management	0.6	0.8	0.1	0.0	2.9	0.3	0.0
Livestock Grazing	0.4	0.4	0.1	0.0	88.7	8.9	0.0
Recreation and Visitor Services	8.6	0.2	0.9	0.0	226.9	22.8	0.1
Vegetation Management	2.9	0.0	0.7	0.0	13.7	1.4	0.1
Total	**536.7**	**80.7**	**271.1**	**4.6**	**487.9**	**83.0**	**29.1**

1 Excludes emissions from wildfires.

tpy = short tons per year

Air quality throughout the rural planning area is good. Because cumulative modeling was not performed as part of this analysis, a qualitative description of potential air quality impacts is provided below.

- CO — CO concentrations throughout Montana are low and are monitored in only a few locations. CO concentrations are typically greatest in urban areas. The nearest CO monitor, located in Great Falls, indicates CO concentrations are approximately 8 percent of the NAAQS. A 3 percent emission increase in the planning area would be highly unlikely to cause a violation of the CO NAAQS.
- NO_2 — nearest NO_2 monitor is located in Billings and indicates that NO_2 concentrations are approximately 11 percent and 8 percent of the 1-hour and annual NAAQS, respectively. A 0.7 percent emission increase in the planning area would be highly unlikely to cause a violation of the NO_2 NAAQS.
- SO_2 — SO_2 concentrations throughout Montana are low, except for localized areas near oil refineries in the Billings and Laurel area. Because the increase in SO_2 emissions would be less than 0.1 percent of planning area emissions and would be dispersed over large areas, these emissions would be highly unlikely to cause or contribute to a violation of the SO_2 NAAQS.
- PM_{10} — PM_{10} concentrations monitored at the Lame Deer tribal monitor are approximately 60 percent of the NAAQS. An emission increase of approximately 1.9 percent would be highly unlikely to cause a violation of the PM_{10} NAAQS.

- PM2.5 — $PM_{2.5}$ concentrations monitored at the Great Falls tribal monitor are approximately 40 and 34 percent of the 24-hour and annual NAAQS, respectively. An emission increase of approximately 4 percent would be highly unlikely to cause a violation of the $PM_{2.5}$ NAAQS.

4.2.1.5.1 Impacts from Vegetation Management

Due to Alternative A having the greatest number of acres undergoing vegetation management, air quality impacts from Alternative A would be greater than those for Alternatives B, C, and D. However, vegetation management emissions are a small proportion of total emissions from all types of resource activities.

4.2.1.5.2 Impacts from Fire Management

Due to Alternative A having the least prescribed burning, emissions and air quality impacts from Alternative A would be less than those for Alternatives B, C, and D. However, over time, greater prescribed burning could reduce emissions from wildfire response activities.

4.2.1.5.3 Impacts from Energy and Minerals

Coal

Future coal leasing could occur under Alternative A. Coal emissions under this Alternative are based on continued operation of the SPE mine at the maximum production capacity included in the facility's air quality permit. When future mining occurs on federal mineral estate, mine emissions and their resulting impacts are directly attributable to BLM leasing decisions. However, when future mining occurs on private mineral estate, associated emissions would be non-federal emissions. In order to conservatively estimate direct impacts, maximum annual SPE facility emissions are assumed to result from mining on federal mineral estate.

Fluid Minerals

Conservative estimates of Alternative A oil and gas activity emissions are approximately: 78 tpy CO: 35 tpy NO_x, 244 tpy VOC, 1 tpy SO_2, 34 tpy PM_{10}, 5 tpy $PM_{2.5}$, and 16 tpy HAPs. As mentioned earlier, these estimates were based on currently applicable air quality regulations for minor sources of air pollutants. Proposed federal regulations would substantially reduce VOC and HAP emissions if the regulations are finalized.

4.2.1.5.4 Impacts from Woodlands/Forestry and Woodland Products

Alternative A forestry management activity emissions are less than those for other Alternatives, due to less surface disturbance under Alternative A. Emissions from forestry management activities are a small proportion of total emissions from all resource activities.

4.2.1.5.5 Impacts from Livestock Grazing

Air quality emissions and impacts from livestock grazing are expected to be the same under all Alternatives. Most emissions occur over a 5-6 month period and impacts to air quality are negligible.

4.2.1.5.6 Impacts from Recreation and Visitor Services

Air quality impacts from recreation and visitor services are the same for all Alternatives and are due primarily to on and off-road vehicle traffic. Most emissions occur over a 5-6 month period and impacts to air quality are negligible, with the exception of fugitive dust emissions (primarily PM_{10}).

4.2.1.6 Alternative B

Alternative B emissions are summarized in Table 4-15. The largest Alternative B emissions of CO, NO_x, $PM_{2.5}$, VOCs, and HAPs would result from fire management activities. Coal mining would cause the greatest SO_2 emissions, while oil and gas development and production would account for the greatest VOC emissions. Recreational activities are expected to cause the greatest PM_{10} emissions.

Table 4-15 Estimated Alternative B Maximum Annual Criteria and Hazardous Air Pollutant Emissions

Resource or Resource Use	Emissions (tpy)						
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAP
Oil Development and Production	67.4	30.6	241.1	0.1	11.9	4.1	15.2
Natural Gas Development and Production	10.8	4.6	3.1	0.0	1.7	0.4	0.3
BLM Travel	1.3	0.5	0.6	0.0	54.9	5.5	0.1
BLM Road Maintenance	0.2	0.5	0.0	0.0	1.7	0.2	0.0
Coal Mining	11.3	23.7	1.2	0.0	29.9	3.0	—
Fire Management [1]	1,475.6	48.5	76.5	11.9	172.7	129.0	18.7
Forestry Management	0.9	1.2	0.1	0.0	6.3	0.7	0.0
Livestock Grazing	0.4	0.4	0.1	0.0	88.7	8.9	0.0
	8.6	0.2	0.9	0.0	226.9	22.8	0.1
Vegetation Management	0.5	0.0	0.1	0.0	2.3	0.2	0.0
Total	**1,577.0**	**110.2**	**323.8**	**12.0**	**597.1**	**173.1**	**34.4**

1 Excludes emissions from wildfires.

tpy = short tons per year

As estimated by emission inventory calculations, Alternative B emissions and air quality impacts for the following resource management activities are expected to be identical to those for Alternatives A, B, and C:

- Oil and natural gas activities
- BLM travel
- BLM road maintenance
- Livestock grazing
- Recreational and visitor services.

4.2.1.6.1 Impacts from Vegetation Management

Due to Alternative B having the lowest number of acres undergoing vegetation management, air quality impacts from Alternative B would be less than those for Alternatives A, C, and D.

4.2.1.6.2 Impacts from Fire Management

Alternative B fire management criteria pollutant and HAP emissions are greater than those for Alternative A. Alternative B includes greater prescribed fire activity, which accounts for the increased emissions. Although the fire management emission inventories assumed constant wildfire activity in each year and for each Alternative, the increase in Alternative B prescribed fire activity could reduce the number, intensity, and size of wildfires in future years. Consequently, Alternative B emission calculations may overestimate total fire management emissions.

4.2.1.6.3 Impacts from Coal Mining

Alternative B management actions would not allow any new leasing during the life of this RMP. However, leases that are already in place would allow continued mining. Because a leasing action may be completed prior to the Record of Decision for this RMP, coal mining emissions from the SPE mine are included under Alternative B. These emissions would occur during only a portion of the life of this RMP. After expiration of any existing leases, the mine would either shut down or conduct mining operations on private mineral estate. Consequently, federal coal mining emissions would cease at some point during the life of this RMP and BLM-authorized emissions would be reduced by the following quantities: 11.3 tpy of CO, 23.7 tpy of NO_x, 1.2 tpy of VOC, 29.9 tpy of PM_{10}, and 3.0 tpy of $PM_{2.5}$.

4.2.1.6.4 Impacts from Woodlands/Forestry and Woodland Products

Alternative B forestry management activity emissions are less than those for Alternatives C and D due to less surface disturbance under Alternative B. Emissions from forestry management activities are a small proportion of total emissions from all resource activities.

4.2.1.7 Alternative C

Alternative C emissions are summarized in Table 4-16. Total Alternative C emissions are nearly identical to those for Alternative B, but are greater than those for Alternative A.

Table 4-16 Estimated Alternative C Maximum Annual Criteria and Hazardous Air Pollutant Emissions

Resource or Resource Use	Emissions (tpy)						
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAP
Oil Development and Production	67.4	30.5	241.1	0.1	11.9	4.1	15.2
Natural Gas Development and Production	10.7	4.6	3.1	0.0	1.7	0.4	0.3
BLM Travel	1.3	0.5	0.6	0.0	54.9	5.5	0.1
BLM Road Maintenance	0.2	0.5	0.0	0.0	1.7	0.2	0.0

Coal Mining	11.3	23.7	1.2	0.0	29.9	3.0	—
Fire Management	1,477.8	48.5	76.9	11.9	164.0	128.0	18.7
Fire Management [1]	1.4	1.9	0.2	0.0	15.4	1.7	0.0
Livestock Grazing	0.4	0.4	0.1	0.0	88.7	8.9	0.0
	8.6	0.2	0.9	0.0	226.9	22.8	0.1
Vegetation Management	2.2	0.0	0.5	0.0	10.4	1.1	0.1
Total	**1,581.54**	**110.9**	**324.7**	**12.0**	**605.5**	**173.9**	**34.5**

1 Excludes emissions from wildfires.
tpy = short tons per year

As estimated by emission inventory calculations, Alternative C emissions and air quality impacts for the following resource management activities are essentially identical to those for Alternatives A, B, and C:

- Oil and natural gas activities
- BLM travel
- BLM road maintenance
- Livestock grazing
- Recreational and visitor services

4.2.1.7.1 Impacts from Vegetation Management

Alternative C would have the second largest number of acres undergoing vegetation management and the second greatest emissions. Air quality impacts from Alternative C would be less than those for Alternative A and more than those for Alternatives B and D.

4.2.1.7.2 Impacts from Fire Management

Alternative B fire management criteria pollutant and HAP emissions are greater than those for Alternative A. Alternative B includes greater prescribed fire activity, which accounts for the increased emissions. Although the fire management emission inventories assumed constant wildfire activity in each year and for each Alternative, the increase in Alternative B prescribed fire activity could reduce the number, intensity, and size of wildfires in future years. Consequently, Alternative B emission calculations may overestimate total fire management emissions.

4.2.1.7.3 Impacts from Coal Mining

Coal leasing would be allowed under Alternative C and could extend production at the SPE mine. Consequently, Alternative C air resource impacts for coal mining are similar to those for Alternative A.

4.2.1.7.4 Impacts from Woodlands/Forestry and Woodland Products

Alternative C forestry management activity emissions are greater than those for the other Alternatives. Emissions from forestry management activities are a small proportion of total emissions from all resource activities.

4.2.1.8 Alternative D (Preferred Alternative)

Alternative D emissions are nearly identical to those for Alternatives B and C, but are greater than those for Alternative A. Alternative D emissions are summarized in Table 4-17.

Table 4-17 Estimated Alternative D Maximum Annual Criteria and Hazardous Air Pollutant Emissions

Resource or Resource Use	Emissions (tpy)						
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAP
Oil Development and Production	67.4	30.6	241.1	0.1	11.9	4.1	15.2
Natural Gas Development and Production	10.7	4.6	3.1	0.0	1.7	0.4	0.3
BLM Travel	1.3	0.5	0.6	0.0	54.9	5.5	0.1
BLM Road Maintenance	0.2	0.5	0.0	0.0	1.7	0.2	0.0
Coal Mining	11.3	23.7	1.2	0.0	29.9	3.0	—
Fire Management [1]	1,475.7	48.4	76.5	11.9	171.2	128.9	18.7
Forestry Management	1.2	1.5	0.2	0.0	10.3	1.1	0.0
Livestock Grazing	0.4	0.4	0.1	0.0	88.7	8.9	0.0
	8.6	0.2	0.9	0.0	226.9	22.8	0.1
Vegetation Management	1.2	0.0	0.3	0.0	5.6	0.6	0.0
Total	**1,578.0**	**110.5**	**324.0**	**12.0**	**602.8**	**173.8**	**34.4**

1 Excludes emissions from wildfires.
tpy = short tons per year

As estimated by emission inventory calculations, Alternative D emissions and air quality impacts for the following resource management activities are essentially identical to those for Alternatives A, B, and C:

- Oil and natural gas activities
- BLM travel
- BLM road maintenance
- Livestock grazing
- Recreational and visitor services

4.2.1.8.1 Impacts from Vegetation Management

Alternative D would have the third largest number of acres undergoing vegetation management and the third greatest emissions. Air quality impacts from Alternative D would be less than those for Alternatives A and C, and more than those for Alternative B.

4.2.1.8.2 Impacts from Fire Management

Alternative D fire management criteria pollutant and HAP emissions are similar to those for Alternatives B and C, and are more than those for Alternative A.

4.2.1.8.3 Impacts from Coal Mining

Coal leasing would be allowed under Alternative D and could extend production at the SPE mine over more years at the level of activity associated with Alternative A. Consequently, Alternative D air resource impacts for coal mining are similar to those for Alternative A.

4.2.1.8.4 Impacts from Woodlands/Forestry and Woodland Products

Alternative D air quality impacts would be similar to Alternative C impacts, and greater than impacts under Alternatives A and B.

4.2.1.9 Cumulative Air Quality Impacts

Cumulative air quality impacts include other future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. In order to identify reasonably foreseeable future actions, BLM estimated future oil and gas activity on non-BLM mineral estate. Estimated emissions associated with non-BLM oil and gas activity are included in Table 4-18 and are approximately four times greater than emissions from BLM-authorized oil and gas activity. Similar to BLM oil and gas activities, future emissions from non-BLM oil and gas activities are expected to decrease on a unit-production basis as new federal and state regulations impose additional emission controls, particularly on VOC and HAP emission sources. Because emissions provided below do not include emission controls that may be mandated by future regulations, the following emission totals likely overestimate cumulative emissions.

Table 4-18 Comparison of BLM and non-BLM Annual Criteria and Hazardous Air Pollutant Emissions from Oil and Gas Activity

Sources	Emissions (tpy)					
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$
Non-BLM Oil Development and Production	251	208	969	1.9	52	14
Non-BLM Natural Gas Development and Production	42	28	13	0.2	8	2
Non-BLM Oil and Gas Total	**293**	**236**	**982**	**2.1**	**60**	**16**
BLM Emissions [1]	1,570	87	324	12	576	171
Alternative C BLM and Non-BLM Total	**1,863**	**323**	**1,306**	**14**	**636**	**187**
Percentage of NEI Emissions [2]	*3.4%*	*2.2%*	*14.6%*	*0.2%*	*2.3%*	*4.4%*

1 Excludes coal mining emissions since the SPE mine was operating during 2008.
2 2008 National Emission Inventory (NEI) emissions (Version 1.5) for Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland, and Yellowstone counties.

Cumulative emissions for Alternative C (the highest-emission Alternative) are also shown in Table 4-16. Cumulative emission increases associated with the Alternatives are small (less than 5 percent) for all pollutants, with the exception of VOC emissions.

Air quality throughout the rural planning area is good due to the very low number of sources. Because cumulative PGM will be performed in the future to account for regional emission impacts, a qualitative description of potential air quality impacts is provided below. Impacts to air pollutant concentrations are direct impacts with durations similar to the duration of emission-producing activities. The impacts are reversible because they decline or disappear when emissions cease. For each criteria pollutant, impacts are expected to be below the NAAQS and MAAQS.

- CO — A 3.4 percent cumulative emission increase in the planning area would cause a minor increase in CO concentrations.
- NO_2 — A cumulative 2.2 percent emission increase in the planning area would cause a 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 throughout Montana are low, except for localized areas near oil refineries in the Billings and Laurel area. Because the cumulative SO_2 emissions increase would be approximately 0.2 percent of planning area emissions and would be dispersed over large areas, these emissions would cause a negligible increase in SO_2 concentrations.
- PM_{10} — PM_{10} concentrations monitored at the Lame Deer tribal monitor are approximately 60 percent of the NAAQS. An emission increase of 2.0 percent compared to planning area emissions 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 the Great Falls tribal monitor are approximately 40 and 34 percent of the 24-hour and annual NAAQS, respectively. An emission increase of 4.2 percent 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 and impacts would be negligible.

As discussed earlier, NO_x and VOC emissions contribute to ozone formation. Cumulative emission increases are estimated to be approximately 2.2 percent for NO_x and 14.6 percent for VOCs. Based on current monitoring data, cumulative emissions are unlikely to cause or contribute to a violation of the ozone NAAQS or MAAQS.

4.2.1.9.1 Impacts to Deposition

Sulfur and nitrogen deposition impacts are likely to be minor. Increases in cumulative NO_x and SO_2 emissions are relatively small (approximately 358 and 15 tpy, respectively) and would be emitted over a large area. These cumulative emission increases represent increases in planning area emissions of 2.2 and 0.2 percent, respectively. In addition, these emissions would disperse away from the Yellowstone National Park, which is the closest Class I area. Winds at Yellowstone Lake near the center of the park are primarily from the southwest and west. Consequently, pollutants emanating from the planning area would typically disperse to the northeast. With regard to the Northern Cheyenne Indian Reservation, cumulative emissions would occur west or northwest of the Northern Cheyenne Indian Reservation.

4.2.1.9.2 Impacts to Visibility

Visibility impacts are described qualitatively because air quality modeling was not performed. Cumulative impacts to visibility are expected to be moderate for the following three reasons:

- Increases in emissions of SO_2, NO_x, and $PM_{2.5}$ would be relatively low compared to planning area emissions

- Emission sources would be spread over a large area covering approximately 900,000 acres

Under the highest-emission Alternative, cumulative emission increases of NO_x and SO_2, and $PM_{2.5}$ are estimated to be 347, 14, and 190 tpy. As explained earlier, NO_x emission increases are likely to be overstated because they do not include emission reductions from newer, less-polluting equipment. Due to geological and surface ownership constraints, cumulative emissions would likely occur more than 25 miles (40 km) from Yellowstone National Park (the closest mandatory Class I area boundary).

4.2.2 Climate

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.

4.2.2.1 Methods and Assumptions

A growing body of evidence indicates that Earth's atmosphere is warming. Records show that surface temperatures in the Montana region have risen approximately 1–3° Fahrenheit since the 1960 to 1979 baseline years (GCRP 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 (GCRP 2009). Observed changes in oceans, ecosystems, and ice cover are consistent with this warming trend (National Academy of Sciences 2006).

Ongoing scientific research has identified the potential impacts of GHG emissions – including CO_2, methane, N_2O), water vapor and several trace gases – on global climate change. Through complex interactions at regional and global scales, these GHG emissions 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 burning 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 (National Academy of Sciences 2006). Global atmospheric concentrations of CO_2, methane, 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 methane and N_2O are due to agricultural soil management, animal manure management, sewage treatment, and mobile and stationary combustion of fossil fuels (IPCC 2007, EPA 2009b). According to climate change researchers, the impacts of climate change are expected to vary by region, season, and time of day (National Academy of Sciences 2006, GCRP 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 (National Academy of Sciences 2006).

Within North America, the report specifically forecasts that warming in western mountains is projected to cause decreased snowpack, more winter flooding, and reduced summer flows, exacerbating 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 percent, 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; and coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution. Specific modeling and/or assessments of the potential impacts for the planning area and for the State of Montana currently do not exist.

The lack of scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change even at regional 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, 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 (GCRP 2009). Rapid spring snowmelt due to sudden and unseasonal temperature increases can also lead to greater erosive events and unstable soil conditions.

Within a given region, 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. All of these factors can affect climate, day-to-day weather conditions, and air quality in the planning area. There is evidence that recent warming is impacting 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 earlier "greening" of vegetation in the spring and 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 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 decision 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 that type of climate condition). This climate change could have very serious impacts to wildlife, particularly greater sage grouse, forage availability, vegetation resources, and air quality (BLM 2009c).

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 bark 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 (GCRP 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 projections of climate change impacts are a continually growing and emerging science. Additional and recent information on climate change and regional projections of Program (http://www.globalchange.gov/) and the Intergovernmental Panel on Climate Change (http://www.ipcc.ch/).

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 (DOI 2010). The North Central Climate Science Center, which will incorporate the planning area, has a target establishment date of 2011.

Given the broad spatial influence of climate change which requires response at the landscape-level, the DOI 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, designed 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 DOI, including setting a baseline and reduction goal for the Department's GHG emissions and energy use. More information about DOI's efforts to respond to climate change is available at: www.doi.gov/archive/climatechange/.

A variety of activities in the planning area currently generate GHGs. Fuels combustion, industrial processes and any number of other activities on public lands result in direct emissions of GHGs. Direct emissions in the planning area include those related to current and ongoing oil and gas and other minerals development, fire events, motorized vehicle use (e.g., OHVs), livestock grazing, facilities development, and other fugitive emissions. Indirect GHG emissions in the planning area include the demand for electricity generated outside the area. Contributions to climate change also result from land use changes (conversion of land to less reflective surfaces that absorb heat, such as concrete or pavement), and soil erosion (which can reduce snow's solar reflectivity and contribute to faster snowmelt).

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 described in Section 4.2.1, with one exception. CO_2 emissions from wildfire are not included in the emission inventories because CO_2 released during wildfires is assumed to be part of the natural carbon cycle. However, GHG emissions from prescribed fire and fire

prevention activities are included in the inventory since these activities vary among the Alternatives and result from BLM-authorized activities. Detailed GHG emission inventories are included in Appendix Y. Emissions provided in Appendix Y are expressed in short tons per year because emission factors used to calculate emissions were in units of pounds and short tons. However, state, national, and global emission inventories are typically provided in terms of metric tons. Consequently, GHG emissions provided in this section are given in terms of metric units in order to compare Alternative emissions with other inventories.

4.2.2.2 Impacts Common to All Alternatives

4.2.2.2.1 GHG Emissions

As explained in Chapter 3, GHG emissions are typically discussed in terms of individual GHG emissions and aggregate emissions. CO_2 and methane are the two GHGs with the largest quantities of emissions due to resource management activities, while much smaller quantities of N_2O would also be emitted. Fire management activities and equipment combustion sources such as engines are the primary sources of CO_2 and N_2O. In contrast, the three largest sources of methane would be emitted from livestock (51 percent), fire management (39 percent), and gas venting/leaks associated with oil and gas activity (15 percent).

Total maximum annual emissions of GHGs are summarized in Table 4-19 in units of metric tons per year (mtpy). The emission estimates reflect GHG emissions from BLM-authorized activities occurring within the planning area. GHG emissions from activities outside the planning area are not included because insufficient data exist to accurately quantify these emissions. For example, combustion emissions associated with coal that was mined within the planning area and combusted outside the planning area were not included in the inventory. Due to insufficient data and methodologies for estimating carbon uptake in vegetation and soils, the GHG emission inventory does not quantify GHG sequestration. Consequently, net GHG contributions to the atmosphere are not represented in the emission inventories for the Alternatives.

From a climate change impact perspective, differences in GHG emissions among the Alternatives are negligible. GHG emissions produced under Alternative A would have the lowest GHG emissions. Alternative B, C, and D GHG emissions are almost equal, and are approximately 1 percent greater than Alternative A emissions. Appendix Y contains detailed GHG emission calculations for each Alternative.

Table 4-19 Estimated Maximum Annual GHG Emissions from Alternatives

Alternative	Pollutant Emissions (mtpy) [1]			
	CO_2	Methane	N_2O	CO_{2e}
A	287,630	435	29	306,025
B	287,579	485	36	309,371
C	287,673	485	36	309,465
D	287,609	485	36	309,401

mtpy = metric tons per year; CO_{2e} = carbon dioxide equivalent

1 Smoke emissions from wildfires are excluded from this table because they are considered to be part of the natural carbon cycle.

In a recent national GHG emission inventory published by EPA, total U.S. GHG emissions (excluding carbon sinks) were 6,633.2 million metric tons carbon dioxide equivalent (CO_{2e}; EPA 2011g). The estimated increase of the highest-emitting Alternative represents a potential of up to a 0.005 percent increase in national GHG emissions, assuming full development under the Alternatives and no future GHG emission reductions due to new national regulations. The effect of improvements in vegetation and soil management may offset some of the estimated GHG emission increase.

GHG emission control within the planning area would be unlikely to substantially reduce GHG emissions. Under each Alternative, fire management activities cause the largest increase in CO_2 and N_2O emissions (excluding wildfire combustion emissions) and livestock grazing causes the largest increase in methane emissions. GHG emissions from equipment used in firefighting, prescribed burning, and fire prevention are most effectively controlled by regulations imposed by EPA on manufacturers of this equipment. Methods to reduce methane emissions from livestock are currently being researched by multiple universities.

Under each Alternative, oil and gas activity emissions account for approximately 2 percent of total estimated CO_2 emission increases, 11 percent of methane emission increases, and less than 1 percent of N_2O emission increases. This is due to the low level of oil and gas development that is expected to occur under the RFD. EPA is expected to promulgate new national regulations that would reduce GHG emissions (primarily methane) from oil and gas activities by an average of 26 percent nationally (GPO 2011). This regulation is expected to be finalized in April 2012.

4.2.2.2.2 Impacts from Resource Management Actions

Soil resources and the vegetation it supports are significant carbon sinks because they remove CO_2 from the atmosphere. Removal of vegetation releases the soil organic carbon and the carbon stored in the vegetation, particularly the roots. Accordingly, the more surface disturbance and loss of vegetation, the more the activity would contribute to atmospheric GHG concentrations. The amount of carbon released varies depending upon the type of soil and vegetation that is removed and the type of vegetation that replaces it (growing trees, for example, are a greater carbon sink than grasses). For most management activities, the amount of surface disturbance does not vary greatly among the Alternatives.

Vegetation resources are also carbon sinks. The impacts to the type and health of the vegetation would directly affect the amount of carbon that is released into the atmosphere. Vegetation management on BLM-administered lands varies by Alternative. The more beneficial the impacts to vegetation resources, the more reduced the release of carbon, particularly where management focuses vegetation treatment on degraded areas with reforestation or revegetation of degraded areas. Forests are important carbon sinks but as trees move from early to late seral stages, the overall carbon being removed from the atmosphere decreases and mature trees become a potential carbon liability if the carbon is released to the atmosphere by decay or fire.

Analyzing this impact is extremely complex and depends on the use of harvested trees. Since timber harvesting does not vary meaningfully by Alternative, the impacts of forest management on climate change are not further analyzed.

All Alternatives authorize livestock grazing throughout the decision area. However, livestock grazing management varies by Alternative both in terms of the type of management systems to be utilized and, over time, the number of AUMs. Cattle and other grazing animals are emitters of GHG in the form of methane and there would be differences in methane emitted by Alternative, as the AUM reductions from the baseline were addressed. Livestock grazing strategies could improve forage so as to reduce methane production as well as reduce adverse impacts to soils and vegetation.

ROWs have the potential to affect climate change. Beneficial long-term effects can be achieved by reducing combustion of carbon based fuels to transport materials (due to pipeline ROWs) or generate electricity (due to transmission lines for renewable energy sources). Adverse effects can occur due to temporary GHG emission increases during ROW construction or due to increased long-term vehicular emissions due to new road construction.

4.2.2.2.3 Impacts to Resources

All Alternatives in the RMP emphasize maintaining or improving the health of soil, water, and vegetation through the use of BMPs, Rangeland/Riparian Standards, and Streamside Zone Management law, which must be met regardless of climatic conditions. These actions taken together would be responsive to vegetative changes brought on by climate change. Biological carbon sequestration by vegetation of all classes (grasses, trees, and shrubs) is dependent on many factors including the amount of cover, plant health and vigor, soil condition and water status. Generally, enhanced plant vigor and soil health combine to sequester the most carbon/acre. These actions would increase the biological carbon stored in the planning area. Due to limitations on emission estimation procedures, changes in biological and soil carbon sinks were not included in GHG emission inventories.

The Alternatives in the RMP strive to balance energy needs, the demand for public access, and recreation and commercial use, with the need for ecological health, resiliency, and sustainability.

For example, Liebig et al, (2010) have shown that livestock grazing at both moderate and high stocking levels on native vegetation and seeded crested wheat grazing treatments yield strong net sinks for soil organic carbon (SOC). Wetlands have been shown to store the most carbon per unit area, 90 percent of which is in the soil (German Advisory Council on Global Change 1998, Bridgham et al. 2007). The construction of fencing to protect riparian areas while allowing other resource activities would balance use. In another example, carbon stored as biomass would be harvested from the forest for the production of durable wood products where it would remain stored in these products over a long period of time.

4.2.2.3 Alternative A

In terms of quantifiable changes in estimated GHG emissions, Alternative A would have slightly lower climate impacts than the other Alternatives. However, the quantifiable differences between the Alternatives' GHG emissions could have less impact than net GHG differences that may occur due to carbon sequestration in vegetation and soils.

4.2.2.4 Alternative B

Based on estimated GHG emissions, Alternative B would lead to an approximate 1 percent increase in emissions over Alternative A. Alternative B closes the most travel routes and imposes the greatest limits on some recreational and commercial uses (oil and gas, coal, and forest products) of public lands. Travel route and recreational closures and constraints on oil and gas surface occupancy would do little to reduce emitted GHGs since use would shift to open routes and surface occupancy areas and emissions would remain relatively unchanged. Alternative B would not allow any new federal coal leasing actions. However, if federal coal has already been leased, mining would continue to occur. Therefore, quantifiable GHG emissions are conservatively estimated to include continued coal mining. Increased prescribed fire would lead to a temporary increase in GHG emissions during these activities followed by a long-term decrease in net GHG emissions (Wiedinmyer 2010). As a result, forested and grass/shrub lands would improve as carbon sinks and help reduce the net GHG emissions within the planning area

Mandatory monitoring and adherence to range standards, stream zone law, and use of BMPs allows adaptive management strategies that would successfully address impacts from climate change. The limitation on surface disturbance on slopes <30 percent, or in areas such as crucial winter range, would limit vegetation treatments designed to maintain and/or enhance vegetation and reduce the risk of wildfire. Hence the likelihood of large fires, releasing large amounts of carbon would increase and the net amount of carbon stored would decrease sharply and slowly return over 25–50 years.

4.2.2.5 Alternative C

Alternative C offers the most open travel routes, recreational opportunities, and commercial use of resources, although increases in quantifiable GHG emissions over Alternatives B and D are negligible. More surface disturbance is allowed in Alternative C than in Alternative B, which could potentially allow more vegetation treatments designed to improve long-term vegetation health and reduce wildfire potential. Removing underbrush and small trees, which store less carbon, would allow faster growth of larger trees resulting in more long-term carbon sequestration. The increase in vegetation treatments would be driven by budget constraints, keeping treatments small and the increase in carbon uptake would be minor.

4.2.2.6 Alternative D

Based on estimated GHG emissions, climate impacts in Alternative D would be greater than those for Alternative A and similar to those for the other Alternatives. Alternative D provides

balance between climate change emissions, recreation, commercial demand, healthy vegetation, and carbon sequestration.

4.2.2.7 Cumulative Climate Impacts

GHG emissions from BLM authorized actions, when taken in combination with all other sources of anthropogenic GHGs, would contribute to climate change, unless unquantified GHG sinks would completely offset quantifiable GHG emission increases. Cumulative global GHG emissions and the resulting climate change would affect BLM managed resources. The Alternatives in this RMP combined with actions already taken, strive to decrease the carbon footprint by increasing vegetation health, thereby increasing the amount of sequestered carbon.

The amount and scope of activity in the decision area is small in comparison to global activities affecting climate change. Emissions from activities and management actions that would occur in any of the Alternatives in the RMP would have a negligible impact on global climate change. However, that does not imply that careful consideration, planning, and implementation should not be exercised. Thoughtful vegetation and resource management would reduce contributions to global climate change and climate change impacts on BLM managed resources.

4.2.3 Geology

See Energy and Minerals (Section 4.3.1).

4.2.4 Soil

The following discussion addresses key soil concepts that are fundamental to understanding the discussion of effects to soils.

The main characteristics for evaluating the overall condition of soils are soil/site stability and hydrologic function. Soil/site stability reflects the capacity of a site to limit redistribution and loss of soils (including nutrients and organic matter) by wind and water. Hydrologic function reflects the capacity of the site to capture, store, and safely release water from rainfall, runoff, and snowmelt.

Soils within the BiFO are susceptible to impacts from compaction and disturbance, which can lead to accelerated erosion, soil loss, and change soil chemistry or disturb soil crusts. Management actions that involve ground disturbing activities, reducing vegetation cover, trampling, and using vehicles and heavy machinery can result in such impacts, especially in areas in which natural erosion rates are very high because of soil type/condition or slope. The greatest impacts to soil come from cross-country vehicle travel, the use of vehicles on poorly constructed routes, mineral operations, and visitor use. The effects of cross-country travel include reduction or disturbance of surface cover (e.g., soil-holding vegetation, litter, rocks), displaced soil particles, increased soil compaction, creation of new flow paths and channels, and increased runoff. Combined, these effects increase soil erosion. The effects of travel on poorly constructed routes are similar to the effects of cross-country travel. Thus, the greater the

number of poorly constructed routes that are left open, the greater the impacts through compaction and erosion.

Surface disturbances generally increase soil susceptibility to erosion and compaction, which in turn increases the potential for offsite movement, salinity, and sediment delivery to streams, and adverse impacts on soil resources. However, short-term activities that disturb soils may sometimes be necessary to make long-term improvements in soil condition and vegetation cover. Activities such as land treatments are expected to slow erosion rates and improve soil productivity, water-holding capacity, and nutrient cycling capability.

4.2.4.1 Methods and Assumptions

4.2.4.1.1 Methods

Impact analysis and conclusions are based on interdisciplinary team knowledge of resources within the planning area, review of existing literature, and information provided by other agencies. Effects are described qualitatively and, where possible, quantitatively. 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.

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 hazard ratings and steep slopes. 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.

Water erosion is a function of many factors including: soil erodibility; slope gradient; length of slope; rainfall amount, duration, and intensity; and vegetation cover. Erosion hazard is the susceptibility of soil to erosion. The soil erodibility factor (K_w) quantifies the soil detachment by runoff and raindrop impact. The values of K_w range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet erosion by water.

Slope gradient is the difference in elevation between two points, expressed as a percentage of the difference between these points. Representative Value (RV) slope indicate the expected slope value for a given soil management unit.

Water erosion hazard for bare non-compacted soil is estimated by using the formula Water Erosion Hazard = K_w factor × RV slope. Water erosion hazard is divided into three rating classes: slight (0 to < 3.21), moderate (3.21 to 7), and severe (>7). In the event of surface disturbance, soils would be subject to increased water erosion based upon the hazard rating. Soils in the low class would experience little erosion from water, soils in the moderate category would experience more erosion from water, and soils in the severe class would experience high amounts of erosion from water. Table 4-20 depicts the surface and subsurface acreage amounts associated with each of these classes.

Table 4-20 Water Erosion Hazard Rating

Rating	BLM (acres)	Split Estate (acres)
Low	291,391	230,612
Moderate	76,888	121,470
Severe	61,186	149,114
Total	**429,465**	**501,196**

Low = <3.2; Moderate = 3.21 – 6.9; Severe + >7
Source: USDA-NRCS; SSURGO datasets (2002)

Wind erosion results in the displacement or loss of topsoil in some areas, increased sediment deposition in other areas, following the removal of protective vegetation. The wind erosion index (WEI) is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. This index is divided into three rating classes based on the expected amount in tons of soil lost per year if the soils was bare, lacked surface crusts, in an unsheltered position, and were subject to the weather at Garden City, Kansas. These classes are: slight (0, 38, 48, 56), moderate (86), and severe (134, 160, 180, 220, 250, 310). In the event of surface disturbance, soils would be subject to increased wind erosion based upon the index rating. Soils in the slight class would experience little erosion from wind, soils in the moderate category would experience more erosion from wind, and soils in the severe class would experience high amounts of erosion from wind. Table 4-21 depicts the surface and subsurface acreage amounts associated with each class.

Table 4-21 Wind Erosion Index

Rating	BLM (acres)	Split Estate (acres)
Slight	240,789	228,491
Moderate	188,677	272,274
Severe	0	0

Low = 0,38,48,56; Moderate = 86; Severe = >134
Source: USDA-NRCS; SSURGO datasets (2002)

Spatial analysis for Table 4-20 and Table 4-21were conducted using USDA-NRCS's Soil Data Viewer ArcGIS Extension and ESRI's ArcGIS Desktop 9.3 computer software using USDA-NRCS's SSURGO datasets (2002). Erosion Hazard Ratings were computed using the MONTANA Suitability Methodology where $K_w \times RV$= the Erosion Hazard Rating. Map 6 displays the locations of the classes of Erosion Hazard Ratings and Wind Erosion Index on public lands within the planning area.

4.2.4.1.2 Assumptions

This analysis was based on the following assumptions:

- Soil resources would be managed at a minimum to meet Standard 1 of the Standards for Rangeland Health and Guidelines for Livestock Grazing for

Montana, North Dakota and South Dakota, (Miles City Standards for Rangeland Health).

- BMPs and erosion controls described in Appendix B would be used and maintained as appropriate. These measures would be effective in mitigating soil erosion.
- 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 on soils with severe erosion hazards. The amount of acres disturbed is anticipated to vary by specific allowable uses and management actions associated with individual Alternatives.
- Substantial surface disturbance to soil, including compaction of soil or loss of vegetative cover, could increase water runoff and downstream sediment loads and could lower soil productivity, thereby degrading water quality, altering channel structure, and affecting overall watershed health.
- Actions that disturb or compact soil, disrupt soil stability, or reduce soil productivity are considered adverse impacts. Actions that stabilize soil or increase soil productivity, avoid or minimize soil compaction or erosion, stabilize soil, or increase soil productivity are considered beneficial.
- Actions that protect cultural assets generally prohibit surface disturbance and thereby protect soil resources.

4.2.4.1.3 Environmental Consequences

Impacts to soils resources would likely result from actions proposed under the following resource programs:

- Soil Resources
- Water Resources
- Vegetative Communities
- Fish, Wildlife and Special Status Species
- Wild Horse and Burros
- Visual Resources
- Fire Ecology and Management
- Wilderness Characteristics
- Energy and Minerals
- Forest and Woodland Products
- Lands and Realty
- Livestock Grazing Management
- Recreation and Visitor Services
- Trails and Travel Management

- Renewable Energy
- Special Designations
  - Pompeys Pillar
  - Areas of Critical Environmental Concern, Wilderness Study Areas

Other programs were determined to have little or no impact to soils resources.

4.2.4.2 Impacts Common to All Alternatives

4.2.4.2.1 Impacts from Soil

Projects to promote healthy and stable soils would have positive impacts to soil resources, such as increased ground cover, reduced erosion, increased soil organic matter, lower bulk densities. Projects may produce short-term soil disturbances, but would produce long-term benefits as vegetation, and sites recover from past disturbances, including those associated with treatment projects. The use of BMPs, mitigations, and site specific NEPA analysis would reduce potential adverse impacts, helping to achieve project goals and objectives.

4.2.4.2.2 Impacts from Water

Projects to promote water resources and watershed restoration may create short-term soil disturbance, but would produce long-term benefits to soil resources. The use of BMPs, mitigations, and site specific NEPA analysis would reduce potential adverse impacts, helping to achieve project goals and objectives.

4.2.4.2.3 Impacts from Vegetation

Most vegetation treatments would be designed to improve overall land health, which would minimize soil erosion. Physical impacts could be incurred to soils during implementation, including increased compaction and reduced and or degraded cover, which could lead to temporary increases in soil erosion. While these areas are subject to wind and water erosion and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class tables Table 4-20 and Table 4-21). Compaction would be greatest where mechanical treatments are used. Depending on the methods utilized, not all acres would be subject to compaction. These impacts would be short term, though the treatments would have long-term beneficial impacts to soils. All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels.

Forests and Woodlands

Forest and woodland management actions would potentially have impacts to soils. These actions include managing vegetation structure, density, and species composition; and managing patch size, pattern, and distribution in a manner which reduces the occurrence of severe wildfires and insect outbreaks. While typically very small, and short-term soil disturbance may occur during implementation. Impacts to soils associated with mechanical treatments include compaction, structural degradation, and the removal protective layers such as foliar and forest litter cover. These impacts would be expected to be localized and temporary for the most part.

Activities which would cause long-term negative impacts would require some type of mitigation to minimize impacts. These projects are intended to alter the vegetative conditions on site, and could potentially increase the cover of shorter statured vegetation on the site. This could lead to increased cover, especially where forest stands are thick, and sunlight and water are limiting factors to shorter statured vegetation. Since these projects are intended to improve forest and woodland health, long-term benefits are expected as soils are maintained or improved.

Rangelands

Rangeland management actions have the potential to impact soils. Rangelands are subject to wind and water erosion, and compaction depending upon local uses, soil type, and soil cover. Management actions that improve rangeland health would improve soil stability. Short-term impacts would be the removal of some or all of the vegetative cover, litter cover, and potentially a loss of soil organic matter. These impacts could initially leave soils more susceptible to wind and water erosion. Over time as vegetative communities recover, vegetative structure changes, and soil organic matter increases soils would become increasingly stable.

Riparian and Wetland

Riparian and wetland management actions have the potential to impact soils. While these areas are subject to wind and water erosion and compaction, these impacts would be limited by the minor abounds of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels. Management actions that improve riparian areas and wetlands would improve soils in these areas. While short-term adverse impacts, such as compaction and surface cover removal are possible, and would impact soils during and immediately following implementation, these impacts would be minimized through site specific analysis. Only projects with long-term benefits would take place.

Invasive Species and Noxious Weeds

Invasive and noxious plants alter soil chemistry and stability and impact soils by reducing vegetation cover and increasing soil exposure to sunlight, drying, wind, and water, thus increasing soil erosion. Weed treatments have a negative impact on soils in the short term by further reducing soil cover, but over the long term reduce soil erosion. Moderate to minor impacts could occur in localized project areas, but would be short term. Improvement in vegetation health would reduce soil erosion and improve soil health over the long term.

Special Status Plants

Management that benefits special status plants areas would generally have beneficial impacts on soil health.

4.2.4.2.4 Impacts from Wildlife Habitat, Fisheries Habitat and Special Status Species

Impacts to soil resources from wildlife habitat, fisheries habitat, and special status species management are expected to be positive and long term. Limiting or prohibiting surface

disturbing activities and promoting vegetation coverage would eliminate compaction and reduce erosion and damage to sensitive soil crusts. While some compaction, erosion, and lower infiltration rates can be expected from some treatment projects, these impacts would be localized, moderate, and short term. Long-term benefits to soil resources from wildlife habitat treatments would be expected. Approximately 84 acres are treated annually for the enhancement of wildlife habitat. Treatment at this level is expected to remain steady throughout the life of this plan. The greatest benefit soils would have from wildlife resource management would be from limiting surface disturbance.

4.2.4.2.5 Impacts from Fire Ecology and Management

Fire Ecology and Management would strive to protect soil resources. Wildfire and prescribed fire have short-term impacts on erosion, soil chemistry and can adversely affect soil crusts. All activities on severe hazard sites (Table 4-20 and Table 4-21) would require mitigation to reduce impacts to acceptable levels. In the course of fire suppression, a resource advisor would be consulted or assigned to wildfires that involve or threaten public lands. Fire suppression equipment including heavy equipment, engines and transport vehicles impacts vegetation, increases compaction and can destroy fragile soil crusts. The use of heavy equipment removes vegetative matter, increasing soil exposure to excessive erosion by wind and water. Exposed soils resulting from wildfire are especially vulnerable to excessive erosion and soil loss. Successful fire containment would limit the area burned, and reducing the amount of soils which would be exposed to increased wind and water erosion. Fuels treatments would be designed to protect resource values, and promote desirable vegetation following the treatment. As vegetation increases following wildfire and treatments soils would become more stable. Emergency stabilization and rehabilitation of burned areas would be conducted in accordance with current policy to protect and sustain ecosystems. These impacts are immeasurable due to the unknown frequency and scale of wildfire.

4.2.4.2.6 Impacts from Energy and Mineral Resources

The action to apply appropriate stipulations to oil and gas leases would minimize impacts to soil resources. These stipulations include but are not limited to NSO and CSU, and various buffers to riparian areas, water bodies, streams, wetlands, and special status species.

4.2.4.2.7 Impacts from Forestry and Woodland Products

Commercial harvest of forest products would normally be associated with vegetative restoration (including forest health) and fuels treatments. Short-term disturbances include compaction and displacement of soil surface layers, leading to the potential for increased erosion. While these areas are subject to wind and water erosion and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels. These disturbances would be reclaimed to minimize long-term impacts.

4.2.4.2.8 Impacts from Livestock Grazing

Livestock grazing has the potential to impact soils directly and indirectly. Direct impacts include compaction and trampling of the soil. These impacts are typically greatest around

livestock facilities, water, and mineral locations, on trails, and areas or periods when soils are wet. Soils would be adversely impacted in the local area when range improvements are being constructed, but the impacts would be short term and minor to negligible. The indirect impacts include changes to the vegetative community. As vegetative communities transition towards or away from historic climax vegetative communities, soils become more or less susceptible to wind and water erosion. While these areas are subject to wind and water erosion and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-20). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels.

Projects such as pipelines, wells, tanks, pits, and reservoirs would continue to be implemented to improve grazing management. The implementation of these projects would lead to surface disturbance during initial construction. Based on assumptions made earlier in this chapter the approximate surface disturbance over the life of this plan would be 23 linear miles of pipeline, 2.4 acres from pits and reservoirs, and 2.4 acres from wells and tanks. These acres are consistent across all Alternatives. These projects would also indirectly impact soils. Impacts could be both adverse and beneficial to soils. Adverse impacts to soils would result from increased livestock use near the water development as livestock often congregate near these facilities. This would result in increased compaction and soil churning near the development. Additionally, as livestock congregate near these areas, forage utilization is typically higher near the water source. This would reduce foliar cover and potentially increase bare ground. These developments are typically intended to improve livestock distribution which would be beneficial to soils. By improving livestock distribution, grazing use is dispersed across larger areas, therefore grazing pressure is reduced. This could result in improved vegetative performance and over time improved vegetative communities over larger areas. As vegetative performance and communities improve, bare ground would decrease and soils would become healthier and more stable. These impacts, both beneficial and adverse, would depend on multiple factors such as grazing season, grazing period length, and number of livestock. Prior to development of such projects, site specific analysis would be conducted.

Implementing the standards of rangeland health would minimize the potential negative indirect impacts to soils, by promoting land health. Where the potential for site specific problems exist measures would be implemented. These measures include: adjusting livestock numbers during periods of drought, excluding livestock from springs and other areas, and adapting grazing systems to produce desired results.

4.2.4.2.9 Impacts from Recreation and Visitor Services

Recreation has the potential to impact soils in various ways. As increasing demand for public lands for recreation is expected to grow in the future, these impacts are also expected to increase. Impacts to soils vary by recreation type, season of use, soil type, and geography. The BLM would manage Special Recreation Management Areas (SRMAs) to promote and enhance recreational use of public lands. By promoting recreation in SRMAs impacts to soils are expected to increase, by the expected increased use. Some SRMAs are managed with under as a Travel Management Area (TMA), allowing BLM to reduce impacts to soil through the use of seasonal road restrictions. Impacts to soils from recreation would be both direct and indirect.

Direct impacts would include compaction, soil loss, and soil contamination (leaks and or spills from mechanized equipment). Indirect impacts would arise from the loss of ground cover, increasing exposure to wind, rain, and sun.

The greatest impacts would come from motorized travel uses. Impacts to soils would be greatest where motorized use is concentrated; however, inappropriate and unauthorized use of these vehicles could increase impacts to soils in all areas.

Other recreational uses such as hiking, camping, hunting, horseback riding could increase impacts to soils, however these impacts are typically much less, and more dispersed than those associated with motorized uses.

4.2.4.2.10 Impacts from Trails and Travel Management

Management of trails and routes would impact soils. The greatest impacts to soils from the use of trails and routes would result from motorized travel. These impacts vary greatly by the route/trail surface, transportation mode, soil type, soil condition, size of vehicle, and speed of travel. Impacts to soils from the use of trails and routes would be both direct and indirect. Direct impacts would include compaction, soil loss, and soil contamination (leaks and or spills from mechanized equipment). Indirect impacts would arise from the loss of ground cover, increasing exposure to wind, rain, and sun. Management actions that close routes (seasonally or permanently), limit use (size or type of vehicle), or allow only authorized uses would benefit soils in these areas. Therefore, the travel restrictions placed on routes and areas would be used for impact analysis. Furthermore, by Alternative, detailed analysis of effects of route designations with respect to sensitive resources and other pertinent factors (highly erodible soils, areas with known erosion scars, route densities, and types) can be found in Appendix O.

4.2.4.2.11 Impacts from Renewable Energy

Development of renewable energy would directly impact soils in construction areas. The remainder of soils in wind farm areas would remain unaffected. Direct impacts from construction activities occurring during development, include the removal of top soils for turbine pads, and potentially access roads, soil compaction, and increased wind and water erosion from vegetation removal. These impacts would be localized to construction areas. While these areas are subject to wind and water erosion, and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels. Initially, approximately two acres per turbine would be impacted. Following development reclamation would occur and long-term impacts would be present on approximately one acre per turbine site. On areas reclaimed soils would recover over time from compaction, and as vegetation improves, become less susceptible to erosion. Soils not initially impacted by construction activities in wind farm areas would likely remain in their current condition.

4.2.4.2.12 Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Approximately 200 acres of the Pompeys Pillar ACEC have been farmed in the past. Currently farming is practiced to promote wildlife habitat. Both irrigated and non-irrigated farming practices are implemented. Approximately 15 percent of those are planted to food plots annually. The remaining 85 percent have been planted to promote perennial cover. Impacts to soil resources are greatest in food plot areas as these areas are worked on an annual basis. Food plot crops are left in place until the following spring when they are burned, leaving soils exposed until the new crop is planted and germinates.

Areas of Critical Environmental Concern (ACEC), Wilderness Study Areas (WSAs)

These special designations generally place a higher level of protection on the land, which restricts surface disturbing activities, road use, and other resource management activities such as mechanical fireline construction and prescribed fire, therefore protecting soil resources. WSA boundaries and acreages would remain unchanged (28,631 acres) under all Alternatives; however, ACECs boundaries and acreages would vary according to Alternative.

4.2.4.3 Alternative A

4.2.4.3.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.2.4.3.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.2.4.3.3 Impacts from Vegetation

Forests and Woodlands

Approximately 30 percent (9,500 acres) of the 32,100 acres of forested lands are protected from cutting, (Protected areas include: Pryor Mountain WSA, Bighorn Tack-On WSA, Burnt Timber WSA, Bad Canyon, Young's Point, Asparagus Point, Shepherd Ah-Nei, and Acton). Also the use of wheeled or tracked logging equipment would be prohibited on sustained slopes >35 percent. This would leave 68 percent of forested lands (21,807 acres) open for operations. This prohibition affects only timber harvest activities. Based on past forest and woodland treatments 840 acres would be treated over the life of this plan. This value is intended to provide perspective versus other Alternatives, not all treatment acres would be subject to surface disturbance.

Rangelands

Rangeland treatments include 6,418 acres of sagebrush burning/treatment, and 160 acres of crested wheatgrass which would be subject to haying, or other mechanical treatment to increase forage production, improve range condition, and reduce erosion. Burning of rangelands would

initially leave soils exposed to wind and water erosion. While these areas are subject to wind and water erosion, and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels. Over time as areas are re-vegetated, and ground cover increased wind and water erosion would decrease. These treatments would be designed to improve land health. Crested wheatgrass stands subject to mechanical treatments, and haying would also be subject to increase wind and water erosion. Haying of crested wheatgrass would remove vegetative cover leaving soils exposed to wind and water erosion following the haying treatment. Any mechanical treatment, including haying would increase compaction on treatment sites. Based on assumptions made earlier in this chapter surface disturbance from rangeland vegetation treatments would be approximately 7,172 acres over the life of this plan. With the exception of haying, treatments would be intended to improve rangeland health, and would have short-term impacts. While 7,172 acres could be treated over the life of this plan, not all 7,172 acres would be treated at once.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 10,114 would be protected from surface disturbance, due to surface disturbance buffers placed on these areas.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Based on assumptions earlier in this chapter, the approximate total surface disturbance from treatments would be 54,883 acres over the life of this plan. Disturbances would be short term. While 54,883 acres would be treated over the life of this plan, not all 54,883 acres would be treated at once.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.4.3.4 Impacts from Wildlife Habitat, Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives.

4.2.4.3.5 Impacts from Wild Horses and Burros

Under this Alternative, wild horses would be managed on approximately 24,595 acres of BLM-administered lands (37,494 acres all ownerships) and administrative pastures and areas adjacent to private lands would remain closed. The maximum number of wild horses would be maintained that the range could sustain while preventing deterioration. This Alternative would continue to protect soils from the direct and indirect impacts of grazing within the administrative pastures, and areas adjacent to private lands. The rest of the range would be subject to grazing by wild horses, allowing little chance for vegetative recovery unless the appropriate management level (AML) is reduced. Pryor Mountain Horse Range vegetation is in poor health and soil is being lost over most of the range. Historically, herd management goals and objectives have not been met allowing horse numbers to exceed the ability of the range to

sustain itself, leading to range deterioration and excessive erosion. Excessive soil erosion is most evident in areas where horse use is concentrated (around water sources) and areas where heavy, concentrated grazing occurs (in the lower more desert areas and the upper portion of the range. Managing for the "maximum amount of wild horses the range can sustain while preventing deterioration", is acceptable in theory, but has not been successful in practice as excessive grazing has led to the deterioration of range conditions and soil loss. Impacts to soils are high to moderate and long term.

4.2.4.3.6 Impacts from Visual Resources

Under this Alternative, VRM in the decision area would be managed as:

- VRM Class I – 29,843 acres
- VRM Class II – 12,427 acres
- VRM Class III – 391,068 acres
- VRM Class IV – 816 acres

Those acres managed as VRM Class I & II (42,270 acres) could limit some surface disturbance and the associated compaction, erosion, and damage to soil crusts.

4.2.4.3.7 Impacts from Fire Ecology and Management

Under this Alternative the use of fireline construction with heavy equipment would generally be restricted in critical winter range and cultural areas thus reducing physical impacts to soils. Impacts from the use of heavy equipment are generally moderate to minor, localized, and short term depending on the timeliness and effectiveness of mitigations. Failure of mitigations can have moderate to severe, long-term impacts. Historically mitigations have been sporadically applied to constructed fireline and in some instances measures used have not been effective.

Prescribed fire is used in accordance with treatments identified by range, wildlife, and forestry programs. Mitigation measures incorporated into the fire prescription generally are effective at controlling accelerated soil erosion.

Under this Alternative, 6,280 acres of vegetation manipulation using prescribed fire and mechanical treatments would be anticipated. Adverse impacts to soils would be short term and minor to negligible. The use of low intensity controlled fire would be expected to improve plant diversity, health, and vigor, thus reducing adverse impacts to soil resources, improving soil health over the long term. Mitigation measures used during and after prescribed fire would be expected to successfully prevent excessive erosion and soil damage.

4.2.4.3.8 Impacts from Lands with Wilderness Characteristics (LWCs)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 1,925 acres are identified lands with wilderness characteristics.

4.2.4.3.9 Impacts from Energy and Mineral Resources

Coal

Lease by application (LBAs) for new coal leases would be processed by applying the coal screening process to the application. The coal screening process would determine which lands may be available for further consideration for coal leasing and development. Under this Alternative 26,131 acres would be closed to coal leasing, this is less than Alternatives C and D. Development of coal minerals could have direct impacts to soils. Impacts vary by the technique used to mine the coal. All techniques would likely require access roads which would need to be constructed; existing roads would likely need to be improved. Impacts to soils associated with roads include increasing compaction, and soil erosion from wind and water. Sub surface mining would have limited impact to soils. The greatest impact would be from the subsidence following mining activities. Initially subsidence would cause cracks at the soil surface, and a gradual slumping across the topography of the surface. Depending upon the width, and location of surface cracks localized erosion could result initially. Over time soils would slump, closing surface cracks and minimizing erosion. If open pit or surface mining was permitted the impacts to soils would be much greater. These impacts would include the removal of soils to access coal minerals below. Following mining the area would need to be reclaimed.

Fluid Minerals

Development of subsurface fluid minerals includes well pad construction, drilling, road construction, pipeline construction, vehicular travel during construction, well maintenance, and reclamation. These activities would lead to impacts to soils such as reduced ground cover, soil mixing, compaction, or removal, exposing soils to accelerated erosion by wind and water, resulting in the irretrievable loss of topsoil and nutrients and potentially resulting in mass movement or sedimentation. While these areas are subject to wind and water erosion, and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels.

The RFD projects 3-4 federal wells per year. Short-term surface disturbance would affect 17.2 acres/year and long-term surface disturbance would impact 74.2 acres/year during 2010 to 2014. These impacts would increase to 21.6 acres/ year short term and 10.8 acres/year long term. The total projected acres of disturbance over 20 years would be: 2,158 acres of surface disturbance with 1,106.5 acres reclaimed from 80 wells over 20 years.

A total of 39,730 acres would be closed to fluid mineral leasing in Alternative A. No Surface Occupancy (NSO) lease stipulation would be placed on 32,595 acres in the decision area. The remaining area proposed for leasing would be open with a Controlled Surface Use (28,337 acres) or Timing Limitation (308,116 acres) which would be subject to standard stipulations with a Cultural Notice, which would require mitigation through Section 106 of the NHPA. Minor constraints such as Timing Limitations would benefit to soil resources as they limit surface disturbing activities when soils are overly moist. These limitations would need to be addressed during the APD stage of development. In areas where increased soil disturbance, and compaction is expected to be high and natural recovery is not likely rehabilitation would be

needed to ensure soils remain stable and productive. Rehabilitation efforts would need to be analyzed in the site-specific environmental analysis.

Under Alternative A, 100,662 acres are administratively unavailable for oil and gas leasing or have major constraints. The lack of specific soil protection management actions under this Alternative has resulted in accelerated erosion in some areas. Standard BMPs and mitigation guidelines, combined with development restrictions on slopes greater than 30 percent, is the existing management standard and has resulted in the present conditions. Table 4-22 summarizes management for each Alternative.

Table 4-22 Fluid Mineral Management Summary for All Alternatives

	Alt A (acres)	Alt B (acres)	Alt C (acres)	Alt D (acres)
No Lease (NL)	39,730	302,713	65,891	72,915
No Surface Occupancy (NSO)	32,595	28,110	64,135	263,185
Controlled Surface Occupancy (CSU)	28,337	76,556	102,682	21,436
Timing Limitation (TL)	308,116	249,460	316,602	315,317

Alternative A has 264,534 acres available for leasing and development with standard leasing terms, which have the least protections to soil. Acres open with standard leasing terms for all Alternatives are as follows: A (264,534); B (67,726); C (126,732); D (6,158).

Locatable Minerals

Exploration and development of locatable minerals creates surface disturbance that could adversely impact soils. These impacts would be similar to impacts discussed in the coal section above, however the size and duration of mining operations could vary greatly. Locatable mineral mining techniques have the potential to vary greatly depending on the mineral being mined. All mining operations would be subject to the appropriate reclamation standards. All top soils initially removed would be reserved and used for reclamation, however in certain instances open pits would not be reclaimed, which would lead to irretrievable losses in these areas. Successful reclamation in areas reclaimed would lead to long-term reduction in soil erosion, and improved site stability. Under Alternative A, 39,700 acres would be closed to locatable mineral development and exploration, less than all other Alternatives: B (270,977), C (36,955) and D (54,761).

Mineral Materials

Impacts would be the same as impacts from coal development, however the size of the operations are generally smaller, impacting fewer acres, and the duration of activities is generally shorter expediting rehabilitation of disturbed areas. Under Alternative A, 44,583 acres would be closed to development of mineral materials. Acres closed for all Alternatives are as follows:

- Alternative A – 44,583
- Alternative B – 343,745

- Alternative C – 251,927
- Alternative D – 272,122

4.2.4.3.10 Impacts from Forestry and Woodland Products

Soil resources would be exposed to compaction and erosion during the short term while timber harvests were in progress. While these areas are subject to wind and water erosion and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels. Timber harvest at a PSQ of 70 mbf/year would impact approximately 18 acres each year. Management includes prohibiting wheeled or tracked equipment operation on sustained slopes greater than 35 percent and re-seeding of grasses and forbs on skid trails, landings, and roads. As not all areas within a harvest unit would be subject to surface disturbance, 18 acres per year is an overestimate. Under certain circumstances, sales of timber could reach 1 mmbf/year with a corresponding increase in adverse impacts to soil resources; however, based on historic timber harvest acreages, the likelihood of sales of this size (257 acres) taking place in a year is considered small. Based on assumptions stated earlier in this chapter, the total acres expected to be harvested over the life of this plan would be approximately 3,340 acres; this number is an overestimate as not all acres would be subject to surface disturbance. Adverse impacts from forest and woodland management actions are expected to be moderate to minor and short term. The adherence to Montana Stream Zone Management Law would be expected to limit impacts including erosion and compaction, both short and long term. In areas where increased soil disturbance and compaction is expected to be high and natural recovery is not likely, rehabilitation would be needed to ensure soils remain stable and productive. Rehabilitation efforts would need to be analyzed in the site specific environmental analysis.

4.2.4.3.11 Impacts from Lands and Realty

The impacts from land use authorizations and trespass activities on soil resources are dependent on the type of activities taking place within the right-of-way. For example, road rights-of-way impact soil resources by exposing soil to the forces of wind and water, channeling water, increasing compactions and soil loss. While these areas are subject to wind and water erosion and compaction, these impacts would be limited by the minor amounts of land in the severe erosion class (Table 4-20 and Table 4-21). All activities in severe hazard sites would require mitigation to reduce impacts to acceptable levels. These impacts are proportionate to a number of factors such as the length of the road, type of surface, weather conditions, and the number of vehicles and speed at which they travel. Utility rights-of-way may have much less impact on soil resources since and the number of vehicles traveling through the right-of-way for maintenance purposes would be much smaller and vegetation may be restored, resulting in less adverse impacts to soils. Transport pipelines have the potential to leak their contents into the soil causing high to irretrievable soil impacts. Under this Alternative ROWs are excluded from 44,014 acres. There are 24,203 acres of avoidance areas under this Alternative. This Alternative protects the least amount of acres from ROW development and therefore has the greatest potential to adversely impact soil resources. The small number of ROW authorized each year keeps the impacts from these activities minor to negligible. Based on assumptions stated earlier

in this chapter surface disturbance over the life of this plan from rights-of-way would be approximately 289 acres with 262 acres being reclaimed. Since ROWs are usually granted for extended periods of time, the cumulative adverse impacts would be the greatest under this Alternative.

4.2.4.3.12 Impacts from Livestock Grazing

Under this Alternative, two areas are specifically closed to livestock grazing. The remaining 387,057 acres (54,873 AUMs) are open to grazing in the decision area with 7,746 AUMs suspended. There are 44,988 acres not fully meeting standards and no assessments have occurred on 6,835 acres. Grazing allotments are monitored and managed to meet rangeland standards and guidelines therefore the impact of grazing on soil resources would be expected to improve on these acres during the life of this plan. Based on assumptions stated earlier in this chapter, impacts to soil resources from livestock grazing improvements would include 23 linear miles of pipeline, 2.4 acres of surface disturbance from pits and reservoirs, and 2.4 acres of surface disturbance from wells. These figures are intended for perspective; most areas would experience short-term disturbance, but would recover. These figures indicate the approximate total expected over the life of the plan, through all Alternatives.

4.2.4.3.13 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, 1,171 acres are designated as SRMAs, and no motorized use is allowed in these areas.

4.2.4.3.14 Impacts from Trails and Travel Management

Alternative A allows 823 of miles of open travel routes (Alternative A: 823 miles, Alternative B: 349 miles, Alternative C: 896 miles, and Alternative D: 680 miles). Alternative A closes or limits use to administrative use on 170 miles of routes. For more detailed discussion of impacts to soils from trails and travel management, see Appendix O.

Under this Alternative, travel is confined to existing roads and trails except for those routes and areas specifically closed. The following areas are managed under a travel management plan:

- Shepherd Ah-Nei
- Acton
- Horsethief
- South Hills
- Pryor Mountain

Off-road use (vehicles 50” or less) is allowed in the Shepherd Ah-Nei area, and motorcycle use is allowed in only 1,357 acres of the South Hills Area. Horsethief, Acton, and Pryor Mountain have road closures and timing limitations established. Unauthorized and/or inappropriate use of these vehicles occurs occasionally and can cause undue environmental degradation and accelerate soil erosion. Accelerated erosion resulting from OHV use is not quantified, but is generally limited to isolated incidences within the decision area. Off-road camping is allowed 300 feet from the travel route, and motor vehicle travel is allowed.

Most roads are two-track, primitive, and are not maintained or receive only periodic maintenance. Many routes are individual user created or the consequence of oil and gas exploration. Many are poorly placed, or duplicate routes, and route density is high in some areas. Impacts range from short term and minor (rarely used routes) to long term and high to irretrievable on heavily used non-engineered routes.

4.2.4.3.15 Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, 47,496 acres would be managed as exclusion areas, and soils would not be impacted in these areas. Additionally 25,141 acres would be managed as avoidance areas, and 361,514 acres would be managed as open areas. If development occurred in these areas, standard BMPs would be implemented to minimize disturbance, improving reclamation potential and soil recovery on disturbed sites. This alternative manages the fewest acres as exclusion and avoidance areas compared to all other alternatives, leaving the most acres open to renewable energy development.

4.2.4.3.16 Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC), Wilderness Study Areas (WSAs)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 37,896 acres are designated as ACECs.

4.2.4.4 Alternative B

4.2.4.4.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.2.4.4.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.2.4.4.3 Impacts from Vegetation

Under this Alternative, moderate to minor impacts could occur in localized project areas, but would be short term. The cumulative impacts under this Alternative include improvement in vegetation health, reduction in soil erosion and improvement soil health over the long term. This Alternative allows the fewest acres subjected to surface disturbance and protects the most acres resulting in the least erosion potential and the best long-term soil productivity of the Alternatives. Moreover, the prohibition of surface-disturbing activities on highly erosive soils with 30 percent or more slopes with adequate mitigation measures would result in improved protections and reduce accelerated erosion rates, as compared to Alternatives A, C and D.

Forests and Woodlands

Approximately 30 percent (9,500acres) of the 32,100 acres of forested lands are protected from cutting, (Protected areas include: Pryor Mountain WSA, Bighorn Tack-On WSA, Burnt Timber WSA, Bad Canyon, Young's Point, Asparagus Point, Shepherd Ah-Nei, and Acton). Also under this Alternative surface disturbing activities and the use of wheeled or tracked logging equipment is prohibited on sustained slopes greater than 30 percent. This would leave 60 percent of forested acres (19,241 acres) open to operations. Under this Alternative timber harvests are projected to impact 18 acres/year. While 18 acres per year could be harvested, not all 18 acres would be subject to surface disturbance. This value is intended to provide perspective versus other Alternatives.

The application of BMPs, treatment of noxious and invasive plants, and mitigation measures identified by specific analysis, would reduce or mitigate impacts to soil resources. Forest management practices, (i.e. thinning, prescribed fire, etc., and forest product removal) which reduce the potential for high intensity wildfire would reduce the impact to soils and improve forest health.

Rangelands

Under this Alternative no prescribed fire would be conducted in sagebrush communities, though wildfire suppression would be conducted in sagebrush communities. Also 15 percent of the crested wheatgrass would be converted to native communities over the life of this plan. Conversion of 22,414, acres of crested wheat grass to native sagebrush/grassland would expose soils to increased erosion through localized exposure to drying by direct sunlight and reduced vegetative cover, as well as compaction from equipment travel during the preparation and planting stages of conversion. Through the use of BMPs and proper preparation and planting methods, impacts would be minor to negligible over the short term. Establishment of native grasses and sagebrush would improve and enhance soil health and reduce erosion over the long term.

Riparian and Wetlands

Surface disturbing activities generally would not be permitted within ¼ mile of riparian areas or wetlands, unless they were to achieve a desired outcome for riparian areas or wetlands. 24,373 acres of soils would be protected from surface disturbance under this Alternative. If activities are permitted impacts would be the same as impacts common to all Alternatives.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Based on assumptions earlier in this chapter, the approximate total surface disturbance from treatments would be 9,280 acres over the life of this plan

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.4.4.4 Impacts from Wildlife Habitat, Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Alternative B generally restricts the most acres from surface disturbance, and therefore would provide the most protections to soils.

4.2.4.4.5 Impacts from Wild Horses and Burros

Under this Alternative, wild horses would be managed within the boundaries of the original Secretarial Orders from 1968 and 1969 (23,204 acres BLM Administered lands and 31,153 acres all ownerships). The remainder of the horse range would be closed to wild horse use. Appropriate Management Level (AML) would be determined in the context of having a minimum amount of wild horses in order to improve ecological conditions.

Vegetation in the original designated area is sparse, precipitation low and soils are shallow and susceptible to excessive erosion. Management objectives under this Alternative would close portions of the range allowing for vegetation recovery and regeneration, reducing excessive erosion over the long term in those areas. The remaining portion of the horse range, where horse use would occur would be in danger of over use with the continuation and/or acceleration of excessive erosion and soil loss in the vicinity of water sources. Not allowing the development of range improvements would increase impact to soils in the vicinity of existing water sources. Impacts would be similar to Alternative A, but the reduction of horse numbers affords the best chance to improve range conditions and reduce soil erosion and loss.

4.2.4.4.6 Impacts from Visual Resources

Under this Alternative, VRM in the decision area would be managed as:

- VRM Class I – 29,823 acres
- VRM Class II – 15,688 acres
- VRM Class III – 388,643 acres
- VRM Class IV – 0 acres

Restrictions placed on management actions range from the most protective for soil resources under VRM class I to the least restrictive under VRM class IV. It is not possible to predict with accuracy what types of actions and acreages would be proposed in each of the VRM classes. The number of acres managed within each VRM class differs by Alternative. Comparison of the number of acres in each VRM class by Alternative yields a relative analysis of the level of protection offered to soil resources under each Alternative. VRM class I is the most restrictive to surface disturbing activities and thereby most beneficial to soil resources. Those acres managed as VRM Class I & II under Alternative B (45,511 acres) would afford the most protection for soil resources by the limitations placed on surface disturbance of all the Alternatives. This Alternative offers slightly less protection for soil resources under VRM class I than Alternative A, (29,823 acres Alternative B as opposed to 29,843 acres in Alternative A), but overall protects 3,241 more acres considering VRM Class I and II restrictions.

4.2.4.4.7 Impacts from Fire Ecology and Management

Impacts would be the similar to those in Alternative A; however, the quantity of impact would be less. Restricting heavy equipment fireline construction to existing roads and trails would greatly reduce impacts to soil resources, but could impede effective fire suppression and increase the size of wildfires, impacting more soil resources. Prescribed fire would not be allowed on: greater sage grouse protection areas, greater sage grouse restoration areas, areas of cultural sensitivity, riparian & wetlands, crucial winter range sage grouse nesting and lek buffered areas and areas of highly erosive soils. This limitation reduces the short-term, localized soil impacts, but may increase wildfire intensity which would have a larger more serious impact on soil resources. Alternatives B, C and D anticipate the use of prescribed fire and mechanical treatments to treat 21,700 acres.

Allowing the management of naturally ignited wildfire for resource benefit on would potentially have short-term, adverse, localized, impacts, on soil resources. The management of wildfire in this manner would increase the potential number of acres impacted by fire. Impacts would be expected to be adverse, minor and short term until vegetation regenerates. The reintroduction of fire into the landscape in this manner closely mimics natural processes, reducing fuel loading, adding nutrient to soils and increasing plant and animal diversity. Excessive erosion would be expected to decrease and soil health to improve over the long term.

Lands with Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 12 tracts would be managed for wilderness characteristics, totaling 27,292 acres.

4.2.4.4.8 Impacts from Energy and Mineral Resources

Coal

No new coal leasing would be considered in the decision area. Therefore there would be no impacts from coal development.

Fluid Minerals

Under Alternative B, an estimated 407,379 acres of the decision area's federal mineral estate is administratively unavailable (No Lease) for oil and gas leasing (302,713 acres) or has major constraints (NSO and CSU) (104,666 acres). Standard BMPs and mitigation guidelines, combined with development restrictions on slopes greater than 30 percent would be expected to reduce impacts to soil resources. Where leases are developed surface disturbing activities, and impacts to soils would be similar to Alternative A. Alternative B has 67,726 acres available for leasing and development with standard leasing terms, which have the most protections to soil. Acres open with standard leasing terms for all Alternatives are as follows:

- Alternative A – 264,534
- Alternative B – 67,726
- Alternative C – 126,732
- Alternative D – 6,158

Locatable Minerals

Impacts to soils would be the same as the impacts discussed under Alternative A. Under this Alternative 270,977 acres would be closed, more than all other Alternatives: A (39,700), C (36,955), and D (54,761). This Alternative would provide the most protections to soils.

Mineral Materials

Impacts would be the same as impacts from locatable minerals under Alternative B. Under this Alternative 364,591 acres would be closed. Acres closed for all Alternatives are as follows:

- Alternative A – 44,583
- Alternative B – 343,745
- Alternative C – 251,927
- Alternative D – 272,122

4.2.4.4.9 Impacts from Forestry and Woodland Products

No acres would be reserved from commercial harvest under this Alternative except for the forested areas contained within the 9,500 acres of WSAs and ACECs. Management of these areas would prohibit commercial cutting and private collection of fuel wood, thus reducing negative impacts to soil resources.

Surface disturbance and the use of wheeled or tracked equipment would be eliminated on sustained slopes greater than 30 percent, thus allowing activities to proceed on 19,241 forested acres of public lands within the planning area. Additionally, re-seeding of grasses and forbs on skid trails, landings and roads would be required. Timber harvest is projected at a PSQ of: 70 mbf/year impacting approximately 18 acres each year. As not all areas within a harvest unit would be subject to surface disturbing activities, 18 acres per year is an overestimate.

No new roads would be constructed unless approved by a travel plan which would be expected to include effective mitigation measures to control erosion and reduce compaction. Decommissioning and reclaiming roads immediately after project completion would decrease the time soils were exposed to wind and water, thus decreasing adverse impacts. Prohibiting non-commercial harvest of forest and woodland products would reduce the amount of unauthorized off road travel and associated adverse impacts. Approximately 20 permits are issued per year for non-commercial forest and woodland products therefore impacts are generally minor to negligible.

Emphasis is on management for forest and woodland health in this Alternative. The type of impacts to soil resources from harvest and treatment actions would be the same as described in Alternative A but to a lesser degree. Compaction, erosion, and reduced infiltration rates would be expected during the short term while timber harvest or treatments (thinning, etc.) were in progress. The increased growth and diversity resulting from forest and woodland treatments would be expected to have a long-term positive effect, preventing erosion, preserving soil crusts and chemistry and promoting general soil health.

Adverse impacts from forest and woodland management actions are expected to be moderate to minor and short term. The use of Montana Water Quality BMPs and adherence to Montana Stream Zone Management Law would be expected to limit impacts including erosion and compaction, both short and long term. In areas where increased soil disturbance, and compaction is expected to be high and natural recovery is not likely rehabilitation would be needed to ensure soils remain stable and productive. Rehabilitation efforts would need to be analyzed in the site specific environmental analysis. This Alternative provides the greatest degree of protection for soil resources.

4.2.4.4.10 Impacts from Lands and Realty

This Alternative is the most restrictive to ROWs. Under this Alternative ROWs are excluded from 211,384 acres. An additional 185,607 acres are designated as ROW avoidance areas and could limit development and impacts with the same protection for soil resources. Based on assumptions stated earlier in this chapter surface disturbance over the life of this plan from rights-of-way would be approximately 289 acres, with 262 acres being reclaimed. Additionally all power lines < 69kV would be buried, unless unfeasible, and applicants would be encouraged to use designated corridors. Adverse impacts under this Alternative would be less than Alternatives A, C, and D.

4.2.4.4.11 Impacts from Livestock Grazing

Eight areas are specifically closed to livestock grazing. The remaining 386,092 acres are open to grazing in the decision area with 7,746 AUMs suspended. Relinquished AUMs would be retained for watershed health and wildlife habitat. Areas with active surface disturbance (such as energy and mineral development, range improvements, wildfire, and prescribed fire) would be unavailable to livestock grazing. The impacts are similar to Alternative A. However, this Alternative would potentially expedite recovery of disturbed areas, improving soil conditions. It closes more acres to livestock grazing than Alternatives C and D. Impacts would be local, direct, and long term.

4.2.4.4.12 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, 92,230 acres are designated as SRMAs. Of the 90,783 acres of SRMA, 90,783 acres would be managed under a TMA, allowing BLM to reduce impacts to soils through the use of seasonal road restrictions.

4.2.4.4.13 Impacts from Trails and Travel Management

The number of miles of open routes is approximately 42 percent fewer miles than Alternative A (Alternative A: 823 miles, Alternative B: 349 miles, Alternative C: 896 miles, Alternative D: 680 miles); hence, the cumulative impacts would be proportionately less. Limiting usage and closure of routes has the potential to decrease impacts to soil resources. Alternative B closes or limits use to administrative use on 644 miles of routes, compared to Alternative A which closes or limits use on 170 miles of routes. For more detailed discussion of impacts to soils from trails and travel management see Appendix O.

Other actions such as not allowing big game retrieval and limiting camping to within 50 feet of the roadway would have positive benefits, but the amount of environment affected by these management actions is small and insignificant. Areas suitable for rock crawling activities (technical 4WD) generally occur in the drainage bottoms the potential for damage and soil loss is great. Not allowing rock crawling activities in Horsethief would eliminate the potential for soil erosion and loss in this area.

4.2.4.4.14 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative B. 345,491 acres would be managed as exclusion areas, and soils would not be impacted in these areas. This is the most of all alternatives. Additionally 85,461 acres would be managed as avoidance areas, and 0 acres would be managed as open areas. If development occurred in these areas standard BMPs would be implemented to minimize disturbance, improving reclamation potential and soil recover on disturbed sites. Standard right-of-way terms and conditions, special stipulations or design features, and other constraints/restrictions consistent with fluid mineral stipulations could also be applied to protect resources, which would reduce impacts to soils. This alternative allows the fewest potential acres of disturbance to soils of all alternatives.

4.2.4.4.15 Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC), Wilderness Study Areas (WSAs)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 181,175 acres are designated as ACECS.

4.2.4.5 Alternative C

4.2.4.5.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.2.4.5.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.2.4.5.3 Impacts from Vegetation

The types of impacts to soil resources would be the similar to Alternative B; however, the degree of impact would change due to the larger range of activities allowed, impacting more acres of public lands. This Alternative presents the most impact to soil resources by allowing surface disturbing activities to occur on the largest amount of acres in the decision area. Impacts would generally be localized, short term, and moderate to negligible. The greatest impacts would occur on steeper slopes and could be long term depending on the success of re-vegetation and other mitigation efforts.

Forests and Woodlands

Under this Alternative surface disturbing activity would be allowed on sustained slopes up to 45 percent. This would leave 79 percent of the forested acres (25,335 acres) open to operations. Increasing the allowable slope, could reduce the need to do hand treatments making vegetation treatments less costly and forest product harvest more profitable, especially considering the emerging demand for biomass. The reduction in cost could increase the amount of vegetation treatments and forest product harvest over the next 20 years. Under this Alternative timber harvests are projected to impact 66 acres/year. While 66 acres per year could be harvested, not all 66 acres would be subject to surface disturbance. This value is intended to provide perspective versus other Alternatives.

The application of BMPs, treatment of noxious and invasive plants, and mitigation measures identified by specific analysis, would reduce or mitigate impacts to soil resources. Forest management practices (i.e. thinning, prescribed fire, etc., and forest product removal) that reduce the potential for high intensity wildfires would reduce the impact to soils and improve forest health.

Rangelands

This Alternative allows the conversion of 5 percent of crested wheatgrass acres (about 7,500 acres) in high density sage grouse population areas to native sagebrush/grassland over the life of the plan, as well as an additional 594 acres of other rangeland treatments, based on assumptions made earlier in this chapter. This Alternative would have the same impacts as Alternative B, but would affect 14,320 fewer acres.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives. Surface disturbance activity would be restricted from 6,666 acres under this Alternative, due to surface disturbance buffers placed on these areas.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Based on assumptions earlier in this chapter, the approximate total surface disturbance from treatments would be 41,760 acres over the life of this plan.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.4.5.4 Impacts from Wildlife Habitat, Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Alternative C generally restricts fewer acres from surface disturbance than B, and therefore would provide the less protection to soils.

4.2.4.5.5 Impacts from Wild Horses and Burros

Under this Alternative, wild horses would be managed on approximately 28,622 acres of BLM-administered lands (44,855 acres all ownerships). Impacts would be the same as in Alternative A, although increasing the available acres by including the "Administrative pastures" could disperse horse usage, reducing vegetation loss and erosion.

4.2.4.5.6 Impacts from Visual Resources

Under this Alternative, VRM in the decision area would be managed as:

- VRM Class I – 26,040 acres
- VRM Class II – 20,498 acres
- VRM Class III – 387,616 acres
- VRM Class IV – 0 acres

Restrictions placed on management actions range from the most protective for soil resources under VRM class I to the least restrictive under VRM class IV. It is not possible to predict with accuracy what types of actions and acreages would be proposed in each of the VRM classes. The number of acres managed within each VRM class differs by Alternative. Comparison of the number of acres in each VRM class by Alternative yields a relative analysis of the level of protection offered to soil resources under each Alternative. Those acres managed as VRM Class I & II under Alternative C (46,538 acres) would be have the most protection for soil resources by the limitations placed on surface disturbance. Under this Alternative, 11 percent of the decision area occurs in the VRM class I & II category, affording more protected acres than Alternatives A, B or D. however, VRM class I affords the most protection for soil resources and this Alternative includes the smallest acreage in VRM class I (26,040 acres) of all the Alternatives. This Alternative includes more acres of VRM II (20,498 acres) than Alternatives A,B, and D, but due to the lower acres of VRM class I, offers less protection to soil resources.

4.2.4.5.7 Impacts from Fire Ecology and Management

Allowing heavy equipment use to build firelines outside of existing roads and trails could potentially impact large areas, depending on the frequency and size of wildfires in the planning area. Mechanically constructed firelines would expose soils to drying and excessive erosion due to wind and water however; wildfires could be smaller impacting smaller areas.

Not allowing management of naturally ignited wildfire for resource benefit would reduce the amount of soil exposed to fire and limit localized short-term adverse impacts, but would decrease the benefit to soil resources from a more natural fire regime. This Alternative would allow the use of prescribed fire in sage grouse restoration areas as long as it benefits sagebrush communities. Alternatives B, C, and D anticipate the use of prescribed fire and mechanical treatments to treat 21,700 acres. This action could have short-term adverse impact, but the amount of fire used would be anticipated to be small and therefore the impacts would be negligible.

The impacts from management in this Alternative are similar to Alternative A, but potentially allows more surface disturbance.

Lands with Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, four tracts, totaling 3,379 acres, would be managed for wilderness characteristics.

4.2.4.5.8 Impacts from Energy and Mineral Resources

Coal

The coal screening process results would determine which lands may be available for further consideration for coal leasing and development. Under this Alternative 264,450 acres would be closed to coal leasing. Alternative C is therefore, less restrictive than Alternative B, but more restrictive than Alternative A. Standard BMPs and mitigation guidelines, combined with development restrictions would be expected to reduce impacts to soil resources. Surface disturbing activities would not be allowed on soils with slopes >45 percent or fragile soils with low reclamation potential and highly erodible characteristics, this restriction would eliminate 16,782 public land surface acres from surface disturbance. Allowing surface disturbance on steeper slopes would significantly increase the impact to soil resources. Impacts would be moderate to severe and both short and long term. Where leases are developed surface disturbing activities and impacts to soils would be similar to Alternative A. Alternative C is less restrictive than Alternative B, but more restrictive than Alternative A.

Fluid Minerals

Under Alternative C, an estimated 232,708 acres of the decision area's federal mineral estate is administratively unavailable (No Lease) for oil and gas leasing or has major constraints (NSO, CSU). Where leases are developed surface disturbing activities, and impacts to soils would be similar to Alternative A. Alternative C has 126,732 acres available for leasing and development with standard leasing terms, which have fewer protections to soil. Acres open with standard leasing terms for all Alternatives are as follows: A (264,534); B (67,726); C (126,732); D (6,158).

Locatable Minerals

Impacts would be the same as impacts from coal under Alternative C. Under Alternative C 36,955 acres within the decision area closed and recommended for withdrawal from mineral entry, less than A (39,700), B (269,122) and D (52,906).

Mineral Materials

Impacts would be the same as impacts from coal under Alternative C. Under this Alternative 251,927 acres would be closed. Acres closed for all Alternatives are as follows: A (44,583); B (343,745); C (251,927); D (272,122).

4.2.4.5.9 Impacts from Forestry and Woodland Products

The impacts would be the same as Alternative B except that the PSQ would increase to 250mbf/year, impacting approximately 66 acres. 66 acres per year is an over estimate as not all areas within a harvest unit would be subject to surface disturbing activities. In areas where increased soil disturbance, and compaction is expected to be high and natural recovery is not likely rehabilitation would be needed to ensure soils remain stable and productive. Rehabilitation efforts would need to be analyzed in the site specific environmental analysis. This Alternative would allow the most harvest and the most surface disturbance. Allowing roads to be added to a travel plan would increase the available routes, encouraging more unauthorized off-road use, increasing adverse soil impacts. Leaving temporary roads un-reclaimed for up to one year after project completion would increase soil loss to erosion. Erosion left unchecked could become severe and have long-term impacts. Having open, exposed soils for 1 year would encourage invasive plant colonization, possibly changing soil chemistry. Allowing unlimited personal permits for fuel wood and other forest products would increase travel, encourage more unauthorized off-road travel, and increase soil disturbance.

This Alternative allows the most surface disturbance and hence has the most adverse impact on soil resources. The use of Water Quality BMPs for Montana Forests and Montana Streamside Management Zone Law on BLM authorized actions is expected to successfully mitigate adverse impacts. Adverse impacts are expected to be short term and moderate to minor.

4.2.4.5.10 Impacts from Lands and Realty

The impacts to soil resources would be similar as described in Alternative B. Under this Alternative ROWs are excluded from 39,491 acres. An additional 355,601 acres are designated as ROW avoidance areas and could limit development and impacts. However, electrical lines > 69Kv would not be required to be buried, though they could be. Even though this Alternative is less restrictive than Alternative B, designation of the Silvertip corridor would increase the impact to the local area of the corridor, but reduce impacts over the remaining area. This is significant due to the amount of potential and active oil and gas activity in that area. With successful mitigation, the impacts in the corridor would be moderate to minor.

4.2.4.5.11 Impacts from Livestock Grazing

Under this Alternative 386,822 acres are permitted for grazing in the decision area with 7,746 AUMs suspended. Relinquished AUMs would remain available for transfer. Areas with active surface disturbances would be available to livestock grazing following surface disturbance, once grazing could continue in a manner which supports rangeland health. This would potentially expedite recovery of disturbed areas, improving soil conditions.

4.2.4.5.12 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, 147,181 acres are designated as SRMAs. Of the 147,181 acres of SRMA, 129,084 acres would be managed under a TMA. Additionally, surface disturbance that would benefit recreational facilities and visitor experiences would be allowed with an approved mitigation plan. If this

action did occur there would be direct impacts to soils, including compaction, erosion, and potentially soil removal.

4.2.4.5.13 Impacts from Trails and Travel Management

Alternative C would allow the most miles of routes open (896 miles open) compared to all other Alternatives (Alternative A 823 miles, Alternative B 349 miles, Alternative C 896 miles, Alternative D 680 miles). Therefore, impacts to soils would be greatest. Impacts would be moderate to minor and both direct and indirect. Alternative C closes or limits use to administrative use on 97 miles of routes, compared to Alternative A, which closes or limits use on 170 miles of routes, and Alternative B, which closes or limits use on 644 miles of routes.

Mitigation measures would be expected to be successful and impacts would be mostly short term.

Allowing other actions such as big game retrieval 300 feet from roadway and motorized travel to campsites within 300 feet of the roadway, encourages travel off established routes and the creation of new routes, which would likely not have consideration for soil resource conservation. Duplicate and unnecessary routes would result. The affected environment could be relatively small in the short term, but the cumulative impacts could be moderate and long term.

Soils in the Horsethief area are sandy loam and have a high erosion potential. Allowing rock crawling activities (technical 4WD) in a 1.5 mile area within Horsethief would expose those soils to compaction and disturbance and have great potential contribute to accelerated erosion. Impacts from this activity could be short term and moderate and potentially long term if mitigations were not successful.

Travel management under Alternative C has the potential to negatively directly impact the largest amount of soil resources in the decision area, both short term and long term. Indirect impacts would occur and impact drainages and riparian areas. For more detailed discussion of impacts to soils from trails and travel management, see Appendix O.

4.2.4.5.14 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative C. 82,019 acres would be managed as exclusion areas, and soils would not be impacted in these areas. This is more than Alternative A, less than Alternative B, and slightly more than Alternative D. Additionally 326,722 acres would be managed as avoidance areas, and 21,349 acres would be managed as open areas. If development occurs standard BMPs would be implemented to minimize disturbance, improving reclamation potential and soil recover on disturbed sites. Standard right-of-way terms and conditions, special stipulations or design features, and other constraints/restrictions consistent with fluid mineral stipulations could also be applied to protect resources, which would reduce impacts to soils. This alternative allows the fewest potential acres of disturbance to soils of all alternatives.

4.2.4.5.15 Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC), Wilderness Study Areas (WSAs)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 67,070 are designated as ACECS.

4.2.4.6 Alternative D (Preferred Alternative)

4.2.4.6.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.2.4.6.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.2.4.6.3 Impacts from Vegetation

The range of activities is a mixture between Alternatives B and C. Adverse impacts under this Alternative would be greater than those in Alternative B, but less than in Alternatives A and C. Impacts would be short term and minor to negligible.

Forests and Woodlands

Under this Alternative, surface disturbing activities would be allowed on sustained slopes up to 25 percent, this would leave 60 percent of the forested acres (19,241 acres) open to operations. Impacts would be the similar to those described in Alternative A. This alternative affords the most protection to soils due to the change in slope restriction. Under this Alternative timber harvests are projected to impact 33 acres/year. While 33 acres per year could be harvested, not all 33 acres would be subject to surface disturbance. This value is intended to provide perspective versus other Alternatives.

The application of BMPs, treatment of noxious and invasive plants, and mitigation measures identified by specific analysis, would reduce or mitigate impacts to soil resources. Forest management practices, (i.e. thinning, prescribed fire, etc., and forest product removal) which reduce the potential for high intensity wildfire would reduce the impact to soils and improve forest health.

Rangelands

This Alternative allows the conversion of 8 percent of crested wheatgrass acres (about 12,000 acres) to native sagebrush/grassland in high density sage grouse population over the life of the plan, as well as an additional 594 acres of other rangeland treatments. This Alternative would have the same impacts as Alternative B, but would affect 9,820 fewer acres.

Riparian and Wetlands

Surface disturbing activities would generally not be permitted within 300 feet of riparian areas or wetlands, unless they were to achieve a desired outcome for riparian areas or wetlands. These restrictions would provide soil protections on 9,087 acres throughout the decision area. If activities are permitted impacts would be the same as impacts common to all Alternatives.

Invasive Species and Noxious Weeds

This Alternative would allow the greatest potential for rehabilitation of disturbed sites, as introduced species could be seeded on sites where stabilization is difficult, or wildlife concerns are present. Introduced species would rarely be used and affect small acreages. This would improve stabilization, and reduce erosion on these acres. Based on assumptions earlier in this chapter, the approximate total surface disturbance from treatments would be 22,272 acres over the life of this plan

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.4.6.4 Impacts from Wildlife Habitat, Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Alternative D is a compromise between Alternatives B and C, and would restrict more surface disturbance than Alternative C, but less than Alternative B.

4.2.4.6.5 Impacts from Wild Horse and Burro

Under this Alternative, wild horses would be managed on approximately 27,094 acres of BLM-administered lands (39,994 acres all ownerships). Impacts would be the same as in Alternative A, although increasing the available acres by including the “Administrative pastures” could disperse horse usage, reducing vegetation loss and erosion.

4.2.4.6.6 Impacts from Visual Resources

Under this Alternative, VRM in the decision area would be managed as:

- VRM Class I – 28,861 acres
- VRM Class II – 13,648 acres
- VRM Class III – 391,645 acres
- VRM Class IV – 0 acres

Restrictions placed on management actions range from the most protective for soil resources under VRM class I to the least restrictive under VRM class IV. It is not possible to predict with accuracy what types of actions and acreages would be proposed in each of the VRM classes. The number of acres managed within each VRM class differs by Alternative. Comparison of the number of acres in each VRM class by Alternative yields a relative analysis of the level of protection offered to soil resources under each Alternative. Since VRM classes I & II are the

most restrictive to soil disturbance, those acres managed as VRM Class I & II under Alternative D (42,509 acres) have the most protection for soil resources. VRM class I affords the most protection for soil resources and this Alternative includes more acreage in VRM class I (28,861 acres) than Alternative C, but approximately 1,000 acres less than Alternatives A &B.

4.2.4.6.7 Impacts from Fire Ecology and Management

This Alternative allows the use of heavy equipment to construct fireline except in: crucial winter range, habitat of candidate or special status species, riparian/wetlands or in areas of cultural resource sensitivity or other designated areas (e.g., ACECs, WSAs). Fireline rehabilitation is required immediately after containment and management of naturally ignited wildfire for resource benefit would be allowed on public lands. While this Alternative does not protect as much area from surface disturbance as Alternative B, more soil resources are protected and or enhanced than in Alternatives A or C. Rehabilitation of impacts would be localized, direct and short term as long as rehabilitation efforts were successful. Wildfire management for resource benefit could have a positive impact on soil resources over the long term. Wildlife would indirectly benefit from better vegetation diversity and health. Alternative D anticipates the use of prescribed fire and mechanical treatments to treat 21,700 acres. This action could have short-term adverse impact, but the amount of fire used would be anticipated to be small and therefore the impacts would be negligible.

Lands with Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 13,653 acres would be managed for wilderness characteristics

4.2.4.6.8 Impacts from Energy and Minerals Resources

Coal

In situ mining could be allowed. Under this Alternative 280,971 acres would be closed to coal leasing. Alternative D is therefore less restrictive than Alternative B, but more restrictive than Alternatives A or C. Coal leasing would be by application by applying the coal screening process to the application. The coal screening process results would determine which lands may be available for further consideration for coal leasing and development. Standard BMPs and mitigation guidelines, combined with development restrictions would be expected to reduce impacts to soil resources. Surface disturbing activities would not be allowed on soils with slopes >30 percent or fragile soils with low reclamation potential and highly erodible characteristics. This restriction would eliminate surface disturbing activities on 47,795 acres of public lands. If sites were developed impacts would be the same as Alternative A.

Fluid Minerals

Under Alternative D, an estimated 357,536 acres of the decision area's federal mineral estate is administratively unavailable (No Lease) for oil and gas leasing or has major constraints (NSO, CSU). Alternative D has 6,158 acres available for leasing and development with standard leasing terms, which have fewer protections to soils. Acres open with standard leasing terms for all Alternatives are as follows: A (264,534); B (67,726); C (126,732); D (6,158).

Locatable Minerals

Impacts would be the same as impacts from coal under Alternative D. Under this Alternative 54,761 acres would be closed, this is more than A (39,700), less than B (270,977) and slightly more than C (36,955).

Mineral Materials

Impacts would be the same as impacts from coal under Alternative D. Under this Alternative 272,122 acres would be closed. Acres closed for all Alternatives are as follows: A (44,583); B (343,745); C (251,927); D (272,122).

4.2.4.6.9 Impacts from Forestry and Woodland Products

Impacts are similar to those described in Alternative C, but less surface disturbance is allowed. PSQ would increase to125 mbf/year, impacting approximately 33 acres. As not all areas within a harvest unit would be subject to surface disturbing activities, 33 acres per year is an overestimate. This Alternative is a compromise between Alternatives A, B and C, and balances timber harvest with sustainability and forest health, contributing to a reduction of wildfire potential and acres burned. This Alternative could impact more acres than Alternatives A and B, but would be less than Alternative C. Negative impacts would be expected to minor to negligible.

4.2.4.6.10 Impacts from Lands and Realty

Adverse impacts to soil resources would be similar as described in Alternative A, but potentially impact less area. Under this Alternative ROWs are excluded from approximately 48,258 acres. Approximately 349,358 acres are designated as ROW avoidance areas which could potentially limit development and impacts. Site-specific analysis and the use of BMPs and Rangeland Health Standards would be expected to minimize adverse impacts to soil resources. Based on assumptions stated earlier in this chapter surface disturbance over the life of this plan from rights-of-way would be approximately 289 acres, with 262 acres being reclaimed. This Alternative excludes less acres than Alternative B, more acres than Alternative A and C. Alternative D potentially protects more acreage than Alternatives A or B by designating more acres as ROW avoidance areas. Impacts would be direct and greatest during the initial construction activities in the ROW, but with successful mitigation, would be short term. After the initial construction, impacts would result from monitoring and maintenance and would be minor.

4.2.4.6.11 Impacts from Livestock Grazing

Impacts would be the same as Alternative C.

4.2.4.6.12 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, 110,862 acres are designated as SRMAs. Of the 110,862 acres of SRMA, 94,845 acres would be managed under a TMA. Additionally, surface disturbance recreational facilities and

maintenance would be allowed subject to mitigation guidelines. Impacts form installation of these facilities would be the same as Alternative C.

4.2.4.6.13 Impacts from Trails and Travel Management

Alternative D. would allow the 680 miles of routes to remain open (Alternative A 823 miles, Alternative B 349 miles, Alternative C 896 miles, Alternative D 680 miles). Alternative D closes, or limits use to administrative use on 379 miles of routes, compared to Alternative A which closes or limits use on 170 miles of routes, and Alternative B which closes or limits use on 644 miles of routes, and Alternative C which closes or limits use on 97 miles of routes.

Mitigation measures would be expected to be successful and impacts would be mostly short term. For more detailed discussion of impacts to soils from trails and travel management see Appendix O.

Other actions such as: not allowing big game retrieval and limiting motorized travel to campsites to 100 feet of the roadway would have positive benefits, but the amount of affected environment is small and impact would be insignificant. Since areas suitable for rock crawling activities (technical 4WD) generally occur in the drainage bottoms the potential for damage and soil loss is great. Not allowing rock crawling activities in Horsethief would eliminate the potential for impacts from this type of activity.

4.2.4.6.14 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative D. 78,088 acres would be managed as exclusion areas, and soils would not be impacted in these areas. This is more than Alternative A, less than Alternative B, and slightly less than Alternative C. Additionally 331,088 acres would be managed as avoidance areas, and 20,937 acres would be managed as open areas. If development occurs standard BMPs would be implemented to minimize disturbance, improving reclamation potential and soil recover on disturbed sites. Standard right-of-way terms and conditions, special stipulations or design features, and other constraints/restrictions consistent with fluid mineral stipulations could also be applied to protect resources, which would reduce impacts to soils. This alternative allows the fewest potential acres of disturbance to soils of all alternatives.

4.2.4.6.15 Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC), Wilderness Study Areas (WSAs)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, 38,786 acres are designated as ACECS.

4.2.4.7 Cumulative Impacts

Cumulative effects include other future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. The planning area is interspersed with parcels of non-BLM managed lands including federal, tribal, state, and privately owned lands. BLM managed lands include 434,154 acres of surface and 1,839,782 acres of federal mineral estate (private or other agency surface ownership with BLM management of mineral resources). These lands are spread thinly across 10,804,549 total acres in nine counties. BLM managed public lands occur in 4 percent of the planning area in these nine counties.

Historic and ongoing activities within the planning area which have impacted soils, or are currently impacting soils include: energy and mineral development, livestock grazing, on and off highway vehicle use, recreation, infrastructure development, fire suppression, fuels management, forestry, urbanization, invasive weed infestations, pollutants, and agriculture. These impacts are expected to continue into the future. The cumulative effects of such activities have directly and or indirectly contributed to increased compaction, increased overland waterflow, mass movement, and accelerated wind and water erosion.

Currently, the BLM is not aware of any other reasonably foreseeable future actions, other than those discussed above.

The BLM's current and future goals for soil management are aimed at maintaining and improving soil health and productivity, minimizing soil erosion and compaction, and maintaining soil water infiltration rates. Under all Alternatives the standards for rangeland health would be used to assess compaction and soil erosion. All authorized activities would include plans for reclamation.

Current and future activities taking place have the potential to cumulatively impact soil resources within the planning area, as increasing demand for resources continues to grow. Due to the amount of public lands within the planning area BLM activities would be minor. Within the RMP Alternatives, livestock grazing, vegetation treatments, roads management, and energy and mineral resource activities have the greatest potential to contribute to cumulative effects to soils on BLM lands. In general, Alternative B would place more restrictions to surface use authorizations, therefore protecting the most soil resources compared to all other Alternatives. Alternative C would have the fewest restrictions to surface use authorizations, therefore protecting the least soil resources of all Alternatives. Alternatives A and D also place restrictions to surface use authorizations. Restrictions are typically less than B but more than C, generally with more restrictions on Alternative D than A.

4.2.5 Water

This section describes the impacts to water resources that may result from the implementation of the actions associated with each of the RMP Alternatives. Activities that disturb the soils alter vegetative cover, disrupt natural drainage patterns, irrigation, and mineral extraction activities result in direct, indirect and cumulative impacts to water resources.

The following discussion addresses key concepts that are fundamental to understanding the discussion of effects to water resources.

The vast majority of water quality impacts in the Billings Field Office are caused by non-point source pollution (Table 3-19). These include pollutants such as sediment, nutrients, and temperature; and non -pollutants such as the alterations of streamside vegetative cover, flow alterations, and habitat alterations. The primary sources of pollutants are natural, rangeland grazing and riparian grazing. These causes of impairment and sources of pollution can typically be addressed through riparian management, watershed management (including upland health), and BMPs.

The BLM manages non-point source pollution by controlling the cause and source of pollutants through the use of site-specific pollution control measures such as the BMPs and soil and water conservation practices (SWCP). We also use riparian vegetation, riparian health, and upland health as primary indicators of water quality. This is because these variables directly measure the "cause or source" of the problem (Table 3-19) and not just the end result. This allows for early warning of potential problems and provides an early indication that improvements are occurring. It also enables us to quickly implement additional pollution control measures (as needed) that directly address the cause of the problem. Using in-stream indicators would not provide this rapid feedback and may result in unacceptable impacts.

Riparian vegetation is a valuable indicator of potential livestock effects because these plant associations respond readily to changes in management and can be modified to produce conditions more favorable to stream stability and water quality. While instant recovery would be unrealistic, vegetative improvements generally occur faster than other stream components, such as bank morphology. This is important since it enables us to track the most sensitive variable (first to change), while describing the potential effects to stream channels and some water quality parameters. In addition, since the condition of riparian vegetation can also be used to indicate how much time livestock spends adjacent to or in water bodies, it can also be used to evaluate potential sediment, thermal, nutrient, and bacterial inputs.

As with riparian vegetation, riparian function can be used as an indicator. Properly functioning riparian areas generally have stable stream banks (low sediment inputs) and that are well vegetated (low thermal loading). This condition also suggests that livestock are not spending excessive time in, or immediately adjacent to, the waterway (low bacteria and nutrients). Riparian trends also provide valuable information. Improving trends would indicate that banks are become more stable (less sediment), 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. Thus riparian function can be used as an effective indicator of some aspects of water quality and can actually provide an earlier indication of water quality problems than the water column itself.

The "riparian indicator approach" is consistent with the Environmental Protection Agency who reported (EPA, 1993), that the proximity of fecal contamination to a water body is the key element in determining potential effects. They also reported that the primary mechanisms for bacterial contamination are the direct deposition of fecal material into the stream or its delivery

through overland flow. In semi-arid rangelands, where overland flow is the primary delivery mechanism, the potential travel distance is fairly short. This means that most water quality impacts would result from deposition originating inside the riparian area. In fact, the University of Idaho Forest, Wildlife and Range Policy Analysis Group found that water quality impacts from livestock urine and feces generally are not a problem unless cattle congregate near surface water to the point that protective ground cover is less than 50 percent or large amounts of feces and urine are being deposited in or immediately adjacent to surface waters. They also reported that 20 feet was adequate to filter nutrients and bacteria resulting from manure (Mosley, et.al, 1997). This means that ensuring healthy and properly functioning riparian areas could improve water quality by reducing the amount of time livestock spend in or adjacent to waterbodies.

Upland health can be used as an indicator as it evaluates changes in infiltration, flow patterns, and erosion. Managing for near natural upland runoff and erosion would minimize the risk of excess sediment delivery to project area streams.

The use of riparian and upland function along with the BMPs has been accepted by the Montana Department of Environmental Quality in the BLM/DEQ Non-Point Source Memorandum of Understanding (2010).

4.2.5.1 Methods and Assumptions

To analyze the potential effects of the Alternatives on water quality we used our existing riparian and upland health assessments. The analysis is also based on the professional expertise of the BLM specialists.

This analysis was based on the following assumptions:

- In streams that meet state water quality standards and that fully support their beneficial uses, the most effective and practical means of controlling the NPS pollution is through the use of watershed planning and science-based BMPs.
- In streams that do not meet state water quality standards, or that do not fully support their beneficial uses, the application of the 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 (WQP). These WQPs (and their associated TMDLs) identify reasonable land, soil, and water conservation practices that are expected to reduce the NPS pollution and ultimately support beneficial uses. These land, soil and water conservation practices include, but are not limited to, the BMPs.
- Wetlands and riparian areas play a significant role in protecting water quality and reducing or eliminating many of the potential impacts of the NPS pollution. One way this is achieved is by providing a buffer between uplands and adjacent water bodies. This can filter out the NPS pollution before it can impact water quality. Healthy riparian areas and wetlands can also reduce the NPS pollution by shading waterbodies, stabilizing stream banks, and controlling erosion.

- Managing uplands, riparian areas, and wetlands to be in Proper Functioning Condition (the PFC) is a reasonable land, soil, and water conservation practice that increases the likelihood that these areas would not produce unacceptable amounts of the NPS pollution.
- Improving the condition of degraded uplands, riparian areas, and wetlands (i.e., improving trends) is a reasonable land, soil, and water conservation practice that reduces the NPS pollution from these source areas.
- Some surface-disturbing actions, such as vegetation management projects, could cause short-term adverse impacts to water quality immediately following treatments, but could result in long-term benefits as vegetative restoration and enhancement measures become established.
- The BLM-authorized activities would comply with state and federal regulations, the Montana Range Land Health Standards, conservation agreements, and BMPs to protect the chemical, physical, and biological integrity of the water and riparian habitat.

The discussions of impacts on water and riparian resources from the Alternatives are based on the best available data. Knowledge of the analysis area and professional judgment from observation and analysis of conditions and responses in similar areas are used to infer environmental impacts where data is limited.

4.2.5.2 Environmental Consequences

The management actions associated with the resources listed below could have impacts on water resources. Those not listed would have little or no impact to water resources.

- Soil
- Water
- Vegetation
- Wildlife and Special Status Species
- Fisheries and Special Status Species
- Wild Horses and Burros
- Visual Resources
- Fire Ecology and Management
- Wilderness Characteristics
- Energy and Mineral Resources
- Forestry and Woodland Products
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Renewable Energy

- Special Designations

4.2.5.3 Impacts Common to All Alternatives

4.2.5.3.1 Impacts from Soil

Projects to promote healthy and stable soils would have positive impacts on water resources by reducing potential soil erosion. This includes the reclamation of previously disturbed lands. Reduced erosion could lead to a reduction in sediment delivery and improved water quality.

4.2.5.3.2 Impacts from Water

Using Rangeland Health Standards to meet or exceed Montana DEQ water quality standards and acquiring in-stream water rights where feasible would have positive impacts on water resources. Managing for stable channels would reduce sediment production and improve water quality.

4.2.5.3.3 Impacts from Vegetation

Forests and Woodlands

Forest and Woodland management actions have the potential to impact water resources. These actions include managing vegetation structure, density, and species composition; and managing patch size, pattern, and distribution in a manner which reduces the occurrence of severe wildfires and forest insect outbreaks. These actions use adaptive management strategies that address climate change in order to maintain or enhance forest based ecosystems. While typically very small, short-term soil disturbances may occur during project implementation. To minimize the extent of these disturbances site-specific BMPs would be implemented. Since these actions are designed to improve upland health, long-term benefits are expected as watershed functions are maintained or restored.

Rangelands

Rangeland conditions were identified as potential source of water quality problems (table 3-7). Management actions that improve rangeland health would directly address this source and should improve water quality. While short-term adverse effects are possible, during and immediately following implementation, these impacts would be minimized through site-specific BMPs. Only projects with long-term benefits would take place. Shrublands and rangelands make up 87 percent of the decision area. Erosion in these areas can produce the Non-Point Source pollution (NPS) if the pollutant is transported to a water body. Land Health condition is monitored regularly and corrective action is required under all Alternatives if the surveyed range is not meeting standards. These improvements, which are required of all Alternatives, would reduce the NPS pollution throughout the Field Office. The benefits to water quality are dependent upon the various transport mechanisms (i.e., slope, distance, vegetative cover of adjacent sites) between the site and a water body.

Riparian Vegetation

"Alteration of streamside vegetation" was identified as a potential cause of water quality impairment (Table 3-19). Implementing strategies to maintain healthy communities or to restore degraded systems would benefit water resources. These benefits could include reductions in sediment production, reductions in nutrient loading, and increased stream shading.

While only 3.5 percent of the decision area is comprised of riparian areas, impacts to these areas have a disproportionate contribution to nonpoint source pollution and possible impacts to water resources. Currently 40 percent are in Properly Functioning Condition (PFC) and are unlikely to be contributing unacceptable levels of Non-Point Source pollution (NPS), having negligible impacts to water resources. 46 percent of surveyed riparian areas are Functioning At Risk (FAR). Corrective actions have been taken to move these ratings towards PFC on many areas; however quantifiable data is not available. In areas where corrective action has not yet been taken, the NPS pollution would likely continue. Corrective action would occur in all areas to help move the functional rating in a positive trend towards PFC. Six percent are rated as Non-Functioning (NF). These areas are likely sources of substantial NPS and are contributing to adverse impacts to water resources. Corrective action would be required under all Alternatives. These improvements would reduce the NPS throughout the Decision Area and reduce adverse impacts to water resources. Currently, eight percent of riparian areas have not been surveyed. These are comprised of bluffs and steep banks along the Yellowstone River and on several islands; it is likely they are in PFC due to known conditions along the river and on its islands.

Invasive Species and Noxious Weeds

Invasive species management has the potential to impact water quality. However, these effects should be short-term until native species are re-established. All projects would contain site-specific BMPs to minimize impacts. These impacts would vary in degree by project scale and proximity to water resources. Chemical application and mechanical treatment are carefully implemented, following the BMPs, label specific instruction and the Montana DEQ guidelines to ensure the protection of water resources.

Special Status Plants

The management of the SSS plant species would have beneficial long-term impacts on water resources. SSS management would reduce surface disturbance in areas associated with SSS populations and habitats, minimizing the risk of effects to water quality associated with these actions.

4.2.5.3.4 Impacts from Wildlife and Special Status Species

Wildlife management actions would be neutral to positive for water resources. Potential management techniques include: prescribed and managed wildfire, prescriptive livestock grazing, planting, exclusion to intense disturbance, timber harvest and other mechanical methods would be used to restore, maintain or improve the ecological conditions of vegetative

communities for the purpose of improving forage, nesting, breeding, and security habitat, hiding cover and travel corridors for a wide diversity of terrestrial and aquatic species.

Some short-term minor impacts can occur from project implementation. However, since these projects are designed to improve watershed conditions (upland health) runoff and erosion should be maintained or shifted to more natural rates. The extent of these projects is unknown and any impacts to water quality would be analyzed on a case by case basis through the NEPA analysis and project-specific planning (including the BMPs to minimize adverse effects).

Enhancing or restoring habitat composition and structure beyond PFC in riparian habitats, where and when appropriate, for migratory bird habitat would have net beneficial impacts on water resources.

4.2.5.3.5 Impacts from Fisheries and Special Status Species

Fisheries projects would address the habitat alteration source of impairment resulting in positive effects. Measures that protect fish would also benefit water quality.

4.2.5.3.6 Impacts from Wild Horses and Burros

The Pryor Mountain Wild Horse Range is located in a particularly arid environment in the southeast corner of the Billings Field Office planning area. Management common to all Alternatives from wild horse management would have a positive impact on water resources by ensuring appropriate management levels (numbers of horses on the range) to ensure a thriving, natural ecological balance. Implementation level planning through a Herd Management Area Plan (HMAP) or other activity level plans would identify and set objectives for soil, vegetation, and watershed characteristics to promote healthy drainage and clean water.

4.2.5.3.7 Impacts from Visual Resources

Management of visual resources restricts types of development in certain areas, which can reduce the amount of surface disturbing activities authorized by the BLM. Those acres managed as VRM Class I & II (approximately 42,000 acres across all Alternatives) could limit some surface disturbance and the associated compaction, erosion and damage to soil crusts.

This would benefit water resources, at least cumulatively on a watershed scale. There would be no adverse impacts expected to water resources from visual resource management actions.

4.2.5.3.8 Impacts from Fire Ecology and Management

Fire Ecology and Management would strive to protect water resource values. In the course of fire suppression, a resource advisor would be consulted or assigned to wildfires that involve or threaten public lands; the use of wildfire suppression chemicals within 300 feet of waterways would be prohibited; fuels treatments would be designed to protect or improve resource values; emergency stabilization and rehabilitation of burned areas would be conducted in accordance with current policy to protect and sustain ecosystems. These impacts are immeasurable do to the unknown frequency and scale of wildfire events.

4.2.5.3.9 Impacts from Wilderness Characteristics

Lands with Wilderness Characteristics are managed for wilderness characteristics, which promotes natural, healthy watershed conditions. Actions associated with this program would have cumulative, long-term beneficial impacts to water resources, with no adverse impacts expected.

4.2.5.3.10 Impacts from Energy and Minerals

Coal

Site specific environmental analysis would address potential impacts to water quality; ensuring adverse impacts were avoided or kept to an acceptable level from project development. The extent of coal development is limited by Alternative.

Fluid Minerals

The action to apply appropriate stipulations to oil and gas leases would minimize impacts to riparian and water resources. These stipulations include but are not limited to NSO with various buffers to riparian areas, water bodies, streams, wetlands, and special status plant and wildlife species. Produced water from fluid mineral development would be disposed of with approved plans that comply with BLM and MT DEQ regulations. Impacts from surface disturbance and NPS associated with fluid mineral development can adversely impact water quality by increasing sediment loads or chemical pollution with overland flow from development sites.

Locatable Minerals

Process notices and plans would be required (43 CFR 3809) to ensure the proposed action does not create unnecessary or undue degradation of the environment. Currently most claims are concentrated in Carbon county (and are expected to remain there) and potentially impact 7,323 acres (including future expansion of existing claim), which represents 3.3 percent of BLM public lands in Carbon county and 0.4 percent of the total county. These claims and activity are located in an area of the decision area with distant proximity to water resources; however, run-off events can bring NPS from developed areas into distant water sources.

Mineral Materials

The requirement of site specific environmental analysis (NEPA) prior to mineral material leases would ensure impacts from development activities to water resources would be mitigated or at an acceptable level. Impacts from actions associated with mineral material development, in all Alternatives, would have negligible impacts to water resources

Impacts from Forestry and Woodland Products

Impacts from forest management would be minimized through the use of forestry BMPs and site-specific design criteria. Commercial harvest of forest products would normally be associated with vegetative restoration (including forest health) and fuels treatments and would be designed to meet objectives for wildlife habitat management, including riparian and water quality preservation where applicable. Disturbances would be reclaimed to minimize potential sediment production. Restoring watershed function would provide a long-term benefit.

4.2.5.3.11 Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Actions associated with this program, across all Alternatives, have the potential to impact water resources by allowing surface disturbance, particularly road construction, which increases the risk of noxious weed infestations that can degrade upland and riparian health and alters drainage patterns and increases sediment delivery to water sources. However, site specific NEPA analysis to analyze the potential impacts and BMP use during implementation of projects would ensure water quality standards are met.

4.2.5.3.12 Impacts from Livestock Grazing

Livestock grazing has been identified as a source of impairment in the decision area. Grazing has the potential to degrade riparian health and water quality. Increased erosion by vegetative and stream-bank alteration as well as nutrient and bacterial contamination are potential impacts to aquatic resources from improperly managed livestock grazing.

Implementing the standards for rangeland health would minimize potential impacts by promoting riparian and upland health. Where the potential for site-specific problems exist site-specific BMPs are used to minimize damage to streams and water quality. These measures include: adjusting livestock numbers during periods of drought; excluding livestock from springs and other areas; site-specific riparian protections; adapting grazing systems to produce desired results.

Overall, water quality should improve as riparian and upland areas that are currently functioning at risk or are non-functional move towards PFC.

4.2.5.3.13 Impacts from Recreation and Visitor Services

Actions to manage recreation include surface disturbance and fluid mineral development restrictions that would benefit water resources by decreasing surface disturbance and its associated impacts (increased erosion and NPS pollution). These actions would have beneficial, long-term impacts on water resources. Impacts associated with unauthorized off road travel and dispersed camping by recreationists are not quantifiable, but would likely have negligible impacts to water resources.

4.2.5.3.14 Impacts from Renewable Energy

Development of renewable energy would directly impact water resources in construction area, if proximate. Direct impacts from construction activities occurring during development include the removal of topsoils for turbine pads, and potentially access roads, increasing water erosion from vegetation removal and increased run-off form compacted soils. These impacts would be localized to construction areas and could decrease water quality in adjacent streams and other water bodies by increasing sedimentation and altering the natural quantity and quality of water inputs. Initially, approximately two acres per turbine would be impacted. Following development, reclamation would occur and long-term impacts would be present on approximately one acre per turbine site. On areas of reclamation, soils would recover over time

from compaction, and as vegetation improves, become less susceptible to erosion and increased run-off.

4.2.5.3.15 Impacts from Trails and Travel Management

Motorized and mechanized modes of travel on the BLM-administered land (outside of established TMAs) would be limited to existing roads and trails. Site-specific travel planning would be initiated if resources were impacted (not meeting Land Health Standards, excessive erosion). In all Alternatives, the BLM may close or restore unauthorized, user created roads and trails to prevent resource damage. Prohibiting off road travel reduces erosion and protects water quality and riparian resources.

Travel planning designated 11 Travel Management Areas (TMAs) to designate specific routes as open, closed or limited to administrative use. Resource values and impacts from resource uses were used to develop a range of Alternatives designed to protect resources and comply with specific resource objectives while maintaining a sound multiple use opportunity.

The primary issues related to water resources are the preservation of water quality, erosion, drainage from road surfaces into wetlands and the increased risk of noxious weed infestation. More specifically, the existence of routes with their areas of surface disturbance, as well as the use of motor vehicles on those routes that are associated with water courses and/or sensitive soils constitutes a primary activity that has the potential to adversely affect water resources. Relative to travel management, this can occur by improper placement of routes; inappropriate behavior by visitors in these areas; or unauthorized off-road vehicle use. Therefore, the supply and spatial extent of travel access networks for motor vehicles is an important component for managing or providing various levels of protection for water resources.

A detailed analysis of potential impacts to water resources from travel management decisions can be found in Appendix O. Impacts associated with routes near water resources, riparian areas and those located in areas with fragile and highly erosive soils are analyzed by Alternative.

4.2.5.3.16 Impacts from Special Designations

Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves water resources (if not directly, then cumulatively). There are some variations in acreage of special designations across the Alternatives; however, the difference in effects to water resources would be negligible. Impacts of special designation management would have beneficial, long-term impacts to water resources in all Alternatives.

4.2.5.4 Alternative A

4.2.5.4.1 Impacts from Soil

Restricting wheeled or tracked equipment operation on slopes greater than 35 percent and mitigating impacts on slopes greater than 30 percent for oil and gas development would have

beneficial impacts to water resources by decreasing potential erosion and NPS pollution when these activities are proximate to water resources.

4.2.5.4.2 Impacts from Water

Actions in Alternative A would protect water resources similar to impacts common to all. The stipulation to exclude riparian areas, wetlands, streams, water bodies and 100 year floodplains of major rivers from fluid mineral development would further protect water resources from pollution associated with these activities on 13,984 acres in the decision area. Fluid mineral development generally impacts water resources by increasing NPS, including increased erosion and sedimentation from surface disturbance and unnatural drainage patterns associated with roads.

4.2.5.4.3 Impacts from Vegetation

Forests and Woodlands

Forest and Woodland management actions would have negligible impacts on water resources. These actions include managing vegetation structure, density, and species composition; and managing patch size, pattern, and distribution in a manner which reduces the occurrence of severe wildfires and forest insect outbreaks. These actions use adaptive management strategies that address climate change in order to maintain or enhance forest based ecosystems. Short-term soil disturbances may occur during project implementation. To minimize the extent of these disturbances, site-specific BMPs would be implemented. Since these actions are designed to improve upland health, long-term benefits are expected as watershed functions are maintained or restored.

Rangelands

Vegetative treatments which change the vegetation structure may increase local erosion and sedimentation rates. However, most treatments are designed to improve overall watershed condition (which includes minimizing erosion and maintaining infiltration rates). This would protect water resources in the long-term.

Riparian and Wetlands

This Alternative would require PFC assessments on a 10-year rotating cycle. During this interval degraded conditions could develop before a declining trend was recognized, threatening water quality. This could reduce water quality below levels anticipated under impacts common to all Alternatives. Stipulations to restrict fluid mineral development from riparian areas, wetlands, streams, waterbodies, and 100-year floodplains of major rivers as well as designated reservoirs with fisheries would further reduce impacts to water quality on approximately 13,984 acres in the decision area.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Based on current rates and assumptions, under Alternative A management, 54,883 acres of weed treatment would occur within the decision area. Alternative B would treat 9,280 acres, Alternative C 41,760 and

Alternative D, 22,272. Standard actions would specifically manage treatment activities near riparian areas and water bodies to ensure chemical pollution does not impact water quality and would ensure protection of water resources.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.5.4.4 Impacts from Wildlife and Special Status Species

A number of actions in this Alternative restrict surface disturbing activities from various terrestrial wildlife species habitats, particularly nesting areas and winter ranges. These restrictions would improve upland and riparian habitat conditions, minimizing erosion and unnatural drainage patterns, therefore promoting water quality.

4.2.5.4.5 Impacts from Fisheries and Special Status Species

General impacts would be the same as common to all Alternatives. Stipulations to restrict fluid mineral development from riparian areas, wetlands, streams, water bodies and 100 year floodplains of major rivers as well as designated reservoirs with fisheries would further reduce impacts to water quality on approximately 13,984 acres in the decision area.

4.2.5.4.6 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.5.4.7 Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

4.2.5.4.8 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.5.4.9 Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts common to all resources. Acreages designated as closed to coal development would reduce the potential for surface disturbing activities that can degrade watershed health and water quality. Therefore, the more acres designated closed, the less adverse impacts would be expected to water resources. Site specific conditions and proximity to water resources would be necessary to determine the actual impacts. Alternative A designates the least acres as closed (26,131), while Alternative B closes 290,048, slightly more than Alternative C (265,450) and D (280,971).

Fluid Minerals

This Alternative designates 13,984 acres of riparian areas, 100-year floodplains of major rivers, streams, wetlands, and water bodies as a fluid mineral NSO. The Montana DEQ water quality regulations, coupled with the above NSO are designed to protect water resources from negative

impacts, including those from discharge waters and their disposal. The NEPA analysis and site-specific project design and mitigation would protect water quality from actions associated with oil and gas developments authorized by the BLM.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives. Each Alternative designates areas to be closed and withdrawn from mineral entry. The more acres closed to mineral entry, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative A, 39,700 acres are closed and or withdrawn from mineral entry, the least of any Alternative: Alternative B (270,977); Alternative C (36,955); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative A, 44,583 acres are closed, the least of all Alternatives: B (343,745); C (251,927); D (272,122).

4.2.5.4.10 Impacts from Forestry and Woodland Products

Over the 20-year life of this plan only 1 percent (360 acres) of the coniferous forest (30,803 acres) would have harvest treatments. Forest and woodland product harvest activities would have negligible impacts on water resources due to the minimal amount of acres disturbed, the uncommon proximity of forest treatments to water resources and the use of BMPs to minimize adverse impacts to water quality.

4.2.5.4.11 Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives. Additionally, under Alternative A, 44,014 acres would be designated for ROW exclusion. 24,203 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.5.4.12 Impacts from Livestock Grazing

Current management allows grazing on 387,057 acres. While most effects would be similar to impacts common to all Alternatives, there is some increased risk due to the requirement to monitor riparian health on a ten year rotation. This would allow some riparian and aquatic conditions to deteriorate before a decreasing trend is recognized.

4.2.5.4.13 Impacts from Recreation and Visitor Services

Alternative A management of recreational resources on Billings Field Office lands can impact water resources. Motorized vehicle use, which has the potential to increase erosion and the spread of noxious weeds or other invasive species, is restricted to existing roads and trails. These existing routes generally avoid wetlands and riparian areas and use improvements such as culverts and water bars to mitigate the effects of storm run-off.

The allowance of motorized cross-country travel to establish a campsite within 300 feet of existing roads and trails may cause accelerated erosion, especially in areas with wet soil conditions. This impact has not been recognized as detrimental to fisheries resources, but could become more common if recreation increases. There is no data to quantify current or potential impacts from this activity. These impacts are addressed more thoroughly in the Trails and Travel Management section.

4.2.5.4.14 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative a, 47,496 acres would be managed as exclusion areas, and soils would not be impacted in these areas. Additionally 25,141 acres would be managed as avoidance areas, and 361,514 acres would be managed as open areas. If development occurred in these areas, standard BMPs would be implemented to minimize disturbance, improving reclamation potential, and decreasing impacts to water resources from the disturbed sites. This alternative manages the fewest acres as exclusion and avoidance acres compared to all other alternatives, therefore leaving the most acres open to renewable energy development.

4.2.5.4.15 Impacts from Trails and Travel Management

See impacts common to all for general discussion pertaining to travel management impacts to water resources.

Based on assumptions, the more route miles open, the more impacts would affect water resources.

Under Alternative A, there would be 824 miles of open routes (83 percent of all route miles). This Alternative opens more routes than Alternative B (35 percent) and D (62 percent) and fewer routes than Alternative C (90 percent).

An analysis of specific effects of route miles open under this Alternative on water resources, with proximity to water and sensitive or crucial habitats associated with water resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.5.4.16 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.5.5 Alternative B

4.2.5.5.1 Impacts from Soil

Restricting surface disturbing activities on slopes greater than 30 percent and mitigating impacts on slopes greater than 30 percent for oil and gas development would have beneficial impacts on water resources by decreasing potential erosion and NPS pollution when these activities are proximate to water resources.

4.2.5.5.2 Impacts from Water

Actions in Alternative B would protect water resources similar to impacts common to all. Further protections are addressed with a ¼ mile NSO on Riparian areas, Water Bodies, Perennial Streams and Floodplains of Perennial Streams (56,312 acres Federal Mineral Estate), and other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but it is only applied to surface ownership (24,373 acres BLM). These actions result in less potential for water quality degradation by reducing soil erosion and non-point source pollution in close proximity to water sources, as well as maintaining vegetative communities adjacent to perennial streams and water bodies; allowing for functional riparian areas that shade streams and filter pollutants from overland flows before they reach water bodies.

Prohibiting the disposal of new surface discharge of oil and gas produced water into streams or other flow-connected surface features on BLM administered lands would ensure the maintenance of water quality with proximity to fluid mineral development.

4.2.5.5.3 Impacts from Vegetation

Forests and Woodlands

Impacts would be similar to those discussed under Alternative A, except Alternative B restricts operation of wheeled and tracked vehicles from slopes greater than 30 percent, resulting in 2,566 few acres of disturbance compared to Alternative A which restricts this activity to slopes greater than 35 percent. This would have net beneficial impacts on water resources.

Rangelands

Impacts would be the same as impacts from Alternative A.

Riparian and Wetlands

Actions specific to riparian vegetation are designed to protect or enhance riparian communities and consequently protect water resources.

Alternative B establishes 78 miles of priority riparian habitat on perennial and fish bearing streams, where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Maintaining or restoring functionality to these areas would benefit water resources.

Alternative B actions are the most restrictive in managing surface disturbing activities and oil and gas exploration and development in riparian areas, floodplains and on water bodies and streams associated with YCT and high value fisheries, offering the most resource protection of the four Alternatives.

A quarter-mile NSO stipulation on riparian areas, wetlands, water bodies, perennial streams, and flood plains of perennial streams would be implemented for oil and gas exploration and development (56,312 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (24,373 acres BLM surface) .

YCT habitat, suitable habitat, Blue Ribbon and Red Ribbon Fisheries have half-mile NSO stipulations for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect water resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.5.5.4 Impacts from Wildlife and Special Status Species

Impacts would be the same as impacts common to all. All wildlife management actions across the Alternatives protect water quality. Alternative B proposes stipulations with larger buffers and less surface disturbance to wildlife habitats, especially nesting areas and winter ranges, than other Alternatives. The long-term and cumulative impacts from minimizing surface disturbance in these areas would benefit water resources by reducing erosion, vegetation alteration, and invasive species infestation potential. Actual impacts would vary, depending on the proximity and scale of proposed surface disturbing activities affected by these stipulations.

4.2.5.5.5 Impacts from Fisheries and Special Status Species

Impacts from fisheries management would include the same protection measures as those in Riparian and Wetland management in Alternative B. Additionally, increased monitoring on fish bearing streams and excluding livestock grazing from fish bearing streams would improve riparian conditions and potentially decrease NPS which can degrade water quality. Additionally, new spring developments would be authorized and fenced if the development would maintain the integrity and functionality of the associated riparian area/wetland. This could lead to better livestock distribution across the range and reduce pressure on riparian areas and water sources that can lead to degraded riparian conditions and decreased water quality.

4.2.5.5.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.5.5.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.5.5.8 Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

4.2.5.5.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.5.5.10 Impacts from Energy and Mineral Resources

Coal

There would be no new coal leases permitted in the decision area. Impacts would be the same as impacts common to all Alternatives.

Fluid Minerals

Development of oil and gas resources is expected to have the least impacts to water resources from Alternative B management actions. NSO stipulations on fluid mineral development, described in Water and Riparian resource sections would help to protect fisheries resources from adverse impacts associated with fluid mineral development.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative B, 270,977 acres would be closed and withdrawn from mineral entry, the most of any Alternative: Alternative A (39,700); Alternative C (26,955); Alternative D (54,761).

These restrictions would protect water resources by minimizing potential water pollution resulting from surface disturbance (erosion and sedimentation, weed infestation, and direct habitat alteration).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative B, 343,745 acres are closed, the most of all Alternatives: A (44,583); C (251,927); D (272,122).

4.2.5.5.11 Impacts from Forestry and Woodland Products

General impacts would be the same as impacts in Alternative A. An action to not allow new road construction, unless approved by a travel management plan could have beneficial impacts on water resources by reducing potential erosion and sediment inputs and noxious weed infestations.

4.2.5.5.12 Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, 211,384 acres would be designated for ROW exclusion. 185,607acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.5.5.13 Impacts from Livestock Grazing

General impacts from Alternative B livestock grazing actions would be similar to Alternative A; however Alternative B also places priority management on allotments that are not meeting standards for rangeland health, which includes riparian areas that are not in PFC; and establishes increased monitoring on 46 miles of riparian habitat on fish bearing streams. These management actions would reduce grazing impacts on water resources by taking actions to increase riparian functionality.

4.2.5.5.14 Impacts from Recreation and Visitor Services

In Alternative B, under trails and travel management actions, South Hills TMA (1,357 acres) is closed to motorized travel. Natural revegetation of the existing motorcycle trails would slowly improve erosion and infiltration rates; however, impacts from this action would be negligible due to distant proximity to water resources.

Recreation actions in Alternative B also stipulate NSO for oil and gas development, at seven special designations, including: Sundance Lodge Recreation Area (387), Four Dances Natural Area ACEC (784 acres), Shepherd Ah-Nei Recreation Area (4,680), Acton Recreation Area (3,697 acres), Bundy Island (98), South Hills TMA (1,357 acres) and Pryor Mountain TMA (81,227 acres). Not knowing the potential number of O&G developments in these areas, it is impossible to quantify potential impacts. However, with the areas under NSO stipulation, the potential impacts are minimized for more than 92,000 acres, having a net beneficial impact on water quality.

4.2.5.5.15 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative B, 345,491 acres would be managed as exclusion areas and water resources would not be impacted in these areas. This is the most acreage under all alternatives. Additionally 85,458 acres would be managed as avoidance areas and 0 acres would be managed as open areas. If development occurred in these areas standard BMPs would be implemented to minimize disturbance, improving reclamation potential, and soil recovery on disturbed sites. This alternative allows the fewest potential acres of disturbance that would impact water resources of all alternatives.

4.2.5.5.16 Impacts from Trails and Travel Management

In action Alternatives (B, C, D) the BLM established 11 Travel Management Areas (TMAs) to minimize impacts and provide a spectrum of motorized and non-motorized recreational opportunities. In each TMA, motorized and mechanized travel would be limited to designated roads and trails, except in designated open areas (ex: South Hills Motorcycle Area). Routes on BLM lands but outside of TMAs would be managed as in Alternative A: “limited to existing roads and trails.”

An implementation and monitoring plan would be initiated for the TMAs within 3-5 years of the ROD. The plan would include monitoring of impacts associated with continued use on designated open routes. The implementation plan would also identify criteria for route

variances specific to each TMA. In this plan, the BLM may close or restore unauthorized, user created roads and trails to prevent resource damage. The travel plan would also allow for, upon project completion, roads used for commercial or administrative access on BLM-administered lands to be reclaimed, unless the route provides specific benefits for public access, minimizes impacts to the resources, and would be considered on a case-by-case basis.

Impacts would be the same as described in impacts common to all Alternatives. Based on assumptions, the more route miles open would have more impacts to fisheries resources.

Under Alternative B, there would be 349 miles of open routes (35 percent of all route miles). This Alternative Closes or limits to administrative access more route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative C designates 90 percent of route miles as open and Alternative D designates 62 percent of route miles as open.

An analysis of specific effects of route miles open under this Alternative, on water resources, with proximity to water and sensitive or crucial habitats associated with water resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.5.5.17 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6 Alternative C

4.2.5.6.1 Impacts from Soil

Restricting surface disturbing activities on slopes greater than 45 percent (as opposed to 35 percent for A and 30 percent for B and D) would increase erosion and sediment hazards on approximately 31,013 acres compared to Alternatives B and D and 17,126 acres compared to Alternative A.

4.2.5.6.2 Impacts from Water

As in Alternative A, BLM would adhere to state and federal water quality standards and use rangeland health standards to ensure maintenance of surface and ground water quality.

In Alternative C, water resources are protected with several actions, including:

- Seasonally closing and reclaiming roads contributing to a decline in water quality
- Surface discharge of produced waters into streams or flow-connected water sources must comply with Montana DEQ standards and regulations
- Surface disturbing activities within riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams, would not be allowed

without an approved mitigation plan and compliance with fisheries resource objectives (6,666 acres)

- NSO for oil and gas development within riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams (9,206 acres)

With smaller buffer zones and less restrictive protective measures, Alternative C has more potential to negatively impact water resources than Alternatives B and D. However, with project level planning and NEPA analysis, all impacts should be avoided or mitigated. Water resources are layered with protections from local, state and federal agencies as well as with the use of BMPs designed to protect water quality.

4.2.5.6.3 Impacts from Vegetation

Forests and Woodlands

Same as impacts common to all in respect to using BMPs and Standards for Rangeland Health in managing Upland and Forest/Woodland resources to reduce the risk of negative impacts to water resources.

Alternative C allows for woodland treatments on approximately 79 percent of woodland habitats, versus 60 percent for Alternative B and 68 percent for Alternatives A and D. Allowing wheeled and tracked vehicle operations on slopes up to 45 percent would increase the potential of contributing fine sediment to streams due to erosion of disturbed soils on steep slopes, adversely impacting water resources (see acreage figures in water section).

Rangelands

Impacts would be the same as impacts from Alternative A.

Riparian and Wetlands

Alternative C would be less protective of water resources with the same impacts described in Alternative B. There are fewer acres with an NSO stipulation due to smaller buffer allocations:

- 9,206 acres oil and gas NSO on riparian, water bodies, perennial streams, wetlands, and floodplains of perennial streams for Federal Mineral Estate.
- 6,666 acres surface disturbance restrictions consistent with the oil and gas NSO on BLM surface managed lands.
- 2,051 acres of oil and gas NSO (¼ mile) on YCT populations and Blue Ribbon Fisheries.
- 806 acres surface disturbance restrictions consistent with oil and gas ¼ mile NSO on BLM surface managed lands.

These NSO stipulations and consistent surface disturbing management actions would protect water resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation.

Alternative C establishes 13 miles of priority riparian habitat to promote functioning riparian areas associated with YCT populations and suitable habitat, Blue and Red Ribbon fisheries and existing cottonwood galleries. Assuring these habitats are in PFC or moving towards PFC would promote good water quality.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6.4 Impacts from Wildlife and Special Status Species

Wildlife management actions in Alternative C are the least restrictive of surface disturbing activities. Overall management would still have beneficial impacts to water resources, negligibly different than other Alternatives. Impacts would be the same as those discussed in impacts common to all Alternatives and Alternative B.

4.2.5.6.5 Impacts from Fisheries and Special Status Species

Management actions in Alternative C are the least restrictive to surface disturbing activities and oil and gas development, which have the potential to adversely impact water resources; however these actions still promote aquatic resource protection and enhancement of water resources. Restrictions to protect water resources would be the same as impacts from Riparian and Wetlands in Alternative C.

Additionally, allowing spring developments for livestock and wildlife uses would have the potential to distribute livestock across the range and reduce grazing and watering pressure on existing riparian areas, promoting healthy riparian communities and high water quality.

4.2.5.6.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6.8 Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6.10 Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts from Alternative B, with slightly less acres closed and/or withdrawn from solid leasable mineral entry (264,450). Alternative A (26,131); Alternative B (290,048); Alternative D (280,971).

Fluid Minerals

Impacts to water resources would be the same as impacts from Alternative B. Alternative C restricts fewer acres with an NSO stipulation for fluid mineral development, as described in Water and Riparian sections under this Alternative. All produced water from fluid mineral development would be in compliance with DEQ requirements if discharged onto BLM administered lands. This action would ensure the maintenance of water quality in existing water sources "flow connected" with the discharge.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative C, 36,955 acres would be closed and withdrawn from mineral entry, the least of any Alternative: Alternative A (39,700); Alternative B (270,977); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative C, 251,927 acres would be closed, the least of all action Alternatives, but more than Alternative A (current management). A (44,583); B (343,745); D (272,122).

4.2.5.6.11 Impacts from Forestry and Woodland Products

Timber harvest rates, which would have the most potential impact on water resources, would be increased to 250 mbf/year (66 acres per year). Surface disturbance restrictions where riparian areas and water sources intersect timber sale boundaries would protect water resources from adverse impacts associated with harvest. Harvest plans are designed to comply with water resource objectives. Many forested areas in the decision area do not have close proximity to water resources, therefore, the actual impacts to water resources is dependent on the location and scale of the projects.

4.2.5.6.12 Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, 39,491 acres would be designated for ROW exclusion. 355,601 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24, 203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.5.6.13 Impacts from Livestock Grazing

Impacts would be the same as impacts from Alternative A.

4.2.5.6.14 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives.

4.2.5.6.15 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative C, 82,019 acres would be managed as exclusion areas and water resources would not be impacted in these areas. This is the more than Alternative A, less than Alternative B, and slightly more than Alternative D. Additionally 326,722 acres would be managed as avoidance areas and 21,349 acres would be managed as open areas. If development occurred in these areas standard BMPs would be implemented to minimize disturbance, improving reclamation potential, and soil recovery on disturbed sites. Additionally, CSUs and TLs would be applied in avoidance areas to protect resources, which could also reduce impacts to water resources.

4.2.5.6.16 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts described in Alternative B. Based on assumptions, the more route miles open would have more impacts to water resources.

Under Alternative C, there would be 893 miles of open routes (90 percent of all route miles). This Alternative closes or limits to administrative access less route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative D designates 62 percent of route miles as open.

An analysis of specific effects of route miles open under this Alternative, on water resources, with proximity to water and sensitive or crucial habitats associated with water resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.5.6.17 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7 Alternative D (Preferred Alternative)

4.2.5.7.1 Impacts from Soil

Impacts would be the same as impacts from Alternative B.

4.2.5.7.2 Impacts from Water

General impacts would be the same as Alternative B, with slightly less surface disturbance restrictions and less area stipulated as an NSO for fluid mineral development.

In Alternative D, water resources are further protected with several actions, including:

- 300-foot NSO on riparian areas, water bodies, perennial streams, and floodplains of perennial streams (15,653 acres). Other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but only surface ownership is effected (9,087 acres BLM).
- Closing and reclaiming roads contributing to a decline in water quality.
- Avoiding surface discharge of produced waters into streams or flow-connected water sources; comply with MT DEQ regulations pertaining to produced water quality.

These actions result in less potential for water resource degradation by reducing soil erosion and non-point source pollution in close proximity to water sources, as well as maintaining vegetative communities adjacent to perennial streams and water bodies; allowing for functional riparian areas that shade streams and filter pollutants from overland flows before they reach waterbodies.

4.2.5.7.3 Impacts from Vegetation

Forests and Woodlands

Same as impacts common to all in respect to using BMPs and Standards for Rangeland Health in managing Upland and Forest/Woodland resources to reduce the risk of negative impacts to water resources.

Alternative D restricts surface disturbing activities in relation to slopes (no wheeled or tracked vehicle operation on 30 percent or greater slopes) therefore the impacts would be the same as impacts from Alternatives A and B.

Rangelands

Impacts would be the same as impacts from Alternative A.

Riparian and Wetlands

Alternative D would be less protective of water resources with the same impacts described in Alternative B. There are fewer acres with an NSO stipulation due to smaller buffer allocations:

- 15,653 acres oil and gas NSO (300’) on riparian, water bodies, perennial streams, wetlands, and floodplains of perennial streams for Federal Mineral Estate
- 9,087 acres surface disturbance restrictions consistent with the oil and gas NSO on BLM surface managed lands
- 8,256 acres of oil and gas NSO (½ mile) on YCT population habitat and Blue Ribbon Fisheries
- 2,068 acres surface disturbance restrictions consistent with oil and gas ½ mile NSO on BLM surface managed lands

These NSO stipulations and consistent surface disturbing management actions would protect water resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation.

Alternative D establishes 78 miles of priority riparian habitat where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Alternatives B and C would establish 78 and 13 miles. Alternative D aims to promote healthy water quality, riparian areas and fish habitat associated with perennial streams and cottonwood gallery habitat in the decision area, with beneficial impacts to water resources.

Invasive Species and Noxious Weeds

Same general impacts as Alternative B, with more acres treated per year (400-2,000 acres).

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7.4 Impacts from Wildlife and Special Status Species

Management of wildlife resources in this Alternative has beneficial impacts on water and riparian resources by requiring minimal ground disturbing activities, compliance with Rangeland Health Standards, on and off site mitigation. There would be no long-term or cumulatively negative impacts to water resources from actions associated with wildlife management. Short-term disturbances from vegetation enhancement projects could impact riparian areas until reclamation efforts matured, effectively having short-term negative impacts on water resources. Long-term and cumulative impacts would benefit water resources.

4.2.5.7.5 Impacts from Fisheries and Special Status Species

Stipulations to protect fisheries resources and water quality would have the same beneficial impacts to water resources as those in Riparian and Wetlands from Alternative D. General impacts are the same as impacts common to all Alternatives.

4.2.5.7.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7.8 Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7.10 Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts from Alternative B.

Fluid Minerals

A 300-foot NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (15,653 acres Federal Mineral Estate); YCT habitat and Blue Ribbon Fisheries have a ½ mile NSO stipulations for oil and gas exploration and development (8,256 acres Federal Mineral Estate).

These NSO stipulations protect water resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation, and direct habitat alteration. Alternative D stipulates less acreage with an NSO than Alternative B and more than Alternatives A and C.

Locatable Minerals

Impacts would be the same as impacts from Alternative B.

Mineral Materials

Impacts would be the same as impacts from Alternative B.

4.2.5.7.11 Impacts from Forestry and Woodland Products

Impacts would be the same as impacts from Alternative B.

4.2.5.7.12 Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives.

4.2.5.7.13 Impacts from Livestock Grazing

Impacts to water resources from livestock grazing actions in Alternative D would be negligibly different than those from Alternative B.

4.2.5.7.14 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts from Alternative B.

4.2.5.7.15 Impacts from Renewable Energy

Impacts would be the same as impacts common to all alternatives. Under Alternative D, 78,088 acres would be managed as exclusion areas and water resources would not be impacted in these areas. This is the more than Alternative A, less than Alternative B, and slightly less than Alternative C. Additionally, 331,088 acres would be managed as avoidance areas and 20,937 acres would be managed as open areas. If development occurred in these areas standard BMPs

would be implemented to minimize disturbance, improving reclamation potential, and soil recovery on disturbed sites.

4.2.5.7.16 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts in Alternative B. Based on assumptions, the more route miles open would have more impacts to fisheries resources.

Under Alternative D, there would be 624 miles of open routes (62 percent of all route miles). This Alternative closes or limits to administrative access more route miles than Alternatives A and C, but less than Alternative B. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative C designates 90 percent of route miles as open.

An analysis of specific effects of route miles open under this Alternative, on water resources, with proximity to water and sensitive or crucial habitats associated with water resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.5.7.17 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.5.8 Cumulative Impacts

4.2.5.8.1 Reasonably Foreseeable Actions

Cumulative effects include future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. The planning area is interspersed with parcels of non-BLM managed lands including federal, tribal, state, and privately owned lands. BLM managed lands include 434,154 acres of surface and 1,839,782 acres of federal mineral estate (private or other agency surface ownership with BLM management of mineral resources). These lands are spread thinly across 10,804,549 total acres in nine counties. BLM managed resources occur in 12.8 percent of the planning area in these nine counties. Water resources are scarce and under heavy use in agricultural applications. Six major rivers transect the planning area and BLM lands, including: the Bighorn, Yellowstone, Musselshell, Clark's Fork of the Yellowstone, Stillwater, and Boulder.

Activities taking place on these 10,804,549 acres cumulatively impact water resources within the planning area. Existing and reasonably foreseeable actions on lands in the planning areas that have the potential to cumulatively affect water resources include:

- Increasing recreation demand on public and private lands, primarily OHV
- Coal mining and associated activities
- Other mining operations including gold, palladium, gravels, etc.

- Spread of invasive noxious species including terrestrial and aquatic plants, and invertebrates
- Developments on private land (housing and industrial)
- Irrigation and livestock watering actions
- Agricultural activities that remove riparian vegetation or alter stream channels
- Livestock grazing, particularly in riparian areas and on streams and water bodies
- Vehicle traffic in and through riparian areas
- Fluid mineral development
- Severe or high intensity and localized wildfire events

Where these existing and future activities on non-BLM lands interface with water resources, they would cumulatively add to the impacts of activities authorized in the decision area. Generally, impacts to water resources are associated with surface disturbance and vegetation loss in proximity to waterways that could lead to an increase in runoff and sediment, contaminant delivery and minimizing water infiltration into compacted and bare soils. Increased runoff and erosion following runoff could deliver sediment and contaminants to nearby waterways. Sedimentation in waterways can cause changes in water chemistry as well as geomorphic adjustments that could have negative effects on stream function. In addition, agricultural runoff would introduce nutrients, pesticides, and herbicides to surface water and shallow groundwater sources. Quantified data on the existing and future extent of these land uses is not available.

Under all Alternatives, water resources would benefit from management in accordance with Rangeland Health Standards and applicable state and federal water-quality standards. Site-specific mitigation and BMPs for surface disturbing activities would further reduce impacts on water resources. Adherence to these standards would reduce many of the adverse impacts from future actions. In addition, existing and proposed stipulations designed to protect water resources would be beneficial by minimizing sediment and contaminant delivery potential by preventing or limiting surface-disturbing activities in proximity to hydrologic features. Stipulations and limitations for other resources that prevent or limit surface disturbing activities would provide additional protection for water resources and thereby could be beneficial (e.g., fisheries, riparian). Furthermore, timing limitations could benefit water resources by limiting or preventing surface-disturbing activities during times of the year when saturated soil conditions exist or when precipitation and runoff are frequent (e.g., winter, spring). However, with the scattered distribution and sparse ownership of BLM administered lands in the planning area, stipulations and management actions to minimize impacts to water resources may not prevent impaired water quality on BLM waterways, as is the current situation in some areas.

4.2.5.9 Irreversible and Irretrievable Commitments of Resources

Implementation of the RMP management actions would result in surface-disturbing activities, including dispersed recreation, recreational OHV use, fire and fuels management, mineral and energy development, livestock grazing, and infrastructure development that could permanently alter watershed health. Water quality in "impaired" condition may sustain sufficient degradation, coupled with adjacent non-federal ownership management that it may no longer be capable of being restored to original site potential. However, management actions and BMPs are intended to reduce the magnitude of these impacts and restore some of the potential.

4.2.5.10 Unavoidable Adverse Impacts

Surface-disturbing activities on non-BLM lands could cause unavoidable adverse impacts to water resources. Although these impacts are mitigated to the extent possible, unavoidable damage is inevitable due to the land ownership pattern and varying degrees of management. BLM administered lands manage water resources to protect their value and all Alternatives provide ample protective measures, coupled with other state and federal regulations, to allow for sustainable aquatic uses if feasible.

4.2.6 Vegetation

4.2.6.1 Forests and Woodlands/Forestry and Woodland Products

Management actions in each of the Alternatives would impact forest and woodland health and affect the quantity and quality of forest products available. This section describes the potential impacts each Alternative may have in terms of direct, indirect, short-term, and long-term impacts. Management actions that would contribute to a decline in forest and woodland health or productivity are considered adverse impacts. Actions that would enhance proactive management, improve forest and woodland health, and protect and/or restore forests and woodlands in the decision area are considered beneficial impacts.

4.2.6.1.1 Methods and Assumptions

This analysis addresses potential impacts on forest and woodland health and forest products by management actions in each of the Alternatives as described in Chapter 2.

Impact analyses and conclusions are based on interdisciplinary team knowledge of resources in the Billings Field Office. Walkthrough inventories (2004-2005), stand exams (2003-2009), and Landfire imaging data was used in this analysis. Forest inventories are limited and include approximately 14,000 acres (45 percent) of the coniferous forest. Spatial analysis was conducted using ESRI's ArcGIS Desktop 9.3 computer software. In the absence of quantitative data, professional judgment and qualitative data was used. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, where appropriate.

It is estimated that there are approximately 32,100 acres of forestland on BLM-administered lands in the decision area, based on LANDFIRE Vegetation Cover Types data. However, all

acres are not available for forest health restoration treatments or commercial harvest due to access issues, equipment operability challenges, merchantability specifications, soils, riparian, visual, cultural, WSA, or wildlife restrictions. Acreages and other numbers used in the analysis are approximate estimates for comparison and analytical purposes only and do not reflect exact measurements or precise calculations.

Assumptions

The analysis is based on the following assumptions:

- The necessity to manage forests and woodlands would increase during the life of the plan due to hazardous fuel loadings and increased levels of insect and disease activity.
- Vegetation management activities, such as prescribed burning and mechanical treatments, would benefit the long-term productivity of forests and woodlands.
- Generally, quaking aspen is declining due to natural succession (aging) and the encroachment of conifer species.
- Species composition, structure, and stocking levels of forest and woodlands have diverged from historic conditions due to aggressive fire suppression practices, resulting in higher densities than historical conditions.
- Management of forests and woodlands may increase water yield from forests and woodlands.
- Demand for forest and woodland products is not anticipated to grow substantially during the planning period, unless there are significant impacts to forest and woodland resources due to wildfire and/or insects and disease outbreaks as similar to recent years (e.g., 2006).
- A healthy forest is more stable and more resilient to disturbances (e.g., wildfires, wind, insects, and disease outbreaks).
- The need to manage forests and woodlands would increase to accommodate multiple uses associated with wildlife habitat improvement, water yield, livestock grazing, fire/fuels reduction activities, forest health restoration, and recreation.
- Climate change may have long-term adverse impacts to forest and woodlands. Changes in available water would impact species composition, stand density, growth rates, resilience to disturbances, and the sustainability of forest and woodland areas.
- Epidemic or near epidemic levels of insect outbreaks, primarily mountain pine beetle and western spruce budworm would continue for at least the next five years and may change the species composition, structure, and function of forested areas.

- Ground vegetation, as the lowest vegetative layer, creates additional fuel for fires. Increasing fuel levels increases the intensity, severity, and duration of fire activity. High intensity fires can cause extensive damage to forests and woodlands; including stand replacement mortality and devastation to other resources dependent on forests and woodlands.

Environmental Consequences

Impacts to forest and woodlands/forestry and woodland products would likely result from actions proposed under the following resources and resource use programs:

- Air
- Soil
- Water
- Vegetation
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Cultural Resources
- Paleontological Resources
- Visual Resources
- Fire Ecology and Management
- Wilderness Characteristics
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Transportation and Facilities
- Special Designations

Other programs were determined to have little or no impact on Vegetative Communities – Forests and Woodlands/Forestry and Woodland Products.

4.2.6.1.2 Impacts Common to All Alternatives for All Resources and Resource Uses

- Air quality restrictions would have short-term adverse impacts to forest and woodland treatments, especially for the use of prescribed fire and slash pile disposal, by placing timing restrictions on the treatments to reduce smoke emissions.

- Mitigation measures to protect soil, riparian, water, and fisheries resources would impact the overall cost, timing, and location of transportation and logging systems and reduce or eliminate timber volume availability in some areas; resulting in increased risk of severe or high intensity wildfire, insect/disease

outbreaks, and declining forest health, productivity, and resiliency on untreated acres.

- All timber harvest and forest management activities would meet or exceed the guidelines established in the Montana Streamside Management Zone (SMZ) Law and Water Quality Best Management Practices for Montana Forests, which are designed to protect soil and water resources. Mitigation measures would allow short-term impacts to water resources from forest management activities, but these impacts would be offset by long-term benefits (e.g., forest and riparian vegetation health, fuels reduction, wildlife habitat/forage, etc.).
- Requiring an assessment of current stand conditions and desired future conditions for all proposed forest and woodland management activities would ensure that an accurate inventory and health evaluation is completed for all projects. Obtaining information regarding stocking levels and stand attributes would assist in achieving management objectives to maintain and promote forest stand structures with large trees appropriate to forest types and successional stages and restore forests and woodlands towards a more natural Fire Regime Condition Class (FRCC 1) consistent with historical conditions.
- Monitoring forest health indicators, including populations of insects, and applying forest management methods that promote the appropriate level of stocking and function based on forest type would ensure that adaptive management strategies are incorporated into forest management decisions based on current information and trends (e.g., mortality levels, climate change, etc.).
- Prioritizing forest health restoration projects that reduce hazardous fuel loadings and improve resiliency to disturbances from wildfires, insects, and diseases would ensure that forest and woodland areas in serious need of forest management treatments, would be treated first.
- Silvicultural treatments in forests and woodlands (e.g., prescribed fire, thinning, mastication, commercial forest products removal, etc.) would reduce the density of overstocked stands; thereby reducing competitive stress for water, sunlight, and nutrients, and lowering the area's susceptibility to insect attacks, disease, and stand-replacing wildfire. Lower stand density levels and increased sunlight would promote tree growth and vigor, as well as ponderosa pine, lodgepole pine, and limber pine regeneration. Leaving healthy dominant and co-dominant trees would increase the large tree component and potential future snag recruitment of forests and woodlands.
- Considering wildlife habitat, watershed health, soils stability, local economic opportunities, recreational use, public safety, hazardous fuels, visual integrity, and any other relevant concerns before implementing forest management treatments would ensure that other resource values would be recognized and evaluated before removing live or dead trees.

- Managing forest products removal according to sustainability limits, and where consistent with other resource management objectives, would ensure that silvicultural treatments comply with the concepts of sustained yield and multiple use and that the ecosystem management approach is incorporated into all forestry projects.
- Probably Sale Quantity (PSQ) levels may be adjusted based on current inventory, information, monitoring evaluations, and unforeseen events, such as wildfires, insect/disease activity, or changing climate conditions.
- Allowing the cutting and removal of forest products (e.g., sawlogs, firewood, biomass, post/poles, wildings, etc.), except where prohibited, would reduce fuel accumulations and stand density, as well as provide a balance of forest products to meet public demand.
- Treatment methods used to eliminate conifer encroachment, including prescribed burning and mechanical treatments, would reduce fuel accumulations and facilitate the process of restoring forest meadows and prairie ecosystems towards systems that are more resilient to change agents.
- Attaching stipulations to all surface disturbing projects for noxious/invasive species prevention, identification, monitoring, and treatments, as well as requiring the use of certified weed-free seed would decrease weed seed proliferation throughout the planning area, thus lowering the overall threat of spreading weeds. Although initial application of weed management strategies would increase forest and woodland treatment costs, proactive control of weeds on BLM-administered forestlands would decrease overall potential future costs.
- Maintaining or improving habitat for federally listed threatened, endangered, and special status plants would alter project design (e.g., timing, buffers, location, etc.) and increase costs for forest and woodland management activities.
- Management and protection of habitat values for wildlife and special status species would alter the size, scale, project design, cost, and timing of forest and woodland treatments. In some cases, restrictions (e.g., timing constraints, hiding cover, road densities, buffer zones, etc.) would prevent management activities designed to reduce stand density and improve forest and woodland health. Subsequently, the number of acres that would be treated would be reduced and may result in detrimental impacts to forest and woodland resources, including but not limited to; an increase in fuel accumulations, increased stand density (overstocking), higher levels of insect and disease activity, and a lowered resilience to disturbances (e.g., severe or high intensity fire, insects/diseases, climate change, etc.). However, the impacts of these actions would depend on the individual species in need of protection and its specific habitat requirements. For example, prohibiting surface-disturbing activities within 0.25 miles of sharp-tailed and sage-grouse leks would exclude some forest management projects designed to reduce conifer encroachment and enhance grouse habitat.

Similar limitations for bighorn sheep and nest buffers for bird species (e.g., eagles, raptors, ferruginous hawks, etc.) would also limit and/or increase the cost of forest health treatment actions.

- Avoiding impacts to known or newly discovered cultural and paleontological resources would reduce the efficacy of forest and woodland treatments by redesigning or canceling projects. As a result, this action would decrease or eliminate some treatments that would improve forest health and the availability of forest products. Inventory and mitigation costs would increase per acre treatment costs. However, cultural and paleontological sites typically represent a small percentage of forest and woodland acreage; therefore, impacts would be negligible.

- Managing forest treatment activities according to VRM classifications, and in locations adjacent to National Historic Trails, would require mitigation measures on forest and woodland acres (e.g., size, shape, timing, silvicultural prescription, harvest method, feathering, buffering, road locations, season of operations, etc.) to reduce the impacts of visual contrasts, which would subsequently decrease or eliminate some treatments to improve forest health and the availability of forest products. Management in VRM classes II, III, and IV would allow greater flexibility in the range and design of treatments on forests and woodlands; thereby increasing available acres and generating a greater volume of timber available for forest products harvest.

- Land use authorizations (e.g., rights-of-way, leases, permits, etc.) would impact forest and woodland acres by removing trees and vegetation in conjunction with road maintenance activities, reconstruction, and new road construction. There would be a temporary increase in fuel accumulations due to slash disposal of tree boles, limbs, and needles (e.g., lopping, piling, slash filter windrows, etc). However, these impacts would be minimal because land use authorizations occur on only a small percentage of forest acres.

- Some special designation areas (e.g., WSAs, ACECs, Pryor Mountain Wild Horse Range, LWCs, etc.) would restrict or prohibit forest health restoration treatments and the removal of commercial and/or personal use forest products. These areas would experience increased fuel loadings, overstocking, competition for growing space, and higher levels of insect and disease activity; thereby damaging the health, resiliency, and productivity of forest and woodland resources on these acres. However, some vegetation and fuels treatments would be allowed if the activity would enhance wilderness values (i.e., insect and disease control, emergencies involving wildfires or prescribed fires burning outside of designated boundaries, etc.).

- Adjusting livestock grazing permits based on site-specific evaluations, monitoring data, and environmental analysis would ensure that grazing management actions designed to maintain or improve vegetative conditions

would reduce the mortality and growth deformity of seedling and sapling trees caused by livestock foraging and trampling. Permitting livestock grazing in dry conifer forest and woodland areas may encourage conifer encroachment into adjacent non-forest areas by reducing competition with grasses.

- Management actions for visitation at Pompeys Pillar, especially in the "picnic" area, would have negative impacts on the management and health of cottonwood galleries and shrub species. Management to benefit public use (i.e., removing hazard trees and general clearing of brush for picnic areas) does not favor diversity and regeneration of cottonwood trees and shrubs. These impacts from the areas managed for public use (83 acres) are long term, but represent only a small fraction of the total riparian vegetation along the Yellowstone River; therefore, cumulative impacts would be negligible. Limiting livestock grazing, fuel wood collection, and confining ROWs to a 500-foot wide corridor in the remaining 349 acres would protect seedlings, encourage understory diversity, and enhance the development of healthy cottonwood galleries and associated woodlands. Continued proactive management of woodlands at Pompeys Pillar would have a positive cumulative impact on the overall health of deciduous forests and woodlands along the Yellowstone River.

4.2.6.1.3 Alternative A

Impacts from Soil

Alternative A would restrict wheeled and tracked logging equipment to sustained slopes of 35 percent or less, allowing ground-based operations on approximately 21,807 acres, or 68 percent, of coniferous forest acres not restricted by WSAs or ACECs from public lands. This action would limit or prohibit some forest treatment activities, which would reduce the number of acres treated over the life of the plan. The impacts of these actions would increase total costs and alter management activities; including the size, scale, type, location, and timing (e.g., temporary skid and haul road layout, skidding distances, cutting unit design, harvest system requirements, transportation systems, season of operations, mitigation measures, and silvicultural prescriptions) of treatments designed to improve forest health.

The availability of forest and woodland products, especially sawtimber, biomass, and post and pole material would be reduced due to the high cost of operations in areas where tracked and wheeled operations are not allowed. Forest stem densities in untreated areas would increase and forest health would deteriorate over time; resulting in declining vigor, productivity, and resilience to disturbances (e.g., wildfire, insects and disease, etc.). Higher stem densities would be expected to increase the frequency and intensity of wildfires, potentially changing soil chemistry (e.g., loss of nutrients, hydrophobicity, and reduced infiltration rates), thereby negatively impacting the ability of forest and woodlands to quickly regenerate.

Impacts from Water

There are no impacts from water resources under Alternative A.

Impacts from Vegetative Communities:

Forests and Woodlands/Forestry and Woodland Products

Alternative A would restrict mechanical harvest to sustained slopes of 35 percent or less. Impacts would be the same as impacts from soil resources, Alternative A. Under this Alternative, 9,500 acres of forested land in WSAs and ACECs would be protected from cutting, except where needed for other resource values; thereby reducing the amount of timber available for commercial harvest. A PSQ of 84 MBF/year, based on public demand, impacts approximately 42 acres/year. If demand trends continue over the 20 year life of this plan, only 2.6 percent (840 acres) of coniferous forest would be harvested for commercial forest products.

Riparian and Wetlands

Adhering to the Montana Streamside Management Zone (SMZ) Law and meeting or exceeding BMPs in conjunction with forest management activities in riparian and wetland areas would mitigate impacts so that riparian areas are managed to meet PFC.

Invasive Species and Noxious Weeds

There are no impacts from invasive species and noxious weeds under Alternative A.

Special Status Plants

Requiring an on-site examination for special status plants prior to surface disturbing activities would increase the cost of forest and woodland management activities.

Impacts from Fire Ecology and Management

Under Alternative A, wildfire suppression would follow the Appropriate Management Response (AMR) outlined in the Billings Field Office Fire Management Plan BLM 2004 (BiFO FMP) for areas identified where fire is not desired or in areas where fire can be used as a management tool (e.g., Fire Management Categories B and C). Alternative A would allow prescribed fire and mechanical methods to manipulate vegetation in areas identified for treatment by the range, forestry, wildlife, and fuels programs.

Fuels reduction in Fire Management Categories B and C (BiFO FMP) would authorize the removal of trees and shrubs to reduce the hazards associated with high intensity and severe wildfires. Fuels reduction activities would decrease the density of seedlings, saplings, and ladder fuels (i.e., lower tree branches, understory vegetation, etc.), resulting in a more open forest dominated by larger diameter trees. This action would also improve the resiliency and ecological functions of forests and woodlands. On-site dispersal of woody material created by hand/mechanical fuels reduction or prescribed burning would contribute to nutrient cycling, thereby providing essential nutrients for fungi, bacteria, invertebrates and other organisms that are an integral part of forest and woodland ecosystems. Short-term surface disturbance associated with fuels reduction treatments would increase the potential for short-term adverse impacts, but the relatively small size of treatment areas and the use of BMPs would reduce these impacts to acceptable levels. The long-term benefits from prescribed fire and fuels treatments outweigh the short-term impacts. In contrast, wildfire suppression would have an adverse impact on forest and woodland resources by contributing to increased fuel loadings and

tree densities, and inhibiting the natural regeneration of lodgepole pine and quaking aspen stands associated with fire.

Impacts from Energy and Minerals

Although some forest and woodland acres managed by the Billings Field Office which would be open for leasing, the potential for impacts is minimal because little production in forested areas has historically occurred. The same trend is expected to continue, with RFD predictions of 2-4 wells per year. If production in forest or woodland areas did occur, little impact would be expected because of the limited amount of disturbed acres. Potential impacts would include the cutting and subsequent removal of forest and woodland vegetation from drill-site development areas; including roads, pads, reserve and earthen pits, surface facilities, pipelines, and power lines. Severing and removing forest and woodland vegetation would result in the loss of a viable natural seed source for future forest regeneration. Surface disturbing activities resulting from the construction of development facilities would result in soil compaction, which could interfere with site preparation and the establishment of seedlings. Consequently, site reclamation measures would potentially include artificial planting of bareroot or containerized nursery stock seedlings. Roads constructed for oil and gas development areas would improve access to forest and woodland areas in or adjacent to the project area; therefore, lowering costs and facilitating the execution of silvicultural treatments, as well as increasing the availability of commercial forest products.

Impacts from Trails and Travel Management

Under this Alternative, motorized vehicle travel would be confined to existing roads and trails, except for those specifically closed. The total number of miles of travel routes that specifically impact forested areas is not known.

Limiting motorized travel to existing roads and trails would ensure that forest and woodland areas with young seedlings would be protected from damage, growth deformity, and/or mortality. However, the lack of a formal travel management plan would allow duplicate and unneeded routes to remain open; thereby contributing to increased erosion and higher maintenance costs. These routes have negative impacts on forest resources; including, encouraging unauthorized forest products removal, the spread of invasive plants, and damaging or killing seedlings. However, existing routes provide access to forest resources and reduce the cost of forest treatments and harvest. Closure and decommissioning of roads that contribute to resource damage, or which are not needed, would afford greater protection for forest resources, but would increase costs and restrict or eliminate some forest management treatments. The negative impacts to resources from duplicate unmaintained routes outweigh the benefits of additional access to forest and woodland acres and lower cost of treatments.

Impacts from Lands and Realty

Land Tenure Adjustment and Access

Disposal of public lands that are forested or wooded would reduce the land base of forestland acres and the availability of wood products. Under this Alternative, 8,433 acres of forest lands would be available for disposal. Many of these parcels are small (<40 acres) and difficult to

manage; therefore, disposal would decrease the costs of management. However, the loss of forest and woodlands may also result in the loss or reduction of crucial forested habitat where subsequent private and/or commercial use of the disposal acres would remove the forest and woodland resource (i.e., conversion of forested lands to tilled farmland). The loss of forested lands would decrease carbon sequestration potential within the planning area. Acquisition of lands that would consolidate forested areas would improve manageability and decrease costs. Retention and acquisition of additional forested lands would increase the amount of forest and woodland acres, wildlife habitat, and timber resources available.

Disposal and acquisition would indirectly impact the amount of carbon sequestered on public lands by decreasing or increasing the number of acres and/or health and vigor of forest and woodland areas within the Billings Field Office.

4.2.6.1.4 Alternative B

Impacts from Soil

Impacts would be similar to Alternative A; however, surface disturbance is limited to sustained slopes of 30 percent or less, thereby allowing ground-based mechanical operations on approximately 12,241 acres, or 60 percent of coniferous forest acres not restricted by WSAs or ACECs. This would result in higher cost treatment acres and would be expected to reduce the level of forest management treatments and timber harvest that would occur.

Impacts from Water

Restricting or limiting activities that contribute to deteriorating watershed conditions and/or excessive erosion, including closing and/or reclaiming roads, would modify or prohibit forest management activities that have the potential to cause erosion and deliver sediment to water resources.

Impacts from Vegetative Communities

Forests and Woodlands/Forestry and Woodland Products

Alternative B would restrict mechanical harvest to sustained slopes of 30 percent or less. Impacts would be the same as impacts from soil resources, Alternative B. Emphasis on the retention and acquisition of forested lands would ensure that the current forested area land base would remain at current acreages or increase, thereby positively impacting carbon sequestration ability within the Billings Field Office. Under Alternative B, 9,500 acres of forested lands are located in WSAs or ACECs and would be protected from commercial harvest, except where needed for other resource values, thereby reducing timber availability on these acres.

A PSQ of 134 MBF impacts approximately 67 acres/year, or about 4.2 percent (1,340 acres) of the coniferous forest on public lands over the life of the plan, if public demand trends remain similar to current levels. Adjusting PSQ values based on monitoring evaluations would allow the flexibility to alter these values based on unforeseen events (e.g., wildfires, current inventories, insect/disease activity, climate conditions, etc.) to ensure the long-term health and sustainability of forests and woodlands. Restricting permits for forest products (e.g., Christmas

trees, fuelwood, post/poles, etc.) would reduce impacts to forest soils and seedlings, but would contribute to the buildup of fuels on the forest floor; thereby increasing fire intensity and size, as well as insect and disease activity. Restricting forest treatments to areas accessible by the current road system would limit or prevent forest management activities and reduce timber volume availability in areas not accessible by an existing road network. As a result, some silvicultural activities designed to improve forest health, productivity, and resiliency would not occur and forests/woodlands would decline in vigor. Decommissioning and reclamation of temporary roads as soon as projects were completed would ensure that soils were protected and reforestation would take place quickly. Where contiguous acres of dead and dying forest exceed 1,000 acres, restricting harvest area to 50 percent would leave fuel accumulations untreated and increase insect/disease activity in untreated stands; however, these areas would provide structural diversity, shade, and a source of coarse woody debris when snags eventually fall down.

Riparian and Wetlands

Cottonwood galleries are on the decline due to invasive plants, drought, and animal usage. The designation of cottonwood galleries as priority recovery areas would ensure actions are taken to promote the health and expansion of these galleries.

Not allowing surface disturbing activities within ½ mile of riparian areas and wetlands, designated 100 year flood plains, and on water bodies and streams, except for those activities that are not in conflict with watershed health, would help achieve the goals of cottonwood gallery expansion, protecting and encouraging growth and expansion of quaking aspen clones, and improving vigor and resiliency of riparian area forests. Silvicultural activities improve forest health in riparian areas by reducing the density of overstocked stands, fuel accumulations, and removing insect/disease affected trees; therefore, are not considered activities that are in conflict with watershed health. All forest management activities would meet or exceed the guidelines set forth in the Montana Streamside Management Zone (SMZ) Law and Water Quality Best Management Practices for Montana Forests (BMPs), which are designed to protect soil and water resources to maintain and/or improve watershed health. These forest practices mitigation measures allow short-term impacts to water resources, but these impacts are offset by long-term benefits; including, but not limited to, forest and riparian vegetation health, fuels reduction, wildlife habitat, forage quality and quantity, and shade to regulate stream temperatures. There could be an occasional instance when watershed health conflicts with forest management (e.g., salvage after a stand-replacing wildfire); therefore, in these rare cases some forested riparian areas declining in health may not receive the necessary silvicultural treatments to increase overall vigor, resiliency, and productivity.

Invasive Species and Noxious Weeds

The removal of invasive species from cottonwood galleries and implementation of actions to maintain the appropriate stand composition, structure, and understory diversity would improve gallery health and promote the expansion of cottonwood trees.

Special Status Plants

Impacts would be the same as Alternative A.

Impacts from Fire Ecology and Management

Under Alternative B, wildfires would be suppressed using the appropriate fire management strategies. Appropriate strategies would have the following tactical constraint: heavy equipment would be restricted to existing roads and trails, except where specified by safety and other resource concerns, such as cultural, big game crucial winter range, and riparian areas. Naturally ignited wildfire would be managed for resource benefit on 52,548 acres contained in WSAs and ACECs.

Forests historically evolved with fire: healthy forests are both dependent on, and resistant to, wildfire. Forest health treatments and the reintroduction of fire to the landscape would limb trees, remove ladder fuels, and reduce stocking levels; thereby improving growth, vigor, and resilience to disturbances (e.g., climate change, insects/disease, wind, severe or high intensity wildfire, etc.).

A variety of forest treatments could be used, including manual, mechanical, and prescribed fire. Prescribed fire and naturally ignited managed wildfire would be used to reintroduce fire in its natural role back into the ecosystem to meet forestry and fire/fuels resource management objectives, which would improve habitats and reduce fuel loads, resulting in a beneficial impact on forest and woodland resources.

Impacts would vary by the method used to accomplish the treatment (e.g., manual, mechanical, prescribed fire, etc.). Vegetation treatments are designed to move plant communities towards desired future conditions. Not implementing proactive restoration treatments would inhibit or prevent attainment of ecological objectives and desired conditions in forest and woodland communities. Where fuel loads are excessive, failure to conduct vegetation treatments would increase the risk of high intensity wildfire and insect and disease activity. High intensity wildfire would cause severe long-term impacts in terms of wildlife habitat loss and long-term or permanent reduction in biomass productivity due to excessive erosion.

Confining heavy equipment use to existing roads and trails would reduce the impacts to soils, reduce invasive species and loss of forest/woodland vegetation, but would limit the effectiveness of fire suppression tactics and could result in larger high intensity wildfires in areas where fuels are heavy and few roads and trails exist. Large fires would cause severe damage or mortality to large trees, releasing carbon into the atmosphere and reducing the amount of carbon sequestered in the forest and forest soils.

Impacts from Energy and Mineral Resources

Impacts would be the same as Alternative A.

Impacts from Trails and Travel Management

The establishment of eleven travel management areas would reduce the number of miles of open roads and trails and improve route monitoring and maintenance. The reduction of routes would reduce the negative impacts to forest resources as discussed in Alternative A, except for the possible reduction in access for potential harvest and forest treatments. The increased cost of constructing and decommissioning temporary routes needed for forest management activities would reduce the amount of acres treated over the life of the plan.

Reclamation of roads upon completion of projects, unless the route provides specific benefits for public access, would minimize detrimental impacts to forests and woodlands and provide the conditions required for rapid forest regeneration. This Alternative closes or limits the most routes and reduces access for forest treatments and harvest more than the other Alternatives. The current level of planning would limit access to areas such as Tin Can Hill and Mill Creek/Bundy, thereby increasing the costs of forest management treatments. Closures under this Alternative would restrict access and eliminate all but the most expensive hand treatments in portions of some areas such as Grove Creek (see Appendix O).

Impacts from Lands and Realty

Land Tenure Adjustment and Access

Impacts under this Alternative are similar as described in Alternative A; however, no forested lands were identified for disposal.

4.2.6.1.5 Alternative C

Impacts from Soil

Impacts would be the similar to Alternative A. However, surface disturbance would be limited to sustained slopes of 45 percent or less; thereby allowing ground-based operations on approximately 25,335 acres, or 79 percent, of coniferous forest acres not restricted by WSAs or ACECs. Increasing the allowable slope for mechanical treatments would increase acres available for harvest and decrease the cost of forest health restoration activities. Implementing silvicultural treatments on forest and woodland areas would reduce the density of overstocked stands; which would reduce competitive stress for water, sunlight, and nutrients, and reduce the area's susceptibility to insect attacks, disease, and stand-replacing wildfire.

Impacts from Water

Impacts would be the same as Alternative B. Developing and gaining approval for mitigation plans would add to the cost of treatments and harvest in those areas. Wildlife would benefit from improved forest riparian health.

Impacts from Vegetative Communities

Forests and Woodlands/Forestry and Woodland Products

Alternative C would restrict mechanical harvest to sustained slopes of 45 percent or less. Impacts would be the similar to impacts from soil resources, Alternative C. Under this Alternative, disposal of isolated forest lands where appropriate land/resource values are considered would facilitate the removal of non-strategic, isolated parcels with poor access from the Billings Field Office forested land base. Allowing cutting for density management, forest health, and fuels reduction unless otherwise restricted (e.g., WSAs, ACECs, etc.) would reduce competitive stress for water, sunlight, and nutrients, and reduce the susceptibility of forests and woodlands to insect attacks, disease, and stand-replacing fire. Lower stand density levels and increased sunlight would promote residual tree growth and vigor, as well as regeneration. Removal of large trees, when consistent with wildlife requirements and other resource values,

would allow selective harvest of dead, dying, old, and suppressed trees; thereby increasing growing space (e.g., sunlight, water, nutrients, etc.) for the residual stand, contributing to vigorous, resilient, and productive forests.

A PSQ of 233 MBF/year, based on public demand, would impact approximately 112 acres/year, or 7 percent (2,240 acres), of coniferous forest acres over the life of the plan. Adjusting PSQ values based on monitoring evaluations would allow the flexibility to alter PSQ values based on unforeseen events (e.g., wildfires, current inventories, insect/disease activity, climate conditions, etc.) to ensure the long-term health and sustainability of forests and woodlands. Allowing unlimited permits for forest products like Christmas trees and fuelwood would reduce fuel buildup and the danger from wildfire. New road construction to access forest areas would increase the number of acres that would receive silvicultural treatments to improve forest health and increase timber volume availability. Decommissioning and reclamation of temporary roads within one year of project completion would expose soils to wind and water erosion and increase soil damage and loss, encouraging invasive plant establishment and slow seedling regeneration. Allowing salvage harvest without prescriptive restrictions for dead and down woody materials would facilitate the timely removal of timber damaged by fire, wind, insects/diseases, but would eliminate a source of structural diversity (e.g., snags, down woody materials).

Riparian and Wetlands

Impacts would be similar to Alternative B, but would impact fewer acres without the ½ mile radius restriction around riparian areas, wetlands, floodplains, waterbodies, and streams.

Invasive Species and Noxious Weeds

Allowing natural processes (i.e., no proactive management) to determine the structure and composition of cottonwood galleries would contribute to a further decline in cottonwood stands due to overstocking and competition from other vegetative species.

Special Status Plants

Impacts would be similar as Alternative A; however, an on-site inventory would not be required unless the project is located on a known special status plant location.

Impacts from Fire Ecology and Management

Fires would not be managed for resource benefit across the entire decision area. Heavy equipment would not be restricted to existing roads and trails, except where prohibited (e.g., cultural areas, etc.). Full suppression tactics would protect more forest resources from high intensity fires in the short term, but would continue the exclusion of fire leading to higher levels of overstocking and decadence with a greater potential for soil damage and loss. High intensity fires would likely continue and increase in number, intensity, and severity. Long-term adverse impacts to forest resources would occur where a large percentage of trees were destroyed. Some areas would remain deforested for decades or longer. Unrestricted heavy equipment use would remove forest vegetation, damage or kill seedlings, and cause erosion and soil loss. Impacts would be moderate to high depending on the success of fireline rehabilitation.

Prescribed fire would be used to reintroduce fire to the landscape and the impacts would be the same as in Alternative B. Management of naturally ignited wildfires would not be allowed which would reduce the beneficial effects of reintroducing fire to the landscape as described in Alternative B.

Impacts from Energy and Minerals

Impacts would be the same as Alternative A.

Impacts from Trails and Travel Management

The impacts to forest resources would be similar to Alternative A. Soil compaction, loss of infiltration capacity, erosion, and vegetation loss would be less than Alternative A, but more than Alternatives B and D due to the increase in routes open for public use.

Impacts from Lands and Realty

Land Tenure Adjustment and Access

Under this Alternative 1,419 acres of forest and woodlands were identified for disposal. These parcels are relatively small (<40 acres) acreages that generally lack legal access, which makes them difficult and expensive to manage. Disposal of these lands would decrease the costs of management, but would also decrease the amount of forest and woodland habitat for wildlife; and, if access became available, public recreational opportunities. Disposal of these tracts could allow for habitat fragmentation or loss of habitat.

4.2.6.1.6 Alternative D (Preferred Alternative)

Impacts from Soil

Alternative D has the same slope restrictions as Alternative B and the same impacts, with the exception that actions would be allowed if an approved mitigation and reclamation plan (e.g., Water Quality Best Management Practices for Montana Forests) is developed prior to activities taking place. Allowing ground-based operations on slopes greater than 25 percent with an approved mitigation plan would increase the number of forested acres that would receive silvicultural treatments designed to reduce the density of overstocked stands; thereby reducing competitive stress for growing space (e.g., water, sunlight, nutrients, etc.) and the area's susceptibility to insect attacks, disease, and stand-replacing wildfire.

Impacts from Water

Impacts would be the same as Alternative B.

Impacts from Vegetative Communities

Forests and Woodlands/Forestry and Woodland Products

Alternative D would restrict mechanical harvest to sustained slopes of 25 percent or less. Impacts would be the same as impacts from soil resources, Alternative D. Impacts from the emphasis on retention and acquisition of forested lands would be the same as Alternative B. Allowing cutting for density management, forest health, and fuels reduction unless otherwise

restricted (e.g., WSAs, ACECs, etc.) would reduce competitive stress for water, sunlight, and nutrients, and reduce the susceptibility of forests and woodlands to insect attacks, disease, and stand-replacing wildfire. Lower stand density levels and increased sunlight would promote residual tree growth and vigor, as well as regeneration. Retention of large trees in numbers and species as appropriate for the forest type and successional stage would promote growth and maturation of forest types towards an older age class structure and composition. Forest growth that includes retention of large trees would indirectly enhance the sequestration of carbon.

A PSQ of 178 MBF/year would impact approximately 89 acres/year, or about 5.6 percent of forested lands over the life of the plan, if public demand trends remain similar to current levels. Adjusting PSQ values based on monitoring evaluations would allow the flexibility to alter PSQ values based on unforeseen events (e.g., wildfires, current inventories, insect/disease activity, climate conditions, etc.) to ensure the long-term health and sustainability of forests and woodlands. Restricting permits for forest products like Christmas trees and fuelwood would reduce impacts to forest soils and seedlings, but would contribute to the buildup of fuels on the forest floor and would increase fire intensity and size, as well as insect and disease activity. Allowing new road construction to access forest areas would increase the number of acres that would receive silvicultural treatments designed to improve forest health and increase timber volume availability. Decommissioning and reclamation of temporary roads within 1 year of project completion would expose soils to wind and water erosion and increase soil damage and loss, encouraging invasive plant establishment and slow seedling regeneration. When salvage is proposed in dead and dying forests, retaining contiguous acres of undisturbed standing and down woody material would leave some fuel accumulations untreated and increase insect/disease activity in untreated stands; however, these areas would provide structural diversity, shade, and a source of coarse woody debris when snags eventually fall down.

Riparian and Wetlands

Impacts would be similar to Alternative B, but would impact fewer acres with a ¼ mile radius restriction around riparian areas, wetlands, floodplains, waterbodies, and streams.

Invasive Species and Noxious Weeds

Impacts would be the same as Alternative B.

Special Status Plants

Impacts would be similar to Alternative A; however, an on-site inventory would only be conducted if potential special status plant habitat is present.

Impacts from Fire Ecology and Management

Wildfire suppression would follow appropriate fire management strategies. These strategies would allow management of fire in a manner that would achieve resource goals where practical and where firefighter and public safety was not compromised. Suppression tactics and techniques would be used to reduce impacts to resources and achieve forest health goals. Impacts from the management of natural wildfire ignitions and prescribed fire would be the same as Alternative B, but would potentially impact 62,937 acres of public lands over ten years.

This Alternative allows the use of heavy equipment to construct fireline, except in crucial winter range, habitats of candidate or special status species, riparian/wetlands, or in areas of cultural resource sensitivity or other designated areas (e.g., ACECs, WSAs). Fireline rehabilitation is required immediately after containment. Impacts would be short-term and include soil disturbance, compaction, and vegetation loss.

Impacts from Energy and Minerals

Impacts would be the same as Alternative A.

Impacts from Trails and Travel Management

Impacts to forest resources would be the same as described in Alternative A. This Alternative is a compromise between public use and resource protection needs.

Impacts from Lands and Realty

Land Tenure Adjustment and Access

Impacts under this Alternative are similar as described in Alternative A; however, only 3.2 acres of forested lands were identified for disposal under this Alternative.

4.2.6.1.7 Cumulative Impacts

Past and Present Actions

Historically, the majority of forested areas in the planning area consisted of open, park-like stands of ponderosa pine and juniper intermixed with hardwood draws. Mature stands were dominated by large ponderosa pine trees with an understory of native bunchgrasses and low shrubs. For at least the last 10,000 years, Native Americans supplemented lightning-caused fire with their own fires to encourage foods to grow in the understory (such as berries), to open the forest to attract game and simplify hunting, and to prevent surreptitious attacks by enemies in heavy forest cover (Clark and Sampson 1995). Prior to European settlement, fires ignited by lightning and Native Americans burned frequently throughout southeastern Montana, with fire-return intervals of 35 to 40 years (Arno and Gruell 1983). High frequency, low intensity fires kept forests open and removed understory vegetation, down material, and tree regeneration, resulting in irregularly shaped patches and groups of trees varying in size and density across the landscape. Impacts of past actions, natural events, and region-wide decisions (e.g., fire suppression, insect and disease activity, grazing) that affected forests are described in Chapter 3, Affected Environment.

In the early 1900s, aggressive fire suppression became the management rule on public lands to protect human lives, property, and forests from the devastating impacts of wildfires. Implementation of fire control strategies dramatically interrupted the historical role of fire in ponderosa pine ecosystems, which resulted in species composition changes and increased stand density levels. Subsequently, vegetative communities shifted towards late successional stage forests and woodlands. Forests and woodlands have declined in overall health, productivity, and functionality, and are therefore less resilient to disturbances (e.g., wildfire, insects, and disease). Overstocked stands experience increased stress due to competition for water, sunlight,

and nutrients. These conditions have increased the susceptibility of forested areas to insect attacks, disease, and stand-replacing fires. The virtual exclusion of fire in the more than 100 years since Euro-Americans settled the region has been a major factor in ecosystem changes that today pose an almost-certain risk of high-intensity, stand-replacing wildfire (Clark and Sampson 1995).

Horses, cattle, and sheep have intensively grazed eastern Montana since the mid-1850s (Hansen, Thompson, Massey, and Thompson 2008) and have removed fine grass fuels that historically carried low-intensity fires over large areas annually (Clark and Sampson 1995). Because of both fire suppression and livestock grazing, juniper became established on sites that were previously grass covered and maintained by periodic wildfires (Smeins and Fuhlendorf 1997). Today, trees are growing on sites in which natural disturbance historically limited their presence.

Alternative A would provide an incidental low volume of commercial forest products and contribute to a decline in forest health, productivity, and resiliency. Under this Alternative, forest management activities requiring the use of wheeled or tracked logging equipment would be restricted to sustained slopes of 35 percent or less, allowing forest treatments on 68 percent of forested acres not restricted by WSAs or ACECs; thereby limiting or prohibiting some forest treatment activities.

The impacts of these actions would increase total costs and alter management activities; including the size, scale, type, location, and timing (e.g., temporary skid and haul road layout, skidding distances, cutting unit design, harvest system requirements, transportation systems, season of operations, mitigation measures, and silvicultural prescriptions) of treatments designed to improve forest health. The availability of forest and woodland products, especially sawtimber, biomass, and post and pole material would be reduced due to the high cost of operations in areas where tracked and wheeled operations are not allowed.

As a result, forests and woodlands would continue to depart from historic conditions, which would contribute to a decline in forest health, species composition changes, increased stand density levels and fuel loadings, and increased susceptibility of these areas to insect and disease epidemics. Competition for resources (e.g., sunlight, water, and nutrients) would increase stress to forest and woodland vegetation across the entire landscape, which would result in declining vigor, productivity, and resiliency to disturbances (e.g., wildfire, insects, and disease).

Alternative B would also provide an incidental-low volume of commercial forest products and contribute to a decline in forest health, productivity, and resiliency. Impacts would be similar to Alternative A; however, forest management activities requiring the use of wheeled or tracked logging equipment would be limited to sustained slopes of 30 percent or less.

As a result, mechanical treatment and harvest would only be allowed on approximately 60 percent of coniferous forest acres not restricted by WSAs or ACECs. This would result in higher cost treatment acres and would further reduce the level of forest management treatments and timber harvest that would occur. Consequently, forest and woodland areas would be at risk for extensive resource damage or loss due to landscape-level insect outbreaks or severe or high intensity wildfires.

Alternative C would provide a moderate volume of commercial forest products and contribute to long-term forest health improvement. Under this Alternative, forest management activities requiring the use of wheeled or tracked logging equipment would be restricted to sustained slopes of 45 percent or less; thereby allowing forest treatment activities on 79 percent of forested acres not restricted by WSAs and ACECs.

Implementation of silvicultural treatments in forests and woodlands would reduce the density of overstocked stands, which would subsequently reduce competitive stress for water, sunlight, and nutrients, and reduce the susceptibility of forests and woodlands to insect attacks, disease, and stand-replacing fire. Lower stand density levels and increased sunlight would promote tree growth and ponderosa pine and limber pine regeneration. Alternative C would contribute to the overall vigor, productivity, and resiliency of forest and woodland vegetation in the planning area and the restoration historic conditions.

Alternative D would provide a low-moderate volume of commercial forest products and contribute to long-term improvements in forest health. Under this alternative, slope restrictions would be reduced to 25 percent; however, actions would be allowed if an approved mitigation and reclamation plan (e.g., Water Quality Best Management Practices for Montana Forests) is developed prior to activities taking place.

As a result, the number of forested acres that would receive silvicultural treatments designed to reduce the density of overstocked stands would increase; thereby reducing competitive stress for growing space (e.g., water, sunlight, nutrients, etc.) and the area's susceptibility to insect attacks, disease, and stand-replacing wildfire. Alternative D would also contribute to the overall vigor, productivity, and resiliency of forest and woodland vegetation in the planning area and the restoration of historic conditions.

4.2.6.2 Rangelands and Shrublands

Actions contributing to the decline in abundance or distribution of grassland and shrubland communities are considered adverse impacts. Conversely, beneficial impacts to grassland and shrubland communities include actions that protect or restore these communities in the planning area.

For the purpose of this analysis, short-term impacts to grassland and shrubland communities comprise those activities that contribute to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Mid-term impacts persist for 5 to 10 years, and long-term impacts to grassland and shrubland communities are those that persist for more than 10 years to manifest themselves.

Impact analysis and conclusions are based on interdisciplinary team knowledge of resources within the planning area, review of existing literature, 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. The following assumptions were made:

4.2.6.2.1 Assumptions

- Surface disturbances generally increase the potential for accelerated erosion.
- Surface disturbances substantially increase the likelihood of the spread of Invasive Non-Native Species in an area.
- The placement of supplements can affect the distribution of livestock grazing within grassland and shrubland communities.
- Grazing and browsing, whether by livestock or wildlife, is important for maintaining the health of grassland and shrubland communities. Improper grazing can decrease plant vigor and ground cover, lead to increased erosion, degrade soil nutrients and water retention, and impact rangeland health.
- The BLM and grazing lessees strive to manage livestock grazing to maintain or improve rangeland health.
- The primary conduit for the initial establishment of the spread of INNS is through the road network.
- Fire plays an intricate role in these communities, particularly shrubland communities.
- Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife and certain desirable wildlife habitats.

4.2.6.2.2 Environmental Consequences

Management actions for the following resource programs would result in specific minor to moderate adverse impacts, and substantial beneficial impacts to vegetation resources:

- Soil
- Water
- Vegetation
- Wildlife and Fisheries Habitat and Special Status Species
- Fire Ecology and Management
- Energy and Mineral Development
- Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Special Designations

Other programs were determined to have little or no impact on vegetation communities.

4.2.6.2.3 Impacts Common to All Alternatives

Impacts from Soil

Maintenance of healthy productive soil is required to meet management goals for vegetation. The goals of the soil resources management program are to promote long-term soil health and productivity, and to provide earth materials for activities (i.e., roads, trails, and livestock water, facilities). To meet these goals, a variety of standard management measures, or BMPs would be applied to all project activities, including: incorporation of livestock grazing rest in pastures or use areas in accordance with new projects such as prescribed burning or seeding, decrease in hot season-of-use in riparian areas, intensive woody riparian plantings, vegetation manipulation, upland erosion control structures, and installation of drainage structures. In addition, gathering wild horses or adjustment of the appropriate management level (AML) numbers, maintenance of existing exclosures, prescribed burning or mechanical vegetation treatment, soil treatment or seeding, installation and maintenance of existing erosion control structures, closure and rehabilitation of selected roads, minimizing new road construction, and minimizing ground-disturbing activities (such as heavy machinery operation near perennial and intermittent drainages or where soils are not in PFC) could affect vegetation communities.

Some soil management measures could result in minor, direct, short-term effects on vegetation resources through surface disturbance and subsequent vegetation removal, the long-term result of these actions would be an increase in soil productivity and site stability. Increased soil productivity and site stability would benefit vegetation resources through maintaining or improving hydrologic function, chemical and biological soil development processes, and nutrient cycling. To protect both vegetative and soil resources, BMPs for project work (Appendix B) would be applied through site specific analysis.

Impacts from Water

Proposed water resources management actions involve managing and protecting streams (and associated riparian and wetland communities), wetlands, and springs by implementing a variety of measures (including implementing management practices, adjusting current grazing management strategies, and road closure activities). These management actions would result in long-term benefits to select riparian and wetland systems by allowing vegetation diversity and structure to redevelop in selected systems. The increased availability of water along normally dry stream channels could result in an increase in the extent of riparian and wetland vegetation along the stream banks. Increases in levels of water and rates of flow through stream corridors also could benefit shrub associations located along the upland border of riparian areas.

Water resource management actions would increase infiltration on upland sites, increase groundwater recharge, increase spring flow, reduce peak flows during flood events, and increase the stability of base flows during late summer and winter. Although some of the water resources management actions (particularly bioengineering measures) would result in direct short-term effects through surface disturbance or vegetation removal, the long-term result would be an increase in hydrologic function and sediment regime for water-dependent

ecosystems. Therefore, the long-term effect of water resources management actions on vegetation, particularly riparian and wetland communities is expected to be beneficial.

In summary implementing BMPs (Appendix B) to minimize detrimental impacts to soils and water quality from ground-disturbing activities and maintaining or enhancing riparian areas through project design features or stipulations would help to reduce soil erosion, surface runoff, and sedimentation of streams. This reduction would help to maintain or improve upland vegetation and riparian and wetland communities. Making necessary management adjustments to meet watershed and riparian objectives (e.g., Standards for Rangeland Health and Guidelines for Grazing Management for Montana and the Dakotas, EIS, 1997-Standard 1-Uplands and Standard 2-Riparian) would reduce the potential for impacts on creeks, springs, and riparian areas associated with trampling and removal of understory vegetation, thus generally maintaining or improving riparian conditions as well as upland vegetation and wetlands.

Impacts from Vegetation

Impacts would vary by method (or a combination thereof) used to accomplish the treatment, whether manual, mechanical, chemical, biological, or fire. Vegetation treatments are designed and implemented to move plant communities towards desired conditions. Not implementing these treatments would inhibit or prevent attainment of ecological objectives and desired outcomes for cold desert shrub, sagebrush steppe, forest and woodland, and riparian communities. Severe or high intensity fire would cause major, long-term indirect impacts in terms of wildlife habitat loss, long-term or permanent reduction in biomass productivity from erosion and plant community/habitat type conversion.

Vegetation treatments are designed to change vegetative composition and diversity from one state to another. As a result, most treatment methods initially remove some or all of the surface vegetation. This removal results in reduction of ground cover and some degree of soil loss. Depending upon the method(s) used, there could also be varying levels of surface disturbance (i.e. seed bed preparation), these impacts would be direct, both short- and long-term and would positively affect some species while adversely affecting others. Creeks, springs, and riparian areas could be adversely affected from the increased run-off and erosion in the short-term until vegetation reestablishes particularly when mechanical treatment methods are used. Because seedling success is greatest when seeds are covered by soil and protected from erosion and when moisture is held, treatment methods that disturb soils often have higher success rates compared to those methods that do not disturb the soil surface. Successful treatments would increase ground cover and vegetative diversity, providing soil stability, reducing soil surface temperatures, increasing water-holding capacity, and increasing food and cover for wildlife. These increases would improve the ecological health in treated areas.

The greatest level of environmental impact occurs when a vegetation treatment fails. A vegetation treatment is considered a failure when the existing vegetation is not removed or the target vegetative community does not become established. When the existing vegetation remains at the site, the environmental consequences to soil are minimal. However, when the treatment is successful in removing existing vegetation but the desired future vegetative community does not become established, a variety of consequences can result. In such cases, mechanical and other surface-disturbing treatment methods can lead to increased erosion

because effective ground cover would not establish, or be greatly reduced. Increased invasion of noxious weeds and other exotic weed species, decreased water holding capacity and availability, and long-term changes in habitat and species composition could occur. The duration of these effects would vary by treatment method(s), habitat and community type, availability of appropriate seed, and amount and timing of precipitation. At best, most such failed treatments would eventually re-vegetate by the means of the existing seed bank or by some new and perhaps less-desirable community.

Treatment areas change over time as vegetation is re-established. Some areas treated early in the planning cycle would become completely re-vegetated and could conceivably require treatment maintenance prior to the next planning cycle. Failed treatments would not be considered permanently "lost" from the system unless the site became reestablished with a highly stable, non-target plant community. Treatment methods that proved to be unsuccessful at achieving the desired results would be modified or discontinued. Because most treatments require at least two growing seasons to determine success, it is unlikely that unsuccessful methods would be used for more than 2 consecutive years. As a result, the potential for failed treatments to occur on the maximum number of acres available for treatment is considered negligible. Use of adaptive management would reduce or eliminate the potential for permanent loss of desired vegetation communities from treatments.

Forest and Woodlands

Under all Alternatives the BLM would conduct inventories and health assessments of forested stands within the decision area during the life of the plan. Based on these findings the BLM would manage vegetation structure, density, species composition, patch size, pattern, and distribution in a manner which reduces the occurrence of unnaturally large and severe wildfires and forest insect/disease outbreaks. To accomplish these objectives the BLM would conduct, or permit forest treatment projects including timber harvest and hazardous fuels reduction project. Within treatment areas vegetation would be subject to surface disturbing activities these activities could result in total removal and/or crushing. Additionally, some areas would be subject to compaction, especially where heavy equipment is used. Compaction would result in decreased infiltration and percolation rates on soils affected, resulting in decreased plant performance. Based on the goals of the treatment areas, vegetative structure would likely change following treatment. For example, following a forest thinning project shorter statured vegetation such as herbaceous species, and shrubs could increase from an increase of space, light, water, and nutrients once used by trees.

Rangelands

Rangelands would be managed to meet health standards consistent with the Standards for Rangeland health. To achieve these standards the BLM would use a variety of treatment methods including but not limited to improved grazing management, prescribed fire, and mechanical treatments. Throughout all Alternatives crested wheatgrass would be targeted for treatment. Crested wheatgrass is a non-native species, and once established, forms nearly exclusive monocultures. The species is moderately to highly competitive with native species, and is highly tolerant to defoliation by grazing and fire. Crested wheatgrass is one of the first forage species to "green-up" in the spring, and therefore plays an important role in many

grazing systems throughout its range. Crested wheatgrass can provide good supplemental winter feed if hayed during this period of growth. Its palatably window is quite short however, and by late spring to early summer is not preferred by grazing animals. Some use does occur during the "fall green-up," or "fall re-growth" period however. Many stands that have not been maintained or improved exhibit various stages of progression back to native communities. Efforts are under way to convert monoculture stands of the species back to native communities. Methods (or prescriptions) include, but are not limited to, mechanical (plowing, chiseling), chemical (herbicide), cultural (grazing) and the use of prescribed fire, individually, or in various prescriptive combinations and intensities. Impacts from individual treatment methods are still being evaluated for economic and biological success (or failure) rates. Specific surface disturbing stipulations (i.e. percent slope, soil type limitations, etc.) can be found in the "Soils" section of Chapter 4.

Riparian and Wetlands

Under all alternates the BLM would manage riparian areas and wetlands to meet health standards, to ensure these areas are in PFC. To achieve these goals a variety of techniques would be implemented on a site specific basis, based on priority and monitoring. Treatments would potentially include improved grazing management, mechanical, hand, and silvicultural treatments. Short-term impacts would include vegetation removal and compaction, however these projects would be intended to benefit riparian and wetland communities, and would therefore have long-term beneficial impacts to these communities.

Invasive Species and Noxious Weeds

Impacts depend upon the method(s) used. All Alternatives would allow a full range of BLM approved treatment methods for controlling noxious weeds that would ensure the highest degree of success. Direct impacts to target species from manual techniques and herbicide applications would range from minor to moderate, with some non-targets experiencing impacts in the short term. Eradication of noxious weeds and invasive species and improved species composition for the remaining community would occur over the long term. Controlling noxious and invasive species would also benefit riparian habitat by reducing competition with native species and by allowing natural ecosystems to reestablish.

Biological Vegetation Treatments

Target species would experience direct short- and long-term impacts caused by biological vegetation treatments. Depending upon the biological control agent, a variety of other direct and indirect effects could occur, including mortality of non-target species. As with other vegetation treatment methods, indirect effects would include reduced soil infiltration, increased erosion and sedimentation, increased soil surface temperatures, and short- or long-term changes in species composition or community structure. Creeks, springs, and riparian areas could be adversely affected from the increased run-off and erosion in the short term, until vegetation re-establishes. Direct and indirect effects from the use and application of specific biological agents are described in detail in the Final EIS for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991a), as well as the final EIS of September 2007; Vegetation Treatments Using Herbicide on Bureau of Land Management Lands in the 17 Western States.

Chemical Vegetation Treatments

Target and some non-target species would experience direct, short-term impacts, depending upon the chemical used and the application rate. Indirect effects would include reduced soil infiltration, increased erosion and sedimentation, increased soil surface temperatures, and short- or long-term changes in species composition or community structure. Creeks, springs, and riparian areas could be adversely affected from the increased run-off and erosion in the short term, until vegetation reestablishes. Direct and indirect effects from the use and application of specific chemicals are described in detail in the Final EIS for Vegetation Treatment on BLM Lands in Thirteen Western States (BLM 1991a), as well as the final EIS of September 2007; Vegetation Treatments Using Herbicide on Bureau of Land Management Lands in the 17 Western States.

Special Status Plants

Special status plant species are known to or could occur in the planning area. Special considerations for the management of these plant species (known populations, or discovered), or if critical habitat is designated, also could impact plant communities. Management for plant and wildlife species designated as threatened or endangered under the ESA or designated as special status species by the BLM can affect resource uses where these SSS occur. Specifically, restrictions on the type, location, or period that consumptive use activities are allowed to occur could limit management options on lands where special status species occur and in turn, could affect vegetative communities. For example, surface use restrictions could affect development or placement of range improvement projects and potentially affect the ability of the BLM or a grazing operator's ability to implement grazing management practices.

Collection and Use of Native Seed/Use of Non-native Plants

Under all Alternatives, collection and use of native seed could be authorized with a permit. Collection of native seed could result in localized, minor short-term impacts to vegetation from trampling, loss of individuals, reduction in seed availability at the collection site, and potential reduction in plant vigor. These impacts would be greatest through commercial collection. Internal collection (BLM staff, volunteers, or interns) would result in reduced impacts as collection would follow protocol outlined in H-1740-2 (Integrated Vegetation Management Handbook). These protocols are intended to limit the loss of individual plants and seed availability, as well as maintain plant vigor. The availability of local native seed would result in moderate indirect long-term impacts, which include improved ability to achieve desired conditions by improving the species composition in areas needing vegetation treatments. The ability of the treatment to achieve project goals would also be dependent on factors outside human control, such as drought, fire, or insects.

Assuming that the criteria described in Chapter 2 are met, non-native plant species could be used in treatment or restoration efforts. The major short-term direct impact from the use of nonnative plant species is the stabilization of soils following disturbance when native species are ineffective, cannot become established, or are unavailable. Additionally, the use of non-native species could be used to break fire cycles on sites that have been degraded or could potentially become dominated by annual species or other species which increase the fire frequency. The major short and long term indirect impacts from the use of non-native plant

species for re-seeding would include changes in the species composition and potentially reduced diversity. Non-native species have the potential to dominate and out compete native species. Once the non-native species have stabilized sites and built up soils, follow-up treatments could become necessary to improve species composition and diversity. An example of this is the many crested wheatgrass dominated lands throughout the planning area. Historically, crested wheatgrass was planted to stabilize sites following unsuccessful attempts at homesteading. This species now dominates many of these locations and species composition and diversity is poor on many of these sites. Alternatives B, C, and D all propose follow-up treatments to improve species composition and diversity on portions of these lands throughout the decision area.

Collection of listed plant species would only be considered if the applicant was issued a collection permit from the USFWS. Additionally the collection of special status plant species would generally not be permitted unless the collection is research based and site specific analysis is completed.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Grazing and habitat utilization can alter vegetative communities and impair riparian-wetland functioning condition. Wildlife habitat utilization can result in removing portions of plants, altering the shape and growth of vegetation, compact soils, and introduce noxious and invasive plant species. This could result in result in reduced plant vigor, production, and potential mortality of individual plants within the vegetative community. These impacts are dependent on numerous factors such as wildlife density, the period of use, the length of use, and climactic conditions. These impacts would be greatest in areas of high wildlife concentration, such as wintering ranges and parturition areas for species that tend to prefer herds or large groups. Transplanting big game species would increase the number of grazing animals; however, wildlife tends to disperse across a large area. Thus, impacts from these newly transplanted big game animals should be minor. Prairie dog colonies represent the most significant visual and structural community alteration to vegetative communities. Black tail prairie dogs, in particular, that occupy surface area in medium to tall grasslands and shrublands, would completely denude the surface of vegetation.

One of the greatest impacts to vegetation from the management of wildlife resources would be from restrictions placed on surface disturbing activities. These restrictions would potentially reduce surface disturbance for defined buffers surrounding key wildlife areas, therefore limiting impacts to vegetation from these activities. Buffer distances vary by Alternative.

Impacts from Fire Ecology and Management

Periodic natural fire cycles have been a major factor in shaping the composition, structure, and distribution of all plant communities within the planning area. Fire history in the timbered regions of the planning area is fairly well documented, however, there is a distinct lack of fire history in the northern short to mid grass steppe region of the planning area. Today, in an effort to protect human life and property, most fire starts are aggressively suppressed. Most researchers agree that reintroduction of fire into ecosystems (e.g. prescribed fire) is essential to help maintain bio-diversity and ecological integrity of fire adapted systems. Reintroduction of

fire (or treatments that mimic naturally occurring fire) on the landscape generally is considered to result in a beneficial effect on fire-adapted vegetation communities in the long-term. The long-term goal of the fire management program is to maintain a variety of seral stages across all vegetation communities on the landscape.

The intensity of impacts from prescribed fire and wildfire used for resource benefit would depend on the size and severity of the fire, as well as the fuel type and quantity. Impacts from fires that cause injury or loss of individual plants and a decrease in soil moisture caused by the elevated soil temperatures would be short-term and minor. Impacts from fires that change species composition, plant density, and vegetative structure and that increase the abundance of non-native invasive, fire-adapted plant species would be direct, major, and both short- and long-term. Reduced biomass productivity caused by accelerated erosion resulting from the reduction in effective ground cover, as well as reduced habitat suitability for seed dispersers, would represent indirect, major impacts. Creeks, springs, and riparian areas could be adversely affected from the increased run-off and erosion in the short term, until vegetation reestablishes. However, these projects are designed to minimize erosion and increase habitat suitability. If these major impacts cannot be mitigated, the project would not be approved or implemented.

Proposed fuels management actions would include a variety of treatment types, including an emphasis on prescribed burning, which would result in beneficial effects on vegetation communities by creating mosaics of disturbance regimes, seral stages, and stand structures. Potential adverse effects associated with prescribed burns include a long-term decrease in some sagebrush species, a short-term increase in annual weeds, and a long-term increase in grass species (especially cheatgrass). Careful planning of the fire prescription would determine the appropriate outcome of each individual burn. Prescribed fire would result in moderate long-term beneficial effects on sagebrush-steppe communities by increasing the age and species diversity within, promoting thicker vegetation growth, enhancing nutrient cycling, and resulting in fewer decadent stands of trees and shrub communities.

General effects of prescribed fire on vegetation include:

- Immediate reductions in the total amount of vegetation, followed by rapid re-growth. Rapid nutrient cycling increases density and vigor of vegetation, in particular, grasses, forbs and fire dependent species. However, species composition could change in the long term. Regrowth begins with a high proportion of herbaceous species, provided there is an adequate seed bank available prior to project implementation. Later, over a period of years, fire tolerant woody species (shrubs and trees) emerge as increasingly dominant community components through the process of succession.

- Reduction of some fire intolerant species and increases of some fire-tolerant or fire dependent species. Shade-intolerant species replace shade tolerant species in the short term.

- Changes in nutritional and physical characteristics of the soil and corresponding effects on plant growth due to a potential nutrient “flush,” particularly

phosphorus and potassium. Long-term net loss of nutrients and organic matter could occur with fire.

- Reduction in the potential for intense wildfire. Prescribed burning reduces surface and ladder fuels in a controlled environment. However, the potential for introduction or spread of noxious weeds and other invasive early seral or non-native species could exist.
- Changes in livestock and wildlife forage use patterns and animal distribution that would affect vegetation. Succulent plant palatability increases after burning.

Wildfires typically result in more adverse effects than prescribed burns, because wildfires generally cover larger areas, remove more vegetation, and burn hotter than controlled burns. High-intensity, long duration fires can also damage soil organisms and plant root systems and alter soil moisture and temperature regimes. This can result in long-term adverse effects on vegetation communities by reducing future plant recruitment and growth rates. Soil 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. Direct impacts from the removal of vegetation from fire-line construction would be short-term and minor. Impacts from using aerially-applied retardant as an Alternative to mechanical line construction would be negligible. Most impacts from fire suppression activities would be minor, short term, and localized, particularly if activities in sensitive habitats are mitigated or avoided. Impacts in the cold desert-shrub community type could be long term because this vegetation type does not recover as readily.

Impacts from Energy and Mineral Resources

Proposed energy and minerals actions could potentially result in both short-term and long-term effects on vegetation communities. These effects would result from direct removal of vegetation and indirect disturbances (e.g., the introduction or spread of noxious weeds).

Energy and minerals management actions could result in the following potential effects on vegetation communities:

- Expansion of existing or creation of new community pits could result in the disturbance or loss of native vegetation communities, including sensitive vegetation communities. This action also could result in the introduction or spread of existing noxious weeds that could further degrade the surrounding land health.
- Public collection of decorative rock (flat rock) in remote areas could involve driving vehicles outside designated roads. Impacts of flat rock collecting on vegetation are considered minor and can be managed through the permit issuance process, based on monitoring of collection sites.

- Energy and mineral exploration and development activities could result in the long-term disturbance or loss of vegetation communities. Overall, the severity of the effects on vegetation resources depends on the amount of the mineral extraction action, the location of the action, and the success of the reclamation efforts. Specific extraction activities would require individual permitting and NEPA analysis, which would identify appropriate measures to minimize effects and reclaim conditions following mining completion. Development would result in permanent loss of vegetation. The degree of loss would depend on the type of development (i.e. wind, solar, etc.).

Impacts from Forestry and Woodland Products

Heavy equipment used in thinning operations for forestry and woodland management would cause some soil compaction and displacement with corresponding effects on plant survival and growth. Compaction and displacement would be minimized by designating skid trails, specifying low-impact equipment, logging over snow and/or frozen ground, suspending operations during periods of high soil moisture content, and closely monitoring operations. Compaction could also be reversed on some sites by scarifying skid trails, temporary roads, and landings. Compaction also diminishes gradually over time through natural processes such as freeze and thaw action, root penetration and other biotic activity.

For some early successional plant species, soil disturbance during mechanized harvest activities would have the effect of preparing a receptive seed bed by exposing mineral soil and reducing plant competition. For these species, disturbance aids in seed germination and survival. Removal of trees, shrubs, logs, and organic matter would reduce shade and protective cover, altering the physical and micro-climatic characteristics of the site that affects plant habitat. Wildlife and micro-biota (plant and animal) composition would also change, which would further affect plant communities.

Site Rehabilitation and Restoration

Restoration projects using mechanical treatments are designed to produce long-term positive ecological effects. Mechanical vegetation treatments are implemented to achieve two main objectives: 1) restoration of plant communities, habitats, and watersheds; and 2) reduction of natural fuels for protection of life and property. Depending on the specific treatment, equipment used, site conditions, and plant community involved, these activities have the potential to improve long-term condition, composition, and structure of vegetation. Most of the long-term vegetation changes occur with a response to a reduction of plant competition for a limited supply of sunlight, water, nutrients, and physical space.

Site rehabilitation and integrated weed management is often needed where a ground disturbance has occurred. Methods of rehabilitation of damaged sites would include mechanical, manual, chemical, and biological techniques. Manual and biological effects on vegetation would not be discussed because they are relatively minor in terms of acreage treated compared to treatments using motorized/mechanical methods. Site rehabilitation and management of noxious weeds and invasive annuals is commonly needed where ground disturbance such as mining, logging, road construction, utilities and other rights-of-way, and

visitor-created roads/ trails has occurred. Natural events such as wildfire and soil erosion would also be considered for rehabilitation.

Rehabilitation of disturbed sites and management of weeds restores overall ecosystem and watershed health with extenuating benefits to all other resources including soils, water quality, vegetation, wildlife, and visual quality.

Impacts from Lands and Realty

Land Tenure Adjustments (LTA; i.e., acquiring or disposing of lands) could result in sensitive vegetative communities entering or leaving federal ownership. High-quality riparian areas are identified in the LTA criteria as areas BLM would retain or acquire, thereby increasing federal ownership of riparian areas and associated federal protection not afforded to lands in private ownership. Impacts to vegetation resources could result from disposal of federal lands. Impacts associated with land disposals would depend upon the use of those lands by future owners. In the worst-case scenario, all vegetation would be removed from a parcel of land and the site would be paved or otherwise permanently altered to prevent future vegetation growth. This represents minor-to-moderate long-term impacts, depending upon the size and location of the parcel. Parcels that include listed threatened, endangered, or proposed species would not be identified for disposal.

Impacts to vegetation resources could result from issuance of land use authorizations (e.g., ROWs, permits, leases, easements). Impacts from issuance of these authorizations would vary, based on the nature and purpose of the authorization. Impacts to vegetation and riparian areas would generally be minor to moderate and would be addressed in site-specific NEPA analysis. Rights-of-way would be avoided in sensitive resource areas. This would include areas where soil erosion cannot be effectively controlled or mitigated and reclamation to BLM program standards is likely to be unsuccessful. This would maintain soil and vegetation quality and ensure that a site is not degraded.

Impacts from Livestock Grazing

Existing policy directs BLM to properly manage livestock grazing in order to meet land health standards. Individual grazing allotments (Appendix S) would be evaluated against the five Standards for Rangeland Health (Appendix I). If allotments are not meeting these criteria, then livestock management would be adjusted using specific and appropriate Guidelines for Grazing Management (i.e., adjusted AUMs, season of use, grazing intensity, etc.).

Grazing by domestic livestock and wild horses can affect soil, vegetation, and ecological processes. Effects on soil depend upon the intensity, duration, timing, and frequency of the grazing event, and the type of soil. Effects include compaction (which can decrease water infiltration and increase erosion) and some local displacement which can increase erosion from wind and water. Grazing can also result in beneficial effects by incorporating organic material and seeds into the soil, increasing nutrient cycling and germination of native plants.

Grazing by livestock, wildlife, rodents, insects, or fire would cause defoliation of individual plants. This, in turn can have two consequences: 1) reduced leaf area and thus reduced photosynthesis, or 2) increased photosynthesis if defoliation removes dead leaves that were

shading and retarding new growth. By carefully managing the timing, intensity, duration and frequency of defoliation treatments, grazing management can promote increased frequency of one plant form over another. However, where animals are allowed to graze for too long of time in one area, individual plants would become over stressed from repeated defoliation, and would become weakened over time. Providing rest or deferment (rest during a specific life-cycle stage) is important during the growing season. This allows plants time to recover from grazing defoliation, and remain vigorous and capable of reproducing.

Grazing by livestock and wild horses primarily affects sagebrush-steppe associations, grassland associations, and riparian/wetland associations. Some localized overuse of forage would most likely occur, primarily in riparian and wetland areas and near watering facilities. When forage plants are overused, desirable native species can be replaced by less desirable species that possess little or no forage value. A decline in soil condition, plant cover, and species composition also can encourage the invasion and establishment of noxious weeds. Early spring grazing also would adversely affect vegetation resources by the trampling of wet soils, uprooting of seedlings, and damage to mature plants.

Three allotments along the Montana/Wyoming border are currently administered by the BLM Cody Field Office, Cody, Wyoming: (30,197 acres). Although these acres are in the official planning area boundary, the livestock grazing management would not impact the program.

Impacts from Recreation and Visitor Services

Surface disturbance activities associated with proposed recreation resources management are likely to result in minor site-specific effects to vegetation resources. Limitations on recreation activities (i.e., limits on OHV use) as part of special recreation management areas (SRMAs) or within other special designations are anticipated to benefit vegetation communities by limiting potential ground disturbance. Recreational activities can introduce the spread of noxious and invasive weed seeds from vehicles, shoes, clothing, and recreational equipment. As recreation use increases, people from outside the area have brought in noxious and invasive weeds, including new invasive species. Recreation activities that occur in undisturbed and remote areas have the potential to distribute weed seeds into otherwise weed-free areas.

Recreation management actions that would result in varying degrees of loss or short-term disturbance of vegetation communities include:

- Construction and public use of interpretive sites would result in direct and indirect disturbance or loss of sensitive native communities (riparian and wetland communities) that occur in or adjacent to the interpretive sites. Vegetation would be affected directly during construction of the interpretive facilities, by public use of these areas (trampling of vegetation) and by surface disturbances resulting in the spread of existing or introduction of new noxious weeds that could degrade the community.
- Establishment of trails that are planned for interpretive and tourism development could result in the loss or disturbance of vegetation communities.

- The overall potential effects of these types of management actions to all plant associations are expected to be negligible to minor and short term because specific projects would involve the protection of sensitive vegetation communities and implementation of noxious weed prevention guidelines. Additionally, potential conflicts would be identified through an interdisciplinary process and appropriate actions would be taken to monitor, avoid, protect, or mitigate potential effects.

Impacts from Trails and Travel Management

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 fails 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 water, leading to erosion within the road and vegetative loss adjacent to the road. Appropriate design standards and features that minimize surface runoff and subsequent soil erosion and subsequent vegetative loss would be required for new roads/trails.

Limiting road density per square mile could cause road closures in some locations of the planning area. The primary negative effects of high road density are habitat fragmentation/degradation and disturbance/disruption to wildlife and grazing animals.

Common road closure techniques include (but are not limited to) the following:

- Signage that indicates the road is closed and being allowed to naturally revegetate
- Rubble and debris piles at road entrance points
- Physical barriers, such as gates and tank traps
- Mechanical ripping and obliteration of the road surface, followed by reseeding

Impacts from Special Designations

National Landmarks

The acquisition of and subsequent designation of Pompeys Pillar National Monument has provided the maximum level of protection for vegetation resources at the site. The site is maintained as close to pristine condition as possible, while still providing for visitor services, its interpretive and historical values. Settlement of the area brought farming and agriculture to site, altering most of the native vegetation surrounding the site. As such, many restoration projects have (and continue to) occur at the site. Based on historical records, vegetation restoration related projects are aimed at restoring the site to its condition in the year 1805, when Captain Clark and Corps of Discovery visited the site. Surface disturbing activities such as oil and gas development, renewable energy development and timber harvest are not allowed at the site. Livestock grazing is not authorized and the site has not been adjudicated as open to grazing.

Areas of Critical Environmental Concern

Although ACEC designation alone does not necessarily provide protection, management actions included in ACECs are often more restrictive, thus indirectly providing protection for vegetation and riparian-wetland communities. Protections associated with ACEC designation that would affect vegetation and riparian-wetland resources include managing oil and gas leasing as closed to leasing or open to leasing subject to moderate constraints (NSO), implementing more restrictive VRM designations, restricting some classes of livestock grazing, and implementing travel limitations. Collectively, most impacts from ACEC designation and management are beneficial to plant communities located in them.

4.2.6.2.4 Alternative A

Impacts from Soil

Under this Alternative the use of wheeled or tracked equipment would be prohibited on sustained sloped >35 percent, and skid trails, landings and road would be re-seeded following disturbance. These stipulations would limit the amount of surface disturbance on slopes > 35 percent and protect existing vegetation on approximately 33,908 acres of public land throughout the planning area. The requirement of seeding specific disturbed areas would potentially reduce the potential for invasive species and noxious weed establishment in these areas. These species, if established, have the potential to infest neighboring vegetative communities.

Impacts from Water

Under this Alternative the use of rangeland health standards and BMPs would be used to stabilize watershed condition where range condition or grazing management is contributing to excessive erosion. Management to meet these objectives would lead to improved vegetative conditions for both upland vegetative communities, as well as riparian communities.

An NSO would be stipulated to fluid mineral development on all riparian areas, wetlands, water bodies, and 100 year flood plains. This stipulation would eliminate surface disturbance to these

areas, and protect the associated vegetative communities in these areas. Where fluid mineral development does occur produced water would be in compliance with Montana DEQ requirements. This would ensure that water quality would not impair vegetation in these areas.

Impacts from Vegetation

Forest and Woodlands

Under this Alternative forest and woodland treatments could occur on 68 percent of the forested public lands within the planning area (21,807 acres) over the life of the plan. Where these activities take place impacts would be the same as impacts common to all Alternatives. Additionally, harvests on slopes >35 percent could be conducted through line or helicopter methods. Where these activities take place vegetative communities would benefit from the treatment, while having very isolated surface disturbance. Adverse impacts to vegetative communities would be minimal.

Rangelands

Under Alternative A 6,418 acres of sagebrush treatment are proposed using a variety of techniques including prescribed fire. Additionally, 160 acres of crested wheatgrass would be hayed or mechanically treated to improve forage production, range condition, and reduce erosion. Where treatments occur, impacts would be the same as impacts common to all Alternatives based on treatment methods. This Alternative proposes treating the fewest acres of crested wheatgrass of all Alternatives.

Riparian and Wetlands

Impacts would be the same as impacts from water under Alternative A. Additionally an NSO would be stipulated with a ¼ mile buffer from designated reservoirs with fisheries (10,114 acres). This would benefit communities within these buffers, ensuring these areas remain undisturbed from the associated activates. Given the fact that there are currently no designated reservoirs with fisheries and the low RFD for fluid mineral development there is little potential for adverse impacts to these areas.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives based on the treatment methods used. Under Alternative A. 366-5,548 acres of invasive species and noxious weeds would be treated annually.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative A buffers to surface disturbance from key wildlife habitat areas generally less than Alternative B, more than Alternative C, and slightly less than Alternative D.

Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative A. 6,280 acres of prescribed fire could occur on public lands within the planning area over the life of this plan. This is less than all other Alternatives (Alternatives B-D propose 21,700 acres)

Impacts from Energy and Mineral Resources

Coal

Development of coal minerals could have direct impacts to vegetation. Impacts vary by the technique used to mine the coal. All techniques would likely require access roads which would need to be constructed; existing roads would likely need to be improved, therefore vegetation would be removed from these areas. Increased use would increase the potential for invasive species and noxious weed infestations. Sub surface mining would have limited impact to vegetation, as most activities would be below the surface. If open pit or surface mining was permitted the impacts to vegetation would be much greater. These impacts would include the removal of soils and vegetation to access coal minerals below. Following mining the area would need to be reclaimed. Under Alternative A, 26,131 acres would be closed to coal development, potentially protecting vegetation in these areas.

Fluid Minerals

Development of subsurface fluid minerals includes well pad construction, drilling, road construction, pipeline construction, vehicular travel during construction, well maintenance and reclamation. These activities would lead to impacts to vegetation, such as removal of vegetation, crushing of vegetation, compaction of soils decreasing vegetation performance and vigor. Increased use would increase the potential for invasive species and noxious weed infestations.

The RFD projects 2-4 federal wells per year. Short-term surface disturbance would affect 17.2 acres/year and long-term surface disturbance would impact 74.2 acres/year during 2010 to 2014. These impacts would increase to 21.6 acres/ year short term and 10.8 acres/year long term. The total projected acres of disturbance over 20 years would be: 2,158 acres of surface disturbance with 1,106.5 acres reclaimed from 80 wells over 20 years. Therefore over the life of the plan impacts to vegetation across the decision area would be very minor. Under Alternative A, 72,325 acres would be managed with NL or NSO stipulations, potentially protecting vegetation in these areas.

Locatable Minerals

Exploration and development of locatable minerals creates surface disturbances that could adversely impact vegetation. These impacts would be similar to impacts discussed in the coal section above. Under Alternative A. 39,700 acres would be closed to locatable mineral development and exploration, less than Alternatives: B (270,977) and D (54,761).

Mineral Materials

Impacts would be the same as impacts from Coal development. Under Alternative A 44,583 acres would be closed to development of mineral materials. Acres closed for all Alternatives are as follows: A (44,583); B (343,745); C (251,927); D (272,122).

Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives. Timber harvest at a PSQ of: 70 mbf/year would impact approximately 18 acres each year. Management includes prohibiting wheeled or tracked equipment operation on sustained slopes greater than 35 percent and re-seeding of grasses and forbs on skid trails, landings, and roads. 18 acres per year is an overestimate as not all areas within a harvest unit would be subject to surface disturbance. Under certain circumstances, sales of timber could reach 1 mmbf/year with a corresponding increase in adverse impacts to soil resources, however based on historic timber harvest acreages, the likely hood of sales of this size (257 acres) taking place in a year, is considered small. Based on assumptions stated earlier in this chapter the total acres expected to be harvested over the life of this plan would be approximately 3,340 acres, this number is an overestimate as not all acres would be subject to surface disturbance. Adverse impacts from forest and woodland management actions are expected to be moderate to minor and short term. The adherence to Montana Stream Zone Management Law would be expected to limit impacts including erosion and compaction, both short and long term, allowing for improved vegetative response from both existing vegetation and rehabilitation efforts. In areas where increased soil disturbance, and compaction is expected to be high and natural recovery is not likely rehabilitation would be needed to ensure sites remain stable and productive. Rehabilitation efforts would need to be analyzed in the site specific environmental analysis.

Impacts from Lands and Realty

Under Alternative A, the most acres (7,529 acres) would be available for disposal through land tenure adjustment. An additional 2,088 acres would be identified for further study. Impacts under this Alternative could be minor to moderate depending on the vegetation community type and ecological condition class they are in. Vegetation communities (and associated habitats) that would be disposed of would no longer receive federal protection under federal law or policy. Additionally ROWs would be excluded from 44,014 acres. There are 24,203 acres of avoidance areas under this Alternative. This Alternative protects the least amount of acres from ROW development and therefore has the greatest potential to adversely impact vegetation resources. The small number of ROW authorized each year keeps the impacts from these activities minor to negligible. Based on assumptions stated earlier in this chapter surface disturbance over the life of this plan from rights-of-way would be approximately 289 acres with 262 acres being reclaimed.

Impacts from Livestock Grazing

Where livestock grazing is authorized, impacts would be the same as impacts common to all alternatives.

Under Alternative A, livestock grazing would be permitted on 387,057 acres, with the exception of a number small, isolated and unallocated parcels in Sweet Grass, Wheatland and

Golden Valley counties. Two designated recreation/natural areas are currently closed to livestock grazing. Temporary nonrenewable permits have not been issued for unallocated parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock grazing and serve as a primary means of improving range conditions on category I and maintaining M and C category allotments (see Glossary). The trend of continued improvement in rangeland productivity in the planning area is expected to continue under current management.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, Sundance Lodge Recreation Area and Four Dances Natural Area ACEC would continue to be managed as SRMAs (1,171 acres).

Impacts from Trails and Travel Management

Under Alternative A, travel is restricted to "existing roads and trails". Allowing OHV travel off existing roads and vehicular routes to retrieve big game kills and to access primitive campsites would increase disturbance from OHVs and trampling by humans, increasing vegetation damage in these localized areas. Rangeland management and monitoring sites, areas or sites of seeding, predator control, vegetation treatment, fuels management, monitoring or exclosures are typically accessed by motorized vehicle along existing routes. Total closure of routes to or near these areas or sites could have a detrimental effect on the ability of the agency personnel to access them to conduct research, treatments, reclamation, or other related activities.

With regard to the 259 routes that are associated with rangeland management or monitoring areas or sites under the No Action Alternative, 237 routes (446 miles) or about 92 percent would continue to be managed as open/open with restrictions or limited to administrative use only. Although Alternative A carries forward 22 route closures, over 8 percent of routes associated with facilities, the direct, long-term effect of these closed routes on the ability of agency personnel to access these sites would be negligible, due to the continued availability of over 9 out of every 10 existing BLM routes for these activities.

Routes that are proposed for closure would either be allowed to reclaim vegetative cover naturally over time or would receive some degree of mechanical reclamation following closure. In either case, the route acreage returned to a more natural condition would potentially change overall upland health associated with such routes.

Under the No Action Alternative, no routes would be slated for active, mechanical reclamation. However, 81 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 120 acres.

Impacts from Special Designations

National Landmarks (PPNM)

Increases in the region's population and increases in visitor use days to the decision area would impact vegetation and the demand on it for various uses. As more people travel, recreate, hunt,

and otherwise enjoy BLM-administered public lands, vegetation resources are trampled from foot, animal, bike, and vehicle travel. This occurs on small, localized areas, and the effect is minimal. Conversely, education of the public who use and value these resources creates advocates for the natural ecology and traditional uses of the vegetative resources, which might have long-term benefits to vegetation resources. As the public becomes aware of their impacts, the public would learn to use techniques that are less harmful to vegetation in the BiFO. Under Alternative A, PPNM is designated as a national treasure and is provided the greatest level of protection from human disturbance, including the vegetation community.

Areas of Critical Environmental Concern (ACEC)

Impacts to vegetation from the management of ACECs under Alternative A are confined to the Meeteetse Spires ACEC. Sheep grazing is not allowed in this ACEC due the SSS plants vulnerability to defoliation and the domestic sheep's ability and potential to access the isolated sites. If allowed, surface disturbing activities (such as range improvements) that affect the vegetative community would be subject to moderate to major constraints and or restrictions that protect the ACEC values. Under this Alternative 37,896 acres are designated as ACECs

4.2.6.2.5 Alternative B

Impacts from Soil

Under this Alternative authorizations would not be allowed in areas where erosion would not be effectively controlled, and surface disturbing activity would not be allowed on slopes >30 percent. The use of BMPs would be used to mitigate disturbances. The use of BMPs would reduce impacts to soils and vegetation in the area, and increase reclamation potential of disturbed sites. These stipulations would reduce surface disturbance on 47,795 acres of public lands within the planning area. This is more than Alternatives A and C, and the same as Alternative D.

Impacts from Water

Impacts would be similar to Alternative A, however the BLM would restrict activities that contribute to watershed conditions. This includes restricting other uses rather than grazing alone as in Alternative A. This would allow greater potential for improved vegetative conditions within the watershed. Additionally, a ¼ mile NSO buffer would be stipulated for fluid mineral development from riparian areas, wetlands, water bodies, and flood plains. This would potentially benefit vegetative communities within the buffer. Where fluid mineral development takes place, discharge water would not be allowed into streams. This stipulation would ensure that contaminated water does not impact associated vegetative communities.

Impacts from Vegetation

Forest and Woodlands

Under this Alternative forest and woodland treatments could occur on 60 percent of the forested public lands within the planning area (19,241 acres) over the life of the plan. Where these activities take place impacts would be the same as impacts common to all Alternatives. Additionally, harvests on slopes >30 percent could be conducted through line or helicopter

methods. Where these activities take place vegetative communities would benefit from the treatment, while having very isolated surface disturbance.

Rangelands

Under Alternative B there would be no prescribed fire treatments in sage brush communities. Additionally, 22,414 acres of crested wheatgrass would be converted to native communities over the life of this plan. Where treatments occur, impacts would be the same as impacts common to all Alternatives based on treatment methods. This Alternative proposes treating the most acres of crested wheatgrass of all Alternatives.

Riparian and Wetlands

Impacts would be the similar to Alternative A. However the NSO buffer distance from designated reservoirs with fisheries would increase from ¼ mile to ½ mile, increasing protections to associated vegetative communities (24,373 acres under Alternative B). Under Alternative B riparian areas would be managed towards Desired Future Communities (DFCs), and management efforts would emphasize recovery of high priority areas.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives based on the treatment methods used. Under Alternative B. 200-800 acres of invasive species and noxious weeds would be treated annually.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative B buffers to surface disturbance from key wildlife habitat areas generally the greatest of all Alternatives, therefore protecting the most vegetative communities of all Alternatives.

Under Alternative B, the development of springs would not be authorized in riparian areas and wetlands. This would have a beneficial impact to riparian communities if these areas were already excluded from livestock grazing, however if these areas were not excluded from livestock grazing impacts there would likely be adverse. Typically during the development of springs water is piped from riparian areas, and excess water continues support riparian areas which would be fenced. Therefore spring development would benefit riparian areas, as well as improve livestock distribution improving, potentially improving rangeland health on uplands.

Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative B. 21,700 acres of prescribed fire could occur on public lands within the planning area over the life of this plan, 15,420 more acres that Alternative A. Additionally, wildfire to meet resource objectives could be used on 52,548 acres

Impacts from Energy and Mineral Resources

Coal

Under Alternative B, no new coal leasing would be available; therefore there would be no potential adverse impact to vegetation from coal development.

Fluid Minerals

Impacts would be the same as Alternative A. Under Alternative B, 330,823 acres would be managed with NL or NSO stipulations, potentially protecting vegetation in these areas. This is more than any other alternate

Locatable Minerals

Exploration and development of locatable minerals creates surface disturbances that could adversely impact vegetation. These impacts would be similar to impacts discussed in the coal Alternative A. Under Alternative B 270,977acres would be closed to locatable mineral development, more than all other Alternatives: A (39,700), C (36,955) and D (54,761).

Mineral Materials

Impacts would be the same as impacts from Coal development under Alternative A. Under Alternative B 343,745 acres would be closed to development of mineral materials sales. Acres closed for all Alternatives are as follows: A (44,583); B (343,745); C (251,927); D (272,122).

Impacts from Forestry and Woodland Products

Impacts would be the similar to Alternative A. however no new roads would be constructed unless approved by a travel plan which would be expected to include effective mitigation measures to control erosion and reduce compaction. Decommissioning and reclaiming roads immediately after project completion would increase the reclamation potential of disturbed areas, have a corresponding beneficial impact to vegetative communities.

Impacts from Lands and Realty

Under Alternative B, the least number of Category III acres would be conveyed (68 acres) through land tenure adjustments. Impacts under this Alternative would be negligible. Vegetation communities (and associated habitats) that would be disposed of would no longer be protected by federal law or policy. Additionally ROWs would be excluded from 211,385 acres. There are 185,607 acres of avoidance areas under this Alternative. This Alternative protects the most acres from ROW development and therefore has the greatest potential for beneficial impacts vegetation resources.

Impacts from Livestock Grazing

Where livestock grazing is authorized, impacts would be the same as impacts common to all alternatives.

Under Alternative B, livestock grazing would be permitted on 386,092 acres, with the exception of a number small, isolated and unallocated parcels in Sweet Grass, Wheatland and Golden Valley counties. Under Alternative B, livestock grazing would not be permitted on the

following lands: Pompeys Pillar ACEC (432 acres), Bundy Island (78 acres), Pryor Mountain Herd Area (28,387 acres), Twin Coulee WSA (6,756 acres), Sundance Lodge (387 acres), Four Dances Natural Area ACEC (784 acres), Asparagus Point (+/- 26 acres, that portion north of the Musselshell River and accessible from State Hwy 12), Meeteetse Spires (1,523 acres). Under Alternative B, livestock grazing would not be permitted in these areas for any reason, and therefore would not impact the existing vegetative communities.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, seven areas (90,783 acres) would be managed as SRMAs. This is more than Alternative A, but less than Alternatives C and D.

Impacts from Travel Management

Of the 259 routes that are associated with rangeland management or monitoring areas or sites under Alternative B, 142 routes (385 miles) or about 55 percent would continue to be managed as open/open with restrictions or limited to administrative use only (36 percent fewer than in Alternative A). Because Alternative B would close 117 routes, or over 45 percent of routes associated with these sites, the direct, long-term effect of these closed routes on the ability of agency personnel to access livestock grazing facilities would be moderate to major, due to the availability of over 5 out of every 10 existing BLM routes for these activities.

Under Alternative B, no routes would be slated for active, mechanical reclamation (same as Alternative A). However, 458 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 404 acres, 285 more acres than Alternative A.

Impacts from Special Designations

National Landmarks (PPNM)

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 181,175 acres would be managed as ACECs.

4.2.6.2.6 Alternative C

Impacts from Soil

Impacts would be similar to Alternative B, however surface disturbing activity would not be allowed on slopes >45 percent. These stipulations would reduce surface disturbance on 16,782 acres of public lands within the planning area. This is the fewest of all Alternatives.

Impacts from Water

Impacts would be similar to Alternative A, however an NSO would be stipulated for fluid mineral development on riparian areas, wetlands, water bodies, and flood plains of perennial streams, therefore potentially protecting more acres.

Impacts from Vegetation

Forest and Woodlands

Under this Alternative forest and woodland treatments could occur on 79 percent of the forested public lands within the planning area (25,335 acres) over the life of the plan. Where these activities take place impacts would be the same as impacts common to all Alternatives. Additionally, harvests on slopes >45 percent could be conducted through line or helicopter methods. Where these activities take place vegetative communities would benefit from the treatment, while having very isolated surface disturbance.

Rangelands

Under Alternative C, a variety of treatment methods could be used to achieve diversity within sagebrush stands. Additionally, 7,500 acres of crested wheatgrass would be converted to native communities over the life of this plan. Where treatments occur, impacts would be the same as impacts common to all Alternatives based on treatment methods. This Alternative proposes treating the more acres of crested wheatgrass than Alternative A 160 acres, but less than Alternative B 24,414 acres and Alternative D 12,000 acres.

Riparian and Wetlands

Impacts would be the similar to Alternative A. However an NSO would be stipulated for areas within ¼ mile of blue ribbon streams and YCT populations, therefore potentially protecting 6,666 acres of vegetation.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives based on the treatment methods used. Under Alternative C. 1,500-3,000 acres of invasive species and noxious weeds would be treated annually.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative C buffers to surface disturbance from key wildlife habitat areas generally the least of all Alternatives. This would provide the fewest acres of vegetation from surface disturbance of all Alternatives.

Under Alternative C, Spring developments would be authorized and developed to maintain the integrity and function of associated riparian areas and wetlands. This would be a beneficial impact to both riparian and wetland vegetative communities, as well potentially be a beneficial impact to rangeland vegetation, through improved livestock distribution.

Impacts from Fire Ecology and Management

Impacts would be the same as Alternative B. However the use of wildfire to meet resource objectives would not be used.

Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts under Alternative A. Under Alternative C, 264,450 acres would be closed to coal development. This is more than Alternative A, but less than Alternatives B and D.

Fluid Minerals

Impacts would be the same as Alternative A. Under Alternative C, 130,026 acres would be managed with NL or NSO stipulations, potentially protecting vegetation in these areas. This is more than Alternative A, but less than Alternatives B and D.

Locatable Minerals

Development of locatable minerals creates surface disturbances that could adversely impact vegetation. These impacts would be similar to impacts discussed in the coal Alternative A. Under Alternative C, 36,955 acres would be closed to locatable mineral development and exploration, this is less than Alternatives A (39,955 acres), B (270,977), and D (54,761).

Mineral Materials

Impacts would be the same as impacts from Coal development under Alternative A. Under Alternative C 251,927 acres would be closed to development of mineral materials sales. Acres closed for all Alternatives are as follows: A (44,583); B (343,745); C (251,927); D (272,122).

Impacts from Forestry and Woodland Products

Impacts would be the similar to Alternative B, however under Alternative C timber harvest at a PSQ of 250 mbf/year would impact approximately 66 acres each year, rather than a PSQ of 70 MBF impacting 18 acres per year under Alternative A. While 66 acres per year could be treated 66 not all areas within a harvest unit would be subject to surface disturbance. Management includes prohibiting surface disturbing activities on slopes >45 percent, and disturbed areas would require re and re-seeding of grasses and forbs on skid trails, landings and roads. Additionally, new roads would be constructed following BMPs, these roads could be added to existing travel management plans. This would reduce vegetation in the long term compared to Alternative B which would require new roads to be reclaimed. If temporary roads were constructed rehabilitation would be required within 1 year of project completion, rather than immediately as in Alternative B. This would increase the potential for invasive and noxious weed species invasion.

Impacts from Lands and Realty

Land tenure adjustments under Alternative C would be less than Alternative A ("disposals"), but more than Alternatives B and D. 4,719 acres of Category III disposal acres would be

available for conveyance. Impacts under this Alternative could be minor to moderate depending on the vegetation community type and ecological condition class they are in Vegetation communities (and associated habitats) that would be disposed of would no longer be protected by federal law or policy. Additionally ROWs would be excluded from 39,491 acres, the fewest of all Alternatives. There are 355,601 acres of avoidance areas under this Alternative.

Impacts from Livestock Grazing

Where livestock grazing is authorized, impacts would be the same as impacts common to all alternatives.

Under Alternative C, the following areas could be open to livestock grazing on a temporary basis for the treatment of noxious weeds, or as a prescription treatment (targeted grazing) to meet site specific vegetation or other resource management goals: Pompeys Pillar ACEC (432 acres), Bundy Island (78 acres), Sundance Lodge Recreation Area (387 acres), Four Dances Natural Area ACEC (784 acres), Asparagus Point (+/- 26 acres, that portion north of the Musselshell River and accessible from State Hwy 12), Meeteetse Spires (558 acre acquisition area) and Twin Coulee WSA (6,756 acres). Total acres available for targeted prescription grazing treatments: 9,021 acres. Short and long-term positive impacts such as enhanced integrated noxious weed treatment, possible reduction of fuels, re-invigoration of native and introduced plant communities, etc. would occur under this Alternative, but not under Alternative B on 9,021 acres.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, eleven areas (147,181 acres) would be managed as SRMAs. This is the most of all Alternatives.

Impacts from Trails and Travel Management

Of the 259 routes that are associated with rangeland management or monitoring areas or sites under Alternative C, 247 routes (494 miles) or over 95 percent would continue to be managed as open/open with restrictions or limited to administrative use only (4 percent more than in Alternative A). Because Alternative C would close just 12 routes, at 5 percent of routes associated with facilities, the direct, long-term effect of these closed routes on the ability of agency personnel to access these sites would be negligible, due to the availability of over 9 out of every 10 existing BLM routes for these activities.

Under Alternative C, no routes would be slated for active, mechanical reclamation (same as Alternative A). However, 18 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 6 acres, 63 fewer acres than Alternative A.

Impacts from Special Designations

National Landmarks (PPNM)

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 67,079 acres would be managed as ACECs.

4.2.6.2.7 Alternative D (Preferred Alternative)

Impacts from Soil

Impacts would be similar to Alternative B.

Impacts from Water

Impacts would be similar to Alternative C; however, an NSO buffer of 300 feet would be stipulated for fluid mineral development on riparian areas, wetlands, water bodies, and flood plains of perennial streams, therefore potentially protecting more acres.

Impacts from Vegetation

Forest and Woodlands

Impacts would be the same as Alternative B.

Rangelands

Impacts would be the same as Alternative C, however 12,000 acres of crested wheatgrass would be converted under Alternative D, compared to 7,500 acres under Alternative C.

Riparian and Wetlands

Impacts would be similar to Alternative B, however the NSO buffer for fluid mineral development near riparian areas, wetlands, waterbodies, perennial streams and flood plains would be reduced from ¼ mile to 300 feet (9,087 acres), therefore providing less potential protections for vegetative communities in these areas.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives based on the treatment methods used. Under Alternative C. 400-2,000 acres of invasive species and noxious weeds would be treated annually.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative D buffers to surface disturbance from key wildlife habitat areas generally the more than Alternative C, less than Alternative B, and slightly more than Alternative A.

Spring developments would be managed the same as Alternative C, with the same impacts.

Impacts from Fire Ecology and Management

Impacts would be the same as Alternative B. However the use of wildfire to meet resource objectives could potentially occur on 62,937 acres, this is 10,389 acres more than Alternative B.

Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts under Alternative A. Under Alternative D, 280,971 acres would be closed to coal development. This is more than Alternatives A and C but less than Alternative B.

Fluid Minerals

Impacts would be the same as Alternative A. Under Alternative D, 336,100 acres would be managed with NL or NSO stipulations, potentially protecting vegetation in these areas. This is more than all the other Alternatives.

Locatable Minerals

Exploration and development of locatable minerals creates surface disturbances that could adversely impact vegetation. These impacts would be similar to impacts discussed in the coal Alternative A. Under Alternative D 54,761 acres would be closed to locatable mineral development, this is more than Alternatives A (39,700 acres) and C (36,955), but less than Alternative B (270,977).

Mineral Materials

Impacts would be the same as impacts from coal development under Alternative A. Under Alternative D 272,122 acres would be closed to development of mineral materials sales. Acres closed for all Alternatives are as follows: A (44,583); B (343,745); C (251,927); D (272,122).

Impacts from Forestry and Woodland Products

Impacts would be the same as Alternative C, however the PSQ would be reduce from 250 MBF impacting 66 acres annually to 125 MBF impacting 33 acres per year.

Impacts from Lands and Realty

Alternative D would convey only slightly more Category III acres than Alternative B (302 acres) through land tenure adjustments. Impacts under this Alternative would be also negligible. Vegetation communities (and associated habitats) that would be disposed of would no longer be protected by federal law or policy. Additionally ROWs would be excluded from 48,258 acres. This is more than Alternatives A and C, but less than Alternative B. There are 349,358 acres of avoidance areas under this Alternative. This is more than Alternative A and B, but slightly less than Alternative C.

Impacts from Livestock Grazing

Impacts under Alternative D are essentially the same as Alternative C.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, nine areas (110,862 acres) would be managed as SRMAs. This is more than Alternatives A and B, but less than Alternative C

Impacts from Trails and Travel Management

Of the 259 routes that are associated with rangeland management or monitoring areas or sites under Alternative D, 247 routes (523 miles) or about 95 percent would continue to be managed as open/open with restrictions or limited to administrative use only. Because Alternative D would close 14 routes, or about 5 percent of routes associated with these sites, the direct, long-term effect of these closed routes on the ability of agency personnel to access most sites would be negligible, due to the availability of over 9 out of every 10 existing BLM routes for these activities.

Under Alternative D, no routes would be slated for active, mechanical reclamation (same as Alternative A). However, 66 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 73 acres, 47 fewer acres than Alternative A.

Impacts from Special Designations

National Landmarks (PPNM)

Impacts would be the same as impacts common to all Alternatives.

Areas of Critical Environmental Concern (ACEC)

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 38,786 acres would be managed as ACECs. This is more than slightly more than Alternative A, but less than Alternatives B and C.

4.2.6.2.8 Cumulative Impacts

Cumulative effects include future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. The planning area is interspersed with parcels of non-BLM managed lands including federal, tribal, state, and privately owned lands. BLM managed lands include 434,154 acres of surface and 1,839,782 acres of federal mineral estate (private or other agency surface ownership with BLM management of mineral resources). These lands are spread thinly across 10,804,549 total acres in nine counties. BLM managed resources occur in 12.8 percent of the planning area Activities taking place within the planning area cumulatively impact vegetation resources within the planning area. Existing and reasonably foreseeable actions on lands in the planning areas that have the potential to cumulatively affect vegetation resources include:

- Domestic livestock grazing would continue to affect 98 percent or less of the areas, with actual grazing use differing depending on grazing system design

- Fish and wildlife development and use would continue at its current or an increased rate depending on the condition of habitat, which is influenced by terrestrial vegetation health
- Mineral exploration and production are not expected to increase because of the lack of mineral resources except for sand and gravel
- Outdoor recreation would increase as more people recreate away from metropolitan crowds found in the planning area
- Timber production would continue at its current or possibly lower levels, perhaps becoming a fuels management activity more than commercial enterprise
- Wild horses and burros would be maintained at viable population levels
- Wildfires would continue to change the vegetation landscape, requiring, in most cases, human-driven emergency stabilization, and rehabilitation

The continued management and protection of large tracts of land as open space is considered a beneficial cumulative effect to vegetation because it offsets the conversion of lands from agricultural or residential use and maintains large contiguous patches of native plant communities. Lands adjacent to BLM-administered lands are being invaded by noxious weeds at a similar rate, or higher rate, to the rates occurring on BLM-administered lands.

The continued coordination across administrative boundaries with private and public agencies throughout the region as part of BLM's Integrated Weed Management Program is considered a beneficial cumulative effect.

In addition to conifer encroachment on BLM-administered lands, encroachment is also occurring on adjacent public and private lands. Harvesting of conifer (both for fuelwood and biomass) is occurring on public and private lands at some level. While the harvest results in additional ground disturbance and the potential for the introduction of noxious weeds, BLM's focus on reduction in conifer encroachment in the region is considered a major beneficial cumulative effect. Extensive removal of conifer, even-aged forest management, and some of the more intensive WUI treatments would result in substantial and long-term changes to the ecosystem. In these areas, successive treatments would allow early seral grass and shrub communities to dominate or co-dominate. Multiple conifer thinnings over decades would accelerate growth rates and greatly affect the residual stand structure. Thinned forest stands would begin displaying old and late-successional stage characteristics earlier than unmanaged stands.

Cumulative effects on wildlife habitat could be both beneficial and detrimental depending on the specific species involved. Generally, wildlife diversity and abundance would be expected to increase over time. Overall watershed function and visual quality would also be expected to improve. A net export of biomass from some sites could occur with large-scale conifer cutting/harvest or broadcast burning and with successive forest thinning/harvest or under-burning. These activities would cause a decrease in organic matter and nutrients, possibly resulting in a slight degradation of site quality over the long-term. Nitrogen losses would be

greater with prescribed fire than with timber harvest. This effect could be offset, at least partially limiting prescribed fire, or by leaving fine woody material (tops, branches, foliage) on-site during harvest for organic matter retention and nutrient cycling.

The effects of logging, road construction, and water use on vegetation resources are difficult to describe and quantify, however they are not expected to result in significant cumulative effects on vegetation resources. Fire management on private and USDA Forest Service lands can result in cumulative effects on vegetation resources. Although fire generally is considered beneficial to vegetation resources, airshed concerns are growing and could result in less prescribed burning on private and USDA Forest Service lands. In addition, a lack of Montana Department of Natural Resource Conservation involvement in prescribed burns on private lands could lead to fuel buildups and the potential for more extreme wildfires. The proposed action would be effective in reducing or reversing cumulative effects due to the emphasis on restoration toward historic conditions and range of major vegetative community types. Sagebrush-steppe condition and structure (and habitat for associated wildlife species) would be improved by these treatments. Health, longevity, and range of old-growth conifer and coniferous forests would also be enhanced. There would be moderate cumulative impacts on the vegetation resources within the BiFO area. Most of these impacts would be beneficial as BLM promotes management that maintains and/or makes significant progress toward meeting land health standards.

Alternative A is the current acres planned for the treatment of sagebrush and crested wheatgrass stand within the decision area. Impacts to sage grouse habitat are not considered under this alternative. Instead, impacts to livestock forage are emphasized.

Alternative B would not allow any use of prescribed in sagebrush habitat, and require full suppression of any wildfires in this community type. Impacts from this alternative would limit the number and kind of tools available for improving sagebrush habitat. Under this alternative, a total of **fifteen** percent of crested wheatgrass acres would be converted to native sagebrush/ grassland over the life of the plan. This is the highest number of treatment acres of all of the alternatives.

Preferred treatment areas would be areas that are not currently being used in a grazing system to provide early spring grazing and reduce grazing pressure from other areas within a grazing allotment, and is consistent throughout Alternatives B, C and D, but is not considered under Alternative A. Priority treatment areas would be in sage-grouse PPAs, RAs and general habitat and is also consistent throughout Alternatives B, C and D, and is also not considered under Alternative A.

Alternative C considers the use of prescribed fire and wildland fire as a treatment options in sagebrush habitat if the treatment would achieve a diversity of age classes in sagebrush communities *"… if the treatment would achieve a diversity of age classes in sagebrush communities"*. Under this alternative, a total of **five** percent of crested wheatgrass acres would be converted to native sagebrush/ grassland over the life of the plan. This is the lowest of number of acres under Alternatives B, C and D but higher that Alternative A.

Alternative D also considers the use of prescribed fire and wildland fire as a treatment options in sagebrush habitat if the treatment would achieve a diversity of age classes in sagebrush communities *"… if the treatment would achieve a diversity of age classes in sagebrush communities"*. Under this alternative, a total of **eight** percent of crested wheatgrass acres would be converted to native sagebrush/ grassland over the life of the plan. This number of acres is lower that Alternatives A and C but higher that Alternative B.

The impacts of Alternatives B, C and D would increase total costs and alter management activities including the size, scale, type, location, and timing of treatments designed to improve rangeland health and protect and improve sagebrush habitat.

Reasonably Foreseeable Actions

All allowable land uses could potentially affect vegetation resources. Mitigation measures would be required to ensure the continued health of the land. The primary actions that are necessary to mitigate impacts on vegetation include:

- Ensuring that livestock grazing is managed to meet the Rangeland Health Standards for upland soils, streams, water quality, riparian/wetland, or biodiversity. This would be accomplished by adjusting livestock season of use, intensity of use, and duration of use through livestock allotment management plans.
- Impacts from recreational use would be reduced by controlling the timing and areas 'Open' to OHVs.
- Unnecessary and redundant roads, particularly those that impact special habitat areas, would be closed and rehabilitated.
- Disturbance associated with water development (reservoirs, wells, and springs), wildfire suppression, commercial woodcutting, vegetation restoration, fences, roads, campgrounds, interpretive sites, and mineral extraction sites would be limited to the smallest practical area.

Past and Present Actions

Since European settlement began in the late 1800s, livestock grazing practices have changed dramatically. Initial livestock use of the area was completely unregulated and occurred on a first come, first served basis. The natural fire regime was intact, and additional fires were set by both Native American residents and European settlers, resulting in much larger areas of land dominated by native bunch grasses. There were few invasive plant species and meadow systems along riparian corridors were broad and productive. There were no fences, and virtually all of the lands were available for livestock use. As a result, the area was used by extremely large numbers of domestic sheep and cattle, and grazing management practices were relatively inexpensive.

Within a short time of initial settlement however, livestock grazing conditions began to change. The most productive lands were homesteaded, fenced, and placed in crop production. Repeated overgrazing of the uplands resulted in reduced natural fire events, and shrub and conifer dominated communities began to replace the grasslands. Livestock grazing and the construction of roads/trails along riparian corridors resulted in stream down cutting and dewatering of meadows. These factors, coupled with fire suppression and the extreme drought of the 1930s resulted in a reduction of the forage available for livestock grazing. The increasing competition for available grazing lands made livestock management much more difficult and undependable.

The Taylor Grazing Act in 1934 allocated grazing lands to individuals that controlled adjacent base properties, which increased the dependability of public land livestock grazing. Montana Grazing District 4 (M-4) was the fourth such district created under the act in the western United States. The adjudication period (Missouri River Basin Studies) in the 1960s reduced the number of livestock that were permitted to use the public lands, and the reductions resulted in increased livestock forage production. Water developments and non-native seedings further increased the forage available for livestock.

In the 1970s and 1980s, allotment management plans were developed. The management methods these plans implemented further improved livestock forage conditions. However, they also increased the time and costs of maintaining livestock grazing on public lands. During the 1990s, due to ever increasing demands by other user groups for rangeland resources, Land Health Standards were developed, shifting rangeland management direction away from forage production, and focusing on healthy rangelands regardless of the type of use that was occurring. This type of management is the status quo today.

4.2.6.2.9 Irreversible and Irretrievable Commitment of Resources

The type conversion of native vegetation communities to non-native species, particularly annual grasses (cheatgrass) could not be reversible. Restoration of vegetation communities on sites in which the soil has been irretrievably lost, compacted, or subjected to accelerated erosion could not be possible.

4.2.6.2.10 Unavoidable Adverse Impacts

Actions needed to restore land health, particularly prescribed fire and special habitat management, would have short and long-term unavoidable impacts to livestock grazing. Treated areas would need to be rested from livestock grazing until vegetation is well established and can withstand livestock grazing. Some special habitat areas would need to be excluded from livestock grazing for extended periods of time. To meet land health and other resource objectives, livestock grazing management would need to be more tightly controlled in terms of season of use, duration of use, and periods of rest between uses, which could increase the costs to livestock operations grazing on public lands. Activities that directly disrupt or impact the soil surface (such as mining and facility construction, compaction by grazing animals and vehicles, exposure of soil surfaces to wind and water erosion, and accelerated erosion of meadow soils along riparian corridors) reduce the long-term productivity of vegetation in the disturbed areas. Activities, such as excessive or inappropriate livestock grazing, compaction of heavy clay soils by grazing animals and vehicles, heavy grazing that

reduces fine fuels and ladder fuels, and aggressive wildfire suppression contribute to the type conversion of native vegetation communities to non-native species, particularly annual grasses (cheatgrass), or to invasive native species. These type conversions also impact the long-term productivity of vegetation in the decision area. Reduction in the productivity of vegetation adversely impacts the long-term productivity for livestock as well.

4.2.6.3 Riparian and Wetlands

This section describes the impacts to riparian vegetation resources that could result from the implementation of the actions associated with each of the RMP Alternatives.

For the purpose of this analysis, the primary indicator of effects to riparian resources is the amount of acres of surface disturbance in or near riparian areas caused by allowable uses and management actions. The types of impacts that are projected to occur to soils, riparian vegetation, and water resources 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. The direct and indirect impacts resulting from BLM authorized surface disturbing activities that would affect riparian resources are erosion and riparian habitat alteration caused by altered drainage patterns from travel routes, surface disturbance, vegetative removal, and non-native vegetative invasion. These impacts deteriorate riparian functionality, causing impacts to water quality and aquatic resources on multiple scales.

Existing conditions for riparian resources are described in Chapter 3.

4.2.6.3.1 Methods and Assumptions

To analyze the potential effects of the Alternatives on riparian resources, information was gathered from existing inventories, management and recovery plans, and coordination with the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife, and Parks (MFWP), Montana Natural Heritage Program, and relevant scientific literature. The analysis is also based on the professional expertise of the BLM specialists.

This analysis was based on the following assumptions:

- Actions that accelerated the achievement of “yes answers” on the Proper Functioning Condition checklist/evaluation form are considered to produce positive effects. Actions that could result in “no answers” are considered negative effects.
- Local climate patterns of historic record and related conditions for plant growth would continue during the analysis period.
- Surface disturbances, transportation networks, ungulate use, and recreational activities increase the likelihood of noxious plant species spread in an area.

- The functioning condition of some riparian areas is sometimes reduced due to factors outside the control of the BLM's management, e.g., roads, upstream dams, ownership patterns, climate, etc.
- The more acres within a No Surface Occupancy stipulation or No Lease oil and gas area, the more overall protection a riparian area would have from oil and gas development. When comparing Alternatives, those Alternatives with more acres in the NSO or NL would provide the least negative effects to riparian resources.
- Proposed decisions that limit surface-disturbing activities or that protect or restore soil, water, and vegetation resources could protect or improve riparian resources.
- Some surface-disturbing actions, such as vegetation management projects, could cause short-term adverse impacts to riparian resources immediately following treatments, producing long-term benefits as vegetative restoration and enhancement measures become established.
- The discussions of impacts on riparian resources are based on the best available data. Knowledge of the analysis area and professional judgment from observation and analysis of conditions and responses in similar areas are used to infer environmental impacts where data is limited.

4.2.6.3.2 Environmental Consequences

The management actions associated with the resources listed below could have impacts on riparian resources. Those not listed would have little or no impacts to riparian and wetland resources.

- Soil
- Water
- Vegetation
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Wild Horses and Burros
- Visual Resources
- Fire Ecology and Management
- Wilderness Characteristics
- Energy and Mineral Resources
- Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management

- Special Designations

4.2.6.3.3 Impacts Common to All Alternatives

(Tied back to the Properly Functioning Condition Riparian Survey Form (Appendix Z)).

Impacts from Soil

Projects to promote healthy and stable soils would have positive impacts on riparian resources by reducing potential soil erosion. This includes the reclamation of previously disturbed lands. Reduced erosion could lead to a reduction in sediment delivery and improve the balance between sediment and flows being supplied by the watershed (Appendix Z - question 17).

Impacts from Water

Using Rangeland Health Standards to meet or exceed the Montana DEQ water quality standards and acquiring in-stream water rights where feasible would have positive impacts on riparian resources. The extent that these impacts would affect the resource would depend on unknown site-specific conditions. Managing for stable channels would benefit riparian resources by directly affecting the Properly Functioning Condition (PFC) (Appendix Z - questions 1-4 and 13-16).

Impacts from Vegetation

Forests and Woodlands

Forest and Woodland management actions would have negligible impacts on water resources. While typically very small, short-term soil disturbances could occur during project implementation, to minimize the extent of these disturbances, site-specific BMPs would be implemented. Since these actions are designed to improve upland health, long-term benefits are expected as watershed functions are maintained or restored (contributes to the PFC, Appendix Z - questions 5 and 17). The extent to which these actions would affect riparian resources is dependent on the scale of the forest treatment and proximity to riparian resources.

Rangelands

Since these actions are designed to maintain or improve upland health, long-term riparian benefits could occur as watershed functions are maintained or restored (contributes to PFC Appendix Z - questions 5 and 17). Currently, 309,658 acres of rangelands are meeting health standards and would not adversely impact riparian resources. 41,153 acres are not meeting standards, but appropriate action has been taken to ensure progress toward standards, which should minimize impacts to riparian resources. Approximately 3,835 acres are not meeting standards, which could have detrimental effects on riparian health (associated with PFC, Appendix Z - question 5). In cases of rangelands not meeting standards, corrective actions are required which would reduce impacts to riparian resources from rangeland management. No rangeland health assessment has been completed on 6,835 acres.

Riparian and Wetlands

Managing riparian communities to meet Health Standards would directly benefit several PFC questions including age class diversity, species diversity, vigor, and others (Appendix Z - questions 6-12). Actions from management of riparian areas are designed to promote healthy riparian areas and attain Properly Functioning Conditions, beneficial to riparian resources. Managing surface disturbing activities consistent with fluid mineral stipulations would benefit riparian resources from the implementation of NSO buffers of various widths per Alternative for riparian, floodplain and sensitive species resources.

Invasive Species and Noxious Weeds

Invasive species management actions would benefit riparian resources by minimizing impacts from invasive species spread and infestations, including decreased native plant diversity and abundance and increased erosion (contributing to PFC, Appendix Z - questions 8 and 9).

Special Status Plants

Impacts from management actions common to all Alternatives in the SSS plant species would have beneficial impacts to riparian resources. SSS management usually restricts surface disturbing activities in areas associated with these populations, which can lead to erosion and the spread of invasive plant species. There would be varying degrees of impacts due to project size and proximity.

Impacts from Wildlife Habitat and Special Status Species

Wildlife management actions would be neutral to positive for riparian resources. Potential management techniques include: prescribed and managed wildfire, prescriptive livestock grazing, planting, exclusion to intense disturbance, timber harvest and other mechanical methods would be used to restore, maintain or improve the ecological conditions of vegetation communities for the purpose of improving forage, nesting, breeding, and security habitat, hiding cover and travel corridors for a wide diversity of terrestrial and aquatic species.

Some short-term, minor impacts can occur from project implementation. However, since these projects are designed to improve watershed conditions (upland health) runoff and erosion should be maintained or shifted to more natural rates (Appendix Z - question 5 and 17). The extent of these projects is unknown and any impacts to riparian resources would be analyzed on a case by case basis through the NEPA analysis and project specific planning (including the BMPs to minimize adverse effects).

Enhancing or restoring habitat composition and structure beyond PFC in riparian habitats, where and when appropriate, for migratory bird habitat would have net beneficial impacts on riparian resources.

Impacts from Fisheries Habitat and Special Status Species

Fisheries actions promote riparian health and would address the habitat alteration source of impairment, resulting in positive effects. Some short-term, minor impacts can occur from project implementation, however, these projects are designed to improve fisheries habitat

(including riparian health) in the long term. Measures that protect fish would also benefit riparian resources.

Impacts from Wild Horses and Burros

The Pryor Mountain Wild Horse Range is located in a particularly arid environment in the south-east corner of the Billings Field Office. Management common to all Alternatives from wild horse management would have a positive impact on riparian resources by ensuring appropriate management levels (numbers of horses on the range) to ensure a thriving, natural ecological balance. Implementation level planning through a Herd Management Area Plan (HMAP) or other activity level plans would identify and set objectives for soil, vegetation and watershed characteristics to promote healthy drainage (Appendix Z - questions 5 and 17).

Impacts from Visual Resources

Those acres managed as VRM Class I & II (approximately 42,000 acres across all Alternatives) could limit some surface disturbance and the associated compaction, erosion and damage to soil crusts. This would benefit riparian resources, at least cumulatively on a watershed scale (Appendix Z - questions 5 and 17).

Impacts from Fire Ecology and Management

Fire Ecology and Management would strive to protect riparian resource values. In the course of fire suppression, a resource advisor would be consulted or assigned to wildfires that involve or threaten public lands; the use of wildfire suppression chemicals within 300 feet of waterways would be prohibited; fuels treatments would be designed to protect or improve resource values; emergency stabilization and rehabilitation of burned areas would be conducted in accordance with current policy to protect and sustain ecosystems. These impacts are immeasurable do to the unknown frequency and scale of wildfire events.

Impacts from Wilderness Characteristics

Management of Lands with Wilderness Characteristics, through minimizing surface disturbing activities which can lead to accelerated erosion and reduced water quality, are expected to have long-term beneficial impacts to riparian resources. There are negligible differences in impacts between all Alternatives.

Impacts from Energy and Mineral Resources

Coal

The requirement of site specific environmental analysis prior to development of solid leasable minerals would ensure riparian resources would be protected from impacts that would result from development activities. Negligible impacts to riparian resources would be expected.

Fluid Minerals

The action to apply appropriate stipulations, standard leasing terms and BMPs to oil and gas leases would minimize impacts to riparian resources. These stipulations include but are not limited to the NSO and various buffers to riparian areas, water bodies, streams wetlands and

special status plant and wildlife species. Each stipulation's protective measure is analyzed by Alternative.

Locatable Minerals

Terms and conditions and other standard management practices would prohibit degradation of riparian resources. Impacts from locatable mineral development would be negligible.

Mineral Materials

Impacts from actions associated with mineral material development would have negligible impacts to riparian resources; an environmental analysis prior to development would ensure protection of riparian resources.

Impacts from Forestry and Woodland Products

Impacts from forest management would be minimized through the use of forestry BMPs and site-specific design criteria. Commercial harvest of forest products would normally be associated with vegetative restoration (including forest health) and fuels treatments and would be designed to meet objectives for wildlife habitat management, including riparian and water quality preservation where applicable. Short-term disturbances would be reclaimed to minimize potential sediment production. Restoring watershed function would provide a long-term benefit (Appendix Z - questions 5 and 17).

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Actions associated with this program, across all Alternatives, have the potential to impact riparian resources by allowing surface disturbance, particularly road construction, which alters drainage patterns and increases sediment delivery to riparian areas. However, site specific NEPA analysis to analyze the potential impacts and BMP use during implementation of projects would ensure PFC standards are met. Acreages of avoidance and exclusion areas vary by Alternative.

Impacts from Livestock Grazing

Implementing the standards for rangeland health would minimize potential impacts by promoting riparian and upland health (all PFC questions – Appendix Z). Where the potential for site-specific problems exist site-specific BMPs are used to minimize damage to streams and water quality. These measures include: adjusting livestock numbers during periods of drought; excluding livestock from springs and other areas; site-specific riparian protections; adapting grazing systems to produce desired results. Overall, riparian areas should improve as areas that are currently functioning at risk move closer to PFC.

Impacts from Recreation and Visitor Services

Actions to manage recreation include surface disturbance and fluid mineral development restrictions that would benefit riparian resources by decreasing surface disturbance and its associated impacts (increased erosion and NPS pollution). These actions would have beneficial, long-term impacts on riparian resources. Impacts associated with unauthorized off road travel

and dispersed camping by recreationists are not quantifiable, but would likely have no adverse impacts to riparian resources.

Impacts from Trails and Travel Management

Motorized and mechanized modes of travel on the BLM-administered land (outside of established TMAs) would be limited to existing roads and trails. Site-specific travel planning would be initiated if resources were impacted (not meeting Land Health Standards, excessive erosion). In all Alternatives, the BLM could close or restore unauthorized, user created roads and trails to prevent resource damage. Prohibiting off road travel reduces erosion and protects riparian resources.

Travel planning designated 11 Travel Management Areas (TMAs) to designate specific routes as open, closed or limited to administrative use. Resource values and impacts from resource uses were used to develop a range of Alternatives designed to protect resources and comply with specific resource objectives while maintaining a sound multiple use condition. This action would further protect riparian resources by ensuring responsible route designations and addressing issues that would affect riparian areas.

Impacts from Special Designations

Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves riparian resources (if not directly, then cumulatively). There are some variations in acreage of special designations across the Alternatives; however, the difference in effects to riparian resources would be negligible. Most of the special designations are in arid portions of the field office and have no riparian habitat, surface water or recognized ground water resources. In the event a special designation does encompass an aquatic resource, the riparian vegetation would benefit from decreased surface disturbance.

4.2.6.3.4 Alternative A

Impacts from Soil

Impacts would be the same as impacts common to all Alternatives. Limiting logging with wheeled and tracked vehicles to slopes less than 35 percent and fluid mineral development to slopes less than 30 percent would protect riparian resources from accelerated erosion derived from surface disturbing activities on steeper slopes.

Impacts from Water

Impacts would be the same as impacts common to all Alternatives. Additionally, a stipulation to restrict fluid mineral development from riparian areas and 100 year floodplains would protect riparian resources from impacts associated with surface disturbance on approximately 13,984 acres.

Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as impacts common to all Alternatives. In Alternative A, forest management would include harvest activities on up to 68 percent of forested land (21,807 acres) over the life of the plan. Alternative B and D allow harvest activities on 60 percent and Alternative C on 79 percent of the forests. Impacts by Alternative, therefore, vary slightly by the amount of disturbance allowed.

Rangelands

Impacts would be the same as impacts common to all Alternatives.

Riparian and Wetlands

This Alternative would require the PFC assessments on a 10-year rotating cycle. During this interval degraded riparian conditions could develop.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Chemical application and mechanical treatment are carefully implemented, following the BMPs and the Montana DEQ guidelines to ensure the protection of riparian resources.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife Habitat and Special Status Species

A number of actions in this Alternative restrict surface disturbing activities from various terrestrial wildlife species habitats, particularly nesting areas and winter ranges. These restrictions would improve upland and riparian habitat conditions, minimizing erosion and unnatural drainage patterns, therefore promoting clean water and healthy riparian communities. Actions in Alternative A would be less beneficial to riparian resources than other Alternatives.

Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. NSO stipulations to restrict fluid mineral development from riparian areas and 100 year floodplains, as well as ¼ mile from designated reservoirs with fisheries, would help to maintain riparian health when proximate to fluid mineral development sites on at least 13,984 acres.

Impacts from Wild Horses and Burros

Wild horses in the Pryor Mountains have had a detrimental impact on riparian vegetation. Natural water sources are rare on the PMWHR and riparian areas associated with natural ponds and springs that horses have easy access to are generally in non-functional condition. Current management has implemented the installation of guzzlers and water tanks to help distribute watering activities and lessen pressure on natural wetlands and distribute horses across the range.

Adaptive management strategies allow horse managers to adjust population levels as needed to ensure a thriving natural ecological balance. The appropriate management level (AML) (number of horses on the range) would be made within the context of having the maximum amount of wild horses the range can sustain while preventing deterioration. This strategy makes it difficult to maintain good rangeland and riparian health, as opposed to Alternative B, managing for the minimum number of horses.

Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

Impacts from Fire Ecology and Management

Current wildfire management utilizes national fire suppression guidelines, which are developed to protect riparian and aquatic resources among others. Resource advisors are consulted to determine resource friendly tactics and develop mitigation plans to protect water quality and riparian habitat, minimizing adverse impacts to riparian resources.

Fuels management projects are designed to meet resource objectives. Short-term negative impacts to the resources could occur, although long-term benefits to the watershed are expected with proper design and implementation of fire related projects (the PFC questions 5 and 17). Mitigation measures to restore watershed health are implemented when implementation fails to follow guidelines. These impacts are not quantifiable due to the unknown extent or occurrence over the life of the plan.

Impacts from Wilderness Characteristics

Current LWC management protects, preserves, and maintains wilderness characteristics in 1,925 acres of land. Wilderness characteristics include a “high degree of naturalness” which restricts surface disturbing activities that contribute to erosion and degraded water quality. The LWC management would minimize impacts to riparian resources. Cumulatively, increased watershed health would benefit water and riparian resources (Appendix Z - questions 5 and 17). By Alternative, the more acres managed as LWC, the more beneficial impacts to riparian resources.

Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts common to all Alternatives. Furthermore, Alternative A designates the least acres as closed to coal development (26,131), while Alternative B closes 290,048, slightly more than Alternative C (264,450) and D (280,971). The more acres closed to development, the less potential for adverse impacts to riparian resources.

Fluid Minerals

This Alternative stipulates an NSO on 13,984 acres of riparian areas, 100-year floodplains of major rivers, streams, and water bodies. The Montana DEQ water quality regulations, coupled with the above NSOs are designed to protect water and riparian resources from negative

impacts. The NEPA analysis and site-specific project design and mitigation would promote riparian health.

Locatable Minerals

Each Alternative designates areas to be closed and withdrawn from mineral entry. The more acres closed to mineral entry, the less potential for surface disturbance and associated impacts to watershed health, which would benefit riparian resources at least cumulatively, long term. Under Alternative A, 39,700 acres are closed and or withdrawn from mineral entry. Alternative B (270,977); Alternative C (36,955); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative A, 44,583 acres are closed, the least of all Alternatives. B (343,745); C (251,927); D (272,122).

Impacts from Forestry and Woodland Products

Forest and woodland product harvest activities would utilize the BMPs to minimize impacts to riparian resources. A PSQ of 70 mbf/year impacts approximately 18 acres/year. Over the 20-year life of this plan only 1 percent (360 acres) of the coniferous forest (30,803 acres) would be completed. Much of the coniferous forest resources in the Billings field office (approximately 31 percent, (9,500 acres)) are protected from commercial cutting. Forest and woodland product harvest activities would have negligible impacts on riparian resources.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Additionally, under Alternative A, 44,014 acres would be designated for ROW exclusion. 24,203 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358). Within these avoidance and exclusion areas, adverse impacts to riparian resources in those areas would not be expected.

Impacts from Livestock Grazing

Current management permits grazing on 387,057 acres. While most effects would be similar to impacts common to all Alternatives there is some increased risk due to the requirement to monitor riparian health on a ten year rotation. This would allow some riparian and aquatic conditions to deteriorate before a decreasing trend is recognized.

Impacts from Recreation and Visitor Services

Current management of recreational resources on Billings Field Office lands has negligible impacts to riparian resources. Motorized vehicle use, which has the potential to increase erosion, is restricted to existing roads and trails. These existing routes generally avoid wetlands

and riparian areas and use improvements such as culverts and water bars to mitigate the effects of storm run-off.

Impacts from Trails and Travel Management

See impacts common to all for general discussion pertaining to travel management impacts to riparian resources.

Motorized and mechanized modes of travel on the BLM-administered land would be limited to existing roads and trails. Site-specific travel planning would be initiated if riparian resources were impacted (not meeting Land Health Standards, excessive erosion). The BLM could close or restore unauthorized, user created roads and trails to prevent resource damage. Prohibiting off road travel reduces erosion and protects water riparian resources. Alternative A travel planning actions would have the same impacts as Alternative C. Alternatives B and D are more restrictive, designating more routes closed or open to administrative use only, which would have less impact on riparian areas from effects of erosion, sediment delivery, unnatural drainage patterns and potential weed infestations (relating to PFC questions 5, 7, 9 and 17).

An analysis of specific effects of routes open under this Alternative, with proximity to riparian resources and in areas with fragile or highly erodible soils, can be found in Appendix O.

Impacts from Special Designations

Same as impacts common to All Alternatives.

4.2.6.3.5 Alternative B

Impacts from Soil

Restricting surface disturbing activities to slopes less than 30 percent would reduce potential erosion issues. Reduced erosion could lead to a reduction in sediment delivery and improve the balance between sediment and flows being supplied by the watershed (the PFC question 17).

Impacts from Water

Actions in Alternative B would protect riparian resources similar to impacts common to all. Further protections are addressed with a ¼ mile NSO on Riparian areas, Water Bodies, Perennial Streams and Floodplains of Perennial Streams (56,312 acres Federal Mineral Estate), and other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but it is only applied to surface ownership (24,373 acres BLM). These actions result in less potential for riparian degradation by reducing soil erosion and non-point source pollution in close proximity to riparian sources, as well as maintaining vegetative communities adjacent to perennial streams and water bodies (promoting yes answers for PFC, Appendix Z - questions 5-12 and 17).

Impacts from Vegetation

Forests and Woodlands

Same as impacts common to all in respect to using BMPs and Standards for Rangeland Health in managing Upland and Forest/Woodland resources to reduce the risk of negative impacts to riparian resources.

Alternative B does have more restrictions on surface disturbing activities in relation to slopes (no wheeled or tracked vehicle operation on 30 percent or greater slope), therefore it would have slightly less potential to impact riparian resources with soil erosion and sediment input to water bodies than Alternative A and C (PFC Appendix Z - questions 5 and 17).

Rangelands

Same as impacts common to all Alternatives.

Riparian and Wetlands

Alternative B manages riparian areas the most intensively.

Actions specific to riparian vegetation are designed to protect or enhance riparian communities and resources.

Alternative B establishes 78 miles of priority riparian habitat on perennial and fish bearing streams, where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Maintaining or restoring functionality to these areas would benefit water resources.

Alternative B actions are the most restrictive in managing surface disturbing activities and oil and gas exploration and development in riparian areas, floodplains and on water bodies and streams associated with YCT and high value fisheries, offering the most resource protection of the four Alternatives.

A ¼ mile NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (56,312 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (24,373 acres BLM surface) .

YCT habitat, suitable habitat, Blue Ribbon and Red Ribbon Fisheries have ½ mile NSO stipulations for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation (PFC Appendix Z - questions 2, 4-12, 16 and 17).

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. In this Alternative, weed treatments would be implemented on 200-800 acres per year, the least of any Alternative, therefore the least beneficial to riparian resource health.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife Habitat and Special Status Species

Alternative B is the most protective of wildlife habitat and would initiate the most restoration projects to degraded habitats, which would be most beneficial to riparian resources. However, wildlife actions in all Alternatives have net beneficial impacts to riparian resources, with negligible differences between Alternatives. Fluid mineral stipulations and consistent management of surface disturbing activities do change per Alternative. Alternative B places more restrictive stipulations on these activities than all other Alternatives, providing the most protections to riparian resources directly and on a watershed scale.

Impacts from Fisheries Habitat and Special Status Species

Management actions in Alternative B promote riparian resource protection and enhancement more than other Alternatives. This would lead to increased long-term and cumulative beneficial impacts, and increased short-term negative impacts to riparian health. Implementation of fish habitat restoration projects increase surface disturbance, however, the projects are designed specifically to minimize surface disturbance and reclaim disturbed sites with native vegetation seeding and planting and surface mulching.

Increased monitoring on fish bearing streams and excluding livestock grazing from fish bearing streams would improve riparian conditions. Additionally, new spring developments would not be authorized. This could lead to concentrated livestock use in riparian areas and cause degraded riparian conditions and decreased water quality.

Alternative B actions are the most restrictive in managing surface disturbing activities and oil and gas exploration and development in riparian areas, floodplains and on water bodies and streams associated with YCT and high value fisheries, offering the most resource protection of the four Alternatives.

A ¼ mile NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (56,312 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (24,373 acres BLM surface) .

YCT habitat, suitable habitat, Blue Ribbon and Red Ribbon Fisheries have ½ mile NSO stipulations for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation, direct riparian alteration.

Impacts from Wild Horses and Burros

Impacts would be the same as impacts from Alternative A.

Impacts from Visual Resources

Same as impacts common to all Alternatives.

Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wilderness Characteristics

Impacts would be the same as impacts from Alternative A, with 27,292 acres managed for wilderness characteristics, the most of any Alternative.

Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts common to all Alternatives. Furthermore, Alternative B designates the most acres as closed to coal development (290,048), while Alternative A closes 26,131. Alternative C closes 264,450 acres, and D 280,971 acres. The more acres closed to development, the less potential for adverse impacts to riparian resources.

Fluid Minerals

Development of oil and gas resources is expected to have the least impacts to riparian resources from Alternative B management actions. NSO stipulations on fluid mineral development, described in Water and Riparian resource impacts in Alternative B would help to protect fisheries resources from adverse impacts associated with fluid mineral development.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative B, 270,977 acres are closed and or withdrawn from mineral entry, the most of any Alternative. Alternative A (39,700); Alternative C (36,955); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health and riparian condition. Under Alternative B, 343,745 acres are closed, the most of all Alternatives. A (44,583); C (251,927); D (272,122).

Impacts from Forestry and Woodland Products

Same as impacts from Alternative A. An action to not allow new road construction, unless approved by a travel management plan could have beneficial impacts on riparian resources by reducing potential erosion and sediment inputs and noxious weed infestations.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, 211,384 acres would be designated for ROW exclusion. 185,607acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358). This Alternative would be slightly more beneficial than Alternative A and slightly more than Alternatives C and D.

Impacts from Livestock Grazing

General impacts from Alternative B livestock grazing actions would be similar to Alternative A; however Alternative B also places priority management on allotments that are not meeting standards for rangeland health, which includes riparian areas that are not in PFC and establishes increased monitoring on 46 miles of riparian habitat on fish bearing streams. These management actions would reduce grazing impacts on riparian resources by taking actions to increase riparian functionality.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Recreation actions in Alternative B also stipulate NSO for oil and gas development, at seven special designations, including: Sundance Lodge Recreation Area (387), Four Dances Natural Area ACEC(784 acres), Shepherd Ah-Nei Recreation Area(4,680), Acton Recreation Area(3,697 acres), Bundy Island(98), South Hills TMA (1,357 acres) and Pryor Mountain TMA (81,227 acres). Not knowing the potential number of O&G developments in these areas, it is impossible to quantify potential impacts. However, with the areas under NSO stipulation, the potential impacts are minimized for more than 92,000 acres, having a net beneficial impact on riparian function (overall promoting yes answers to all PFC questions).

Impacts from Trails and Travel Management

See impacts common to all for general discussion pertaining to travel management impacts to riparian resources.

Alternatives B is the most restrictive, designating more routes closed or open to administrative use only, which would have less impact on riparian areas from effects of erosion, sediment delivery, unnatural drainage patterns and potential weed infestations (PFC Appendix Z - questions 4-12 and 17).

An analysis of specific effects of routes open under this Alternative, with proximity to riparian resources, can be found in Appendix O.

Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.6.3.6 Alternative C

Impacts from Soil

Restricting surface disturbing activities on slopes greater than 45 percent (as opposed to 35 percent for A and 30 percent for B and D) would increase erosion and sediment hazards on approximately 31,013 acres compared to Alternatives B and D and 17,126 acres compared to Alternative A (the PFC, Appendix Z - question 17).

Impacts from Water

As in Alternative A, BLM would adhere to state and federal water quality standards and use rangeland health standards to ensure maintenance of surface and ground water quality. These regulations also protect riparian resources.

In Alternative C, water and riparian resources are further protected with several actions, including:

- Seasonally closing and reclaiming roads contributing to a decline in water quality
- Surface discharge of produced waters into streams or flow-connected water sources must comply with Montana DEQ standards and regulations
- Surface disturbing activities within riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams, would not be allowed without an approved mitigation plan and compliance with fisheries resource objectives (6,666 acres)
- NSO for oil and gas development within riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams (9,206 acres)

With smaller buffer zones and less restrictive protective measures, Alternative C has more potential to negatively impact riparian resources than Alternatives B and D. However, with project level planning and NEPA analysis, all impacts should be avoided or mitigated. Water resources are layered with protections from local, state, and federal agencies as well as with the use of BMPs designed to protect water quality, hence riparian resources.

Impacts from Vegetation

Forests and Woodlands

Same as impacts common to all in respect to using BMPs in managing Forest/Woodland resources to reduce the risk of negative impacts to riparian resources.

Alternative C allows for woodland treatments on approximately 79 percent of woodland habitats, versus 60 percent for Alternative B and 68 percent for Alternatives A and D. Allowing

wheeled and tracked vehicle operations on slopes up to 45 percent would increase the potential of increased erosion from disturbed soils on steep slopes, adversely impacting riparian resources (see acreage figures in water section). (PFC Appendix Z - questions 5 and 17).

Rangelands

Impacts would be the same as impacts common to all Alternatives.

Riparian and Wetlands

Alternative C would be less protective of riparian resources with the same impacts described in Alternative B. There are fewer acres with an NSO stipulation due to smaller buffer allocations:

- 9,206 acres oil and gas NSO on riparian, water bodies, perennial streams, wetlands and floodplains of perennial streams for Federal Mineral Estate.
- 6,666 acres surface disturbance restrictions consistent with the oil and gas NSO on BLM surface managed lands.
- 2,051 acres are stipulated for oil and gas development with an NSO (¼ mile) on YCT population habitat and Blue Ribbon Fisheries.
- 806 acres surface disturbance restrictions consistent with oil and gas ¼ mile NSO on BLM surface managed lands.

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation (PFC Appendix Z - questions 5-12 and 17).

Alternative C establishes 13 miles of priority riparian habitat to promote functioning riparian areas associated with YCT populations and suitable habitat, Blue and Red Ribbon fisheries and existing cottonwood galleries. Assuring these habitats are in PFC or moving towards PFC would promote good water quality.

Invasive Species and Noxious Weeds

Same as impacts common to all Alternatives, with the most treatment acres of all Alternatives, (1,500-3,000) potentially protecting riparian resources and uplands from weed infestations (PFC question 9).

Special Status Plants

Same as impacts common to all Alternatives.

Impacts from Wildlife Habitat and Special Status Species

Impacts would be the same as impacts from Alternative B, with negligibly less benefit to riparian resources.

Impacts from Fisheries Habitat and Special Status Species

Impacts from fisheries management would be the same as those in Riparian and Wetland management in Alternative C. Additionally, allowing spring developments for livestock and wildlife uses, would have the potential to distribute livestock across the range and reduce grazing and watering pressure on existing riparian areas, promoting healthy riparian communities.

Impacts from Wild Horses and Burros

Impacts would be the same as impacts from Alternative A.

Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wilderness Characteristics

Impacts would be the same as impacts from Alternative A, with 3,379 acres managed for wilderness characteristics under Alternative C. This is more than Alternative A (1,925) and less than Alternatives B (27,292) and D (13,653). The more acres managed for wilderness characteristics, the more potential benefit would be expected to riparian resources.

Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts from Alternative B, with slightly less acres closed for solid leasable mineral entry (264,450). Alternative A (26,131); Alternative B (290,048); Alternative D (280,971).

Fluid Minerals

Impacts would be the same as impacts common to all Alternatives. An NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (9,206 acres); YCT habitat and Blue Ribbon Fisheries have ¼ mile NSO stipulations for oil and gas exploration and development (2,051 acres).

These NSO stipulations, following BMPs and proper project design would protect riparian resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation (PFC, Appendix Z - questions 5-12 and 17).

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative C, 36,955 acres are closed and or withdrawn from mineral entry. Alternative A (39,700); Alternative B (270,977); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative C, 251,927 acres are closed, the least of all Action Alternatives, but more than Alternative A (current management). A (44,583); B (343,745); D (272,122).

Impacts from Forestry and Woodland Products

Timber harvest rates, which would have the most potential impact on riparian resources, would be increased to 250 mbf/year (66 acres per year). Surface disturbance restrictions where riparian areas fall within timber sale boundaries would protect water resources from adverse impacts associated with harvest. Harvest plans are designed to comply with riparian resource objectives. Many forested areas in the decision area do not have close proximity to riparian resources, therefore, the actual impacts to riparian resources is dependent on the location and scale of the projects.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, 39,491 acres would be designated for ROW exclusion. 355,601 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358). The more avoidance and exclusion area designated the high the potential benefit/protection to riparian resources.

Impacts from Livestock Grazing

Impacts would be the same as impacts from Alternative A.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts from Alternative B.

Impacts from Trails and Travel Management

See impacts common to all for general discussion pertaining to travel management impacts to riparian resources.

Alternative C has the least restrictions to road designations (fewer routes closed, limited by dates or vehicle type, or limited to administrative use only). Alternative C would have the most adverse impacts to riparian function from the effects of erosion, sediment delivery to water sources and the spread of noxious weeds to areas that would impact water quality (PFC, Appendix Z - questions 4-12 and 17).

An analysis of specific effects of routes open under this Alternative, with proximity to riparian resources, can be found in Appendix O.

Impacts from Special Designations

Impacts would be the same as impacts common to all.

4.2.6.3.7 Alternative D (Preferred Alternative)

Impacts from Soil

Impacts would be the same as impacts from Alternative B.

Impacts from Water

BLM would adhere to state and federal water quality standards and use rangeland health standards to ensure maintenance of surface and ground water quality, potentially enhancing riparian resources.

In Alternative D, riparian resources are further protected with several actions, including:

- 300-foot NSO on Riparian areas, Water Bodies, Perennial Streams and Floodplains of Perennial Streams (15,653 acres). Other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but only surface ownership is effected (9,087 acres BLM).
- Closing and reclaiming roads contributing to a decline in water quality.
- Avoiding surface discharge of produced waters into streams or flow-connected water sources; comply with MT DEQ regulations pertaining to produced water quality.

These actions result in less potential for riparian habitat degradation than Alternatives A or C, by reducing soil erosion and non-point source pollution in close proximity to riparian resources, as well as maintaining vegetative communities adjacent to perennial streams and water bodies; allowing for functional riparian conditions.

Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as impacts from Alternative B.

Rangelands

Impacts would be the same as impacts common to all Alternatives.

Riparian and Wetlands

Alternative D would be slightly less protective of riparian resources with the same impacts described in Alternative B. There are fewer acres with an NSO stipulation due to smaller buffer allocations:

- 15,653 acres oil and gas NSO (300 feet) on riparian, water bodies, perennial streams, wetlands and floodplains of perennial streams for Federal Mineral Estate
- 9,087 acres surface disturbance restrictions consistent with the oil and gas NSO on BLM surface managed lands
- 8,256 acres of oil and gas NSO (½ mile) on YCT population habitat and Blue Ribbon Fisheries
- 2,068 acres surface disturbance restrictions consistent with oil and gas ½ mile NSO on BLM surface managed lands

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation.

Alternative D establishes 51 miles of priority riparian habitat where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Alternatives B and C would establish 189 and 13 miles. Alternative D aims to promote healthy riparian areas associated with perennial streams and cottonwood gallery habitat in the decision area, with beneficial impacts to riparian resources.

Invasive Species and Noxious Weeds

Same general impacts as Alternative B, with more acres treated per year (400-2,000 acres) (PFC, Appendix Z - question 9).

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife Habitat and Special Status Species

Same as impacts from Alternative B, with negligibly less benefit to riparian resources from less restrictive fluid mineral stipulations and consistent management of surface disturbing activities.

Impacts from Fisheries Habitat and Special Status Species

Management actions in Alternative D promote aquatic and riparian resource protection and enhancement. This would lead to increased long-term and cumulative beneficial impacts, and increased short-term negative impacts to riparian resources from project implementation. Implementation of fish habitat restoration projects could increase surface disturbance, however, the projects are designed specifically to minimize surface disturbance and reclamation of disturbed sites with native vegetation seeding and surface mulching to decrease erosion and surface run off.

A 300-foot oil and gas NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas

exploration and development (15,653 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (9,087 acres BLM surface).

YCT habitat and Blue Ribbon Fisheries have ½ mile NSO stipulation for oil and gas exploration and development (8,256 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (2,068 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation, direct habitat alteration. Alternative D actions would decrease potential impacts on riparian resources more than Alternatives A and C but less than Alternative B.

Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

Impacts from Fire Ecology and Management

Impacts would be negligibly different than Alternative B impacts.

Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Alternative D proposes management for 13,653 acres for wilderness characteristics. Alternative A (1,925); Alternative B (27,292); Alternative C (3,379).

Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts from Alternative A, with more acres for solid leasable mineral development (280,971). Alternative A (26,131); Alternative B (290,048); Alternative C (264,450).

Fluid Minerals

Impacts would be the same as impacts described in Alternative B. A 300’ NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (15,653 acres Federal Mineral Estate); YCT habitat and Blue Ribbon Fisheries have a ½ mile NSO stipulations for oil and gas exploration and development (8,256 acres Federal Mineral Estate).

These NSO stipulations protect riparian resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation, and direct habitat alteration (PFC, Appendix Z - questions 5-12 and 17).

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative D, 54,761 acres are closed and or withdrawn from mineral entry. Alternative A (39,700); Alternative B (270,977); Alternative C (36,955).

These restrictions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance (erosion and sedimentation, weed infestation, and direct habitat alteration).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative D, 272,122 acres are closed to mineral material sales and development. A (44,583); B (343,745); C (251,927).

Impacts from Forestry and Woodland Products

Impacts would be negligibly different from Alternative B.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, 48,258 acres would be designated for ROW exclusion. 349,358 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

Impacts from Livestock Grazing

Impacts to riparian resources from livestock grazing actions in Alternative D would be negligibly different than those from Alternative B.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts from Alternative B.

Impacts from Trails and Travel Management

See impacts common to all for general discussion pertaining to travel management impacts to riparian resources.

Alternative D has more restrictions in road designations (routes closed, limited by dates or vehicle type, or limited to administrative use only) than Alternatives A and C, but less than Alternative B. Overall, Alternative D travel management actions were designed to protect riparian resources by minimizing routes that conflict with riparian resource objectives, but still providing multiple use opportunities on BLM public lands (PFC, Appendix Z - questions 4-12 and 17).

An analysis of specific effects of routes open under this Alternative, with proximity to riparian resources, can be found in Appendix O.

Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.6.3.8 Cumulative Impacts

4.2.6.3.9 Reasonably Foreseeable Actions

Cumulative effects include future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. The planning area is interspersed with parcels of non-BLM managed lands including federal, tribal, state, and privately owned lands. BLM managed lands include 434,154 acres of surface and 1,839,782 acres of federal mineral estate (private or other agency surface ownership with BLM management of mineral resources). These lands are spread thinly across 10,804,549 total acres in nine counties. BLM managed resources occur in 12.8 percent of the planning area in these nine counties. Water resources are scarce and under heavy use in agricultural applications. Six major rivers transect the planning area and BLM lands, including: the Bighorn, Yellowstone, Musselshell, Clarks Fork of the Yellowstone, Stillwater, and Boulder. Thousands of riparian areas are interspersed throughout the planning and are not necessarily associated with rivers, streams, or water bodies.

Activities taking place on these 10,804,549 acres cumulatively impact riparian resources within the planning area. Existing and reasonably foreseeable actions on lands in the planning areas that have the potential to cumulatively affect riparian resources include:

- Increasing recreation demand on public and private lands, primarily OHV
- Spread of invasive noxious species including terrestrial and aquatic plants, fish and invertebrates
- Coal mining and associated activities
- Other mining operations including gold, palladium, gravels, etc.
- Demands on travel management (private access across public lands)
- Developments on private land (housing and industrial)
- Irrigation and livestock watering actions
- Agricultural activities that remove riparian vegetation or alter stream channels
- Livestock grazing, particularly in riparian areas and on streams and water bodies
- Vehicle traffic in and through riparian areas
- Oil and gas development

- Severe or high intensity and localized wildfire events

Where these existing and future activities on non-BLM lands interface with riparian resources, they would cumulatively add to the impacts of activities authorized in the decision area. Generally, impacts to riparian resources are associated with surface disturbance and associated increased erosion and potential invasive species infestations, as well as direct alteration of riparian vegetation/communities by livestock grazing and mechanical manipulation. Sedimentation in waterways can cause changes in water chemistry as well as geomorphic adjustments that could have negative effects on stream function. In addition, agricultural runoff would introduce nutrients, pesticides, and herbicides to surface water that can impair riparian vegetation and reduce riparian functionality. Quantified data on the existing and future extent of these land uses is not available, although an increasing trend from current levels is expected.

Under all Alternatives, riparian resources would benefit from management in accordance with Rangeland Health Standards. Site-specific mitigation and BMPs for surface disturbing activities would further reduce impacts on riparian resources. Adherence to these standards would reduce many of the adverse impacts from future actions. In addition, existing and proposed stipulations designed to protect riparian resources would be beneficial by minimizing sediment and contaminant delivery potential by preventing or limiting surface-disturbing activities in proximity to hydrologic features.

Stipulations and limitations for other resources that prevent or limit surface disturbing activities would provide additional protection for riparian resources and thereby could be beneficial (e.g., fisheries, water, wildlife, LWC, etc.). Furthermore, timing limitations could benefit riparian resources by limiting or preventing surface-disturbing activities during times of the year when saturated soil conditions exist or when precipitation and runoff are frequent (e.g., winter, spring).

However, with the scattered distribution and sparse ownership of BLM administered lands in the planning area, stipulations and management actions to minimize impacts to riparian resources could not prevent impaired water quality on BLM administered lands, as is the current situation in some areas.

Alternative A represents how impacts have affected riparian resources under current management. Currently, the primary sources of riparian impairment are livestock grazing and invasive species infestations. At this time, approximately 40 percent of riparian areas are in Properly Functioning Condition (PFC), while 46 percent are rated as Functioning at Risk (FAR) and 6 percent Non-Functioning (NF). 8 percent are unknown/unsurveyed. Current management requires riparian areas to be meeting PFC, or if FAR, moving toward PFC. Rangeland and riparian specialists would adjust grazing practices to attain these ratings where possible (if livestock grazing is identified as the causal factor or impairment). Other resource uses have negligible impacts on riparian resources under this alternative.

Under Alternative B management, riparian resources would have the most protection and should attain the highest state of functionality compared to any other alternative. Management actions for all resources and resource uses have the most restrictions to surface disturbing activities and potential invasive species infestation under this alternative. Increased buffer

distances for oil and gas development, other surface disturbing activities and livestock exclusion from fish bearing streams are examples of restrictions made to conserve or improve riparian resources. Establishing 78 miles of "priority riparian habitat" will ensure increased monitoring and management action to attain PFC conditions on perennial streams.

Under Alternative C, impacts to riparian resources would be similar to impacts from Alternative A. There are still appropriate measures taken to protect riparian areas from erosion, sedimentation and invasive species infestation, however, being less restrictive that alternative B and D actions, there is a higher potential for degradation. Livestock grazing and weed infestation would still be the primary source of impairment for riparian areas and would be managed using the standards and guidelines for livestock grazing. These methods, as described under Alternative A impacts, require managers to change grazing practices to move riparian status towards PFC or maintain PFC when already meeting.

Impacts to riparian resources from actions under Alternative D would be negligibly different than alternative B impacts.

4.2.6.3.10 Irreversible and Irretrievable Commitments of Resources

Implementation of the RMP management actions would result in surface-disturbing activities, including dispersed recreation, recreational OHV use, fire and fuels management, mineral and energy development, livestock grazing, and infrastructure development that could permanently alter riparian health. Riparian condition could sustain sufficient degradation, coupled with adjacent non-federal ownership management that it could no longer be feasible to be restored to historic potential. However, management actions and BMPs are intended to reduce the magnitude of these impacts and restore some of the potential.

4.2.6.3.11 Unavoidable Adverse Impacts

Surface-disturbing activities on non-BLM lands could cause unavoidable adverse impacts to riparian resources. Although these impacts are mitigated to the extent possible, unavoidable damage is inevitable due to the land ownership pattern and varying degrees of management. BLM administered lands manage riparian resources to protect their value and all Alternatives provide ample protective measures, coupled with other state and federal regulations, to allow for sustainable riparian functionality if feasible.

4.2.6.4 Invasive Species and Noxious Weeds

This section addresses the potential impacts to the noxious and invasive species program. The presence of noxious and invasive species in the decision area is considered an adverse impact to most other resources. Actions that contribute to the introduction of noxious and invasive species, the spread of existing noxious and invasive populations, or that avoid, reduce, or prohibit noxious and invasive species control activities in the decision area also are considered adverse impacts.

Direct noxious and invasive species impacts typically result from actions that disturb the soil or create habitats (i.e., seedbed) for the establishment of noxious and invasive species. Indirect impacts result from activities that avoid, reduce, or prohibit noxious and invasive species control activities in the decision area. The transport (by wildlife, livestock, vehicles, wind, or water) of noxious and invasive species seed, plant parts, propagates, or pathogens to new locations, thereby expanding the distribution or increasing the rate of spread of noxious and invasive species, is also considered an indirect impact.

Noxious and invasive species could reduce vegetation diversity, production, desirable plant cover, and overall ecological health of vegetation communities. Decreased ecological health would make vegetation communities less resilient to disease, drought, fire, invasive species, and other natural disturbances and stressors. Indirectly, surface disturbance could increase soil erosion rates, modify soil composition, and alter water flow patterns across the landscape. On the contrary, implementing vegetation treatments (mechanical, fire, biological, and chemical), managing vegetation and ecological resources to meet desired vegetation conditions, and limiting or restricting surface disturbances could improve vegetation and ecological conditions. Although short-term losses of vegetation cover would occur, over the long-term these actions would help remove undesirable vegetative species, increase species diversity and age class, improve vegetation composition and structure, and increase vegetation cover and improve ecological conditions. This would result in healthier vegetation communities that are more capable of retaining moisture and nutrients and of resisting disease, invasive species, drought, and other natural disturbances and stressors.

4.2.6.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location (e.g., a watershed); the type, time and degree of disturbance; existing vegetation; and precipitation
- Noxious and invasive weeds would continue to invade and spread as a result of surface disturbing activities, vehicle traffic, recreational activities, wildlife and livestock grazing, and natural causes
- Weed and pest control would be carried out in coordination with the appropriate county, public, and private interests

Allowable uses and management actions that could affect the spread and introduction of noxious and invasive species include all surface-disturbing activities (see glossary); concentrated livestock and native ungulate grazing; fire and fuels management; recreation, OHV use, and dispersed travel; and proactive management actions.

As noxious and invasive species are affected by the Alternatives, noxious and invasive species can, in turn, impact other resources. Impacts of noxious and invasive species on other resources are described in various sections throughout Chapter 4. The spread of noxious and invasive

species also can fragment landscapes, thus creating more habitats in which noxious and invasive species can establish.

4.2.6.4.2 Environmental Consequences

Impacts to noxious and invasive species would likely result from actions proposed under the following resource and resource uses programs:

- Soil
- Water
- Vegetation
- Wildlife Habitat, Fisheries Habitat, and Special Status Species
- Wild Horses and Burros
- Cultural Resources
- Visual Resources
- Fire Ecology and Management
- Wilderness Characteristics
- Energy and Mineral Resources
- Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation, Visitor Services, and Trails
- Travel Management
- Renewable Energy
- Special Designations

Other programs were determined to have little or no impact on noxious and invasive species.

4.2.6.4.3 Impacts Common to All Alternatives

Impacts resulting from surface disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, recreation, off highway vehicle use, dispersed travel, and proactive management actions are described under individual Alternatives.

Specific management actions for non-plant invasive and non-native species are not identified in the following Alternatives, but could have to be addressed in the foreseeable future. The use of insects as biological agents to treat noxious and invasive weeds would continue in the Billings Field Office. The approval for the use of biological agents in the state of Montana would continue from United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS). Short-term and long-term beneficial impacts are anticipated from range improvements to vegetative cover and plant vigor and control of noxious and invasive species infestations that can occur under proper livestock grazing. Short-term and long-term adverse impacts associated with livestock and native ungulate grazing are anticipated to occur primarily in animal concentration areas (e.g., water sources, trails, and favored forage) and

include transport of noxious and invasive species seeds and propagates and disturbance of soil, creating habitats for the spread of noxious and invasive species. Moreover, without a holding period to allow flushing (sheep/goat grazing), movement of livestock onto or within public lands can transport invasive and non-native species seeds to new locations, thereby expanding invasive and non-native species invasions. Weed control using domestic sheep and/or goats in potential grizzly bear and wolf habitat would only be authorized after consultation with U.S. Fish and Wildlife Service.

Land Tenure Adjustments such as disposal would have no effect to the invasive and noxious weed program, although acquiring lands could impact the invasive and noxious weed program. Possible impacts as a result of acquiring lands with existing noxious and invasive infestations would increase management costs for the Billings Field Office. 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.

Impacts from transportation and facilities to noxious and invasive weeds would vary from the development of facilities, construction of roads and other surface disturbance. All phases could increase the potential for the introduction and spread of noxious and invasive weed species. Although BMPs would be adhered to and concerns in the spread and establishment of noxious and invasive weed would be addressed. It is expected that the management of noxious and invasive weeds would increase the cost for the control for invasive and noxious weed species for the duration of the project.

The treatment of invasive and noxious weeds using various treatment methods (e.g., mechanical, prescribed burning, manual, herbicide, biological agents, and grazing) is allowed in Wilderness Study Areas (WSA) as long as treatments does not impair WSA values and would enhance WSA values. The treatment of noxious and invasive weeds within WSAs is considered high priority management.

The collection of native seed within the Billings Field Office would be authorized with a permit. Collection of native seed could result in localized, minor short-term impacts to vegetation from trampling, reduction in seed availability at the collection site, and potential reduction in plant vigor. The availability of local native seed would result in moderate indirect long-term impacts, which include improved ability to achieve desired conditions by improving the species composition in areas needing vegetation treatments.

Non-native plant species could be used in treatment or restoration efforts. The major short-term direct impacts from the use of nonnative plant species is the stabilization of soils and reduce the potential for noxious and invasive weed establishment following disturbance when native species are ineffective, cannot be established, or are unavailable. The major short-term and long-term indirect impacts from the use of non-native plant species for re-seeding would be a short-term change in native species composition and a long-term benefit of soil stabilization and reducing the impacts associated with the introduction of noxious and invasive weeds.

Control of Noxious Weeds and Invasive Species:

Impacts would depend on the method of treatments used and the allowable range of treatments for controlling noxious and invasive species. Direct impacts to the target species from manual techniques and herbicide applications would range from minor to moderate, with some non-targets experiencing impacts in the short-term. In the long-term the eradication and control of noxious and invasive species would improve species composition for the remaining community. Controlling noxious and invasive species would benefit riparian habitat by reducing competition with native species and by allowing natural ecosystems to reestablish. Vegetation treatments are designed to create a desired plant community. If vegetation treatments are not implemented, this could inhibit or prevent attainment of ecological objectives and desired conditions. Impacts could vary by the treatment method (e.g., manual, mechanical, chemical, biological, or fire). The method of treatment is described below with possible impacts associated with each control method.

Manual Vegetation Treatments

Compared to other methods, manual treatments (e.g., hand pulling) would have minimal impacts to desirable vegetative communities. Manual treatments would avoid the destruction of non-target species and therefore would result in a lower likelihood of erosion, soil instability, sedimentation, or increased surface temperatures. Applying this type of treatment would only be feasible in small infestations (less than 5 acres).

Mechanical Vegetation Treatments

The use of mechanical tools in most sites would reduce canopy cover, increase diversity of understory vegetation, increase soil moisture (due to the reduction of evapotranspiration), and change of vegetation types. These direct impacts would be both short-term and long term, and would positively affect some plant species while adversely affecting others. Riparian areas or areas with flowing water could be adversely affected from increased run-off and erosion in the short-term until vegetation reestablishes. Long-term, indirect impacts would result from changes in habitat type, which in turn would result from the changes in vegetation density, canopy cover, structure, and the protection and maintenance of vegetation communities. Mechanical treatment methods could also result in localized, short-term impacts to air quality from fugitive dust, equipment emission and exhaust, and chemical fumes, which could lead to reduced plant vigor and mortality among individual species.

Chemical Vegetation Treatments

Target and some non-target species would experience direct, short-term impacts, depending upon the chemical used and the application rate. Indirect effects would include reduced soil infiltration, increased erosion and sedimentation, increased soil surface temperatures, and short-term or long-term changes in species composition or community structure. Riparian areas or areas with flowing water could be adversely affected from the increased run-off and erosion in the short term, until vegetation reestablishes. Direct and indirect effects from the use and application of specific chemicals are described in detail in the Final EIS for Vegetation Treatment on BLM Lands in Seventeen Western States (BLM 2007).

Biological Vegetation Treatments

Target species would experience direct, short-term impacts caused by biological vegetation treatments, although this process would be slow (5-10 years). In comparison to other vegetation treatments, the indirect effects of this treatment method would not be apparent for the first 5-10 years. Moreover, the rate of soil infiltration, increased erosion and sedimentation; increased soil surface temperatures would not be apparent, if any. Short-term or long-term changes would increase in species composition or community structure as the invasive and noxious weeds decrease, this would occur over time (5-10 years) at approximately the same pace.

Prescribed Fire and Wildfire Management

The intensity of impacts from prescribed fire and wildfire would depend on the size and severity of the fire, as well as the fuel type and quantity. Impacts from fires that cause injury or loss of individual plants and an increase in soil moisture caused by the reduction of evapotranspiration would be short-term and minor. Impacts from fires that change species composition, plant density, and vegetative structure and that increase the abundance of noxious and invasive species, fire-adapted plant species would be direct, major, and both short-term and long-term. Reduced biomass productivity caused by accelerated erosion resulting from the reduction in effective ground cover, as well as reduced habitat suitability for seed dispersers, would represent indirect, major impacts. Creeks, springs, and riparian areas could be adversely affected from the increased run-off and erosion in the short term, until vegetation reestablishes. However, these projects are designed to minimize erosion and increase habitat suitability. If these major impacts cannot be mitigated, the project would not be approved or implemented.

4.2.6.4.4 Alternative A

Impacts from Soil

Under Alternative A, full range of treatment methods would be allowed in the control of noxious and invasive species. The use of wheeled or tracked logging equipment is prohibited on sustained slopes greater than 35 percent. Surface disturbance would not be allowed on fragile soils with low reclamation or mitigation potential. By imposing surface disturbance restrictions on approximately 8 percent of the BiFO administered lands and through project design features, adding stipulations, mitigations and following BMPs to protect soils would indirectly reduce impacts to vegetation communities and thus indirectly reduce the introduction and spread of invasive and noxious weeds. Impacts would be short term, but long-term benefits are expected. In general, impacts from the management of soils would be in the long-term benefit overall vegetation communities.

Impacts from Water

No similar action.

Impacts from Vegetation

Forests and Woodlands

Under Alternative A, the use of wheeled or tracked logging equipment is prohibited on sustained slopes greater than 35 percent. Logging activities on approximately 21,807 acres (68

percent) of forested lands would be allowed if mitigation measures, BMPs and a reclamation plan are in place. All treatment methods (e.g., biological, chemical, manual, mechanical and prescribed fire) would be allowed in the control of noxious and invasive species. In general, impacts from the management of forest and woodlands would in the long-term benefit overall vegetative communities and indirectly decrease the potential for the introduction and spread of noxious and invasive species.

Rangelands

Under Alternative A, a full range of treatments for controlling noxious and invasive weeds would be allowed. Invasive and noxious weed treatment in the last 6 years was applied to approximately 366 – 5,548 acres per year. The potential for re-treatments is anticipated, therefore in the short-term it is anticipated there would be noxious and invasive species present, but in the long-term noxious and invasive species populations would be reduced. Range improvement projects would be implemented to improve range conditions or facilitate resource management. Most range improvements in the decision area include fences, wells, and spring developments. Fences are used to keep permittees' livestock separate, control seasonal use, and prevent grazing in selected areas. Water improvements help improve livestock distribution and alleviate pressure on natural water sources and provide water for some wildlife species. Adhering to statewide rangeland management standards, guidelines, and policies would minimize impacts from livestock grazing by maintaining plant vigor and increasing litter accumulation, resulting in the reduction in the introduction and spread of invasive and noxious weeds. Approximate surface disturbance due to range improvement projects is negligible in comparison to the number of acres open for grazing. Short-term impacts would occur due to soil disturbance associated with range improvements, but long-term benefits are expected. The increased cost to mitigate the introduction of invasive and noxious weeds would be short-term with a long-term benefit. In the long-term the management of rangelands would benefit overall vegetative communities.

Crested wheatgrass treatment to native vegetation would occur in areas with high wildlife habitat value. Total target acres were set at 160 acres for the life of the 1984 Resource Management Plan. Treatment of crested wheatgrass would have some short-term negative impacts (e.g., increased soil erosion) but long-term benefits is expected, such as: vegetation composition, increase forage production, improve range conditions, soil health and wildlife habitat and indirectly reduce the introduction and spread of noxious and invasive species. Through the use of BMPs and proper preparation and planting methods, impacts would be minor to negligible over the short-term.

Riparian and Wetlands

Under Alternative A, impacts would vary depending on the type of vegetation treatment proposed and the nature and extent of the restrictions. For the most part all methods of vegetation treatments would be allowed in riparian and wetlands as long as invasive and noxious weed treatments enhance these areas. Failure to implement vegetation treatments, particularly treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to desirable vegetative communities. Direct impacts from manual treatment techniques and herbicide applications would range from minor to moderate, with

some non-target plant species experiencing impacts in the short-term but would have a long-term benefit to the vegetation community. Surface disturbance restrictions on approximately 10,114 acres (does not include oil and gas development restrictions). Restrictions from soil disturbance to these areas would indirectly reduce the impacts of the introduction and spread of noxious and invasive species and thus protect vegetative communities.

Riparian and wetlands areas would be managed to meet Proper Functioning Condition (PFC), therefore would in the long-term benefit overall vegetation communities and thus reduce the potential from the introduction of noxious and invasive species. Applying mitigations, stipulations and restrictions to riparian and wetland areas would indirectly reduce impacts from the introduction and spread of noxious and invasive weeds to riparian and wetland vegetation communities.

Under current management aerial application of non-aquatic label herbicides are not allowed within 100 feet of riparian and wetlands and 25 feet if using vehicles and 10 feet when using hand application. These restrictions would minimize impacts to non-target wetlands and riparian vegetation communities. The exception is when aquatic label herbicide is used when managing wetlands, riparian areas and aquatic habitats.

Special Status Species

Under Alternative A, the management of special status plant species would benefit vegetative plant communities, thus reducing the impacts from noxious and invasive plant species. Management for special status plants would indirectly reduce the need for noxious and invasive weed treatments. Imposing restrictions, stipulations, and mitigations reduce or eliminate disturbances that would otherwise affect special status plants, would directly benefit vegetative communities and indirectly prevent the spread and introduction of noxious and invasive species.

Under current management vehicle and hand application of herbicides near special status plant species would be allowed if treatment(s) benefit special status plant species. Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to special status species and surrounding vegetative communities. The lack of vegetation treatments could result in an increase in vegetation density and increased establishment of noxious and invasive species in special status species habitats.

Impacts from Wildlife Habitat, Fisheries Habitat, and Special Status Species

Under Alternative A, habitat management for wildlife, fish and special status animal species would benefit vegetative communities and thus reduce the impacts from noxious and invasive weeds. Grazing by wildlife can alter vegetation communities by removing vegetation and compact soils, and serve as a vector to the introduction and spread of noxious and invasive weed species. Noxious and invasive weed management cost would therefore increase. In contrast, the management of wildlife, fisheries, and special status species habitat could indirectly benefit the noxious and invasive weed program, such as reducing road densities, imposing timing restrictions and restricting surface disturbance or surface occupancy within

100 year flood plains and priority wildlife habitats. Closing routes would reduce the introduction and spread of noxious and invasive species and increase plant vigor.

Timing restrictions could impose constraints on noxious and invasive weed treatment projects if disturbance affects big game winter and spring range, big game calving areas, grizzly bear spring and summer range, and grizzly bear denning habitat. For example, treatment of noxious weeds is often most effective in spring; however, in the habitats mentioned above, implementation of noxious weed control may not be possible during periods when it is most effective to prevent disturbance to grizzly bear or big game within big game winter/spring range. Similarly, prescribed fire is often implemented during the spring, early summer and fall when moisture levels are high and temperatures are low. Timing restrictions could inhibit the use of prescribed fires to meet vegetation objectives. Fish habitat protection could restrict weed treatments and method of treatments (e.g., mechanical or herbicide use).

Impacts from Wild Horses and Burros

Under Alternative A, in general, the greater the number of wild horses, the greater the possibility of adverse impacts on vegetative communities due to grazing, trampling, compaction, and reduction of vegetation and serving as a vector for the introduction and spread of noxious and invasive species. Under this Alternative range improvement projects would be authorized to improve conditions or facilitate resource management. Most range improvements within the Pryor Mountain Wild Horse Range include fences, wells, and spring developments. Short-term impacts would occur due to soil disturbance associated with range improvements, but long-term benefits are expected. The increased cost to mitigate the introduction of invasive and noxious weeds would be short-term with a long-term benefit.

Under Alternative A, wild horses would be managed on approximately 24,595 acres of BLM-administered lands (37,494 acres all ownerships) and administrative pastures and areas adjacent to private lands would remain closed. The current appropriate management level (AML) is set at the maximum amount of wild horses the range can sustain while preventing deterioration. Thus, proper management of wild horses could beneficially impact vegetation communities and indirectly decrease the potential spread and introduction of noxious and invasive species.

Impacts from Cultural Resources

Under Alternative A, the overall management of cultural and heritage resources lands would be protected from development and motorized travel therefore reducing the potential impact to vegetative communities and decrease the potential introduction of noxious and invasive weeds. Surface disturbing methods in the removal of invasive and noxious weeds (e.g., Russian olive or saltcedar removal using heavy equipment) could require cultural inventories. There could be an increase in costs to the noxious and invasive weed program for cultural inventories prior to surface disturbing weed treatments.

Cultural and Heritage Resources are currently protected from the oil and gas actions, this would indirectly reduce the potential for the introduction and spread of noxious and invasive weeds. Under current management applying restrictions, stipulations, mitigations and following BMPs in areas with cultural and heritage resources would benefit vegetative communities and thus decrease the possible introduction and spread of noxious and invasive weeds.

Impacts from Visual Resources

Under Alternative A, Visual Resource Management (VRM) was not addressed in the 1984 RMP only Visual Resource Information (VRI) levels. Noxious and Invasive weed treatments would continue to be allowed, under VRI Class A (29,843 acres). VRI Class A would be managed to meet VRM Class 1 objectives, which includes WSA lands. WSAs operate under the BLM Manual 6330, which allows for weed treatments. These areas would be top priority to preserve Class 1 condition. VRI Class B (12,427 acres) allows for "change" to the landscape, which means there could be minor impacts from surface disturbing projects to these areas, therefore could increase the potential for the introduction and spread of noxious and invasive weeds. VRI Class B lands are for the most part ACEC lands. The management in ACECs would provide a wide range of recreational opportunities and experience thus would increase the possibility of noxious and invasive weed introduction and spread by increased users to these areas.

In contrast VRI Class B/C (391,068 acres) would have an increase in recreation use and possible development of facilities. VRI Class B/C and Class C (816 acres) would have the greatest flexibility in the use of mechanical treatments applied on noxious and invasive weeds and would also have the flexibility for more use by recreationist, which would increase the opportunity for the introduction and spread of noxious and invasive weeds. All treatment types (e.g., herbicide, insects, domestic sheep and goat grazing, mechanical, and manual) would have short-term impacts but long-term benefits to all VRI Classes. The use of mechanical treatments would temporarily remove vegetative communities in the treatment area and would temporarily create visual contrast with the adjacent natural area. However, the visual contrast between the treatment area and natural areas would reduce over time and overall would have a long-term benefit to all Class of VRI. VRI limitations could reduce the number roads or routes, utilities, facilities, and well locations would reduce the potential for the introduction and spread of invasive and noxious weeds.

Impacts from Fire Ecology and Management

Under Alternative A, the intensity of impacts from prescribed fire and wildfire to meet resource objective would depend on the size and severity of the burn, as well as the fuel type and fuel loads. Impacts from prescribed fires and wildfire management would cause injury or loss of vegetation and would be short-term and minor. Impacts from fires that change species composition, plant density, and vegetative structure could increase the abundance of non-native invasive species. However, these projects are designed to minimize erosion and increase habitat suitability. If these major impacts cannot be mitigated, the project would not be approved or implemented.

Beneficial impacts can occur when noxious and invasive plants and seeds are destroyed or damaged by wildfires. On the other hand, adverse impacts from wildfire suppression activities could occur such as: soil disturbance, removal of vegetation cover, the use of retardant or foam all of which could provide a niche where noxious and invasive species can become established. The adverse impacts could be considered direct or indirect because the impacts may or may not occur immediately. The use of surface disturbing equipment could transport invasive and

noxious weeds from infested to non-infested areas; this would increase management costs for the invasive and noxious weed program.

Direct impacts from the removal of vegetation from hand-line construction would be short-term and minor. Most impacts from fire suppression activities would be minor, short term, and localized, particularly if activities in sensitive habitats are mitigated or avoided.

Impacts from Wilderness Characteristics

Under Alternative A, 1,925 acres outside of the Bighorn Tack-on and Pryor Mountain WSAs would be managed as lands with wilderness characteristics. Current management restricts off-road travel by motor vehicles. These restrictions would benefit the noxious and invasive weed program by reducing the potential spread and introduction to uninfested areas.

Impacts from Energy and Mineral Resources

Coal

Under Alternative A, there is currently one active coal lease in the decision area. Approximately 26,131 acres are currently closed to coal leasing. Coal licenses to mine for domestic use would be available and use per family could not exceed 20 tons annually. Coal leasing would remain available for underground long wall mining. Surface disturbance would be minimal and confined therefore adverse impacts on vegetation communities would not be as widespread. This would decrease the potential of the introduction and spread of noxious and invasive weeds.

Fluid Minerals

The footprint of a well pad or mine could be relatively small, although when production and developments occur this process requires additional infrastructure, such as roads and pipelines that extend beyond the development site. Mineral development activities are expected to impact vegetation communities within the decision area because of habitat modification, mortality of individual plants, and soil disturbances. Impacts associated with these actions would include loss or damage of plants because of excavation or trampling, burial under piles of waste material, toxic responses from use of chemicals in mineral extraction or waste pits, and increased exposure to dust and other contaminants associated with construction and use of access roads. Mineral development would impact riparian areas, seeps, and springs through increased runoff, by decreasing infiltration and evapotranspiration from reduction in vegetation cover and increasing the amount of impermeable surface associated with roads, structures, and compacted soil. In addition, disturbance of reclamation-limited soils could increase the opportunity for invasive and noxious weed introduction and spread, which would impair the functioning conditions in vegetation communities and riparian areas. The severity of effects would depend on the amount of activity and the success of reclamation efforts for disturbed areas. Effects from minerals management would be reduced by BMPs outlined in mining laws, plans of operation, pertinent restrictions, and standard terms and conditions within these areas, based on site-specific analysis. Additional Conditions of Approval (COA) could be applied to the lease terms as necessary to establish specific, necessary mitigation measures not covered by lease stipulations for resource and environmental protection.

The acreage in each leasing category would quantify impacts to vegetation in terms of acres of surface disturbance. These categories, listed from greatest to least amount of surface disturbance, are as follows: open to leasing subject to the standard terms and conditions, open to leasing subject to moderate constraints (TL, CSU), open to leasing subject to major constraints (NSO), and closed to leasing. Generally, areas that are closed to leasing or open to leasing subject to major constraints (NSO) would experience little or no surface disturbance caused by minerals development; thus, negligible or no adverse impacts to vegetation and riparian resources would occur in these areas. Areas open to leasing subject to the standard terms and conditions or open to leasing subject to moderate constraints (TL, CSU) would experience short-term and long-term impacts to vegetation and riparian resources from surface disturbance associated with minerals development as described.

Under Alternative A, 28,682 acres (non-discretionary) and11,048 acres (discretionary) would be closed to leasing; 32,595 acres would be open to leasing subject to major constraints (NSO); and 28,337 acres (CSU) and 308,116 acres (TL) would be open to leasing subject to the standard terms and conditions or open to leasing subject to moderate constraints. Withdrawing areas from mineral operations or categorizing areas as closed to leasing or open to leasing subject to moderate constraints (NSO) would prevent the introduction and spread of noxious and invasive weeds within those areas. Slope restrictions (greater than 35 percent) could also help limit the spread of invasive and noxious weeds. These areas are typically harder to establish vegetation due to loss of soil and are ideal areas for weed introduction.

Locatable Minerals

Under Alternative A, 37,845 acres are closed and 1,855 acres are currently withdrawn from the exploration and development of locatable minerals. By closing and withdrawing acres from exploration and development of locatable minerals would create less surface disturbances that could lead to adverse impacts to vegetative communities and thus decrease the potential for the introduction of invasive and noxious weeds. However, plan of operation-level development would be addressed in a site-specific environmental analysis, and notice-level activity would be regulated to prevent undue and unnecessary degradation. These actions would minimize adverse impacts associated with mineral development to vegetative communities.

Mineral Materials

Under Alternative A, 44,583 acres would be closed to mineral material sales and development. Closing areas from mineral operations would prevent impacts to vegetation and would decrease the introduction and spread of noxious and invasive species. Adverse impacts to vegetation would occur where mineral material sales are authorized. Adherence to BMPs outlined in mining laws, plans of operation, pertinent restrictions, and standard terms and conditions would help minimize impacts to vegetation and indirectly reduce the introduction and spread of invasive and noxious weeds.

Impacts from Forestry and Woodland Products

Alternative A, the management of forest and woodland products, based on the Healthy Forest Restoration Act, would generally improve the structure, composition, health, and vigor of forest and woodland vegetation. Alternative A allows for the sale of forest products on 18 acres per

year. Surface disturbance associated with this activity has contributed to approximately 207 acres within a 4 year period (2006-2010). Harvesting of forest and woodland products would have localized, minor-to-moderate, short-term impacts on vegetative communities and an indirect short-term impact on the introduction and spread of noxious and invasive species due to vehicle use to access the harvesting site and loss of vegetative cover. Management that would benefit the noxious and invasive weed program would include prohibiting wheeled or tracked equipment operation on sustained slopes greater than 35 percent and re-seeding of native grasses and forbs on skid trails, landings and roads. Slope restrictions could reduce the number of acres of soil disturbance, therefore reducing the potential impacts to vegetative communities and thus reduce the potential for the introduction and spread of invasive and noxious weeds. Surface disturbance associated with this activity would have a short-term or long-term change in species composition or could increase the cost for management to monitor and treat invasive and noxious species. Under this Alternative all treatment methods would be allowed in the control of noxious and invasive species.

Adverse impacts from forest and woodland management actions are expected to be moderate to minor and short-term. The use of BMPs and adherence to Laws and regulations would limit impacts to vegetative communities and thus reduce the potential introduction and spread of invasive and noxious weeds, both short-term and long-term.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Under Alternative A, impacts from the issuance of land use authorizations (e.g., ROW, leases, permits and easements) to the invasive and noxious weed program would vary based on the nature and purpose of the authorization. Under this Alternative ROWs are excluded from 44,014 acres and 24,203 acres are avoidance areas for ROWs which could limit development and impacts to vegetation communities and thus decrease the potential introduction of noxious and invasive weeds.

Rights-of-way authorize construction, operation, and maintenance of roads, railroads, power lines, renewable energy sites, communication sites, water and irrigation facilities, oil and gas pipelines. This Alternative is one of the lowest acres for the protection from ROW development and therefore has the greatest potential to the introduction and spread of invasive and noxious weed species which would increase management cost. Impacts to invasive and noxious weeds program would generally be minor to moderate and would be addressed in site-specific NEPA analysis. (Exceptions would be granted only when the proposed authorization would not create substantial surface disturbance or would create only temporary impacts). Thus, impacts to vegetation in these avoidance areas would be negligible-to-minor and would be localized.

Withdrawals

Under Alternative A, withdrawing lands from all forms of entry, location, selection, sale, or leasing under the public land laws would preclude future mineral location. This preclusion would reduce the potential for mining disturbance and associated impacts to vegetation and reduce the potential for the introduction and spread of noxious and invasive weeds. Limiting surface disturbance this would be positive to the invasive and noxious weed program.

However, the identified withdrawals, if established, would be subject to valid existing rights. Therefore, exploration and development impacts related to the exercise of valid existing mineral locations could occur in these areas.

Impacts from Livestock Grazing

Under Alternative A, impacts from livestock grazing on invasive and noxious weeds are anticipated to result in a mix of beneficial and adverse impacts. Approximately 387,057 acres of BLM administered lands are currently available for livestock grazing. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on Category I and maintaining M and C category grazing allotments (see Glossary). Improvement in the health of rangelands reduces the opportunities for invasive and noxious weeds to invade and colonize an area and decreases the cost of future management cost of invasive and noxious weed treatments. Livestock grazing could increase soil compaction while trailing, in watering, and in areas where mineral-supplement are placed and could impact vegetative communities and thus indirectly increasing the potential for the introduction and spread of noxious and invasive species. Adhering to statewide standards, guidelines, policies and BMPs would minimize impacts from livestock grazing by maintaining plant vigor and increasing litter accumulation, resulting in the maintenance or improvement of organic matter, soil structure, and vegetative communities as a whole. Impacts therefore would be minor area-wide but potentially moderate in specific areas such as creek, springs, wetland, and riparian areas.

Impacts from Recreation, Visitor Services, Trails, and Travel Management

Under Alternative A, visitor use is expected to increase throughout the Billings Field Office. Although, limiting or controlling activities to protect resources could result in localized closures or limitations on activity use. Impacts to invasive and non-native plants would continue to increase as visitor number increase, therefore management cost would increase.

Most recreational activities have site-specific impacts to vegetation such as frequent or high-use areas (e.g., campgrounds, parking areas and trailheads) and other recreation related use areas. Entrance to these areas is the most probable areas for invasive species to become established. Soil compaction could result in increased soil erosion, loss of vegetation cover and increase in invasive and noxious species. These impacts would be site-specific and localized.

Under this Alternative current management would continue in Travel Management Areas (TMAs) within the Billings Field Office. All vehicles would remain on established roads and camping is allowed 300 feet from travel routes. An analysis of specific effects of routes open under this Alternative in areas inventoried, treated and monitored for invasive and noxious weeds, can be found in Appendix O.

Generally, the more an area is open to motorize travel such as off-highway vehicle use, the greater the potential for adverse impacts to desirable vegetation near the trails and in riparian areas and the increase of invasive and noxious weeds. Closing routes would indirectly reduce the introduction of noxious and invasive species, increase plant vigor, and reduce plant mortality associated with dust generation alongside the road. Compaction would also be eliminated along the closed route, which would increase infiltration and reduce erosion, thereby

improving vegetative cover and riparian wetland functioning condition. Limiting travel to designated routes would confine the impacts to areas that are already disturbed by mechanical use. For further discussion on TMA, see below "Impacts from Travel Management".

Impacts from Renewable Energy

Under this Alternative 361,514 acres are currently open, 25,141 acres are avoided and 47,496 acres are closed to renewable energy development. This Alternative would have the least protection of vegetative communities thus would have the highest potential for the introduction and spread of invasive species and noxious weeds.

Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Currently the Pompeys Pillar National Monument (432 acres) utilizes Integrated Weed Management (IWM) methods. Which includes the following: monitoring, education, mechanical, burning, the use of herbicides and biological treatments. There is potential for noxious and invasive weed spread/ introduction due to the large amount of visitor use to the area. Due to the high number of visitors within the area, timing of weed treatments and number of treatments per year and method of treatments is dependent on visitor use periods. During high use periods and in high use areas, hand held sprayers such as backpack sprayers or ATV mounted sprayers would be used. There are currently designated routes for vehicles to drive and park; there is the potential for invasive and noxious weeds to spread along these designated routes. There are designated walking trails within the monument; visitors are not required to remain on trails.

Pompeys Pillar National Monument is currently withdrawn from mineral development activities. The withdrawal of mineral development activities would eliminated surface disturbance activities thus would decrease the potential for expansion and introduction of noxious and invasive species. Farming practices, including tillage, fertilization, irrigation, weed treatments and prescribed fire could impact noxious and invasive species. Maintenance throughout most of the year and proper irrigation methods would be expected to reduce impacts to minor or negligible.

Areas of Critical Environmental Concern (ACEC)

Although ACEC designation alone does not necessarily provide protection, management actions included in ACECs often are more restrictive, thus indirectly providing protections for vegetation communities. Therefore would indirectly decrease the introduction and spread of invasive and noxious weed species. The protections associated with ACEC designation that could positively affect vegetation resources includes: managing oil and gas leasing as closed to leasing or open to leasing subject to moderate constraints (NSO), implementing more restrictive VRI designations, restricting livestock grazing, and implementing travel limitations. Management under Alternative A would be to continue the designation of 9 ACECs (37,896 acres).

Vegetation was specifically identified as a relevant and important value in the East Pryor ACEC and Meeteetse Spires ACEC. Seven of the eight ACECs allows for the treatment of noxious and invasive weeds. Under this Alternative, Castle Butte ACEC designation documents did not discuss noxious and invasive weed treatment options for the area. Restricting various use to ACEC would indirectly benefit vegetation and therefore would reduce the possibility of damage to the relevant and important values in these areas (closing to OHV use; managing as either closed to leasing or open to leasing subject to moderate constraints (NSO), depending on the ACEC; livestock grazing is authorized, allowed, available or permitted in eight of the ten ACECs, Livestock grazing is closed within PMWHR boundary and is available outside PMWHR. ACEC designations would reduce surface-disturbing activities within those areas and would protect vegetation and riparian wetland resources. However, opportunities for mechanical vegetation treatments could be limited, due to the above restriction. All other treatment methods would be allowed if it benefits ACEC values.

Wild and Scenic River (WSR)

Managing all the eligible Wild and Scenic River (WSR) segments for outstandingly remarkable values (ORV) and classification would indirectly benefit the noxious and invasive weed program. Seven WSR eligible segments in the Billings Field Office include: Bad Canyon (4.5 miles), Bear Canyon (1.62 miles), Crooked Creek (upper 1.59 miles), Crooked Creek (lower 1.56 miles), Gyp Springs (0.46 miles), Piney Creek (0.16 miles), and Yellowstone River/Pompeys Pillar (4.19 miles) with a total of 14.08 miles. Eligible segments would be managed to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under current management. Depending on classifications these areas would be protected. Protections would benefit vegetative communities by limiting ground disturbance in these areas. The indirect effects of managing to protect these values could limit the use of mechanical weed treatments although if treatments benefits WSR values, then treatments would be allowed. Management of WSRs to maintain the primitive and semi-primitive non-motorized recreational opportunities would decrease the introduction and spread of invasive and noxious weeds.

Wilderness Study Areas (WSA)

Current management restricts off-road travel by motor vehicles, and development of facilities except for limited water source or range improvement project development and maintenance for wildlife and wild horse use. If these tracts of lands are included in the Wilderness Bill, these lands would be protected from development, and motorized travel would be restricted to roads on the area boundaries. These restrictions would benefit the noxious and invasive weed program by reducing the potential spread and introduction to uninfested areas. Under current management WSAs are high priority for noxious and invasive weed treatment.

Pryor Mountain Wild Horse Range

No similar action.

4.2.6.4.5 Alternative B

Impacts from Soil

Under Alternative B, full range of treatment methods would be allowed in the control of noxious and invasive species. The use of wheeled or tracked logging equipment is prohibited on sustained slopes greater than 30 percent. Surface disturbance would not be allowed on fragile soils with low reclamation or mitigation potential. By imposing surface disturbance restrictions on approximately 11 percent of the BiFO administered lands and through project design features, adding stipulations, mitigations and following BMPs to protect soils would indirectly reduce impacts to vegetation communities and thus indirectly reduce the introduction and spread of invasive and noxious weeds. This would be 2 percent more than Alternative A and 6 percent more than Alternative C and no change from Alternative D. Under this Alternative there would be more constraints on locations for surface disturbing activities than Alternative A and C. These restrictions would improve upland health. Impacts would be short term, but long-term benefits are expected. In general, impacts from the management of soils would benefit overall vegetation communities.

Impacts from Water

Under Alternative B the direct impacts to the management of noxious and invasive species from water quality standards would be mainly treatment method restrictions (e.g., herbicide and mechanical use). Applying restrictions, stipulations, mitigations and following BMPs for the protection and management of water resources would indirectly benefit and reduce the impacts on vegetative communities and indirectly prevent the introduction and spread of noxious and invasive weeds. Reclamation of surface disturbance would have a long-term benefit, although short-term impacts would occur during reclamation activities.

Impacts from Vegetation

Forests and Woodlands

Under Alternative B, logging activities on approximately 19,241 acres (60 percent) of forested lands would be allowed. The use of wheeled or tracked logging equipment is prohibited on sustained slopes greater than 30 percent. Operation would be allowed with mitigation measures, following BMPs and a reclamation plan in place to reduce impacts to vegetative communities and indirectly reduce the introduction and spread of noxious and invasive species. A full range of treatment methods would be allowed in the control of noxious and invasive species. Moderate to minor impacts could occur in localized project areas where surface disturbance occur, but would be short term, with long-term benefits expected. The increased cost to mitigate the introduction of invasive and noxious weeds would be short-term with a long-term benefit. In general, impacts from the management of forest and woodlands would in the long-term benefit overall vegetation communities and indirectly decrease the potential for the introduction and spread of noxious and invasive species.

Rangelands

Under Alternative B, a full range of treatments for controlling noxious and invasive weeds would be allowed. Impacts would be similar to Alternative A, except invasive and noxious

weed treatments would be applied to approximately 200-800 acres per year. The potential for re-treatments is anticipated, therefore in the short-term it is anticipated there would be noxious and invasive species present, but in the long-term noxious and invasive species populations would be reduced.

Crested wheatgrass conversion to native sagebrush/grassland would occur on approximately 22,414 acres. This Alternative has the most acres for treatment, approximately 22,254 acres more than Alternative A, 14,914 acres more than Alternative C and 10,414 acres more than Alternative D. Treatment would continue to occur in areas with high wildlife habitat value. Treatment would have a negative impact in the short term, but in the long-term would benefit vegetation composition, increase forage production, improve range conditions, soil health and wildlife and indirectly reduce the introduction and spread of noxious and invasive species. Through the use of BMPs and proper preparation and planting methods, impacts would be minor to negligible over the short-term.

Riparian and Wetlands

Under Alternative B, impacts would be similar to Alternative A except surface disturbance restrictions on approximately 24,373 acres (does not include oil and gas development restrictions); this is more protection than Alternative A, C and D. Oil and gas leasing and development would be closed within 100 year flood plains of rivers and on water bodies and streams, except to benefit watershed health. Restrictions from surface disturbance and other programs (e.g., special status species and wildlife) to these areas would indirectly reduce the impacts of the introduction and spread of noxious and invasive species thus protects vegetative communities.

To minimize impacts to wetlands and riparian areas, aerial application of non-aquatic label herbicides would not be allowed within 1/4 mile. Vehicle and hand applications of non-aquatic herbicides would not be allowed within 50 feet of wetlands and riparian areas. The exception is when aquatic label herbicide is used when managing wetlands, riparian areas, and aquatic habitats. These restrictions would minimize impacts to non-target wetlands and riparian vegetation communities. Impacts would vary according to the type of treatment proposed and the nature and extent of the restrictions. Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to vegetation.

Special Status Species

Under Alternative B, impacts would be similar to Alternative A, except all BLM authorized activities would be evaluated for potential effects on special status plants and an onsite inventory would be conducted for special status plants prior to any surface disturbance. Indirectly this would benefit the noxious and invasive weed program, by limiting these areas from any type of disturbance. On the other hand, the protection of special status plant species would limit the type of methods used for treatment and the use of hand and vehicle application would not be allowed within ¼ of a mile of special status plant species. Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to special status species habitat and surrounding vegetative communities. The lack of vegetation treatments could result in a long-term increase

in invasive and noxious weed density and increased establishment and expansion of noxious and invasive species in special status species habitats.

Impacts from Wildlife Habitat, Fisheries Habitat, and Special Status Species

Impacts would be the similar to Alternative A however, Alternative B would prohibit or restrict surface disturbing activities over more acres than Alternatives A, C and D. Impacts to the management of invasive and noxious species from wildlife and special status species management are expected to be positive, long-term. Limiting or prohibiting surface disturbing activities and promoting vegetation coverage would reduce the potential for invasive and noxious weed establishment and spread; these impacts would be localized, moderate and short-term. Wildlife tends to disperse across large areas, thus contribute to the movement of invasive and noxious species vegetative parts and seeds to uninfested areas.

Alternative B proposes habitat treatments to meet terrestrial, aquatic, and riparian habitat objectives. Implementation of vegetation treatments would involve removing individual plants and altering species composition and vegetation structure. Impacts would vary according to the treatment method used and would initially change vegetation structure although long-term, vegetation treatments would improve cover and increase plant diversity, thereby decreasing the potential for the introduction and spread of noxious weeds. Fisheries habitat management, in the long term, would benefit the noxious and invasive weed program.

Impacts from Wild Horses and Burros

Under Alternative B, the greater the number of wild horses, the greater the possibility of adverse impacts on vegetative communities due to grazing, trampling, compaction, and reduction of vegetation and serving as a vector for the introduction and spread of noxious and invasive species. Under this Alternative approximately 23,204 acres would be managed for wild horse use within the Pryor Mountain Wild Horse Range identified in the original Secretarial Orders from 1968 and 1969. The remainder of the horse range would be closed to wild horse use. Under this Alternative, the AMP determination would be made within the context of having a minimum amount of wild horses in order to improve ecological conditions, protecting other resources and individual animals. Thus, impacts to vegetation communities under this Alternative would be less than Alternative A, C and D. Under this Alternative range improvements and/or vegetation treatments would not be authorized in wild horse habitat; only natural processes would occur.

Impacts from Cultural Resources

Alternative B impacts are similar to those discussed under Alternative A.

Impacts from Visual Resources

Under Alternative B, setting VRM levels would be addressed. Impacts associated with implementation of VRM guidelines would have similar impacts as discussed in Alternative A. The main difference would be the change in management acres. Under this Alternative, VRM levels would be established to VRM Class I, II, II, and IV. VRM Class I would be the most restrictive for activates to occur and the least restrictive would be VRM Class IV. VRM Class I level would have no significant change in acres from Alternative A. Under this Alternative

VRM Class II would have 3,261 more acres than Alternative A. VRM Class III and Class IV would have 2,425 less acres than Alternative A. VRM Class I is the most restrictive to surface disturbing activities and thereby most beneficial to the invasive and noxious weed program. Those acres managed as VRM Class I and II under Alternative B would have the most protection for the introduction of invasive and noxious weed species by imposing limitations on surface disturbing activities compared to all the Alternatives. Treatments in WSAs and ACECs would have no limitations on the type and method of treatments as long as treatments protect or enhance its values.

Impacts from Fire Ecology and Management

Under Alternative B, impacts would be similar to those described in Alternative A, however fewer impacts would occur. The restrictions of heavy equipment on fire line construction to existing roads and trails would greatly reduce impacts to invasive and noxious weeds, although would not be effective for fire suppression. The size of wildfires would increase and would create favorable habitat for the introduction of invasive and noxious weeds. Prescribed fire would not be allowed on, greater sage grouse protection areas, greater sage grouse restoration areas, areas of cultural sensitivity, riparian and wetlands, crucial winter range, sage grouse nesting and lek buffered areas and in areas of highly erosive soils. This would limit the use of prescribed fire to reduce vegetative cover in preparation for herbicide treatments. In the long-term this could increase future wildfire intensity thus negatively impacting vegetative communities and potentially increase the introduction and spread of invasive and noxious species.

Allowing the management of naturally ignited wildfire on 52,548 acres for resource benefit would potentially have both a long-term and short-term adverse impact on noxious and invasive species. Depending if noxious and invasive species are present or not, the management of wildfire in this manner would increase the potential number of acres impacted. Impacts would be expected to be adverse, minor and short-term until desirable vegetation regenerates. The reintroduction of fire into the landscape in this manner closely mimics natural processes, reducing fuel loading, adding nutrient to soils and increasing plant diversity, which would indirectly benefit the noxious and invasive weed program in the long-term.

Impacts from Wilderness Characteristics

Under Alternative B, 12 tracts (27,292 acres) would be managed for wilderness characteristics. Under this Alternative the following restrictions would have positive impacts to vegetative communities and indirectly benefit the noxious and invasive weed program. Lands would be managed as VRM Class I, closed to OHV use, closed to oil and gas leasing, exploration and development, closed to solid mineral leasing, closed to disposal of mineral materials, closed and recommended for withdrawal from mineral entry, new ROWs exclusion, closed to permitted commercial and personal use wood cutting and seed collection, and prescribed fire would be allowed. Surface disturbing activities would be allowed only if the activity does not impair the resource values and/or wilderness characteristics with the exception of emergency operations and valid existing rights and vegetation treatments to control the expansion of noxious and invasive species would be allowed.

Impacts from Energy and Mineral Resources

Coal

Under Alternative B, impacts would be similar to Alternative A except approximately 290,048 acres would be closed to coal leasing. Compared to Alternative A, 263,917 acres more would be closed to leasing of coal materials (e.g., Cultural, ACECs, wildlife PPAs, and WSAs). Overall this Alternative would have more acres closed than all other Alternatives.

Fluid Minerals

Under Alternative B, impacts to vegetation and noxious and invasive weeds would be similar to Alternative A. Surface disturbing activities would provide opportunities for the establishment and spread of invasive and noxious weeds. The percent slope restrictions (30 percent) would help to restrict activities and reduce vegetation loss therefore reducing areas of possible weed introduction and invasion. Approximately 28,110 acres of NSO; 76,556 acres of CSU; 274,031 acres of closed (discretionary) and 28,681 acres closed (non-discretionary). Over all, under this Alternative surface disturbance would be less than Alternative A, C and D. Applying lease notice and lease stipulations would indirectly prevent the introduction and spread of noxious and invasive species.

Locatable Minerals

Under Alternative B, impacts would be similar to Alternative A, except 270,977 acres would be closed and recommended for withdrawal from the exploration and development of locatable minerals. Under this Alternative 231,277 more acres than Alternative A would be closed to exploration and development. This would protect vegetative communities and indirectly reduce the potential for the introduction and spread of invasive and noxious weeds.

Mineral Materials

Under Alternative B, 343,745 acres would be closed to mineral material sales and development. This would be 299,162 acres more than Alternate A; 91,818 more acres than Alternative C and 71,122 acres more than Alternative D. This Alternative would close more acres than other Alternatives to impacts from surface disturbance. Closing areas from mineral operations would prevent impacts to vegetation and would decrease the introduction and spread of noxious and invasive species. Adverse impacts to vegetation would occur where mineral material sales are authorized. Adherence to BMPs outlined in mining laws, plans of operation, pertinent restrictions, and standard terms and conditions would help minimize impacts to vegetation and indirectly reduce the introduction and spread of invasive and noxious weeds.

Impacts from Forestry and Woodland Products

Under Alternative B, public demand would be met, which would include Probable Sale Quantity (PSQ) 70 mbf/year; 560 mbf short-term (8 years); 1,750 mbf long-term (25 years). This Alternative would have less mbf/year than Alternative A, C, and D. This would decrease impacts to vegetative communities and decrease the possible introduction and spread of noxious and invasive weed species. Management would restrict wheeled or tracked vehicles on sustained slopes greater than 30 percent. Short-term impacts would include compaction, vegetative cover removal, decreased infiltration and increased erosion. The use of BMPs and

adherence to Montana Streamside Management Zone Laws and practices would be expected to successfully mitigate short-term impacts and no long-term impacts would be anticipated. Vegetative cover would increase and erosion would decrease over the long-term and soil health would be improved, thus reducing negative impacts to invasive and noxious weed establishment and spread. No new roads would be constructed unless approved by a travel plan which would be expected to include effective mitigation measures to control erosion and reduce compaction. Decommissioning and reclaiming roads immediately after project completion would decrease the time for noxious and invasive weeds to become established, thus decreasing adverse impacts. Adverse impacts from forest and woodland management actions are expected to be moderate to minor and short-term. This Alternative provides the greatest degree of protection for vegetation communities and therefore would indirectly reduce the potential for the introduction and spread of noxious and invasive weeds.

This exclusion affects only timber harvest activities. The amount of timber harvest typically is less than 40 acres/year and is not expected to increase substantially over the next 15 years. Moderate to minor impacts could occur in localized project areas where surface disturbance occur, but would be short-term. Best management practice would reduce adverse long-term impacts. In general, the management of forest and woodlands would in the long-term benefit overall vegetation communities.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Under Alternative B, impacts would be similar to those described under Alternative A, except 185,607 acres would be managed as ROW avoidance areas and 211,384 acres would be managed as ROW exclusion areas. Exceptions to ROW avoidance would be granted only when the proposed authorization would not create substantial surface disturbance or would create only temporary impacts. Thus, impacts to vegetation in avoidance and exclusion areas would be negligible to minor and would be localized this would indirectly decrease the potential for the introduction and spread of noxious and invasive weeds.

Withdrawals

Impacts would be similar to Alternative A except Alternative B would close and recommend for withdrawal from mineral entry a total of 270,977 acres. Under this Alternative surface disturbance would be limited this would reduce the need for noxious and invasive weed treatment, thus decreasing cost for mitigation.

Impacts from Livestock Grazing

Alternative B impacts are similar to those discussed under Alternative A.

Impacts from Recreation, Visitor Services, Trails, and Travel Management

Under Alternative B, most recreational activity would have site-specific impacts to vegetation such as frequent or high-use areas (e.g., campgrounds, parking areas, trailheads and other recreation related use areas). Entrance to these areas is the most probable areas for invasive species to become established due to the surface disturbance. Soil compaction could result in

loss of vegetation cover and increase soil erosion. These impacts would be site-specific and localized.

Under Alternative B, visitor use is expected to increase throughout the Billings Field Office therefore introduction and spread of noxious and invasive species could increase and could also increase management cost to remove or control these noxious and invasive species. In areas with high visitor use, public protection from herbicide and equipment would create limitations on treatment methods used. Limiting or controlling activities (e.g., off highway vehicle use when soils are wet) to protect resources could result in localized closures or limitations on activity use. Other actions such as; not allowing big game retrieval and limiting camping to within 50 feet of the roadway would have positive benefits, but the amount of affected environment is small and insignificant. Under this Alternative, rock crawling is prohibited. Areas suitable for rock crawling generally occur in drainage bottoms, this activity could spread noxious and invasive species to areas uninfested. Overall Alternative B would have the least adverse impacts to desirable vegetation and wildlife habitat.

Alternatives B is the most restrictive for travel management. Designating more routes closed or open to administrative use only, this would have less potential for the spread of noxious and invasive weeds. An analysis of specific effects of routes open under this Alternative in areas inventoried, treated, and monitored for invasive and noxious weeds, can be found in Appendix O.

Impacts from Renewable Energy

Under Alternative B, no acres would be open to energy development. Closing a total of 345,491 acres of the field office to all phases of renewable energy development and 85,461 acres avoided in this Alternative would limit the potential for introduction and spread of invasive species and noxious weeds to the greatest degree compared to other Alternatives.

Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be similar to those described under Alternative A.

Areas of Critical Environmental Concern (ACEC)

Under Alternative B, impacts would be similar to those described under Alternative A, with the exception of adding three proposed ACECs (Grove Creek, Pryor Foothills RNA, and Greater Sage-Grouse Habitat) with a total of 12 ACECs (181,175 acres). Vegetation was specifically identified as a relevant and important value in the East Pryor ACEC, Grove Creek ACEC, Meeteetse Spires ACEC and Pryor Foothills RNA. Weed treatments would continue in Four Dances Natural Area ACEC, Castle Butte and Pryor Foothills RNA and all other ACEC weed treatments would be allowed if no conflicts with ACEC values exist. However, opportunities for vegetation treatments could be limited.

Wild and Scenic River (WSR)

Seven suitable segments (14.08 miles) would be recommended for inclusion in the National Wild and Scenic River Systems (NWSRS) to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under this Alternative. If included in the NWSRS, the management of these segments would benefit vegetative communities and indirectly reduce the potential impacts from the introduction and spread of noxious and invasive species. Depending on the classification of each segment opportunities for mechanical vegetation treatments could be limited. Otherwise a full range of vegetation treatment would be allowed as long as treatments do not interfere with the outstandingly remarkable values.

Management of WSRs to maintain the primitive and semi-primitive non-motorized recreational opportunities would decrease the potential introduction and spread of invasive and noxious weeds.

Pryor Mountain Wild Horse Range

The management of the Pryor Mountain Wild Horse Range would generally benefit the noxious and invasive weed program. Weed treatments would be allowed if no conflicts with PMWHR values exist. Failure to implement vegetation treatments, especially treatment to control noxious weeds could result in an increase in noxious and invasive weed establishment. Management actions could restrict the type of invasive and noxious weed treatment methods.

4.2.6.4.6 Alternative C

Impacts from Soil

Under Alternative C, full range of treatment methods would be allowed in the control of noxious and invasive species. Under this Alternative, slope restrictions would be prohibited on sustained slopes greater than 45 percent. Surface disturbance would not be allowed on fragile soils with low reclamation or mitigation potential. Imposing surface disturbance restrictions on approximately 4 percent of the BiFO administered lands and through project design features, adding stipulations, mitigations and following BMPs to protect soils would indirectly reduce impacts to vegetation communities. Thus indirectly reduce the introduction and spread of invasive and noxious weeds. In Alternative C there would be fewer constraints and more locations to implement soil disturbing activities than Alternatives A, B and D. These restrictions would improve upland health. Impacts would be short term, but long-term benefits are expected. In general, impacts from the management of soils would have long-term benefits for overall vegetation communities.

Impacts from Water

Under this Alternative the impacts would be the same as Alternative B

Impacts from Vegetation

Forests and Woodlands

Under Alternative C, operations activities on approximately 25,335 acres (79 percent) of forested lands would be allowed. The use of wheeled or tracked logging equipment is

prohibited on sustained slopes greater than 45 percent. Logging activities would be allowed with mitigation measures, following BMPs and a reclamation plan in place. This would reduce impacts to vegetative communities and indirectly reduce the introduction and spread of noxious and invasive species. Under this Alternative a full range of treatment methods would be allowed in the control of noxious and invasive species. Short-term impacts would occur due to soil disturbance associated with timber harvest activities, but long-term benefits are expected. Moderate to minor impacts could occur in localized project areas where surface disturbance occur, but would be short-term. The increased cost to mitigate the introduction of invasive and noxious weeds would be short-term with a long-term benefit. In general, impacts from the management of forest and woodlands would in the long-term benefit overall vegetation communities and indirectly decrease the potential for the introduction and spread of noxious and invasive species.

Rangelands

Under Alternative C, a full range of treatments for controlling noxious and invasive weeds would be allowed. Impacts would be similar to Alternative A, except invasive and noxious weed treatments would be applied to approximately 1,500 - 3,000 acres per year. The potential for re-treatments is anticipated, therefore in the short-term it is anticipated there would be noxious and invasive species present, but in the long-term noxious and invasive species populations would be reduced. Proper rangeland management would also reduce the need for vegetation treatment.

Impacts from crested wheatgrass conversion to native sagebrush/grassland would be similar to Alternative A except treatments would occur on approximately 7,500 acres. This is 7,340 acres more than Alternative A and is less than Alternative C (difference of 14,914 acres) and D (difference of 4,500 acres). Treatment would continue to occur in areas with high wildlife habitat value (e.g., sage grouse, big game). Long-term benefits is expected to increase vegetation composition, increase forage production, improve range conditions, soil health and wildlife and indirectly reduce the introduction and spread of noxious and invasive species. Through the use of BMPs and proper preparation and planting methods, impacts would be minor to negligible over the short-term.

Riparian and Wetlands

Under Alternative C, impacts would be similar to Alternative A except surface disturbance restrictions in riparian and floodplains on approximately 6,666 acres (does not include oil and gas development restrictions). This Alternative would have the least protection for vegetative communities and a higher potential for the spread of noxious and invasive species. Riparian and wetlands areas not rated as Proper Functioning Condition (PFC) would be monitored and managed to ensure movement towards PFC. Oil and gas leasing and development would be allowed within riparian areas or wetlands designated 100 year flood plains and on water bodies and streams, with an approved mitigation plan. Restrictions from soil disturbance to these areas would indirectly reduce the impacts of the introduction and spread of noxious and invasive species and thus protects vegetative communities.

To minimize impacts to wetlands and riparian areas aerial application of non-aquatic label herbicides would follow herbicide label and state regulations. Vehicle and hand applications of

non-aquatic herbicides would be the same as Alternative A. Impacts would vary according to the type of treatment proposed and the nature and extent of the restrictions. Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to vegetation.

Special Status Species

Under Alternative C, impacts would be similar to Alternative A, except all BLM authorized activities would be evaluated in known special status plant sites for the potential effects of these activities on special status plants. This could affect the type of control methods used when controlling noxious and invasive plant species. Indirectly this would benefit the noxious and invasive weed program, by limiting these areas from any type of disturbance. The protection of special status plant species would limit the type of methods used for treatment. Under this Alternative aerial application of herbicides would not be allowed within ½ mile of special status plant species. Vehicle and hand application of herbicides would be allowed only when the treatment would benefit special status plant species. Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to special status species and surrounding vegetative communities. The lack of vegetation treatments could result in an increase in vegetation density and increased establishment of noxious and invasive species in special status species habitats.

Impacts from Wildlife Habitat, Fisheries Habitat, and Special Status Species

Under Alternative C, impacts would be similar to Alternative B. However, in areas designated as 100 year flood plains, surface disturbing activities would be allowed, with approved mitigations. Impacts to the management of invasive and noxious species from wildlife and special status species management are expected to be positive in the long-term. Limiting or prohibiting surface disturbing activities and promoting vegetation coverage would reduce the potential for invasive and noxious weed establishment and spread; these impacts would be localized, moderate in the short-term. Wildlife tends to disperse across a large area, thus contribute to the movement of invasive and noxious species vegetative parts and seeds to areas uninfested. These impacts could be minor to major depending on invasive species, terrain, safe sites for invasive establishment.

Impacts from Wild Horses and Burros

Under Alternative C, approximately 28,622 BLM administered surface acres are managed within the Pryor Mountain Wild Horse Range (44,855 acres – all surface ownerships). Appropriate management level would be consistent to Alternative A. Impacts to vegetation under Alternative C would be the consistent with Alternative A and D.

Impacts from Cultural Resources

Alternative C impacts are similar to those discussed under Alternative A.

Impacts from Visual Resources

The impacts associated with the implementation of VRM guidelines would have similar impacts as discussed in Alternative A. Under Alternative C, vegetation treatments would occur

on 26,040 acres of Class I VRM, 20,498 acres of Class II VRM, 387,616 acres of Class III VRM and 0 acres of Class IV VRM. VRM Class I is the most restrictive to surface disturbing activities, thereby most beneficial to vegetative communities which would reduce the potential for the spread of invasive and noxious weeds. Those acres managed as VRM Class I and II under Alternative C would have the most protection for the introduction of invasive and noxious weed species by imposing limitations on surface disturbing activities compared to other Alternatives. Overall impacts would be decreased under this Alternative. VRM Class I and II would contribute to the protection of 4,268 more acres than Alternative A and 1,027 more acres than Alternative B.

Impacts from Fire Ecology and Management

Under Alternative C, heavy equipment would be allowed in all areas unless otherwise restricted (e.g., ACECs, WSAs, etc). In the event of a wildfire heavy equipment would not be restricted to roads and trails, except where prohibited (e.g., known special status plant species). The impacts would directly affect vegetation communities and indirectly increase the possibility of noxious and invasive weed introduction and spread, although this would be more effective for fire suppression. Under this Alternative, the use of prescribed fire would be similar to Alternative B, except for the use of prescribed fire would be allowed in greater sage-grouse RAs if treatment would benefit sagebrush communities.

Under this Alternative, wildfire management for resource benefit would not be authorized. By not authorizing wildfire management fuel loads would increase and in the long-term could increase wildfire intensity which would have a larger more serious impact to vegetative communities. Thus increase the introduction and spread of invasive and noxious species.

Impacts from Wilderness Characteristics

Impacts under this Alternative would be similar to Alternative B, except 4 tracts of land (3,379 acres) would be managed for wilderness characteristics.

Impacts from Energy and Mineral Resources

Coal

Under Alternative C, impacts would be similar to Alternative A except approximately 264,450 acres would be closed to coal leasing. Compared to Alternative A, 238,319 acres more would be closed to leasing of coal materials (e.g., Cultural, ACECs, wildlife PPAs, and WSAs).

Fluid Minerals

Under Alternative C, impacts to vegetation and noxious and invasive weeds would be similar to Alternative A. Surface disturbing activities would provide opportunities for the establishment and spread of invasive and noxious weeds. Percent slope restrictions (45 percent) would help to restrict activities and reduce vegetation loss therefore reducing areas of possible weed introduction and invasion. Approximately 64,135 acres of NSO; 102,682 acres of CSU; and 37,209 acres would be closed/no lease (discretionary) and 28,682 acres closed/no lease (non-discretionary). Surface production and disturbance would be more than Alternative A, B and D, therefore impacts to vegetation would be more than all other Alternatives therefore would have

a higher potential for the spread of invasive and noxious weeds. Applying lease notice and lease stipulations would indirectly prevent the introduction and spread of noxious and invasive species.

Locatable Minerals

Under Alternative C, impacts would be similar to Alternative A, except 36,955 acres would be closed and recommended for withdrawal from development of locatable minerals. Closing areas to locatable mineral operations would prevent impacts to vegetation thereby reduce the introduction of and spread of noxious and invasive species. This Alternative would have more acres closed to exploration and development for locatable minerals thereby protect vegetative communities and indirectly reduce the potential for the introduction and spread of invasive and noxious weeds. The difference by Alternative is as follows: 2,745 less acres than Alternative A, 234,022 less acres than Alternative B, and 17,806 less acres than Alternative D.

Mineral Materials

Under Alternative C, 251,927 acres would be closed to mineral material sales and development. This would be 207,344 acres more than Alternate A and 91,818 less acres than Alternative B and 20,195 acres more than Alternative D. Closing areas from mineral operations would prevent impacts to vegetation and would decrease the introduction and spread of noxious and invasive species. Adverse impacts to vegetation would occur where mineral material sales are authorized. Adherence to BMPs outlined in mining laws, plans of operation, pertinent restrictions, and standard terms and conditions would help minimize impacts to vegetation and indirectly reduce the introduction and spread of invasive and noxious weeds.

Impacts from Forestry and Woodland Products

Under Alternative C, impacts would be similar to Alternative B, except public demand would be met, which would include Probable Sale Quantity (PSQ) 250 mbf/year, 2,000 mbf short-term (8 years), and 6,250 mbf long-term (25 years). Alternative C and D would have the same amount of mbf/year, more than Alternative A and B. Management would restrict wheeled or tracked vehicles on sustained slopes greater than 45 percent. Short-term impacts would include compaction, vegetative cover removal, decreased infiltration and increased erosion. The use of BMPs and adherence to Montana Streamside Management Zone Laws and practices would be expected to successfully mitigate short-term impacts and no long-term impacts would be anticipated. Vegetative cover would increase and erosion would decrease over the long-term and soil health would be improved. Thus reduce negative impacts to invasive and noxious weed establishment and spread. New roads could be built where multiple entries would be necessary to meet objectives. Decommissioning and reclaiming roads within 1 year of project completion would decrease the time soils were exposed to wind and water. Decreasing adverse impacts to vegetative communities thus decrease the potential for the establishment of invasive and noxious weeds.

Adverse impacts from forest and wood land management actions are expected to be moderate to minor and short-term. The use of Montana Water Quality BMPs and adherence to Montana Stream Zone Management Law would be expected to limit impacts including erosion and compaction, both short-term and long-term.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Under Alternative C, impacts would be similar to those in Alternative A, except 355,601 acres would be managed as ROW avoidance areas and 39,491 acres would be managed as ROW exclusion. Exceptions to ROW avoidance would be granted only when the proposed authorization would not create substantial surface disturbance or would create only temporary impacts. Impacts to vegetation in avoidance and exclusion areas would be negligible to minor and would be localized. Therefore, indirectly decrease the potential for the introduction and spread of noxious and invasive weeds.

Withdrawals

Impacts would be similar to Alternative A except Alternative C would close and recommend for withdrawal from mineral entry a total of 36,955 acres. This Alternative would provide one of the least protections for vegetation communities thus would indirectly increase the potential for the introduction of noxious and invasive species.

Impacts from Livestock Grazing

Alternative C impacts are similar to those discussed under Alternative A. This Alternative could allow livestock grazing on a temporary basis for the treatment of noxious weeds on special management areas which could reduce treatment costs. This Alternative protects specific resource values that could make grazing by domestic sheep and goats unavailable for livestock grazing (e.g., area with known big horn sheep and grizzly bear habitat).

Impacts from Recreation, Visitor Services, Trails and Travel Management

Under Alternative C, impacts to the noxious and invasive weed program would be similar to Alternative A except would allow big game retrieval 300 feet from roadway and allowing motorized travel to campsites within 300 feet off the roadway. This would allow new routes and encourages creation of new routes. In the long-term the cumulative impacts would be high. Under this Alternative rock crawling activities would be allowed, this activity would contribute to the introduction and spread of noxious and invasive weeds.

Alternative C has the least restrictions to road designations (fewer routes closed, limited by dates or vehicle type, or limited to administrative use only). Overall, Alternative C would have the most adverse impacts to the spread of noxious weeds. An analysis of specific effects of routes open under this Alternative in areas inventoried, treated and monitored for invasive and noxious weeds, can be found in Appendix O.

Impacts from Renewable Energy

Under Alternative C, renewable energy development would be closed on 82,019 acres to all phases of development and 326,722 acres would be avoided. Even though development could occur on public lands under this Alternative (21,349 acres open), this Alternative would be significantly less development than current management and 3,931 acres more than Alternative D.

Application of BMPs and applying terms and conditions on authorizations, where allowed, would serve to reduce the potential for introduction and spread, and thus assist in maintenance of healthy vegetative communities.

Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be similar to those described under Alternative A.

Areas of Critical Environmental Concern (ACEC)

Under Alternative C, the Bridger Fossil Area, Castle Butte, Four Dances Natural Area, Grove Creek, Petroglyph Canyon, Pryor Foothills RNA, and Stark Sites' impacts would be the similar to Alternative B except for boundary difference for East Pryor, Meeteetse Spires, and Weatherman Draw which would change the total acreage for Alternative C to 67,079 acres.

Wild and Scenic River (WSR)

Under Alternative C, none of the eligible river segments would be recommended as suitable for inclusion in the National Wild and Scenic River System (NWSRS), although these segments would be managed to protect their outstanding remarkable values. The management of these eligible segments under this Alternative would directly benefit and protect vegetative communities. Thus indirectly prevent the introduction and spread of noxious and invasive species.

Pryor Mountain Wild Horse Range

Impacts would be similar to those described under Alternative B.

4.2.6.4.7 Alternative D (Preferred Alternative)

Impacts from Soil

Under Alternative D, impacts would be the same as Alternative B.

Impacts from Water

Under Alternative D, impacts would be the same as Alternative B.

Impacts from Vegetation

Forests and Woodlands

Under Alternative D, operations activities on approximately 19,241 acres (60 percent) of forested lands would be allowed. The use of wheeled or tracked logging equipment is prohibited on sustained slopes greater than 30 percent. Operation would be allowed with mitigation measures, following BMPs and a reclamation plan in place would reduce impacts to vegetative communities and indirectly reduce the introduction and spread of noxious and invasive species. Under this Alternative a full range of treatment methods would be allowed in the control of noxious and invasive species. Short-term impacts would occur due to soil disturbance associated with timber harvest activities, but long-term benefits are expected.

Moderate to minor impacts could occur in localized project areas where surface disturbance occur, but would be short-term. The increased cost to mitigate the introduction of invasive and noxious weeds would be short-term with a long-term benefit. In general, impacts from the management of forest and woodlands would in the long-term benefit overall vegetation communities and indirectly decrease the potential for the introduction and spread of noxious and invasive species.

Rangelands

Under Alternative D, a full range of treatments for controlling noxious and invasive weeds would be allowed. Impacts would be similar to Alternative A, except invasive and noxious weed treatments would be applied up to 400 - 2,000 acres per year. The potential for re-treatments is anticipated, therefore in the short-term it is anticipated there would be noxious and invasive species present. Long-term, noxious and invasive species populations would be reduced. Proper rangeland management would also reduce the need for vegetation treatment.

Impacts from crested wheatgrass conversion to native sagebrush and grassland would be similar to Alternative A except treatments would occur on approximately 12,000 acres. This is 11,840 acres more than Alternative A and 4,500 acres more than Alternative C and is less than Alternative B (by 10,414 acres). Treatment would continue to occur in areas with high wildlife habitat value. Treatment would have a negative impact in the short term, but in the long-term would benefit vegetation composition, increase forage production, improve range conditions, soil health and wildlife and indirectly reduce the introduction and spread of noxious and invasive species. Through the use of BMPs and proper preparation and planting methods, impacts would be minor to negligible over the short-term.

Riparian and Wetlands

Under Alternative D, impacts would be similar to Alternative A except surface disturbance restrictions on approximately 9,087 acres (does not include oil and gas development restrictions); this is less acres than Alternative A and D and more than C. Restrictions from soil disturbance to these areas would indirectly reduce the impacts of the introduction and spread of noxious and invasive species and thus protects vegetative communities. Riparian and wetlands areas not rated as PFC would be monitored and managed to ensure movement towards PFC. Oil and gas leasing and development would be the same as Alternative B. Restrictions from soil disturbance to these areas would indirectly reduce the impacts of the introduction and spread of noxious and invasive species and thus protects vegetative communities.

To minimize impacts to wetlands and riparian areas aerial application of non-aquatic label herbicides would not be allowed within 500 feet. Vehicle and hand applications of non-aquatic herbicides would be the same as Alternative A. Impacts would vary according to the type of treatment proposed and the nature and extent of the restrictions. Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to vegetation.

Special Status Species

Under Alternative D, impacts would be similar to Alternative B, except if there is a potential for special status plant habitat, an onsite inventory would be conducted. The protection of special status plant species could affect the types of treatment methods applied. Indirectly this would benefit the noxious and invasive weed program, by limiting these areas from any type of disturbance. Aerial application of herbicides and impacts would be similar to Alternative B Failure to implement vegetation treatments, especially treatments to control noxious weeds, in these habitats could result in direct and indirect long-term impacts to special status species and surrounding vegetative communities. The lack of vegetation treatments could result in an increase in vegetation density and increased establishment of noxious and invasive species in special status species habitats.

Impacts from Wildlife Habitat, Fisheries Habitat, and Special Status Species

Under Alternative D, impacts would be similar to Alternative A. However, surface disturbing activities would not be allowed within riparian areas and wetlands designated as 100 year flood plains and on water bodies and streams, except for activities that are not in conflict with the desired outcomes for this resource. These limitations imposed would reduce the introduction and spread of invasive and noxious weeds. Short-term impacts would occur but in the long-term, vegetation treatments would improve cover and increase plant diversity, thereby stabilizing soil, improving overall watershed and riparian function and condition, and allow greater infiltration and soil moisture storage. Therefore, impacts to vegetation from proposed decisions for fish habitat enhancement would be beneficial overall.

Impacts from Wild Horses and Burros

Under Alternative D, approximately 27,094 BLM managed surface acres are managed within the Pryor Mountain Wild Horse Range (39,944 acres all surface ownerships). Appropriate management level would be same as to Alternative A. Thus, impacts to vegetation under Alternative D would be similar to Alternative A and C.

Impacts from Cultural Resources

Impacts would be similar to those described under Alternative C.

Impacts from Visual Resources

The impacts associated with the implementation of VRM guidelines would have the same impacts as discussed in Alternative A. Under Alternative C, vegetation treatments would occur on 28,861 acres of Class I VRM, 13,648 acres of Class II VRM, 391,645 acres of Class III VRM and 0 acres of Class IV VRM. VRM Class I is the most restrictive to surface disturbing activities and thereby most beneficial to the invasive and noxious weed program. Those acres managed as VRM Class I and II under Alternative D (42,509 acres) would have the most protection for the introduction of invasive and noxious weed species by imposing limitations on surface disturbing activities compared to all the Alternatives. Overall under this Alternative, VRM Class I and II would contribute to fewer acres for protection than other Alternatives.

Impacts from Fire Ecology and Management

Under Alternative D, heavy equipment would be used to construct fire lines in crucial winter range, special status species habitat, riparian and wetlands or areas of with cultural sensitivity or other designated area (e.g., ACEC, WSAs, etc). If heavy equipment is used rehabilitation to those lines would begin immediately after fire containment. Any type of soil disturbance would directly affect vegetation communities and indirectly increase the possibility of noxious and invasive weed introduction and spread. The management of noxious and invasive weeds could increase the cost to treat noxious and invasive species.

The use and impacts of prescribed fire would be similar to Alternative C.

Impacts from Wilderness Characteristics

Under Alternative D, impacts would be similar to those described under Alternative B, except 9 tracts (13,653 acres) would be managed for wilderness characteristics. Management of Lands with Wilderness Characteristics would overall benefit the invasive and noxious weed program.

Impacts from Energy and Mineral Resources

Coal

Under Alternative C, impacts would be similar to Alternative A except for coal leasing would be closed on approximately 280,971 acres. Compared to Alternative A 254,840 more acres would be closed to coal leasing (e.g., Cultural, ACECs, wildlife PPAs, and WSAs). In comparison to Alternative B this would be 9,077 less acres and 16,521 more acres than Alternative C.

Fluid Minerals

Under Alternative D, impacts to vegetation and noxious and invasive weeds would be similar to Alternative A. Surface disturbing activities would provide opportunities for the establishment and spread of invasive and noxious weeds. Slope restrictions (greater than 30 percent) would restrict surface disturbing activities, thus reduce impacts to vegetation loss and indirectly reduce possible weed introduction and invasion. Approximately 263,185 acres of NSO, 21,436 acres of CSU, 44,233 acres would be closed (discretionary) and 28,682 closed (non-discretionary). Under this Alternative surface production and disturbance would be more than Alternative A, B and less than Alternative C. Applying lease notice and lease stipulations would indirectly prevent the introduction and spread of noxious and invasive species.

Locatable Minerals

Under Alternative D, impacts would be similar to Alternative A, except 54,761 acres would be closed and recommended for withdrawal from the development of locatable minerals. In comparison to Alternative A this would be 15,061 more acres, 216,216 less acres than Alternative B and 17,806 more acres than Alternative C. More acres that are closed to exploration and development of locatable minerals would indirectly reduce the potential for the introduction and spread of invasive and noxious weeds.

Mineral Materials

Under Alternative D, impacts would be similar to Alternative A, except 272,122 acres would be closed for mineral material sales and development. In comparison to Alternative A this would be 227,539 more acres, 71,623 less acres than Alternative B and 20,195 more acres than Alternative C. More acres that are closed sales and development of mineral materials would indirectly reduce the potential for the introduction and spread of invasive and noxious weeds.

Impacts from Forestry and Woodland Products

Impacts would be similar to Alternative C, except under this Alternative public demand would be accommodated, which would include Probable Sale Quantity (PSQ) 125 mbf/year, 1,000 mbf short-term (8 years) and 3,125 mbf long-term (25 years). Compared to other Alternatives the mbf/year could be adjusted based on monitoring evaluations, due to unforeseen events such as wildfires, current inventories, and disease or climate conditions. Management would restrict wheeled or tracked vehicles on sustained slopes greater than 30 percent. Short-term impacts would include compaction, vegetative cover removal, decreased infiltration and increased erosion. The use of BMPs and adherence to Montana Streamside Management Zone Laws and practices would be expected to successfully mitigate short-term impacts and no long-term impacts would be anticipated. Vegetative cover would increase and erosion would decrease over the long-term and soil health would be improved, thus reducing negative impacts to invasive and noxious weed establishment and spread. New roads would be built where multiple entries would be necessary to meet objectives. Decommissioning and reclaiming roads within one year of project completion would decrease the time soils were exposed to wind and water, thus decreasing adverse impacts.

Adverse impacts from forest and wood land management actions are expected to be moderate to minor and short-term. The use of Montana Water Quality BMPs and adherence to Montana Stream Zone Management Law would be expected to limit impacts including erosion and compaction, both short-term and long-term.

Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Under Alternative D, impacts would be similar to those described under Alternative A, except 349,358 acres would be managed as ROW avoidance areas and 48,258 acres would be managed as ROW exclusion areas. Exceptions to ROW avoidance would be granted only when the proposed authorization would not create substantial surface disturbance or would create only temporary impacts. Thus, impacts to vegetation in avoidance and exclusion areas would be negligible-to-minor and would be localized therefore would indirectly decrease the potential for the introduction and spread of noxious and invasive weeds.

Withdrawals

Impacts would be similar to Alternative A except Alternative D would close and recommend for withdrawal from mineral entry a total of 54,761 acres. Limiting disturbance would indirectly prevent the spread and introduction of noxious and invasive weeds.

Impacts from Livestock Grazing

Impacts would be similar to Alternative C.

Impacts from Recreation, Visitor Services, Trails, and Travel Management

Under Alternative D, big game retrieval would not be allowed and motorized travel to campsites would be limited to 100 feet from roadways. These restrictions would benefit vegetative communities, but the amount of affected environment is small and impact would be insignificant. Rock crawling activities would not be allowed, which would eliminate the potential for the establishment of noxious and invasive weeds.

Alternative D has more restrictions in road designations (routes closed, limited by dates or vehicle type, or limited to administrative use only) than Alternatives A and C, but less than Alternative B. Overall, Alternative D travel management actions would reduce the potential for the spread of noxious and invasive weeds to areas uninfested. An analysis of specific effects of routes open under this Alternative in areas inventoried, treated and monitored for invasive and noxious weeds, can be found in Appendix O.

Impacts from Renewable Energy

Impacts would be similar to those described under Alternative C, except acres would slightly differ 20,937 acres open, 78,088 acres closed and 331,088 acres would be avoided from all phases of renewal energy development.

Impacts from Special Designations

Pompeys Pillar National Monument and ACEC

Impacts would be similar to those described under Alternative A.

Areas of Critical Environmental Concern (ACEC)

Impacts would be similar to those described under Alternative B, with the exception of differences in boundary, which would change the acreage for Alternative D to 38,786 acres. In comparison to Alternative A, this would be 890 more acres, 142,389 less acres than Alternative B, and 28,293 less acres than Alternative C.

Wild and Scenic River (WSR)

Impacts would be similar to those described under Alternative B, with the exception of recommending 2 segments with a total segment miles of 3.15 miles in the National Wild and Scenic River System: Crooked Creek (above fish barrier) – 1.59 miles; tentative management class would be wild. Crooked Creek (below fish barrier) – 1.56 miles; tentative management class would be scenic. This Alternative would decrease the number of miles of WSR segments by 10.93 which would provide less protection to vegetation than Alternatives A, B and C.

Pryor Mountain Wild Horse Range

Impacts would be similar to those described under Alternative B.

4.2.6.4.8 Cumulative Impacts

The cumulative impact analysis boundary for weeds includes the entire planning area, plus public and private lands directly adjacent to the BiFO boundary. Noxious and invasive weeds are a threat to land health as they contribute to loss of rangeland productivity, increased soil erosion and sedimentation, degraded vegetation communities, reduced species richness, reduced wildlife habitat quality, altered fire regime, and reduced aesthetic quality. Surface disturbance creates conditions favorable for the invasion and establishment of noxious weeds and other non-native species, particularly when these species are present in the surrounding area.

Surface-disturbing activities would continue to occur, and would increase in some cases, within and adjacent to the BiFO. The major actions that would cause or facilitate weed invasion and expansion are mineral leasing and development; issuance of ROWs; construction of roads, trails, and recreation facilities; wildfire and prescribed fire; grazing; and cross-country OHV use. Vectors for weed dispersal, such as vehicles, recreationists, livestock, and wildlife, would continue to be present, spreading weed seeds to new sites.

In general, the more soil disturbed over the life of the plan, the greater the cumulative impact anticipated relative to noxious and invasive weed spread. Surface disturbance from non-BLM actions, such as from permittees (e.g., oil and gas companies), is anticipated to be substantively greater than surface disturbance from BLM actions (e.g., recreation development). For the most part, soil disturbances would be revegetated or reclaimed, which would reduce bare ground and decrease the risk of weed invasion and spread. However, restoration efforts can have poor success rates, with loss of species diversity, increase in annuals, decrease in perennials and woody plants, and an increase in weed species.

In addition to the total acres of land disturbed, the type of disturbance is important to the spread of noxious and invasive weeds. For example, construction, maintenance, existence, and operation of linear features (e.g., waterways, roads, trails, and ROW corridors) in the planning area could have a substantial impact on the spread, and particularly the introduction, of noxious and invasive weeds across large areas. Water, wind, vehicles, livestock, humans, and wildlife inadvertently transport weed seeds and propagules along linear features. The more miles of linear features constructed, the greater the adverse cumulative impact would be from weed spread and expansion.

Across all Alternatives, the BLM would continue to monitor and treat new and existing populations of noxious and invasive weeds and would continue to work with partners from local, state, and federal agencies to control weeds on a broad scale. The BiFO would continue implementation of integrated weed management while adhering to federal, state, and county laws and regulations.

The cumulative surface disturbance acreage across the BiFO is anticipated to be the most under Alternative C and the least under Alternative B. Alternative D would have slightly more surface disturbance than under Alternative B but substantially less than under Alternative C. Because weed invasion and spread is directly related to the amount of surface disturbance,

Alternative C would have the most risk of weed spread, whereas Alternative B would have the least.

4.2.6.4.9 Past and Present Actions

Adverse impacts from past or present actions, from vegetative treatments, are relatively minor within the BiFO planning area. Corrective management actions (e.g., improved livestock grazing management, BMPs, standard operating procedures) have taken place in the past to improve vegetative communities, fish and wildlife habitat, riparian, wetlands, rangelands. In addition, vegetation treatments and range improvements on lands adjacent to the BiFO would increase available forage for wildlife populations and livestock in these areas. This would improve the distribution of livestock and wildlife, improving vegetation health by decreasing concentrated impacts from grazing.

The combination of past, present, and future surface-disturbing activities would result in cumulative impacts on vegetative communities throughout the BiFO. Each disturbance increases the risk of weed invasion and disrupts the vegetation communities and could cause habitat fragmentation.

As communities grow, pressure to use and expand recreation areas is expected to continue. Associated development of roads, trails, and infrastructure to accommodate growing use would contribute to noxious and invasive weed introduction and expansion.

4.2.6.4.10 Reasonably Foreseeable Future Actions

Cumulative effects on noxious and invasive species from reasonably foreseeable actions (including those from other federal and non-federal actions) include actions from increased energy and mineral development and increased recreational use. Noxious and invasive weed species are expected to continue to spread on all lands. Management actions associated with each Alternative would require some degree of reclamation and weed prevention measures following surface disturbance on BLM lands. However, prevention measures could be applied unevenly across the planning area and between different management actions, and enforcement and monitoring of these measures depends on BLM priorities and funding.

4.2.6.4.11 Unavoidable Adverse Impacts

Unavoidable adverse effects would primarily be associated with the use of herbicides treatments and mechanical use. Regardless of the method used to remove vegetation, vegetation treatments would potentially result in adverse short-term impacts through increased soil erosion, surface water runoff and reduced water infiltration, leading to loss of soil and reduced soil productivity could result from vegetation removal. The degree of these effects would vary by landform, hydrology, soil, vegetation, and land use. Vegetation treatments could disturb biological soil crusts, potentially reducing soil quality and ecosystem productivity. The extent of impacts to biological soil crusts would be dependent on the intensity and kind of disturbance and the amount of area covered. The duration of the effects would vary, but recovery of biological soil crusts typically takes much longer than the recovery of vegetation. Decomposition of treated non-target aquatic vegetation could result in oxygen depletion for aquatic organisms. Siltation of wetlands could reduce water quality and the amount of oxygen

available to aquatic organisms. Vegetation treatments could cause unavoidable short-term disturbances to plant communities by killing both target and non-target plants. The extent of disturbances would vary by the extent and type of treatment. In many cases, the treatments would return all or a portion of the treated area to an early successional stage by freeing up resources such as light and nutrients for early successional species, such as annual grasses and forbs.

Vegetation treatments could temporarily affect non-target vegetation that might provide forage and shelter for livestock and wildlife. Potential impacts could be mitigated by removing livestock from areas scheduled for treatment. Vegetation treatments would not result in unavoidable adverse effects to visual resources over the long-term. Over the short term, vegetation treatments would kill or harm vegetation in applied areas, resulting in more open, browned, or blackened landscape until new plants were to grow in the area. While these effects are unavoidable, they are considered short-term impacts, as the vegetation would recover and lead to improved natural conditions. The use of mechanical treatment methods would adversely affect wilderness areas and wilderness study areas because vehicles and heavy equipment are incompatible with the "unspoiled" nature of wilderness. For this reason, mechanical treatments would only be allowed on a very limited number of sites where no other method was feasible (e.g., saltcedar removal) and in the few areas where mechanical treatments have occurred in the past and repeat treatments are required. Short-term closures or restrictions on public lands for certain vegetation treatments, such as implementation of herbicide use re-entry restrictions to protect public health or to restrict access by grazing animals until seeding efforts are established (up to two growing seasons) are unavoidable.

4.2.6.5 Special Status Plants

This section presents potential impacts on special status plants, from management actions for other resource programs. Special status species collectively are federally listed or proposed and Bureau special status species (BLM State Director designated special status species), which include both Federal candidate species and delisted species within five (5) years of delisting. (BLM Manual 6840, Special Status Species Management).

Management actions that disturb or disrupt soil or rock surfaces within a particular portion of the planning area could affect the capacity of that landscape to support special status plants.

4.2.6.5.1 Methods and Assumptions

The analysis is based on the following assumptions:

Impact analyses and conclusions are based on interdisciplinary team knowledge of resources in the BIFO, review of existing literature and information provided by other agencies. Effects are quantified where possible. In absence of quantitative data, best professional judgment was used. Spatial analyses were conducted using GIS data and analyses. Impacts are described using ranges of potential impacts or in qualitative terms, if appropriate.

4.2.6.5.2 Environmental Consequences

Impacts to special status plants would likely result from actions proposed under the following resource programs

- Soil
- Vegetation
- Wildlife and Fisheries Habitat and Special Status Species
- Wild Horses and Burros
- Fire Ecology and Management
- Cave and Karst Resources
- Energy and Minerals
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Forestry and Woodland Products
- Lands and Realty
- Renewable Energy
- Special Designations

Other programs were determined to have little or no impact on special status plants.

The principle adverse impacts to BLM special status plant species result from management that increases surface disturbance and habitat fragmentation; the principle beneficial impacts include management that increases restrictions in known or potential BLM special status plant species habitat. Based on the acreage of surface disturbance, the potential for habitat fragmentation, and proactive management actions and special designations to protect BLM special status plant species, Alternatives with the least to most potential adverse impacts to BLM special status plant species are Alternatives B, D, A, and C. Alternative B would result in the least surface disturbance and habitat fragmentation, followed by Alternatives A, D, and C respectively. Alternative D contains management actions to minimize habitat fragmentation. Alternative B includes the most provisions to protect sensitive soils and riparian areas for the benefit of BLM special status plants. Restrictions on motorized vehicle use, especially restricting motorized cross-country travel, would reduce adverse impacts to BLM special status plant species in all Alternatives.

4.2.6.5.3 Impacts Common to All Alternatives[1]

Various surface-disturbing activities, including mineral exploration and development and the associated roads, ROWs, and corridors, can directly affect habitats for BLM special status plant species. Recreational use, collection of plants, fire, as well as livestock, wild horse, and native ungulate grazing could remove or trample vegetation and disturb soil, resulting in adverse impacts to BLM special status plant species.

[1] Also refer to Special Designations – ACECs in this chapter for impacts by Alternative.

Surface-disturbing activities also can indirectly affect BLM special status plant species by contributing to soil erosion and transporting invasive species into BLM special status plant species habitats. The spread of invasive species could adversely affect BLM special status plants due to the limited size and distribution of these sensitive plants. Surface disturbance also can result in habitat fragmentation, which can isolate populations of BLM special status plant species. Populations of BLM special status plant species typically have a patchy distribution across the landscape, and eliminating one or more populations can prevent gene flow among populations if residual populations are too far apart for sufficient cross-pollination. Habitat fragmentation would be a long-term impact to BLM special status plant species. Utilizing BMPs (Appendix B) and mitigating projects to minimize surface disturbing and disruptive activities minimizes adverse impacts from surface disturbance across all Alternatives.

Several BLM special status plant species occur in inaccessible areas, rugged terrain, or on unstable slopes in the decision area. As a result, there are fewer threats to these species and the anticipated adverse impacts from surface-disturbing activities are minimal. Management actions that restrict surface disturbance on unstable slopes would result in beneficial impacts to these species. For BLM special status plant species in riparian/wetland areas, management actions that limit activity in these areas are anticipated to benefit these species by reducing direct impacts from trampling, mining, and recreational activities. Meeting PFC across all Alternatives improves habitat for BLM special status plant species.

Impacts from Soil

Under all Alternatives BLM authorized surface disturbing activities, would include site specific plans for reclamation, these plans would reflect the complexity of the project and the reclamation potential of the site. This requirement would potentially ensure that following activities, sites would be capable of supporting vegetation, including special status plant species, if habitat conditions were favorable to support these species.

Impacts from Vegetation

Forest and Woodlands

Management actions would include inventory, health assessments, monitoring, and management of forest structure, density, species composition, and distribution of forest stands within the decision areas. These actions would increase the potential for identifying special status species occurrences in forests and woodlands. If these species were identified, appropriate management would follow. Additionally, managing forests and woodlands to reduce the risk of severe or high intensity wildland fire, and epidemic levels of insects could potentially protect forest and woodland habitat, which could be suitable for certain special status species.

Rangelands

Rangelands would be managed to meet Standards for Rangeland Health. Additionally vegetative treatments would be implemented over the life of this plan, including treatment of crested wheatgrass, and invasive annual brome infestations. Treatment of these vegetative types could increase available habitat which could be suitable for special status species. Short-term

impacts to special status species would be negligible as often times these species grow in near monocultures with very little species diversity; however, there could be long-term benefits to special status species, through the increase of available habitat.

Riparian and Wetlands

Management across all Alternatives would be to achieve PFC. This would maintain habitat in areas currently meeting PFC, and improve habitat conditions in areas that are not meeting PFC. This could potentially benefit special status species which require these types of habitat.

Invasive Species and Noxious Weeds

Treatment of invasive species and noxious weeds would occur throughout all Alternatives, using various treatment methods. In general the treatment of invasive species and noxious weeds would be beneficial to special status species, as these species have a high potential to aggressively out compete native species, however treatment of these species could negatively impact isolated occurrences of special status species unknown in the treatment area. The greatest threat to special status species from the treatment of invasive and noxious weed species would be from chemical application, and the use of sheep or goats to treat infestations.

Special Status Plants

Management of special status plants would require BLM authorized activities to maintain or improve habitat for these species. Additionally inventories and trend studies would be conducted for known populations, and appropriate management would be implemented based on these studies. These actions would have a beneficial long-term impact to special status species.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Management actions for wildlife and fisheries habitat would generally be beneficial to special status plant species, as most actions are to protect, preserve and provide habitat, and reduce habitat fragmentation. To achieve this restrictions and stipulations would be placed on certain surface disturbing activities with various buffers from key habitat areas, therefore protecting special status plant populations and habitat which may or may not occur in these buffers.

Conversely, implementation of projects and vegetative treatments could directly impact special status species in or near treatment areas. Impacts could include direct mortality from surface disturbance, or habitat degradation from increased wildlife use in these areas. These impacts are considered minor, as special status plants would be considered during the NEPA process prior to project implementation.

Impacts from Wild Horses and Burros

BIFO manages wild horses and the PMWHR to ensure a thriving natural ecological balance.

Almost all special status plants identified are found in the Pryor Mountain Wild Horse Range, and horse population size could have a direct adverse impact on special status plant species through utilization by horses for forage, by trampling of individual plants, and loss of top soil as a consequence of excessive forage utilization.

The indirect effect of managing horse populations within the appropriate management level (AML) would be to protect and enhance populations of special status plants.

Impacts from Fire Ecology and Management

Depending on the type, scope, and intensity, vegetation treatments and fire and fuels management could directly impact special status plants. Impacts in treated areas could range from negligible to extreme. The duration of the impacts would be dependent on the type of treatment being applied. The use of heavy equipment for the construction of fire lines could result in the removal or crushing of special status species, or total habitat loss. Following Wildfire Emergency Stabilization and Rehabilitation (ESR) efforts would follow consistent with current policy

Treatments are anticipated to cause short-term losses, but in the long term, managing vegetation resources to achieve Standards of Rangeland Health and desired vegetation condition, including the control of noxious weeds, invasive species, and insects, would improve the condition of the landscape and enhance special status plants within properly functioning natural ecosystems.

Impacts for Cave and Karst Resources

Many plants with limited populations that qualify them for special status are found on sites which are characterized by harsh conditions including lack of regular moisture, thin soils, and extremes soil acidity or alkalinity. Karst surfaces meet all of these conditions, and several of the special status plants in the BIFO, including Shoshonea (Shoshonea pulvinata), are restricted to limestone soils on south facing slopes in the Pryor Mountains.

Managing to protect cave and karst resources would also have long-term beneficial impacts to special status plants in the area.

Impacts from Energy and Mineral Resources

Development of energy and mineral resources has the potential to adversely impact special status species through all phases of development. Impacts include mortality to individual special status plants, or entire populations, as well as habitat loss and fragmentation. Stipulations would be placed on energy and mineral development which could reduce potential impacts. These stipulations include closing areas to leasing (NL), restricting surface occupancy (NSO or CSU), or restricting the season of operation (TL). Closing or restricting surface use would be the most beneficial stipulations for special status species. A CSU stipulation could limit development on harsh sites which have the potential to contain sensitive species. A TL could restrict use during critical stages of plant development, which could benefit special status species; however, there are no TL stipulations specifically for this.

Impacts from Forestry and Woodland Products

The harvest of forest and woodland products could adversely impact special status species, from surface disturbance and habitat alteration, however most timber sales are small in scale, and would be analyzed in site specific analysis. If special status species are known in the area mitigations and stipulations would be implemented to reduce impacts to these species. If

impacts could not be mitigated to an acceptable level, the BLM would not authorize these activities.

Impacts from Lands and Realty

The greatest impact to special status species from lands and realty would be from land use authorizations. These authorizations have the potential to remove, destroy or alter habitat for special status species, as well as increase use in areas where there is typically little use, which could lead to trampling, crushing, and mortality of individual special status plant species, or populations. Prior to authorizing these uses site specific analysis would be conducted, and impacts would be mitigated to an acceptable level.

Impacts from Livestock Grazing

Principal adverse direct impacts to special status plants by livestock grazing management would be due to forage utilization, trampling of individual plants, soil compaction and erosion. Forage utilization and trampling can remove, reduce, or alter photosynthetic material from the plant. This could result in reduced plant performance and vigor. Depending on the developmental stage of the plant when the disturbance occurs, the defoliation or alteration could preclude seed development. If a special status species is palatable and highly sought after by livestock, populations of the special status species plant could be heavily grazed and over time reduced. Soil compaction and erosion could impact special status species by changing and/or removing existing or potential habitat. Conversely, some species could benefit from some degree of livestock grazing as some disturbance could be beneficial to the plant and neighboring habitat. Additionally the placement of water developments, fencing, supplement and salt could improve livestock distributions, but increase livestock use in areas containing sensitive plant species. The installation and maintenance of range improvement projects could increase surface disturbance, and could adversely impact special status species, and their habitat

Impacts from Recreation and Visitor Services

Specific recreational activities could result in impacts to special status plant species. Where impacts are discovered, and unacceptable levels of change are documented, recreations activities could be limited or prohibited to curtail the damage to special status plants. Limiting or controlling recreation activities to protect resources could result in some localized closures or limitations on public use. The impacts would be dependent on the extent of the closures/limitations necessary

Impacts from Trials and Travel Management

Special Status Plants would most likely be impacted by OHV use off of roads or trails associated with establishment of campsites, principally due to mechanical crushing of vegetation, soil compaction or erosion, and introduction of noxious invasive weeds.

Impacts from Renewable Energy

Special status plants could be impacted during all phases of renewable energy development. Development, access road and infrastructure construction would create surface disturbances,.

Concentrations of wind turbines, solar arrays, power lines, substations and other infrastructure could also result in impacts to Special status plants. Development potential is low in those portions of the decision area where the majority of the special status plants occur. Overall impacts would be minor.

Impacts from Special Designations

Special designations generally place a higher level of protection on the land, which restricts surface disturbing activities, road use, and other resource management activities such as mechanical fireline construction and prescribed fire, therefore protecting special status species.

4.2.6.5.4 Alternative A

Impacts from Soil

Impacts would be the same as impacts common to all Alternatives. Under Alternative A surface disturbing activities associated with logging would be restricted to slopes <35 percent, therefore protecting special status species and their habitat on approximately 33,908 acres within the decision area. This is less than Alternative B and D (47,795 acres), but more than Alternative C (16,782 acres). Oil and gas development would be restricted to slopes <30 percent therefore protecting special status species and their habitat on approximately 47,795 acres within the decision area.

Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as impacts common to all Alternatives. Emphasis would be placed on retention and acquisition of forested lands. 9,500 acres of forested land would be protected from cutting, except where needed for other resource values. This would protect special status species in these areas, additionally Alternative A restricts wheeled and tracked vehicles on sustained slopes greater 35 percent, allowing operations on 21,807 forested acres in the decision area.

Rangelands

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, prescribed fire/treatment would be used on 6,418 acres of sagebrush for forage enhancement, and 160 acres of crested wheatgrass would be treated. This Alternative treats the fewest acres of crested wheatgrass: B 22,414 acres, C 7,500 acres, D 12,000 acres.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, oil and gas leasing and development would only be allowed with an NSO stipulation on riparian areas or wetlands. NSO within 100 year flood plains of major rivers and on water bodies and streams NSO (10,114 acres). This is less than Alternative B (24,373 acres), but more than Alternative C (6,666 acres) and D (9,087 acres).

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Under Alternative A vehicle and hand application of herbicides near special status plant species would be determined on a case-by-case basis and allowed only when the treatment would benefit special status plant species. This would reduce potential adverse impacts to special status species.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative A the following constraints would be placed on fluid mineral development: NL 39,729 acres; NSO 32,595 acres; TL 308,116 acres; CSU 28,337 acres. Fluid mineral development would be allowed on 264,534 acres with standard leasing terms.

Impacts from Wild Horses and Burros

Under this Alternative, wild horses would be managed on approximately 24,595 acres of BLM-administered lands (37,494 acres all ownerships) and administrative pastures and areas adjacent to private lands would remain closed. The maximum number of wild horses would be maintained that the range could sustain while preventing deterioration. This Alternative would continue to protect special status species from the direct and indirect impacts of grazing within the administrative pastures, and areas adjacent to private lands. Managing for the maximum number of wild horse, could increase impacts associated with grazing to special status species on the remainder of the horse range.

Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives.

Impacts from Cave and Karst Resources

Impacts would be the same as impacts common to all Alternatives.

Impacts from Energy and Mineral Resources

Impacts would be the same as impacts common to all Alternatives. Under Alternative A 26,131 acres would be closed to coal leasing, 44,583 acres would be closed to mineral materials, 39,700 acres would be closed to locatable minerals, therefore eliminating potential impacts to special status species in these areas. Additionally the following stipulations would be placed on fluid mineral development: Closed 39,730 acres, NSO 32,595 acres, CSU 28,337 acres, TL 308,116 acres. These stipulations would reduce impacts to special status species in these areas. Under Alternative A 364,534 acres would be open with standard leasing terms. This is more than any other Alternative.

Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives.

Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives. Under this Alternative ROWs would be excluded from 44,014 acres, eliminating potential impacts to special status species in these areas. Additionally, ROW would be avoided on 24,203 acres, potentially eliminating impacts to special status species in these areas. This Alternative excludes ROW from more acres than Alternatives C (39,491 acres), but less than Alternatives D (48,258 acres), and B (211,384 acres)

Impacts from Livestock Grazing

Impacts would be the same as impacts common to all Alternatives. Additionally Under this Alternative sheep and goat grazing would not be authorized within 9 miles of bighorn sheep habitat. This could benefit special status species in these areas, as special status species often occupy harsh habitats that sheep could access and graze with more ease than cattle. This buffer is the least of all Alternatives.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 2 SRMAs (1,171 acres) would be managed. This is the least of all Alternatives.

Impacts from Trails and Travel Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, there would be 824 miles of open routes (83 percent of all route miles). This Alternative opens more routes than Alternative B (35 percent) and D (62 percent) and fewer routes than Alternative C (90 percent). Therefore potential impacts would be greater than Alternatives B and D, but less than Alternative C.

Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 47,496 acres would be closed to renewable energy development. This is the fewest of all Alternatives.

Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives. Under this Alternative there would be 37,896 acres of ACECs. All Alternatives designate 28,631 acres as wilderness study areas.

4.2.6.5.5 Alternative B

Impacts from Soil

Impacts would be the same as impacts common to all Alternatives. Under Alternative B surface disturbing activities associated with logging would be restricted to slopes <30 percent, therefore protecting special status species and their habitat on approximately 47,795 acres within the decision area. This is more than Alternatives A (33,908 acres) and C (16,782 acres), and the same as Alternative D. Oil and gas development would be restricted to slopes <30

percent therefore protecting special status species and their habitat on approximately 47,795 acres within the decision area.

Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as impacts common to all Alternatives. 9,500 acres of forested land would be protected from cutting, except where needed for other resource values. This would protect special status species in these areas, additionally Alternative B restricts wheeled and tracked vehicles on sustained slopes greater 30 percent, allowing operations on 19,241 forested acres in the decision area.

Rangelands

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, prescribed fire would not be used on sagebrush for forage enhancement, and 22,414 acres of crested wheatgrass would be treated. This Alternative treats the most acres of crested wheatgrass: A 160 acres, C 7,500 acres, D 12,000 acres.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, oil and gas leasing and development would be prohibited within a ¼ mile of riparian areas and wetlands, water bodies, perennial streams, and flood plains of perennial streams (24,373 acres). This is more than all other Alternatives. Alternative A (10,114 acres), Alternative C (6,666 acres) and D (9,087 acres).

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Additionally, aerial application of herbicides would not be allowed within 1 mile of special status plant species, and

Vehicle and hand application of herbicides would not be allowed within ¼ mile of special status plant species. This would reduce unintentional chemical drift onto special status species, reducing adverse impacts.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives. Additionally, no supplement or salt placement within ½ mile of known special status plant sites, unless livestock is otherwise excluded (fence or barrier). This would reduce adverse impacts associated with livestock grazing.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative B the following constraints would be placed on fluid mineral development: NL 251,459 acres; NSO 28,110 acres; TL 249,460 acres; CSU 76,556 acres. Fluid mineral development would be allowed on 264,534 acres with standard leasing terms.

Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives. Under this Alternative horse would be managed on the fewest acres and appropriate management level (AML) would be determined within the context of having a minimum amount of horses. This would reduce impacts associated with grazing within the horse range, and eliminate these impacts from areas excluded.

Impacts from Fire Ecology and Management

Impacts would be the same as Alternative A, however the use of Wildfire for resource benefit would could potentially be used on 52,548 acres, with corresponding impacts

Impacts from Cave and Karst Resources

Impacts would be the same as impacts common to all Alternatives. Additionally, surface disturbing activities would be prohibited within ½ mile of cave entrances, increasing protections to special status species in these areas.

Impacts from Energy and Mineral Resources

Impacts would be the same as impacts common to all Alternatives. Under Alternative B 290,048 acres would be closed to coal leasing, 343,745 acres would be closed to mineral materials; 270,977 acres would be closed to locatable minerals, therefore eliminating potential impacts to special status species in these areas. Additionally the following stipulations would be placed on fluid mineral development: Closed 302,713 acres, NSO 28,110 acres, CSU 76,556 acres, TL 249,460 acres. These stipulations would reduce impacts to special status species in these areas. Under Alternative B 67,726 acres would be open with standard leasing terms. This is more than Alternative D, but less than Alternatives A and C.

Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives.

Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives. Under this Alternative ROWs would be excluded from 211,384 acres, eliminating potential impacts to special status species in these areas. Additionally, ROW would be avoided on 185,607 acres, potentially eliminating impacts to special status species in these areas. This Alternative excludes ROW from the most acres: Alternative A (44,014 acres); Alternatives C (39,491 acres); Alternative D (48,258 acres).

Impacts from Livestock Grazing

Impacts would be similar to Alternative A, however the buffer from bighorn sheep habitat would increase from 9 mile to 16 miles, with corresponding impacts. Also no supplement or salt placement within ½ mile of known special status plant sites, therefore reducing impacts associated with livestock grazing in these areas.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 6 SRMAs (90,783 acres) would be managed. This is more than Alternative A, but less than Alternatives C and D.

Impacts from Trails and Travel Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, there would be 349 miles of open routes (35 percent of all route miles). This Alternative Closes or limits to administrative access more route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative C designates 90 percent of route miles as open and Alternative D designates 62 percent of route miles as open. Therefore potential impacts would be fewer than all other Alternatives.

Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 345,491 acres would be closed to renewable energy development. This is the most of all Alternatives.

Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives. Under this Alternative there would be 181,175 acres of ACECs. All Alternatives designate 28,631 acres as wilderness study areas.

4.2.6.5.6 Alternative C

Impacts from Soil

Impacts would be the same as impacts common to all Alternatives. Under Alternative C surface disturbing activities associated with logging would be restricted to slopes <45 percent, therefore protecting special status species and their habitat on approximately 16,782 acres within the decision area. This is less than Alternatives A (33,908 acres) and B and D (47,795 acres). Oil and gas development would be restricted to slopes <45 percent therefore protecting special status species and their habitat on approximately 16,782 acres within the decision area.

Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as impacts common to all Alternatives. Alternative C restricts surface disturbance on sustained slopes greater 45 percent, allowing operations on 25,335 forested acres in the decision area, the most of all Alternatives.

Rangelands

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, prescribed fire could be used on sagebrush to achieve diversity, and 7,500 acres of crested wheatgrass would be treated. This Alternative treats the more acres of crested wheatgrass than

Alternative A 160 acres, but less than Alternative B 22,414 acres, and Alternative D 12,000 acres.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, oil and gas leasing and development would be prohibited on riparian areas and wetlands, water bodies, perennial streams, and flood plains of perennial streams (6,666 acres). This is less than all other Alternatives: Alternative A (10,114 acres), Alternative B (24,373 acres) and D (9,087 acres).

Invasive Species and Noxious Weeds

Impacts would be similar to Alternative B, however the buffer distance from special status species for aerial application would be reduced from 1 mile to ½ mile, and vehicle and hand treatments could be conducted near special status plants. This would allow for more efficient weed control methods, while ensuring special status plants are not targeted, and minimizing impacts associated with chemical application.

Special Status Plants

Impacts would be similar to Alternative B, however the buffer distance for salt and supplement would be reduced from ½ mile to ¼ mile. This could lead to a slight increase in impacts associated with livestock grazing.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative C the following constraints would be placed on fluid mineral development: NL 63,160 acres; NSO 64,135 acres; TL 316,602 acres; CSU 102,682 acres. Fluid mineral development would be allowed on 126,732 acres with standard leasing terms.

Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives. Under this Alternative horses would be managed on the most acres, and the appropriate management level (AML) would be determined within the context of having a maximum amount of horses. This would increase impacts associated with grazing within the horse range.

Impacts from Fire Ecology and Management

Same as Alternative A

Impacts from Cave and Karst Resources

Impacts would be the same as impacts common to all Alternatives.

Impacts from Energy and Mineral Resources

Impacts would be the same as impacts common to all Alternatives. Under Alternative C 264,450 acres would be closed to coal leasing, 251,927 acres would be closed to mineral materials; 36,955 acres would be closed to locatable minerals, therefore eliminating potential

impacts to special status species in these areas. Additionally the following stipulations would be placed on fluid mineral development: Closed 65,891 acres, NSO 64,135 acres, CSU 102,682 acres, TL 316,602 acres. These stipulations would reduce impacts to special status species in these areas. Under Alternative C 126,732 acres would be open with standard leasing terms. This is more than Alternatives B and D, but less than Alternative A.

Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives.

Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives. Under this Alternative ROWs would be excluded from 39,491 acres, eliminating potential impacts to special status species in these areas. Additionally, ROW would be avoided on 355,601 acres, potentially eliminating impacts to special status species in these areas. This Alternative excludes ROW from the fewest acres: Alternative A (44,014 acres); Alternatives B (21`1,384 acres); Alternative D (48,258 acres).

Impacts from Livestock Grazing

Impacts would be similar to Alternative B, however the buffer from bighorn sheep habitat would increase from 16 mile to 12.4 miles, with corresponding impacts. Also the buffer distance of salt and supplement placement would be reduced from ½ mile to ¼ mile, with corresponding impacts.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 11SRMAs (147,181 acres) would be managed. This is the most of all Alternatives.

Impacts from Trails and Travel Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, there would be 893 miles of open routes (90 percent of all route miles). This Alternative closes or limits to administrative access less route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative D designates 62 percent of route miles as open. Therefore potential impacts would be more than all other Alternatives.

Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 82,019 acres would be closed to renewable energy development. This is more than Alternative A, less than Alternative B, and slightly more than Alternative D.

Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives. Under this Alternative there would be 67,079 acres of ACECs. All Alternatives designate 28,631 acres as wilderness study areas.

4.2.6.5.7 Alternative D (Preferred Alternative)

Impacts from Soils

Impacts would be the same as Alternative B.

Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as Alternative B.

Rangelands

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, prescribed fire could be used on sagebrush to achieve diversity, and 12,000 acres of crested wheatgrass would be treated. This Alternative treats the more acres of crested wheatgrass than Alternative A 160 acres and Alternative C 7,500 acres, but less than Alternative B 22,414 acres.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, oil and gas leasing and development would be prohibited within 300 feet of riparian areas and wetlands, water bodies, perennial streams, and flood plains of perennial streams (9,087 acres). This is more than Alternative C (6,666 acres), but less than Alternative A (10,114 acres) and Alternative B (24,373 acres).

Invasive Species and Noxious Weeds

Impacts would be the same as Alternative C.

Special Status Plants

Impacts would be the same as Alternative C.

Impacts from Wildlife and Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Under Alternative D the following constraints would be placed on fluid mineral development: NL 67,215 acres; NSO 263,185 acres; TL 315,317 acres; CSU 21,436 acres. Fluid mineral development would be allowed on 6,158 acres with standard leasing terms.

Impacts from Wild Horses and Burros

Impacts would be the same as Alternative A.

Impacts from Fire Ecology and Management

Impacts would be the similar the Alternative B, however the use of wildfire for resource benefit could potentially increase from 52,548 acres to 62,937 acres.

Impacts from Cave and Karst Resources

Impacts would be the same as impacts common to all Alternatives. Additionally, surface disturbing activities would be prohibited within ¼ mile of cave entrances, increasing protections to special status species in these areas.

Impacts from Energy and Mineral Development

Impacts would be the same as impacts common to all Alternatives. Under Alternative D 280,971 acres would be closed to coal leasing, 272,122 acres would be closed to mineral materials, 54,761 acres would be closed to locatable minerals, therefore eliminating potential impacts to special status species in these areas. Additionally the following stipulations would be placed on fluid mineral development: Closed 72,915 acres, NSO 263,185 acres, CSU 21,436 acres, TL 315,317 acres. These stipulations would reduce impacts to special status species in these areas. Under Alternative D 6,158 acres would be open with standard leasing terms. This is less than all other Alternatives.

Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives.

Impacts from Lands and Realty

Impacts would be the same as impacts common to all Alternatives. Under this Alternative ROWs would be excluded from 48,258 acres, eliminating potential impacts to special status species in these areas. Additionally, ROW would be avoided on 349,358 acres, potentially eliminating impacts to special status species in these areas. This Alternative excludes ROW from the more acres than Alternative A (44,014 acres) and Alternative C (39,491 acres), but less than Alternative B (211,348 acres).

Impacts from Livestock Grazing

Impacts would be the same as Alternative C, however the buffer distance for sheep and goat grazing to bighorn sheep habitat would increase from 12.4 miles to 16 mile with the corresponding impacts to special status species.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 11SRMAs (110,862 acres) would be managed. This is the more than Alternatives A and B, but less than Alternative C.

Impacts from Trails and Travel Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, there would be 624 miles of open routes (62 percent of all route miles). This Alternative closes or limits to administrative access more route miles than Alternatives A and C, but less than Alternative B. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative C designates 90 percent of route miles as open. Therefore potential impacts would be less than Alternatives A and C, but more than Alternative B.

Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 78,088 acres would be closed to renewable energy development. This is more than Alternative A, but less than Alternative B, and Alternative C.

Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives. Under this Alternative there would be 38,786 acres of ACECs. This is slightly more than Alternative A and less than Alternatives B and C.

4.2.6.5.8 Cumulative Impacts

Cumulative effects to special status plant populations would be minor as a result of BLM implementing project clearances and mitigation measures. The effects would be from ground disturbances created by new road and trail construction; fuels management; energy and minerals; forestry; livestock grazing; off-highway vehicles; and utilities, transportation, and communications projects.

4.2.6.5.9 Mitigation Measures

Currently, all known populations of special status plant within ACECs. All proposed BiFO projects would have a special status plant inventory before being implemented. If a population is found, measures would be taken to protect that population and avoid any damage to it.

4.2.6.5.10 Unavoidable Adverse Impacts

No unavoidable adverse impacts would affect the known or suspected populations of special status plants on lands managed by BLM's BiFO.

4.2.6.5.11 Short-Term Uses Versus Long-Term Productivity

None.

4.2.6.5.12 Irreversible and Irretrievable Impacts

There would be no irreversible and irretrievable impacts to the known or suspected populations of special status plants on lands managed by BLM's BiFO. This is a regulated program, and BLM would follow federal and state policy.

4.2.7 Wildlife Habitat and Special Status Species

This analysis focuses on identifying the types and intensity of impacts to wildlife habitat and special status species. Special status species include species listed as threatened or endangered under the Endangered Species Act of 1973 (ESA), species proposed or candidates for listing, species designated as sensitive by the BLM, and state species of concern. Known and potential wildlife, including special status species and their habitats within the decision area are described in Chapter 3.

Species analyzed as affected by various Alternatives and the types of impacts are directly correlated with the location, degree, nature, and quantity of surface-disturbing activities within the decision area. Surface disturbing actions that alter vegetation characteristics (e.g. structure, composition, and/or production) have the potential to affect habitat suitability for wildlife, particularly where the disturbance removes or reduces cover and/or food resources. Even minor changes to vegetation communities have the potential to affect resident wildlife populations. Additionally, impacts and management actions on wildlife and special status species could directly or indirectly relate to other resources or resource uses. Therefore, it is recommended that all impact analyses are reviewed to attain a comprehensive description of the impacts on wildlife and special status species.

Direct impacts to wildlife and special status species could include direct mortalities or displacement of individuals, habitat loss or alteration, habitat fragmentation, impacts to breeding, and animal displacement. Other direct impacts are disruption of species behavior leading to reduced reproductive fitness and/or increased susceptibility to predation, increased stress, and direct mortality of wildlife.

Indirect impacts from increased noise and additional human presence also could lead to displacement and lowered fitness. Although the habitat adjacent to the planning area could support some displaced animals, any species that is at or near its carrying capacity could exhibit localized increased mortality or a decline in reproduction.

Short-term impacts consist of changes in wildlife and special status species habitats lasting less than five years. This would include impacts to species dependent on herbaceous habitats. Long-term impacts would consist of changes to wildlife habitats lasting 10 years or more and would include species dependent on habitats with woody species components. The severity of both short- and long-term impacts would depend on factors such as the sensitivity of the species impacted, seasonal use patterns, type and timing of construction activities, and physical parameters (e.g., topography, cover, forage, and climate).

4.2.7.1 Methods and Assumptions

To analyze the potential effects of the Alternatives on wildlife habitat and special status species, information was gathered from existing inventories, management and recovery plans, coordination with the U.S. Fish and Wildlife Service (USFWS), Montana Fish Wildlife and Parks (MFWP), Montana Natural Heritage Program database, relevant scientific literature, computer habitat models, and other sources identifying the potential distribution of these species in and adjacent to the planning area. The analysis is also based on the professional expertise of BLM specialists.

This analysis was based on the following assumptions.

4.2.7.1.1 Wildlife Habitat

- Changes to vegetation types; either in quantity, quality, or increased fragmentation, are compared to baseline conditions for each Alternative.

Negative and positive impacts to vegetation types (i.e., wildlife habitats) are assumed to have a corresponding negative or positive impact on wildlife species.

- Vegetative treatments would be effective and produce the anticipated short-term and long-term results. Vegetative treatments would be expected to benefit wildlife habitat by moving vegetation towards a range of natural variability. Although it is recognized that modifying vegetation could remove or lessen the quality of habitat for some species (i.e. removing conifer encroachment from sagebrush to increase breeding and foraging habitat for sagebrush obligate species would remove hiding habitat for elk). Overall, it is assumed that vegetative treatments would have long-term benefits to wildlife habitats.
- Acreage indications of habitat improvement associated with vegetation treatments do not consider potential continuing loss of a particular habitat type due to continued fire suppression.
- Habitat availability, quality, and amount, correlate to the viability, health, and size of wildlife populations dependent on the habitat.
- There is a threshold level of disturbance or habitat degradation a species can sustain before the population viability is reduced.
- Management actions intended to benefit habitat for priority and/or special status species would benefit most other species occurring in the same vicinity.
- 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.
- Disruptive activities during sensitive or critical life cycle periods adversely impact wildlife.
- Habitat fragmentation adversely impacts many desirable species of wildlife.
- The more acreage of habitats protected from fragmentation, the greater the benefit to wildlife species. Generally, the more acreage of habitat protected from fragmentation, the greater the benefit to big game and other desirable wildlife species.
- Surface disturbance generally causes adverse impacts to desired wildlife habitats. The amount of surface disturbance in wildlife habitats is directly correlated to the amount of adverse impacts to wildlife.
- Native habitats have greater native species diversity than introduced or non-native habitats.
- Demand for wildlife habitat is expected to increase given listings under the Endangered Species Act and increasing wildlife-based recreational activities in the planning area (wildlife viewing, hunting, etc.).

- The more acres within a No Surface Occupancy (NSO) stipulation or No Lease (NL) oil and gas designation, the more overall protection a wildlife species would have from oil and gas development. When comparing Alternatives, those Alternatives with more acres in NSO or NL would provide the least negative effects to wildlife. As with NSO and NL stipulations, when comparing Alternatives, the more acres an Alternative has within a timing restriction, the more wildlife species would be protected from disturbance during crucial seasons of use.

Wildlife Impacts from Travel Management: Background, Methods, and Assumptions

In the absence of quantitative data, best professional judgment was used for the impact analysis. Impacts are sometimes described using ranges of potential impacts or in qualitative terms, if appropriate.

The following assumptions regarding wildlife resources are made:

- Wildlife habitat would be managed for those species identified as priority wildlife species.
- All surface disturbing activities include mitigation to reduce impacts to wildlife resources. Analysis of impacts includes any and all mitigation.
- Travel through the TMAs is expected to increase due to the increased demand for open space and commercial recreation opportunities on public lands, as well as periodic up trends in energy exploration and development, including renewable energy production.
- Planning decisions that involve changes to the available number and overall miles of roads open for public or administrative use, the number of acres open or closed to off-road travel, road improvement or maintenance activities, or specific travel restrictions (e.g., speed limits, seasonal restrictions; etc.) would affect wildlife resources to varying degrees.

In analyzing the potential effects of route designations on wildlife resources, differences between each action Alternative's set of route designations and the no action, current management route designations are analyzed and expressed primarily in terms of 'absolute percent change' versus a more familiar method of expressing 'relative percent change.' As each Alternative Develops a different transportation network or combination of route designations (open, limited, closed) using the same supply of existing routes, changes in the apportionment of designations within a given Alternative Are then measured against the apportioned designations of the No Action Alternative. As a comparative example then, in relative terms, an Alternative that proposes to close 562 routes in Alternative X out of the total 877 routes that exist where only 89 routes out of 877 routes are closed under No Action represents a 631 percent increase in the number of routes closed in Alternative X relative to the No Action Alternative. In absolute terms, however, the 89 closed routes in the No Action Alternative

represent 10 percent of the current total network while under Alternative X, the 562 closed routes represent 64 percent of the potential network, resulting in 54 percent more routes closed in Alternative X than in the No Action Alternative. Planners determined to use the 'absolute percent change,' primarily because a) the route 'population,' or total number of routes under consideration for designation is constant for all Alternatives and b) planners believe the results better depict the 'shifting' of designations within Alternatives using the same route inventory.

Travel Management Area (TMA) Analysis of Route Densities

Route densities, in route miles per square mile (miles/square mile), were estimated using an overall average of the number of miles of routes in all acreage in the Travel Management Areas (TMAs) for the contracted Travel Management impact analysis. Therefore, route densities were not calculated for each square mile or section in the contracted analysis.

Route Density Analysis for Big Game Winter Range

A separate BLM GIS analysis was used to calculate route densities for each square mile for an estimate of route densities in CAPS SCORE 1 and 2 areas (Montana Fish, Wildlife, and Parks designations) in big game winter range and parturition areas (Wildlife Alternatives –Big Game Winter Range for Roads). The BLM analysis was calculated on all BLM surface and subsurface lands versus just the Travel Management Areas (TMAs). All aliquot sections (one square mile normally or about 640 acres) with only partial public land ownership or small parcels of public land or split estate subsurface minerals were included in the BLM analysis acreage totals. Other ownership acreage in those sections was included in the acreage totals.

Direct impacts to wildlife resources from management activities could result in mortality or displacement of individuals, disturbance, reduced air or water quality, and alteration of immediate environments through loss of, or changes to, key habitat components. Key habitat components include food availability or quality, cover from predators, insulation from extreme temperatures, nesting/roosting/denning habitat, water availability, and travel corridors. Direct impacts could affect wildlife populations or habitats for the duration of the action, for a few days thereafter, for several growing seasons, or could continue indefinitely where the action results in permanent habitat loss.

Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by the action and occur later or farther away but are still reasonably foreseeable. Cumulative impacts are the effects on the environment that result from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions.

Indirect impacts to wildlife resources from management activities typically result from influences of post-disturbance succession, recovery, or rehabilitation of the habitat. These impacts could be long term, depending on the severity of the habitat alteration, and could change species assemblages (relative abundances or species composition), species behaviors, or overall population trends, benefiting some species while negatively affecting others. The direct and indirect effects of management actions on wildlife resources could vary widely, depending on a variety of factors such as the dynamics of the habitat (e.g. community type, size, shape,

complexity, seral state, condition); season, intensity, duration, frequency, and extent of the disturbance; rate and composition of vegetation recovery; change in vegetation structure; type of soils; topography and microsites; animal species present; and the mobility of wildlife species (i.e., ability to leave a site or recolonize a site after a disturbance).

Impacts are also described as to their context, intensity, and duration. Context generally refers to the geographic extent of impact (localized or widespread). Impact duration refers to how long an impact would last. Unless otherwise stated for any particular impact topic, short-term impacts would occur with five years of implementing the Plan, often during construction and recovery, while long-term impacts would occur beyond five years, often from operations. Impact intensity is the magnitude or degree to which a resource would be beneficially or adversely affected. The criteria used to rate the intensity of the impact for each impact topic are discussed below.

The intensities of impacts are also described, where possible, using the following guidance:

- Negligible: No changes to wildlife resources would occur, or effects on individuals, populations, or habitat would be at or below the level of detection. If detected, the effects would be considered slight.
- Minor: Changes to wildlife resources would be measurable, although the changes would be small, short-term (less than 7 consecutive days), and local. Mitigation measures would not be necessary.
- Moderate: Changes to wildlife resources would be measurable and would have appreciable consequences, although the effect would be relatively local. Mitigating measures would be necessary, but would most likely be successful.
- Major: Changes to wildlife resources would be measurable, have substantial consequences, and be noticed regionally. Mitigating measures would be necessary, and their success would be uncertain.

Special Status Species (Wildlife)

- Conservation measures to improve and secure habitat would continue to receive special consideration during planning.
- There would be changes in listed and special status species in the future. Some currently listed species could be delisted during the life of the plan. Most species that are delisted or downgraded from federally proposed or candidate status would be included on the BLM special status species list.
- Precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, population data for species status wildlife species are often lacking, or habitat types impacted by surface-disturbing activities cannot be predicted.

- 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 2011).
- Grizzly bears, gray wolves, Canada lynx, and whooping cranes are found in the planning area, but impacts are expected to be minimal to no affect as a result of activities on BLM land in the planning area. Scattered BLM lands only provide occasional migratory habitat on the periphery of their habitats.
- Because of the migratory nature and relative mobility of some special status wildlife species (e.g., birds), these species also would be impacted by actions on non-BLM-administered lands. Adverse impacts to wildlife during different life stages on non-BLM-administered lands can reduce populations regardless of BLM protective measures.
- The BLM can minimize disturbance impacts to special status wildlife by limiting access to nesting, breeding, and brood-rearing sites. Surface disturbance can be controlled through three types of restrictions: (1) NSO for fluid minerals, which prohibits physical presence; (2) Controlled Surface Use (CSU), which limits surface use unless there is a documented plan for mitigation; and (3) Timing Limitation (TL), which prohibits surface use during specified periods.
- Although some data on known locations and habitats within the planning area are available, the data are neither complete nor comprehensive of all special status species known to occur or potential habitat that might exist.
- Some of the decisions in this document are programmatic; others (e.g., route designation, oil and gas leasing categories) could be implemented immediately. To ensure preservation of specific species, further analyses would be required at the implementation level, following site-specific species inventories.
- The U.S. Fish and Wildlife Service (USFWS) would be consulted for any actions that have a potential to affect federally listed species.
- To comply with Section 7 of ESA, a Biological Assessment (BA) would be prepared to address impacts and mitigating measures on threatened, endangered, and candidate species, as well as designated critical habitat.

Environmental Consequences

Impacts to wildlife and special status species would likely result from actions proposed under the following resource programs:

- Soil Resources
- Water Resources
- Vegetative Communities

- Wildlife Habitat and Special Status Species (Wildlife)
- Fisheries Including Habitat and Special Status Species (Fisheries)
- Wild Horse and Burros
- Visual Resources
- Fire Ecology and Management
- Lands with Wilderness Characteristics
- Cave and Karst Resources
- Energy and Mineral Resources
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Forest and Wood Products
- Lands and Realty
- Transportation/Facilities Access
- Renewable Energy
- Special Designations

Other programs were determined to have little or no impact on wildlife and special status species.

4.2.7.2 Impacts Common to All Alternatives

4.2.7.2.1 Impacts from Soil

Including specific mitigations on surface disturbing activities would benefit wildlife and special status species by reducing soil erosion and increasing soil health thereby leading to increased production in forage and cover.

4.2.7.2.2 Impacts from Water

Participating in water quality restoration plans and using strategies to meet the Standards for Rangeland Health would enhance wildlife habitat by increasing the amount of desirable vegetation cover, structure, and species diversity, which would also improve water quality, aquatic species habitat, and wildlife species diversity.

4.2.7.2.3 Impacts from Vegetation

Forests and Woodlands

Forest and woodland management is consistent with wildlife habitat objectives. Forest and woodland treatments include prescribed burning and mechanical treatments. Treatments could temporarily change habitat to benefit certain species, but could adversely impact habitat of other species. These activities would maintain or improve wildlife and their habitats in the long-term; however, there would be short-term negative impacts including direct mortality of

less mobile species, eggs, and nests; habitat alteration due to soil erosion and sedimentation; and displacement of wildlife and special status species due to human disturbance. Long-term beneficial impacts to wildlife and special status species include restoration of native habitats and an increase in healthy rangelands that provide forage, cover, and a prey base.

Rangelands

Vegetative treatments include prescribed burning, mechanical treatments, grazing, interim farming practices, and herbicide use. Treatments could temporarily change habitat to benefit certain species, but could adversely impact habitat of other species. These activities would maintain or improve wildlife and their habitats in the long-term; however, there would be short-term negative impacts including direct mortality of less mobile species, eggs, and nests; habitat alteration due to soil erosion and sedimentation; and displacement of wildlife and special status species due to human disturbance. Long-term beneficial impacts to wildlife and special status species include restoration of native habitats and an increase in healthy rangelands that provide forage, cover, and a prey base.

Riparian and Wetlands

Riparian and wetland management is prioritized based on meeting Standards or Desired Future Conditions. Management common to all Alternatives include monitoring efforts to ensure health standards are being met and restrictions on surface disturbance activities and oil and gas exploration. These management activities would benefit and enhance riparian and wetland areas, indirectly benefiting wildlife and special status species.

Invasive Species and Noxious Weeds

Invasive species and noxious weed management actions would have beneficial impacts to wildlife habitat by the removal of invasive species and noxious weeds and management of healthy native plant communities that provide cover, forage, and prey base. Short-term adverse impacts would include temporary surface disturbance and displacement of wildlife species. These impacts would vary in degree by project scale and proximity to various wildlife resources.

Special Status Species

The management of special status plants generally restricts surface disturbance activities, which would be beneficial to wildlife habitat. There would be a negligible difference in impacts in all Alternatives.

4.2.7.2.4 Impacts from Wildlife Habitat and Special Status Species

Management of wildlife habitat and special status wildlife is designed to maintain, restore and promote quality, sustainable habitat for native and desirable non-native wildlife species. Actions to restore or enhance wildlife habitat could have short-term adverse impacts (including direct habitat alteration, disruption to various species, etc.), however long-term beneficial effects would be expected.

4.2.7.2.5 Impacts from Fisheries Habitat and Special Status Species

The impacts to wildlife as a result of implementing actions associated with fisheries management programs would include habitat disturbance or loss. Habitat manipulations would include temporary, localized surface disturbance. However, improvements to fish habitats would have long-term beneficial impacts on wildlife and special status species. Management actions that protect Yellowstone cutthroat trout (YCT) habitat through restrictions on road placement and maintenance as well as facility siting, would also protect habitat used by wildlife and special status species using these areas.

4.2.7.2.6 Impacts from Wild Horses and Burros

Adjusting the appropriate management level (AML) to ensure a natural ecological balance would maintain sufficient forage levels so that competition among wild horses, livestock, and wildlife species would be reduced and habitat quality would be improved for various fish and wildlife species.

4.2.7.2.7 Impacts from Visual Resources

VRM class designations would limit or allow surface-disturbing activities in certain areas, and indirectly affect wildlife and special status species. VRM Classes I and II (approximately 42,000 acres across all Alternatives) provide the greatest benefit to wildlife and special status species by restricting surface disturbing activities and preserving the existing habitat. VRM Classes III and IV would provide less protection by allowing surface disturbing activities and increased changes to the landscape.

4.2.7.2.8 Impacts from Fire Ecology and Management

Management of wildfire and suppression would follow national fire suppression guidelines and the current Fire Management Plan (including resource advisor consultation, 300 foot water way buffers for chemical applications, and emergency stabilization and rehabilitation implementation), which were developed to minimize impacts from wildfires and promote healthy ecosystems.

Prescribed fires, wildfire, and suppression operations could have both short-term and long-term effects on wildlife and special status species. Short-term effects on wildlife and special status species include displacement of individuals, mortality for less mobile species, and loss of habitat. Increased human activity and noise associated with wildfire suppression and prescribed fire in areas occupied by special status bird species would affect behaviors including nesting, foraging, or roosting. Habitat loss could occur with the use of equipment, hand tools, and human activity.

However, habitat manipulations resulting from the use of fire would also benefit wildlife and special status species over the long term by improving vegetative conditions. There is potential for long-term impacts depending upon the severity and extent of the fire management activities. However, smaller fires that require less extensive suppression operations, would have short-term impacts. Relatively smaller size fires, versus large severe or high intensity wildfires, would generally improve habitat conditions for most species by increasing habitat diversity and

edge effect, reduce fuel loads and dense understory, and return the vegetative community to an earlier stage of succession, increasing forage and cover for a greater diversity of wildlife. Fire can result in removal of excess dead and dying trees, reducing hiding cover for prey species, potential thermal cover in the winter months, and lynx denning and rearing habitat. However, in the long term, fire would increase denning habitat by increasing horizontal cover with log and limb fall. Additional aspen growth after a fire would be available for instream uses by beavers, which would generally improve habitat conditions for a variety of fish and wildlife species.

Complete shoot mortality could result when plant stature is low to the ground and wood, bark, and foliage are highly flammable (McArthur and Stevens 2004). Removal of large tracts of sagebrush in sage-grouse nesting habitat has resulted in major declines in sage-grouse breeding populations (Connelly et al. 2000). Sagebrush recovery is considered long-term and an increase in wildfire and prescribed fire frequency has contributed to the decline of the quality and quantity of sage-grouse nesting and brood-rearing habitats, as well as overall population declines (Slater 2003).

4.2.7.2.9 Impacts from Lands with Wilderness Characteristics

Management actions for lands with wilderness characteristics would provide protection to wildlife and special status species through restrictions on surface disturbances and minerals developments.

4.2.7.2.10 Impacts from Cave and Karst Resources

Management actions to protect and maintain cave and karst resources would maintain important habitat used by cave dwelling species, such as bats, and other denning species.

4.2.7.2.11 Impacts from Energy and Mineral Resources

Energy and mineral resource development is expected to continue at the current level over the life of this plan. After the completion of energy and mineral development, the area would be reclaimed. However, reclamation efforts do not guarantee that habitat would return to its original function. Reclaimed areas might be more vulnerable to invasion of noxious weeds and might not provide the same habitat, forage, or cover that the original area provided. Reclamation of surface disturbances must also be viewed from the perspective of vegetation succession. Disturbed sites are initially revegetated with early successional species, but given sufficient time without additional disturbance, these species are replaced by late successional species, such as sagebrush or pinyon-juniper woodlands; therefore, these habitats would usually return to late successional plant communities supportive of species favoring these habitat types.

Areas closed to oil and gas leasing would provide a beneficial impact to wildlife resources.

Coal

The requirement of site specific environmental analysis (NEPA) prior to solid leasable mineral leases would ensure impacts from development activities to wildlife resources would be mitigated or at an acceptable level.

Lease by application (LBAs) for new coal leases would be processed by applying the coal screening process to the application. The coal screening process would determine which lands could be available for further consideration for coal leasing and development. Leasing coal minerals could have direct impacts to wildlife resources. Impacts vary by the technique used to mine the coal. Sub surface mining would have fewer impacts to wildlife, which have a centralized surface disturbance, but most activities take place underground. All techniques would likely require access roads which would need to be constructed; existing roads would likely need to be improved. Impacts to wildlife habitat associated with roads include direct habitat alteration and loss, increased human/disruptive activity, and habitat fragmentation. If open pit or surface mining was permitted the impacts to wildlife would be much greater. These impacts would include the removal of habitat to access coal minerals.

Fluid Minerals

Some impacts that would occur include, but are not limited to: displacement of individuals, disturbance from human presence and equipment use, habitat loss and fragmentation from well pad development and road construction and maintenance, increased above ground electrical lines (raptor perch sites which have adverse impacts to sage grouse when proximate), discharge water issues (potential to increase mosquito breeding areas, increasing West Nile virus potential) and direct mortality of individuals.

The requirement of site-specific environmental analysis (NEPA) prior to fluid mineral leases, application of appropriate stipulations, and the use of standard BMPs would reduce and/or mitigate impacts from development activities to wildlife. A Reasonable Foreseeable Development (RFD) scenario indicates that there could be 2-4 federal wells drilled per year. This comprises a total surface disturbing impact of an estimated 22-44 acres per year dependent on the development site and access (Table 4-27 and Table 4-28).

In areas where oil and gas development could conflict with wildlife or other resources, the areas could be closed to leasing, having a beneficial impact to wildlife resources.

Not allowing geophysical exploration within designated ACECs would eliminate stress and disturbance to wildlife. Refer to Fluid Minerals Section and Table 4-29 through Table 4-40, Acres Affected by Oil and Gas Stipulations.

Locatable Minerals

Process notices and plans would be required (43 CFR 3809) to ensure the proposed action does not create unnecessary or undue degradation of the environment. This action would protect wildlife resources in the mining area. Potential impacts would include displacement of individuals, disturbance from human presence and equipment use, habitat loss and fragmentation. Currently most claims are concentrated in Carbon County (and are expected to remain there) and potentially impact 7,323 acres (including future expansion of existing claim), which represents 3.3 percent of BLM public lands in Carbon County and 0.4 percent of the total county.

Mineral Materials

The requirement of site specific environmental analysis (NEPA) prior to mineral material leases would ensure impacts from development activities to wildlife resources would be mitigated or at an acceptable level. Common variety mineral extraction would result in short-term and direct impacts to wildlife and associated habitat; however, impacts would be minimal because disturbances are generally small (less than 5 acres). Potential impacts would include displacement of individuals, disturbance from human presence and equipment use, habitat loss and fragmentation.

4.2.7.2.12 Impacts from Forestry and Woodland Products

Commercial harvest of forest products would result in either short-term or long-term effects to wildlife habitat characteristics, depending on species requirements, from displacement of wildlife during harvest activities and alteration or removal of habitat components such as cover, nesting and roosting sites, and modification of understory vegetation. These actions are designed to be consistent with wildlife resource objectives, generally creating long-term beneficial impacts to habitat.

4.2.7.2.13 Impacts from Lands and Realty

Habitat loss, degradation, fragmentation, and species displacement from linear features (e.g., power-lines, roads, and pipelines) and other permitted facilities (e.g., communication sites) would occur. ROW-approved actions for power-lines and communication sites could also include injury and death to bats, raptors, and other migratory birds as a result of collisions, as well as increased predation on sage grouse from raptors using vertical structures as perches. Increased road density and human presence would act to increase stress levels of wildlife during sensitive time periods (e.g., breeding, migration, wintering) and increase habitat fragmentation for less mobile species.

Land acquisition that consolidates larger blocks of public land through land exchange or purchase would be a long-term benefit to wildlife by preventing habitat fragmentation and protecting linkage corridors.

4.2.7.2.14 Impacts from Livestock Grazing

The effects on wildlife and special status species from livestock grazing could include direct competition for forage, water, and space and indirect habitat alteration through a decrease in vegetation species composition and use of management tools such as range improvements. Improving livestock grazing allotments to meet the Standards for Rangeland Health would enhance wildlife habitat by increasing the amount of desirable vegetation cover, structure, and species diversity, which would also improve water quality, aquatic species habitat, and wildlife species diversity.

Livestock water development such as reservoirs and pits would be developed with BMPs to reduce the spread of West Nile virus that could affect sage grouse populations. The predicted assumption for reservoirs and pit development was 2.4 acres developed over 20 years, which would have negligible potential for increasing mosquitoes and West Nile virus.

Based on assumptions stated earlier in this chapter, range improvements consisting of 23 linear miles of pipeline, 2.4 acres of reservoirs/pits, and 2.4 acres of water well disturbance would be expected over the life of this plan. Adverse impacts from this level of disturbance would be negligible, while providing some new water sources and potentially new riparian habitat for wildlife. These water sources can also improve livestock distribution, improving upland habitat.

Installation of structural range improvements would only be considered where grazing practices (change in season of use, reductions of AUMs, increased rest, etc.) are unable to resolve the resource concern. Structural range improvements could be considered where necessary to facilitate the change in grazing management practices. Existing range improvements would be evaluated and modified to address impacts on wildlife populations, eg: sage grouse/ fence conflicts. This would reduce development of structural range improvements where resource conflicts exist. Big game species migration and movements would improve where fence modifications are made, particularly for young big game. Sage grouse mortality would be reduced where fences are not constructed near habitat areas or are modified with visibility markers.

4.2.7.2.15 Impacts from Recreation and Visitor Services

Recreation management activities that increase human presence would have a localized impact on wildlife and special status species. These activities include hiking, biking, camping, boat use, fishing, hunting, and sightseeing. Impacts of human activity would be most significant on big game winter range, including direct impacts of loss of habitat and forage occurring from surface disturbing and other disruptive activities at any time of the year, direct impacts of displacement, and indirect impacts of physiological stress occurring from human presence and activity during the winter and other critical life cycles (breeding, birthing, and raising young).

SRMA designation has the potential to direct more human activity into these areas or even cause surface disturbance and direct habitat alteration from facility development. Several of these areas are already developed in such fashion and receive high concentrated use, while others have very little potential for development. There would be no adverse impacts expected to wildlife resources from this level of designation. The amount of land designated as SRMAs varies by Alternative as follows: Alternative A (1,171); B (90,783); C (147,181); D (110,862)

Approximately 200 acres of the Sundance Lodge Recreation Area SRMA have been farmed in the past. Currently farming is practiced to promote wildlife habitat. Both irrigated and non-irrigated farming practices are implemented. Approximately 15 percent of those are planted to food plots annually. The remaining 85 percent have been planted to promote perennial cover. Impacts to soil resources are greatest in food plot areas as these areas are worked on an annual basis. Food plot crops are left in place until the following spring when they are burned, leaving soils exposed until the new crop is planted and germinates.

4.2.7.2.16 Impacts from Trails and Travel Management

In general, travel management activities that result in increased human presence would have localized impact on wildlife species. Impacts would include increased displacement of wildlife, increased stress during critical time periods, and degradation of habitats by fragmentation and

potential invasive species infestation. Increased human activity, as a result of motorized access can alter the seasonal use patterns of many wildlife species. Of particular concern is raptor nesting sites, big game parturition areas, and all winter habitats. The reduction of designated open road densities, where appropriate, would decrease disturbance to wildlife and their habitat. Over-the-snow vehicles could affect wintering wildlife by increasing displacement and stress during critical time periods.

4.2.7.2.17 Impacts from Renewable Energy

Wind farm development results in habitat loss, degradation, fragmentation, and species displacement from associated aboveground and linear features (e.g., turbines, power-lines, substations, and roads). These developments could also include injury and death to bats, raptors, and other migratory birds as a result of collisions as well as displace wildlife species that avoid tall structures (e.g. sage-grouse). Increased development and human presence would act to increase stress levels of wildlife during sensitive time periods (e.g., breeding, migration, wintering).

4.2.7.2.18 Impacts from Transportation Facilities/Access

The impacts to wildlife and special status species as a result of implementing actions associated with transportation facilities and access would include long-term adverse impacts habitat loss and fragmentation. However, all new roads and facilities would be subject to environmental analysis, ensuring adverse impacts to wildlife resources would be mitigated or at an acceptable level. Habitat loss is caused by road construction and road use. Areas with many access roads and surface disturbances could disrupt big game migration corridors that link crucial habitats. Migration routes could be altered or eliminated, changing some traditional wildlife use patterns on a regional level. Transportation routes fragment habitats and can act as barriers for some species. Increasing the number of transportation routes could also increase public access to areas that previously had been relatively inaccessible to vehicles during the winter and spring. This management action would become more important over the life of the plan because increased demands for access across public lands would increase adverse effects on wildlife. Seclusion areas for wildlife would become smaller and more dispersed in these areas, which could lead to a decrease in wildlife populations as a result of habitat loss.

4.2.7.2.19 Impacts from Special Designations

Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves wildlife habitat (if not directly, then cumulatively). However, the presence of important values in these areas could also result in increased human presence, resulting in short-term wildlife displacement, depending on the amount and timing of such activity.

Approximately 200 acres of the Pompeys Pillar ACEC have been farmed in the past. Currently farming is practiced to promote wildlife habitat. Both irrigated and non-irrigated farming practices are implemented. Approximately 30 acres are planted to food plots annually. The remaining 85 percent (170 acres) have been planted to promote perennial cover. Impacts to wildlife resources are greatest in food plot areas as these areas are worked on an annual basis.

Beneficial impacts include abundant high quality forage and increased security and nesting cover. Adverse impacts include a short-term barren ground condition, including the removal of all cover and forage between cultivation and crop establishment.

4.2.7.3 Alternative A

4.2.7.3.1 Impacts from Soil

Under Alternative A, impacts to soils from logging for slopes greater than 35 percent and oil and gas activities on slopes greater than 30 percent would be mitigated for wheeled or tracked equipment and associated skid trails, landings and roads would be re-seeded with grasses and forbs, which would maintain or improve wildlife and special status species habitat. The slope restrictions have the potential to affect 47,795 acres (30 percent) and 33,908 acres (35 percent).

4.2.7.3.2 Impacts from Water

Stabilizing watershed conditions in areas with excessive erosion would also maintain or improve wildlife and special status species habitat within seasonal and crucial ranges and during critical life stages. In addition, allowing oil and gas leasing with NSO within the 100-year floodplains of major rivers and on water bodies and streams (totaling 13,984 acres) within the decision area would reduce habitat degradation and disturbance from oil and gas activity within critical wildlife habitat, riparian areas and around water bodies. Requiring produced water from fluid mineral development to be in compliance with MT DEQ standards would ensure adequate water quality would be maintained, reducing impacts to wildlife resources. Species associated with these habitats within the planning area include the whooping crane, bald eagle, black tern, moose, waterfowl, and numerous species of fish, reptiles and amphibians.

4.2.7.3.3 Impacts from Vegetation

Forests and Woodlands

Impacts from forest and woodland treatments would be the same as impacts common to all Alternatives. Under this Alternative 9,500 acres of forested land would be protected from cutting, except where needed for other resource values. Under Alternative A, forest management would include harvest activities on up to 68 percent of forested land (21,807 acres) over the life of the plan.

Rangelands

General impacts are the same as impacts common to all Alternatives. Alternative A actions implement prescribed fire/treatment of sagebrush on 6,418 acres for forage enhancement, which would increase forage for wildlife such as big game species, but would cause long-term negative impacts to sagebrush obligates such as sage-grouse. Treatment of sagebrush could result in displacement of individuals, direct loss of eggs or nests, and loss or breeding and brood rearing habitats. Also, the conversion of 160 acres of crested wheatgrass to improve range conditions and restore native habitats would increase the health of rangelands, although acreage converted is less than Alternatives B, C, and D.

Riparian and Wetlands

Under Alternative A, riparian and wetlands would be managed to meet PFC and oil and gas leasing is allowed with an NSO stipulation within the 100-year floodplains of major rivers, riparian areas, water bodies and streams (13,984 acres). Implementation of these management actions within the decision area would reduce habitat degradation and disturbance within critical wildlife and special status species habitats from oil and gas activity. Species associated with these habitats within the planning area include the whooping crane, bald eagle, black tern, moose, waterfowl, fish (including Yellowstone cutthroat trout), and numerous species of reptiles and amphibians.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.7.3.4 Impacts from Wildlife Habitat and Special Status Species

Under Alternative A, rangelands must comply with the Rangeland Health Standard 5, which promotes healthy, productive, and diverse native plant and animal populations and communities. This action would have beneficial impacts to wildlife and wildlife habitat.

Burying low voltage power-lines where resource conflicts exist would reduce potential collisions to avian species and reduce perching structures for avian predators to small game and sagebrush dependent species, while creating surface disturbances and direct alteration of wildlife habitat and increasing potential spread of invasive plant species to disturbed sites.

Oil and gas leasing, development, and geophysical exploration, would be prohibited from April 1 to June 15 within established spring calving ranges for elk (approximately 5,379 acres), from December 1 to March 31 within big game winter range (approximately 226,806 acres), within designated bighorn sheep range (approximately 14,377 acres), within ¼ mile of sharp-tailed grouse leks (approximately 1,745 acres), from March 1 to June 15 in sharp-tailed grouse nesting habitat within 2 mile of a lek (approximately 54,101 acres), and from March 1 to August 1 within ½ mile of raptor nests which have been active within the past two years (except for eagles, peregrine falcons, and ferruginous hawks) (approximately 12,658 acres). This would ultimately result in protection to these species from short-term adverse impacts associated with oil and gas activity, such as animal displacement and disturbance to breeding and seasonal movements.

Refer to Section 4.3.1.2, Fluid Minerals, for a summary of acres affected by Oil and Gas Stipulations by Alternative and Development Potential. Table 2-5, summarizes “Lease Terms and Stipulations by Alternative.”

Sheep or goats would not be permitted within 9 miles of known bighorn sheep habitat. This distance could increase if deemed necessary through site specific analysis. Currently there are no sheep or goat authorizations in close proximity to bighorn sheep habitat. The impacts of

managing sheep and goats include the potential for disease transmission as well as competition for forage and water and habitat use and alteration for bighorn sheep. The reduction in vegetation would result in loss of important forage for big game species and nesting cover for birds.

To prevent adverse impacts to black-footed ferrets and associated prairie dog colonies prior to surface disturbing activities, prairie dog colonies and complexes 80 acres or greater in size and containing at least 5 burrows per acre would be examined to determine the presence or absence of black-footed ferrets. In addition, the management of prairie dog colonies on public lands would be subject to the statewide prairie dog conservation plan (2002). As a result, desired habitat conditions could be achieved.

Under Alternative A, surface use would be prohibited within ¼ mile of active mountain plover nest sites. Disturbance to prairie dog towns would be avoided where possible, preventing alteration or the potential loss of habitat. Any active prairie dog town occupied by mountain plovers would have no surface use between April 1 and July 31, reducing the potential for individual mortality, disturbance to behavior, and loss of nests and eggs.

Alternative A restricts surface occupancy and surface use within one mile of identified peregrine falcon nests, reducing the potential for disturbance during the nesting period and loss of nests and eggs. To prevent adverse impacts to peregrine falcons from oil and gas development, an NSO of one mile of nesting sites and a restriction of geophysical activity would be enforced under Alternative A.

Activities and habitat alterations that disturb eagles would be restricted within suitable habitats that occur within eagle buffer areas. The following are recommended guidelines: Existing visual buffers within ¼ mile of nest sites should not be removed, but enhanced if possible. Activities in the absence of visual barriers are the following: Potentially disturbing activities should not occur within ½ mile of active and alternate nests (for territories occupied within the last five years). Potentially disturbing activities involving permanent construction, mechanize forest treatments, recreation, and aircraft operations (below 1,000 feet above the nest) should not occur within ¼ mile of a nest (Montana Bald Eagle Working Group, 2009, Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan, 1994. Eagle nesting habitats would be actively protected from loss due to fire, insect, or disease by reducing vegetation competition and encroachment in these habitats. This would ultimately result in greater protection to the eagle from surface disturbing activities, minimize disturbance to nesting eagles, and increase opportunities for successful breeding. Stipulations on surface occupancy and use for oil and gas exploration would provide less protection than Alternative B with a 1 mile buffer (3,568 acres per nest) and the same as Alternative D (½ mile buffer (478 acres per nest)) and more protection than Alternative C (¼ mile buffer; 79 acres per nest).

No surface occupancy or use would be allowed within ½ mile of known active raptor nest sites. In addition, oil and gas leasing, development, and geophysical exploration, would be prohibited with a NSO stipulation within ½ mile of ferruginous hawk nest sites which have been active within the past two years. This would ultimately result in greater protection to raptors and

ferruginous hawks from oil and gas activity and minimize disturbance to nesting hawks and increase opportunities for successful breeding.

To reduce adverse impacts, such as disturbance and habitat degradation, to greater sage-grouse, oil and gas occupancy and use would be prohibited within ¼ mile of lek sites (3,827 acres) and be prohibited seasonally from March 1 to June 15 in greater sage-grouse nesting habitat within two miles of a lek (202,384 acres). Surface use would also be prohibited from December 1 to March 31 within crucial winter range, with the exception of operation and maintenance activities of production facilities. Under Alternative A, there would be no continuous noise restrictions for new oil and gas leases, except for programmatic guidance as outlined in the FSEIS (e.g., restrict noise levels from production facilities to 50 decibels). However, there would be restrictions on new leases for the use of heavy equipment within two miles of a lek from 4-8 AM and 7-10 PM from April 1 to June 30 to reduce disturbance to lekking activities. These management measures would reduce human presence and noise associated with equipment use that would displace sage-grouse as well as other wildlife and special status species. Power-lines would not be required to be buried causing potential for increased predation of sage-grouse from the increased presence of avian perches.

Research has demonstrated that both the ¼ mile and two mile buffer distances are not adequate for the protection of sage grouse populations. Leks with at least one oil and gas well within a 0.4 km (0.25 miles) radius had 35-91 percent fewer attending males than leks with no well within this radius (Harju et al. 2010). A study in Musselshell and Golden Valley counties found that 98 percent of nest locations were within three miles of an active lek (Sika 2006). With regard to existing stipulations applied by the BLM (Walker et al. 2007a) research has demonstrated that the 0.4 km (0.25 mile) NSO stipulation is insufficient to conserve breeding sage grouse populations in fully developed gas fields because this buffer distance leaves 98 percent of the landscape with 3.2 km. (2 miles) open to full-scale development. Full-field development of 98 percent of the landscape with 3.2 km. (2 miles) of leks in a typical landscape in the Powder River Basin reduced the average probability of lek persistence from 87 percent to 5 percent (Walker et al. 2007a). Holloran (2005) shows that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road, and that development influence counts of displaying males to a distance of between 4.7 and 6.2 km (2.9 and 3.9 miles). Models with development at 6.4 km (4 miles) had considerably less support, but the regression coefficient indicated that impacts were still apparent out to 6.4 km (4 miles) (Walker et al. 2007a)

Vegetation treatments, including burning of dense sagebrush (6,418 acres) and treatment of 160 acres of crested wheatgrass would be conducted under Alternative A. The use of equipment to remove invasive species and noxious weeds could result in direct mortality or crushing of less mobile species, nests, and eggs. Additionally, surface disturbance would result in the loss of habitat and disruption in behaviors such as breeding and foraging for other species of wildlife.

Under Alternative A, greater sage-grouse habitat would be managed uniformly without the additional establishment of Protection Priority Areas (PPAs), Restoration Areas (RAs), and general habitat areas (GHAs). These areas would be open to oil and gas leasing and geophysical exploration, as well as renewable energy and ROWs. As a result, impacts to

greater sage-grouse populations and the associated habitat could include short-term and long-term adverse habitat loss and fragmentation, species displacement due to disturbance, and degradation of habitat quality.

Alternative A actions do not address road densities within important wildlife habitats, guidelines for stipulations to be applied to the operation and maintenance of production facilities or other projects, or restrictions for oil and gas leasing, development, and exploration within designated State Wildlife Management Areas. As a result, impacts to wildlife and associated habitat could include short-term and long-term adverse habitat loss and fragmentation, species displacement due to disturbance, and degradation of habitat quality.

4.2.7.3.5 Impacts from Fisheries Habitat and Special Status Species

Under Alternative A, oil and gas leasing would be allowed with an NSO stipulation within the 100-year floodplains of major rivers, riparian areas, water bodies and streams (13,984 acres). Implementation of these management actions within the decision area would reduce habitat degradation and disturbance within critical wildlife habitats from oil and gas activity. Species associated with these habitats within the planning area include the whooping crane, bald eagle, black tern, moose, waterfowl, and numerous species of fish, reptiles and amphibians.

4.2.7.3.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.7.3.7 Impacts from Visual Resources

Under Alternative A, 29,843 acres of Class I, 12,427 acres or Class II, 390,068 acres of Class III, and 816 acres of Class IV would be managed on BLM public lands. This Alternative would allow oil and gas activities within Class II areas if the contrasting visual elements from the actions can be minimized or eliminated. Therefore, wildlife and special status species would potentially be affected by surface disturbance, human presence, the use of equipment, and noise disturbance in areas designated as VRM Class II, III, and IV.

4.2.7.3.8 Impacts from Fire Ecology and Management

Under Alternative A, heavy equipment generally would not be used to construct fire lines in critical winter range, resulting in less surface disturbance from suppression activities. If wildfire threatens critical winter range, agency biologists would be consulted to determine appropriate suppression activities, which would be consistent for management objectives for these habitats. Additionally, fire management would be categorized into FMUs with five being undesirable for unplanned wildfire and one listed as desirable. Impacts from management activities would have the potential to adversely affect wildlife and special status species (surface disturbance, disruptive activities, and direct habitat alteration/loss). However, fire management resulting in habitat manipulations could benefit wildlife and special status species over the long-term by improving vegetative conditions that are linked to forage and cover.

4.2.7.3.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Alternative A designates 1,925 acres with Wilderness Characteristics, the fewest acres of all Alternatives. (Alternative B 27,292; Alternative C 3,379; Alternative D 13,653)

4.2.7.3.10 Impacts from Cave and Karst Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.7.3.11 Impacts from Energy and Mineral Resources

Impacts for energy and mineral activities could include disturbance to wildlife and special status species during construction and operation. Adverse impacts include surface disturbance and habitat loss, an increase in human presence and associated disruptive activities, habitat fragmentation, and direct mortality of individuals.

Coal

Impacts to wildlife and special status species would be the same as impacts common to all Alternatives. Implementation of Alternative A would result 26,131 acres closed to solid mineral leasing. In Alt. B, 290,048; Alt. C, 264,450; Alt. D, 280,971.

Fluid Minerals

Impacts where leasing and development occur would be the same as impacts common to all Alternatives. Implementation of Alternative A would result in 32,595 acres (NSO), 336,453 acres (CSU and TL), open to leasing and subject to major and moderate constraints, and 39,730 acres closed to leasing, including ACECs, the PMWHR, WSAs, and Pompeys Pillar National Monument.

Additionally, geophysical exploration would not be allowed within designated ACECs totaling 37,887 acres. Alternative A includes stipulations to protect raptors from the disturbance of geophysical exploration activities that would directly benefit a variety of species inhabiting these areas. Geophysical exploration would be prohibited within ½ mile of bald eagle nest sites that have been active within the past 7 years and within bald eagle nesting habitat in riparian areas and within ½ mile of ferruginous hawk nest sites that have been active within the past 2 years. Geophysical exploration would also be prohibited within 1 mile of peregrine falcon nesting sites and within ½ mile of all other raptor nests from March 1 to August 1 that have been active in the last 2 years. Other wildlife and special status species that inhabit these areas would also benefit from these stipulations.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives. In addition, Alternative A currently has 1,855 acres within the decision area closed and withdrawn from mineral entry and 37,845 additional acres would be closed and recommended for withdrawal.

Under Alternative A 39,700 acres within the decision area closed and recommended for withdrawal from mineral entry, less than Alternative B (270,977), more than C (36,955), and less than D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. In addition implementation of Alternative A would result in 44,583 acres closed to mineral material sales and disposal.

4.2.7.3.12 Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, the PSQ is set at 70 MBF per year, approximately 18 acres of forest harvest per year. However, based on assumptions stated earlier in the chapter, 3,340 acres of forested land would be impacted over the life of this plan. This reflects actual harvest rates over the last five years.

4.2.7.3.13 Impacts from Lands and Realty

Land Tenure

Under Alternative A, 7,529 acres would be available for disposal and 26,616 acres would be retained. The effects of land tenure on wildlife and special status species would be beneficial through the consolidation and acquisition of lands that contain habitat and provided protection that would not be afforded by non-federal ownership.

Rights-of-Way, Leases and Permits

Impacts would be the same as impacts common to all Alternatives. Additionally, under Alternative A, 44,014 acres would be designated for ROW exclusion. 24,203 acres would be designated for ROW avoidance areas.

Withdrawals

Under Alternative A, 39,700 acres would be closed and recommended for withdrawal from mineral entry. The impacts from withdrawals would be beneficial to wildlife and special status species due to restrictions of surface disturbance preventing loss of habitat a displacement due to disturbance of operation activities.

Impacts from Livestock Grazing

Impacts would be the same as impacts common to all Alternatives. In Alternative A, approximately 387,057 acres would be permitted for grazing. To prevent disease transmission, as well as competition of forage and water sources for bighorn sheep, domestic sheep or goats would not be permitted within nine miles of known bighorn sheep habitat.

In Alternative A there is some increased risk to riparian health and important habitat due to the requirement to monitor riparian health on a ten year rotation. This would allow some riparian and aquatic conditions to deteriorate before a decreasing trend is recognized; having adverse impacts on wildlife resources. Management categories would remain the same on all allotments, therefore management priorities would not change.

4.2.7.3.14 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. In addition, an NSO in developed recreation areas and areas receiving high concentrated use would have beneficial impacts to wildlife resources by minimizing surface disturbing and disruptive activities.

4.2.7.3.15 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts common to all Alternatives. Based on assumptions, the more route miles open would have more impacts to wildlife and wildlife habitat.

Under Alternative A, there would be 824 miles of open routes (83 percent of all route miles). This Alternative opens more routes than Alternative B (35 percent) and D (62 percent) and less routes than Alternative C (90 percent).

An analysis of specific effects of routes open under this Alternative, with proximity to various sensitive wildlife habitats (big game winter range, proximate to leks, PPAs, RAs, General Sage grouse habitat, and Prairie Dog towns), can be found in Appendix O.

4.2.7.3.16 Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under Alternative A, 47,496 acres would be closed to renewable energy development, and an additional 25,141 acres would be managed as avoidance areas for renewable energy authorizations. If authorizations were allowed in avoidance areas, special stipulations, mitigations, and BMPs would be applied, to reduce impacts to wildlife. Alternative A excluded renewable energy form the fewest acres of all Alternatives: A 47,496 acres, B 345,491 acres, C 82,019 acres, and D 78,088 acres. Alternative A also avoids renewable energy from the fewest acres of all Alternatives: A 25,141 acres, B 85,458 acres, C 326,722 acres, and D 331,088 acres.

4.2.7.3.17 Impacts from Transportation Facilities and Access

Impacts would be the same as impacts common to all Alternatives.

4.2.7.3.18 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives. Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves wildlife habitat (if not directly, then cumulatively). There are some variations in acreage of special designations across the Alternatives; Alternative A establishes 66,527 acres of special designations and 14 miles of WSR eligible stream segments; Alternative B establishes 209,806 acres and 14 miles of WSR suitable stream segments; alt. C establishes 95,710 acres and 14 miles of WSR eligible stream segments; alt. D establishes 67,417 acres and 14 miles of WSR suitable stream segments. The difference in acres between Alternatives determines the level of impacts to wildlife resources as described in impacts common to all Alternatives.

4.2.7.4 Alternative B

4.2.7.4.1 Impacts from Soil

Impacts would be similar to those described under Alternative A, with more positive impacts to wildlife and special status species as a result of more stringent mitigation measures on surface disturbing activities and surface occupancy. Under Alternative B, in addition to logging, all surface disturbing activities and surface occupancy for oil and gas would not be allowed on soils with slopes greater than 30 percent. This had the potential to affect up to 47,795 acres, although the affected acreage would be far less due to project proponents selecting more suitable locations for activities. In addition, use of Rangeland Health Standards and BMPs would be used to assess and mitigate soil disturbance. This would allow for minimization of long-term habitat disturbance on sensitive soils prone to erosion, which would maintain or improve wildlife and special status species habitat.

4.2.7.4.2 Impacts from Water

Impacts would be similar to impacts in Alternative A, except: actions Alternative B would restrict fluid mineral development with a ¼ mile NSO on Riparian areas, Water Bodies, Perennial Streams and Floodplains of Perennial Streams (56,312 acres Federal Mineral Estate), and other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but it is only applied to surface ownership (24,373 acres BLM); actions also restrict or limit activities that contribute to deteriorating watershed conditions by closing and reclaiming roads and prohibiting disposal of new surface discharge of produced waters on public lands. These actions would protect wildlife resources by maintaining or improving watershed conditions that would be beneficial to wildlife habitat.

4.2.7.4.3 Impacts from Vegetation

Forests and Woodlands

Emphasis on forest and woodland management under Alternative B would include the retention of forests and woodlands within the decision area with positive impacts to wildlife and special status species. Impacts would be similar to those discussed under Alternative A, except Alternative B restricts operation of wheeled and tracked vehicles from slopes greater than 30 percent, resulting in 2,566 few acres of disturbance compared to Alternative A which restricts this activity to slopes greater than 35 percent.

Rangelands

As opposed to Alternative A, Alternative B would restrict prescribed and wildfire in sagebrush communities, which would provide positive impacts to sagebrush obligates, such as the greater sage-grouse. The conversion of 22,414 acres of crested wheatgrass to native communities would be beneficial to species associated with native grasslands and provide long-term positive habitat conditions.

Riparian and Wetlands

Alternative B manages riparian areas the most intensively.

Actions specific to riparian vegetation are designed to protect or enhance riparian communities which are crucial habitat for many wildlife species.

Alternative B establishes 189 miles of priority riparian habitat on perennial and fish bearing streams, where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Maintaining or restoring functionality to these areas would benefit wildlife resources.

Alternative B actions are the most restrictive in managing surface disturbing activities and oil and gas exploration and development in riparian areas, floodplains and on water bodies and streams associated with YCT and high value fisheries, offering the most resource protection of the four Alternatives.

A ¼ mile NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface) .

YCT habitat, suitable habitat, Blue Ribbon and Red Ribbon Fisheries have ½ mile NSO stipulations for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation, which would have direct, long-term beneficial impacts on wildlife resources.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives.

Special Status Species

Impacts would be the same as impacts common to all Alternatives.

4.2.7.4.4 Impacts from Wildlife Habitat and Special Status Species

Alternative B has additional protection for wildlife resources, including updated and larger scale stipulations for oil and gas development and the designation of sage grouse habitat areas (PPAs, RAs, and General Habitat areas). Where environmental analysis and monitoring demonstrate a continued need for mitigation or insufficient mitigation measures are present for impacts to wildlife, stipulations could be applied to the operation and maintenance of production facilities or other projects. Additionally, the BLM or proponents would monitor areas with wildlife habitat conflicts on an annual basis. Where Rangeland Health Standard 5 is not being met as described under Alternative A, guidelines would be applied within one year to make progress toward meeting the standard. Oil and gas leasing, development, and exploration would be allowed with NSO stipulations in designated State Wildlife Management Areas. As a result, the short-term and long-term adverse impacts identified in Alternative A would be reduced.

Under Alternative B, where resource conflicts exist, BLM would not authorize above-ground power lines, 69 kV or less, unless burying the power-line is unfeasible. Burying power-lines would reduce potential collisions to avian species, eliminate tall structures, and reduce perching structures for avian predators to prey on small-game species; however, it would create surface disturbance dependent upon the size and scale of the project.

Alternative B would provide more protection than other Alternatives to wildlife and special status species from surface disturbance and disruptive activities. Oil and gas leasing and development (including geophysical exploration) would be prohibited from April 1 to July 1 within established big game parturition habitat (approximately 5,379 acres), within big game winter range with a CAPS Score of 1 or 2 as designated by MFWP (approximately 258,592 acres), within designated bighorn sheep range, within ½ mile of raptor nest sites that have been active in the past seven years, within two miles of sharp-tailed grouse leks, and from March 1 to June 15 in sharp-tailed grouse nesting habitat within two miles of a lek (approximately 54,100 acres). This would reduce impacts from habitat loss and disturbance and provide overall benefits to protect these species habitats as well as other wildlife and special status species that occur within these areas.

Under Alternative B, no new permanent roads would be allowed in areas where open road densities are ½ mile/ square mile (mi/mi2) or less in big game parturition ranges and winter ranges with a CAPS Score of 1 or 2 as designated by MFWP, unless not possible due to prior existing rights such as rights-of-way, leases or permits. Additionally, over the snow vehicles would be prohibited in big game winter range. All practicable measures would be taken to assure that important habitats with low road densities remain in that condition. The BLM would manage to reduce open road densities in big game winter range with a CAPS score of 1 or 2 as designated by MFWP and calving ranges where they exceed ½ mi/mi2. To reduce impacts to big game further, roads within these areas would be gated and/or closed during crucial seasons and reclaimed. These management actions would reduce habitat fragmentation and maintain overall habitat quality for big game as well as other wildlife and special status species that occur within these areas.

To prevent competition of forage and water sources for bighorn sheep, no change in livestock conversions from cattle to domestic sheep or goats would be allowed in allotments within occupied wild sheep habitat. New sheep and goat allotments or conversions from cattle to sheep or goats would be permitted a minimum of 14.3 miles or greater from known bighorn sheep habitat. This distance would be greater, if deemed necessary, through site specific analysis. The increased distance would provide more protection to bighorn sheep from potential disease transmission, forage competition, and habitat degradation.

Restrictions to activity around raptor nests would be similar to Alternative A, but would increase the restriction on surface disturbance to a ½ mile protection for raptor nest sites that have been active for the past two years. In addition, unoccupied raptor nests would be protected from removal or destruction for seven years, or the period a known preferred prey species fluctuates from population highs to lows. The nest would not have to be retained if it is physically damaged beyond the point of repair. Impacts from the additional protection of raptor

nests would maintain nesting success within the decision area or increase nesting success compared to Alternative A.

Impacts from management actions for black-footed ferrets would be the same as Alternative A. Prairie dog management on public lands would be based on maintaining populations at current levels. Oil and gas leasing and development activities would be allowed after the conclusion of surveys for black-footed ferrets. In the absence of black-footed ferrets, oil and gas leasing, development and exploration and geothermal operations would not be allowed within ½ mile of black-tailed and white-tailed prairie dog colonies active within the past 10 years. Impacts from these management measures would create long-term beneficial impacts to wildlife and special status species associated with prairie dog towns (e.g., black-footed ferret, mountain plover, burrowing owl) through the preservation of habitat and the reduction in human disturbance.

Alternative B would provide more protection to mountain plover from surface disturbance and disruptive activities. Under Alternative B, oil and gas leasing would be allowed with an NSO stipulation, development, geophysical exploration, and other surface disturbing activities would not be allowed in mountain plover habitat within ½ mile of a nest. These restrictions would minimize disruption and degradation of mountain plover nesting sites as well as other wildlife and special status species occurring within these areas.

To prevent adverse impacts to peregrine falcons from oil and gas leasing, development, geophysical exploration, and other surface disturbing activities, an NSO of one mile within nesting sites, would be enforced. Impacts from the additional protection to peregrine falcons would result in a decrease in human disturbance to individuals and breeding pairs and maintain nesting success within the decision area or increase nesting success compared to Alternative A.

Fluid mineral development, geophysical exploration, and other surface disturbing activities would be allowed with an NSO stipulation within one mile of eagle nest sites which have been active in the past 7 years. Impacts from the additional protection of eagle nests would maintain nesting success within the decision area or increase nesting success compared to Alternative A.

Fluid mineral development, geophysical exploration, and other surface disturbing activities would be allowed with an NSO stipulation within one mile of ferruginous hawk nest sites that have been active within the past seven years. Impacts from the additional protection of ferruginous hawk nests would maintain nesting success within the decision area or increase nesting success compared to Alternative A.

Refer to Section 4.3.1.2, Fluid Minerals, for a summary of acres affected by Oil and Gas Stipulations by Alternative and Development Potential. Table 2-5, summarizes “Lease Terms and Stipulations by Alternative”.

Where resource conflicts occur, above ground power-lines (less than 69 kV), would be prohibited, unless burying the power-line is unfeasible. This would reduce the potential for increased predation from the creation of avian perches and the abandonment of certain areas due to increased vertical structure, however it would create surface disturbance dependent upon size and scale of the project.

Vegetation treatments would depend on technology, funding, and available labor. Crested wheatgrass would be converted to native sagebrush/ grassland over the life of the plan. Potentially 22,414 acres would be treated. Restoration efforts would focus in or near greater sage-grouse habitat areas. Preferred treatment areas would be areas that are not currently being used in a grazing system to provide early spring grazing and reduce grazing pressure from other areas within a grazing allotment. Priorities for treatments would be as follows with PPAs (first), RAs (second), and General Habitat areas (third). The use of equipment to remove invasive species and noxious weeds could result in direct mortality or crushing of less mobile species, nests, and eggs. Human presence and noise associated with equipment use could displace wildlife and special status species in the short term. Surface disturbance would result in the loss of habitat and disruption in behaviors such as breeding and foraging for other species of wildlife. Conversion of crested wheatgrass to native sagebrush/ grassland would improve habitat for sagebrush obligate species in the long term.

Sage Grouse Protection Priority Areas (PPAs)

Under Alternative B, approximately 191,543 acres (Federal minerals) and 154,140 acres (BLM administered surface) would be established as greater sage-grouse PPAs. There are 29 lek sites within the PPAs designated on public lands and Federal mineral estate. Core areas (all ownerships) have 69 lek sites total, with 33 leks in the northern Core Area and 36 leks in the southern Core Area. PPAs are closed to future oil and gas leasing, exploration, and/or development. Existing leases would not be renewed upon expiration. The requirement for unit agreements within sage-grouse PPAs should reduce disturbances associated with ancillary facilities servicing each of the leases within the unit. The requirement for full reclamation bonds would assure most long-term disturbances are reclaimed. Additionally, PPAs would be exclusion areas to commercial renewable energy exploration, facility development, and ROWs, with the exception of valid existing rights. As a result, impacts to greater sage-grouse and associated habitat including short-term and long-term adverse habitat loss and fragmentation, species displacement due to disturbance, and degradation of habitat quality due to oil and gas activities would be negligible for birds inside the PPA or minimized for the birds utilizing habitat both inside and outside of the PPAs.

In Alternative B only, the Greater Sage-Grouse PPA (surface only) would be designated as an ACEC. The potential ACEC would be managed with the same protections as described and provided for in the Greater Sage-Grouse PPA areas which would result in the same impacts and described in that section (see above paragraph for a description of the direct, indirect, and cumulative impacts).

Refer to the “Impacts from Livestock Grazing” section for a summary of impacts from the designation of grazing allotments in PPAs as management Category I allotments.

Sage Grouse Restoration Areas (RAs)

Under Alternative B, approximately 63,437 acres (Federal minerals) and 45,555 acres (BLM surface) would be established as greater sage-grouse RAs and include a smaller core area within Carbon County near the Elk Basin Oil Field. An NSO would be stipulated to limit oil and gas leasing, development, geophysical exploration, and other surface disturbing and

disruptive activities within 0.6 miles of sage grouse leks and nesting habitat in RAs. In addition a timing limitation would be stipulated restricting activity from March 1 to June 15 in greater sage-grouse nesting habitat within 4 miles of a lek. The timing limitation would minimize impacts during the development of the oil and gas during the nesting season only. During the production phase of the oil well, nesting impacts would occur, although they would be reduced by the CSU (one surface disturbance per 640 acres) that would limit the density of disturbances in the area.

Surface occupancy and use for oil and gas exploration and development would be subject to special operating constraints in order to maintain greater sage-grouse habitat. Oil and gas exploration and development and geothermal operations would have a CSU stipulation that would allow one surface disturbance per 640 acres of land, with a cumulative disturbance of no more than 5 percent of the habitat in the 640 acres. This would maintain sage grouse habitat. Impacts from the additional protection of greater-sage-grouse habitat would have long-term beneficial impacts to greater sage-grouse habitat and on population numbers within the decision area. Thus, adverse impacts to lek sites, nesting habitat, and disturbance to breeding individuals would be minimized.

Within RAs, geophysical exploration would be allowed on existing roads and trails with a timing limitation, restricting surface use from March 1 to June 15 within four miles of a lek (48,730 acres). RAs would be closed to commercial renewable energy exploration and facility development and would be considered avoidance areas for ROWs. As a result, impacts to greater sage-grouse and associated habitat including short-term and long-term adverse habitat loss and fragmentation, species displacement due to disturbance, and degradation of habitat quality due to oil and gas activities would be reduced.

Under this Alternative BLM would identify existing disturbance areas and initiate restoration opportunities. These actions would further protect and enhance sage grouse habitat.

Sage Grouse General Habitat Areas (GHAs)

Under Alternative B, greater sage-grouse general habitat areas would encompass approximately 116,452 acres including habitat within three miles of greater sage-grouse leks. Management actions for general habitat areas are the same as those identified for RAs, with the exception of the stipulation for oil and gas exploration and development that prohibits surface occupancy from March 1 to June 15 in greater sage-grouse nesting habitat within 3 miles of a lek versus 4 miles of a lek for RAs. This less restrictive measure could provide opportunity for greater disturbance to sage-grouse nesting habitat.

Sage Grouse Winter Range

To reduce adverse impacts to wintering greater sage-grouse, fluid mineral development, and geophysical activities, as well as surface disturbance and disruptive activities would be prohibited from December 1 to March 1 within crucial winter range for sage-grouse (381,518 acres). This action would minimize activities associated with fluid mineral development that could cause decreases in sage grouse populations.

4.2.7.4.5 Impacts from Fisheries Habitat and Special Status Species

Same as impacts common to all Alternatives and those impacts described in riparian resources in Alternative B. Additionally, this Alternative would prohibit spring development in riparian areas and wetlands. Restricting spring development could have adverse impacts to wildlife resources, by restricting the potential to use the spring as an additional water source to improve livestock distribution, which could potentially benefit local habitats.

Livestock grazing would be restricted from fish bearing streams, and the associated riparian habitat. This action would protect and improve these habitats which are crucial for many wildlife species.

4.2.7.4.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives. Under this Alternative, range improvements would not be authorized. Improvements have the potential to improve wildlife resources in the area.

4.2.7.4.7 Impacts from Visual Resources

Under Alternative B, VRM Class I acres beneficial to wildlife and special status species would be reduced to 29,823 acres, Class II areas would be increased to 15,688 acres, Class III areas would be reduced to 388,643 acres, and Class IV acres would be reduced to 0 acres. Additionally, surface disturbance activities would only be allowed with a CSU stipulation within Class II – IV areas if the location, painting, and camouflage would be able to blend with the natural surroundings and meet the visual quality objectives for each respective class. Therefore, wildlife and special status species would potentially be affected by surface disturbance, human presence, the use of equipment, and noise disturbance in areas designated as VRM Class II, III, and IV.

4.2.7.4.8 Impacts from Fire Ecology and Management

Impacts would be similar to those listed under Alternative A for wildfire, fire suppression operations, and prescribed fire operations. Under Alternative B, fire suppression activities would be limited to urban and industrial interface and developed recreational and electronics areas, reducing impacts to big game and sage-grouse. Within these areas, any heavy equipment needed for suppression operations would be restricted to existing roads and trails or immediately adjacent to them, therefore avoiding adverse impacts within sensitive wildlife and special status species habitats. The use of heavy equipment would also be restricted within riparian/wetland habitats, big game crucial winter range, sage-grouse nesting habitat within proximity to lek sites, and areas of highly erosive soils. Finally, wildfire management would be considered for ACECs to promote the benefits listed under Alternative A, but would be restricted within greater sage-grouse PPAs or RAs. This would preserve sagebrush important for sage-grouse and other sagebrush dependent species.

4.2.7.4.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Alternative B identifies 27,292 acres as lands containing wilderness characteristics, the most acres of all Alternatives. (Alternative A 1,925; Alternative C 3,379; Alternative D 13,653)

4.2.7.4.10 Impacts from Cave and Karst Resources

Impacts would the same as impacts common to all Alternatives. Additionally Alternative B would be beneficial to bat species by restricting surface disturbing and disruptive activities within ½ mile from cave and karst areas within the decision area. Additionally caves and karsts would be closed to mineral development, and be managed as a ROW exclusion area.

4.2.7.4.11 Impacts from Energy and Mineral Resources

Impacts would be the same as those listed in Alternative A. However, the amount of acres with leasing constraints would vary as described below.

Coal

Under Alternative B no new coal leasing would be allowed. This action would provide the most protections to wildlife resources in the decision area with respect to coal resource development.

Fluid Minerals

Implementation of Alternative B would result in 28,110 acres (NSO), 326,016 acres (CSU and TL), open to leasing and subject to major and moderate constraints and 302,713 acres closed to leasing. Wildlife and special status species could be adversely impacted by areas open to leasing. Alternative B would provide long-term beneficial impacts to sage-grouse by protecting PPAs from oil and gas leasing.

Additionally, geophysical exploration would not be allowed within designated ACECs, less than the amount closed to geophysical exploration in Alternative A. The stipulations for the protection of raptors, ferruginous hawks, peregrine falcons, and bighorn sheep habitat would be the same as Alternative A. Stipulations for the bald eagle include an increase in buffer zone to a 1 mile distance for exploration activities.

Alternative B has 67,726 acres available for leasing and development with standard leasing terms, which have fewer protections to wildlife resources. Acres open with standard leasing terms for all Alternatives are as follows: A (264,534); B (67,726); C (126,732); D (6,158).

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives. In addition, implementation of Alternative B would result in 270,977 acres closed and recommended for withdrawal. The withdrawal would preclude any surface disturbances associated with mining claims filed after the date of the withdrawal. Valid and existing mining claims filed prior to the withdrawal would be subject to validity exams or buy-outs which would further reduce the amount of surface disturbance in PPAs. The reduction of surface disturbance would be unknown until the

time a Plan of Operations (POO) is filed, thereby lessening the effects of habitat loss and fragmentation.

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. In addition implementation of Alternative B would result in 343,745 acres closed to mineral material sales and disposal.

4.2.7.4.12 Impacts from Forest and Wood Products

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, the PSQ is set at 70 MBF per year, approximately 18 acres of forest harvest per year, impacting 360 acres over the 20 year life of this plan.

4.2.7.4.13 Impacts from Lands and Realty

Land Tenure

Impacts would be similar to those listed under Alternative A. However, under Alternative B, land ownership adjustments would be considered through site-specific analysis, based on retention, acquisition, and disposal criteria. Three categories would be developed based on BLM adjustment classes. Alternative B would increase the amount of managed acres (approximately 434,000) for retention and reduce the disposal acres to 50. This action can potentially benefit wildlife habitat by ensuring sound resource management by the BLM.

Rights-of-Way, Leases, and Permits

Impacts would be similar to those listed under Alternative A, except under Alternative B, more than 211,384 acres would be designated for ROW exclusion. Over 185,607 acres would be designated for ROW avoidance. Alternative B is the most restrictive to land use authorizations, providing the most protection to wildlife resources of all Alternatives.

Withdrawals

Impacts would be similar to those listed under Alternative A, except under Alternative B, 270,977 acres would be closed and recommended for withdrawal from mineral entry, increasing the amount acres and benefits to wildlife and special status species and associated habitats.

4.2.7.4.14 Impacts from Livestock Grazing

Impacts to wildlife and special status species would be similar to Alternative A. Under Alternative B, approximately 386,092 acres would be permitted for grazing and 38,373 acres closed to grazing. To prevent possible disease transmission to bighorn sheep, no change in livestock conversions from cattle to domestic sheep or goats would be allowed in allotments within occupied wild sheep habitat. New sheep and goat allotments or conversions from cattle to sheep or goats would be permitted a minimum of 16 miles from known bighorn sheep habitat. This distance could be adjusted, if deemed necessary, through site specific analysis.

Assessing PFC on riparian areas on a three year schedule would ensure declining trends in riparian health would be recognized early and could be addressed to maintain riparian health. Healthy riparian areas are critical habitat for many wildlife species.

Areas with active surface disturbance would be unavailable to livestock grazing; various methods would be used to exclude grazing from these areas (fencing, pasture rotation, closing pastures). Impacts to wildlife from this action would be beneficial in the long term as recovery of vegetative cover would be accelerated without grazing pressure. However, if fencing was used to exclude livestock, direct impacts to wildlife would increase, including collision and habitat fragmentation for some species.

Grazing allotments in PPAs would be designated as management Category I allotments. This would increase the priority for sage grouse habitat management within those allotments. More intensive habitat and rangeland monitoring would occur in those allotments, along with a greater priority for funding. This would improve sage grouse habitat conditions and protections more rapidly than other management category allotments and increase or maintain sage grouse populations in those areas. This would add an additional 84 allotments to the Category I allotments or 134,119 acres when compared to Alternatives A and C. There would be a total of 105 Category I allotments and 259,690 total public land acres. Of those 105 allotments, 14 allotments are not meeting rangeland management health standards or about 40,165 public land acres. Eighty-six allotments are meeting rangeland health standards or about 194,762 public land acres.

4.2.7.4.15 Impacts from Recreation and Visitor Services

Impacts would be similar to Alternative A, with the exception of an increase in SRMAs to seven with an increase in managed acres (90,783 acres). Surface disturbance would be subject to mitigation measures. Under Alternative B, no new commercial outfitter/guide permits would be authorized in the Mill Creek/Bundy Road area and existing SRPs would not be renewed creating less hunting pressure on game species. This action would have beneficial impacts to wildlife resources by reducing surface disturbance and disruptive activities associated with fluid mineral development.

An NSO stipulation would be applied to 85,714 acres of specified recreation areas, ACECs and Travel management areas. This action would have beneficial impacts to wildlife resources by reducing surface disturbance and disruptive activities associated with fluid mineral development.

4.2.7.4.16 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts common to all Alternatives. Based on assumptions, the more route miles open would have more impacts to wildlife and wildlife habitat.

Under Alternative B, there would be 349 miles of open routes (35 percent of all route miles). This Alternative Closes or limits to administrative access more route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative C

designates 90 percent of route miles as open, and Alternative D designates 62 percent of route miles as open.

An analysis of specific effects of routes open under this Alternative, with proximity to various sensitive wildlife habitats (big game winter range, proximate to leks, PPAs, RAs, General Sage grouse habitat, and Prairie Dog towns), can be found in Appendix O.

4.2.7.4.17 Impacts from Renewable Energy

Impacts would be the same as impacts common to all Alternatives. Under Alternative B 345,491 acres would be closed to renewable energy development. These areas include Greater Sage-Grouse RAs, PPAs and GHAs, and cave and karst areas. This would benefit species that use these areas, particularly species that avoid tall structures due to predators, by potentially reducing impacts from renewable energy development in these areas. Additionally 85,458 acres would be managed as avoidance areas. These areas would be managed the same as Alternative A. Additionally, special stipulations would be implemented consistent with fluid mineral development for the protection of bald and golden eagles, ferruginous hawks, sage grouse winter range, peregrine falcons, mountain plover, and raptor nests. A ½ mile buffer from riparian areas, wetlands, water bodies, and 100 year floodplains would also be managed as avoidance areas. Alternative B excludes renewable energy from the most acres of all Alternatives: A 47,496 acres, B 345,491 acres, C 82,019 acres, and D 78,088 acres.

4.2.7.4.18 Impacts from Transportation Facilities and Access

Impacts would be the same as impacts common to all Alternatives.

4.2.7.4.19 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives. Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves wildlife habitat (if not directly, then cumulatively). There are some variations in acreage of special designations across the Alternatives; Alternative A establishes 66,527 acres of special designations and 14 miles of WSR eligible stream segments; Alternative B establishes 209,806 acres and 14 miles of WSR suitable stream segments; alt. C establishes 95,710 acres and 14 miles of WSR eligible stream segments; alt. D establishes 67,417 acres and 14 miles of WSR suitable stream segments. The difference in acres between Alternatives determines the level of impacts to wildlife resources as described in impacts common to all Alternatives.

4.2.7.5 Alternative C

4.2.7.5.1 Impacts from Soil

Under Alternative C, surface disturbing activities would not be allowed in areas with highly erosive soils or on slopes greater than 45 percent. Fluid mineral development would be allowed with a CSU to mitigate impacts on slopes greater than 30 percent. These actions would allow

for minimization of long-term habitat disturbance on sensitive soils prone to erosion, which would maintain or improve wildlife and special status species habitat.

In addition, use of Rangeland Health Standards and BMPs would be used to assess and mitigate soil disturbance, ensuring authorized activities do not create long-term adverse impacts to wildlife resources.

4.2.7.5.2 Impacts from Water

Alternative C would include fewer restrictions to protect watershed conditions, thereby resulting in fewer benefits to wildlife and special status species than Alternatives A or B. Surface disturbing activities and fluid mineral development would be allowed with an NSO within floodplains, wetland/riparian areas, and on water bodies. This Alternative is more protective of these resources, which are critical to many wildlife species, than Alternative A (stipulating floodplains of perennial streams instead of 100 year floodplains increases the total acreage), but less than B or D. Requiring produced water from fluid mineral development to be in compliance with MT DEQ standards would ensure adequate water quality would be maintained, reducing impacts to wildlife resources. Species associated with these habitats within the planning area include the whooping crane, bald eagle, black tern, moose, waterfowl, and numerous species of fish, reptiles and amphibians.

Additionally, stabilizing watershed conditions where grazing management or range condition is contributing to excessive erosion would be a long-term benefit to wildlife resources.

Seasonal closures of roads that are contributing to a decline in water quality would be beneficial to wildlife resources by decreasing disruptive activities associated with human presence.

4.2.7.5.3 Impacts from Vegetation

Forests and Woodlands

Impacts would be similar to impacts common to all Alternatives.

Additionally, Alternative C restricts operation of wheeled and tracked vehicles from slopes greater than 45 percent, resulting in 25,335 acres (19,241 for alt. B and D and 21,807 for alt. A) of potential surface disturbance. This Alternative would allow the most acreage available to forest and woodland treatments.

The removal of large trees and disposal of isolated forested lands could lead to long-term loss of important wildlife habitat, habitat fragmentation, and displacement to species such as raptors and lynx.

Rangelands

Sage brush communities would be treated with various methods to achieve a diversity of age classes, improving habitat conditions for local wildlife species.

Converting 7,500 acres of crested wheatgrass, a 10 percent reduction in acres from Alternative B, in high density sage-grouse population areas to native sagebrush/grassland would provide additional habitat for sagebrush obligate species if the treatment were successful. Although, it would provide 10 percent less additional habitat than Alternative B for sagebrush species.

Riparian and Wetlands

Actions specific to riparian vegetation are designed to protect or enhance riparian communities which are crucial habitat for many wildlife species.

Alternative C establishes 13 miles of priority riparian habitat, where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Maintaining or restoring functionality to these areas would benefit wildlife resources.

An NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (9,206 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (6,666 acres BLM surface) .

An NSO stipulation within ¼ mile of YCT habitat and Blue Ribbon for oil and gas exploration and development (2,051 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (806 acres BLM surface) would be implemented.

These NSO stipulations and consistent surface disturbing management actions would protect riparian resources by minimizing potential degradation resulting from surface disturbance; erosion and sedimentation, and weed infestation, which would have direct, long-term beneficial impacts on wildlife resources.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.7.5.4 Impacts from Wildlife Habitat and Special Status Species

Generally, the impacts would be the same as those described under Alternative B with less protection to wildlife resources due to smaller buffers and fewer avoidance areas for ROWs and other potential development.

Oil and gas leasing, development, and exploration would be allowed with a CSU stipulation in designated State Wildlife Management Areas, allowing for potential disturbance and displacement to wildlife species. Power lines less than 69 kV, would be authorized in a manner that ensures habitat would be maintained to reduce potential collisions to avian species and reduce perching structures for avian predators to small game species.

Under Alternative C, oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities would be allowed: within big game parturition habitat (approximately 5,379 acres) with mitigation (CSU); within big game winter range (approximately 226,806 acres) with mitigation (TL); within designated bighorn sheep range with a mitigation plan (CSU); within ¼ mile of raptor nest sites that have been active in the past 7 years (NSO); and between March 1 to June 15 in sharp-tailed grouse nesting habitat within 1/2 mile of a lek (TL) (approximately 5,808acres). These management actions would provide the least protection to these species of any Alternative.

Management actions for surface disturbance and oil and gas activities would be less beneficial to wildlife and special status species than actions provided under Alternative B, creating the potential for more adverse impacts from human disturbance and habitat loss. Management actions for big game winter ranges would be the same as Alternative A. These management actions would provide the least protection to these species.

Oil and gas leasing and development and geophysical exploration within sharp-tailed grouse lek sites and nesting habitats would be subject to the following constraints: noise limits that would not exceed 49 decibels; and operational constraints that could include off-site production facilities and gated access to minimize disturbance to lek sites and nesting habitats. These actions would minimize disruption to grouse lek breeding and nesting habitats.

The management of road densities would prohibit a net increase in areas where open road densities are 1.5 mi/mi2 or less in big game winter and calving ranges unless not possible due to rights-of-way, leases or permits. All practicable measures would be taken to assure that important habitats with low road densities remain in that condition. The BLM would manage to reduce open road densities in big game winter range and calving ranges where they exceed 1.5 mi/mi2. Additionally, over the snow vehicles would be allowed in big game winter range. These management actions under Alternative C would allow for disturbance and possible displacement of individuals and potential habitat fragmentation for big game as well as other wildlife and special status species that occur within these areas. To reduce impacts to big game winter and calving ranges, roads within these areas would be gated and/or closed during crucial seasons.

Under Alternative C, impacts from no change in livestock conversions from cattle to domestic sheep or goats would be the same as Alternative B. However, new sheep and goat allotments or conversions from cattle to sheep or goats would be permitted a minimum of 12.4 miles from known bighorn sheep habitat, a reduction from Alternative B. The buffer distance would provide protection to bighorn sheep from potential disease transmission, forage competition, and habitat degradation, but to a lesser degree than Alternative B.

Impacts to raptor nests would be similar to Alternative B. However, restrictions to activity around raptor nests would be reduced and require a ¼ mile protection for nests that have been active in the past seven years. This would provide less protection to these species than Alternative B.

Impacts from prairie dog management under Alternative C would be similar to Alternative B. However, control measures would be permitted where prairie dog colonies are adversely

impacting adjacent private and state lands or affecting other resources, including livestock-carrying capacities. Controlling prairie dog colonies in these areas could restrict prairie dog colony potential and species associated with these habitat types, though maintaining habitat for other local species.

Oil and gas leasing development and exploration and geothermal operations would be allowed with a CSU within black-tailed and white-tailed prairie dog colonies with specialized design features in order to maintain suitable habitat. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development. This would provide less protection to these species than Alternative B and D, and more protection than Alternative A.

Impacts from management activities associated with mountain plover would be the same as Alternative B. A CSU would be applied to fluid mineral development within ¼ mile of mountain plover nesting sites. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development.

To prevent adverse impacts to peregrine falcons from oil and gas development, an NSO within ¼ mile of nesting sites would be implemented. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development

Management actions for oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities on eagles nest sites would be less restrictive allowing activity with an NSO stipulation of ¼ mile of nest sites. Therefore, impacts would include a higher potential for nest failure.

Oil and gas leasing development and exploration and geothermal operations would be allowed with an NSO within 300 feet of ferruginous hawk nest sites. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development that could cause nest abandonment.

Vegetation treatments would depend on technology, funding, and available labor. Impacts from crested wheatgrass conversion to native sagebrush/grassland would be the same as Alternative B, however only 7,500 acres would be treated as opposed to 22,414 acres in Alternative B.

Sage Grouse Priority Protection Areas (PPAs)

Under Alternative C, the acreage designated for greater sage-grouse PPAs would be the same as Alternative B. Within PPAs, oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities would be more restrictive than Alternative A, but less restrictive that Alternative B. Fluid mineral development activities would be prohibited from March 1 to June 15 in sage-grouse nesting habitat within two miles of a lek (TL) (118,230 acres) to protect nesting habitat. Areas within 0.6 miles of greater sage-grouse lek sites (19,591 acres) would be NSO. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development.

Like Alternative A, PPAs are open to oil and gas leasing and geophysical operations. However, Alternative C is more restrictive than Alternative A with leases subject to the stipulation that surface occupancy and use would be prohibited within a 0.6 mile of lek sites (NSO) (19,591

acres). In addition, surface occupancy and use would be subject to a CSU stipulating BLM authorization of one surface disturbance per 640 acres with a cumulative direct and indirect disturbance of no more than 10 percent of the sagebrush habitat per 640 acres from the point of the disturbance, as long as functional greater sage-grouse habitat and their associated populations can be maintained at the same levels as trend areas. Disturbed areas would have to be fully reclaimed to pre-disturbance conditions or to a desired plant community before additional disturbance could be approved. Additionally, the proponent would prepare a mitigation and monitoring plan detailing protection measures for greater sage-grouse and their habitat.

Under Alternative C, PPAs would be an avoidance area for renewable energy and ROWs unless an approved mitigation plan was presented by the applicant that demonstrates habitat suitability would be maintained. Connelly et al. (2000:977-978) developed recommendations for habitat protection for sage grouse. Specifically, for non-migratory populations occupying habitats that are uniformly distributed, they recommended protecting sagebrush and herbaceous understory within two mi (3.2 km) of all occupied leks. Impacts to sage grouse from wind energy turbines are unknown at this time, although it is expected that the impacts could be similar to impacts from other tall structures, such as power-lines, and oil and gas structures. There are some related studies on other similar species such as the greater prairie chicken. A USFWS briefing paper, July 20, 2004, recommended a five mile buffer from known lek sites. PPAs are designated avoidance areas for renewable energy due to the uncertainty of impacts from wind energy development. Establishing PPAs as ROW avoidance areas would minimize surface disturbing and disruptive activities associated roads, power lines, and pipelines.

Adverse impacts to lek sites, nesting habitat, and disturbance to lekking individuals could be reduced under these management actions however, opportunity for negative impacts would be greater under Alternative C. Studies indicate that a two mile buffer distance for the protection of nesting and brood-rearing habitat is not sufficient and at least a four mile buffer is needed to encompass 74-80 percent of nesting females (Moynahan 2004, Holloran and Anderson 2005, Colorado Greater Sage Grouse Conservation Plan Steering Committee 2008). Also, refer to the discussion of sage grouse research in Alternative A.

The Greater Sage-Grouse PPA area would not be designated as an ACEC. However, the area would be managed within the same protections as described and provided for in the Greater Sage-Grouse PPA areas which would result in the same impacts as described in that section (see above paragraphs for a description of direct, indirect, and cumulative effects).

Sage Grouse Restoration Areas (RAs)

Under Alternative C, the acreage designated for greater sage-grouse RAs would be the same as Alternative B. However, Alternative C has oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities restricted from March 1 to June 15 in sage-grouse nesting habitat within two miles of a lek, allowing for potential disturbance to nesting habitat. Geophysical exploration would require mitigation to maintain habitat suitability.

In RAs, the potential for disturbance to breeding and nesting sage grouse would be greater than Alternative B, due to a reduction in buffer distances from 0.6 miles to 0.25 miles for leks and from four miles to two miles for nesting.

RAs would be designated avoidance areas for renewable energy due to the uncertainty of impacts from wind energy. ROWs would be allowed, if suitable habitat can be maintained.

Sage Grouse General Habitat Areas (GHAs)

Under Alternative C, the acreage for greater sage-grouse general habitat areas would be the same as Alternative B. Management actions for oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities, in general habitat areas are the same as those identified for general habitat areas under Alternative A. Geophysical exploration would require mitigation to maintain habitat suitability. The potential for disturbance to breeding and nesting sage grouse and their habitat would be greater than Alternative B, due to a reduction in buffer distances from 0.6 miles to 0.25 miles for leks and from three miles to two miles for nesting.

Refer to Section 4.3.1.2, Fluid Minerals, for a summary of acres affected by Oil and Gas Stipulations by Alternative and Development Potential. Table 2-5, summarizes "Lease Terms and Stipulations by Alternative."

Renewable energy activities and ROWs would be allowed in general habitat if suitable habitat can be maintained, thus reducing impacts to sage grouse habitat.

Sage Grouse Winter Range:

A TL would be stipulated for designated sage grouse winter range from December 1 to March 1, encompassing 193,982 acres. A TL with the same dates would be stipulated on areas within 2 miles of sage grouse leks (undesignated winter range) that are not within designated winter range. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development that could cause sage grouse to abandon lek sites.

4.2.7.5.5 Impacts from Fisheries Habitat and Special Status Species

Protection of fisheries habitat would be less restrictive under Alternative C. Fluid mineral development, exploration and surface disturbing activities would be allowed with an NSO within riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams. Fluid mineral development, exploration and surface disturbing activities would be allowed with an NSO within ¼ mile of Blue Ribbon streams and YCT populations. These stipulations are less restrictive to fluid mineral development than Alternatives B and D and more restrictive than Alternative A.

New spring developments would be authorized and fenced if the development would maintain the integrity and functionality of the associated riparian area. Developing springs would improve livestock distribution, potentially improving land health in the area and could also enhance the riparian community associated with the development.

Permitting livestock grazing on YCT or other sensitive aquatic habitats, as long as rangeland health standards (PFC) are being met, would maintain crucial riparian habitat for wildlife species.

By developing existing and potential reservoirs to promote recreational fisheries and riparian habitat, would have beneficial and adverse impacts on local wildlife and habitat. The creation of new aquatic and riparian habitat would have beneficial impacts, while the promotion of a recreational fishery would increase human presence and potential disruptive and surface disturbing activities.

4.2.7.5.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts from Alternative A. Additionally; Alternative C maximizes the amount of acres available for range improvements (vegetation treatments and water developments). This action would increase forage and water over the range, distributing horse and wildlife over the range. This would potentially increase usable habitat, and create new habitat for local wildlife species.

4.2.7.5.7 Impacts from Visual Resources

Impacts would be similar to Alternative A; however the impacts of designating 8,071 more acres than Alternative A as Class II (20,498) would allow oil and gas activities on more land, resulting in a higher potential for surface disturbing and disruptive activities that impact wildlife resources.

4.2.7.5.8 Impacts from Fire Ecology and Management

Impacts would be similar to those listed under Alternative A for wildfire, fire suppression operations, and prescribed fire operations. Under Alternative C, suppression operations, including the use of heavy equipment would have fewer restrictions, which could degrade wildlife and special status species habitat. Impacts from wildfire management would have the same impacts as listed under Alternative B, except there would be no use of naturally ignited fires to benefit wildlife and associated habitat resources. This could limit possible restoration through fire, necessary in certain habitats. In addition, prescribed fires would be allowed, including sage-grouse RAs, if the activity is determined to benefit the sagebrush community or meet other resource objectives. This action would have short-term adverse impacts to species dependent on sage brush communities, but long-term beneficial impacts would be expected.

4.2.7.5.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Alternative C designates 3,379 acres with Wilderness Characteristics. (Alternative A 1,925; Alternative B 27,292; Alternative D 13,653)

4.2.7.5.10 Impacts from Cave and Karst Resources

Impacts would the same as impacts common to all Alternatives. However, caves and karsts would need to be inventoried prior to fluid mineral and mineral development, and an approved mitigation plan would need to be submitted by the proponent. Additionally these areas would

be managed as ROW avoidance areas. This Alternative provides the least protection and has the greatest potential for adverse impacts to wildlife species using cave and karst habitats.

4.2.7.5.11 Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as described under Alternative A, except under Alternative C 264,450 acres would be closed to leasing, including PPAs and RAs. Alternative C is therefore, less restrictive than Alternative B, but more restrictive than Alternative A.

Fluid Minerals

Impacts to wildlife resources would be the same as impacts described in impacts common to all Alternatives. Management actions under Alternative C would stipulate major and minor constraints for the protection of wildlife resources, including: 65,891 acres closed to leasing, 64,135 acres with an NSO, and 419,284 acres with a CSU or a TL.

Additionally, geophysical exploration would not be allowed within designated ACECs. Alternative C includes stipulations to protect raptors from the disturbance of geophysical exploration activities that would directly benefit a variety of species inhabiting these areas. Geophysical exploration would be prohibited within ¼ mile of bald eagle nest sites that have been active within the past seven years and within bald eagle nesting habitat in riparian areas and within ¼ mile of ferruginous hawk nest sites that have been active within the past two years. Geophysical exploration would also be prohibited within 1 mile of peregrine falcon nesting sites and within ¼ mile of all other raptor nests from March 1 to August 1 that have been active in the last two years. These stipulations would protect other wildlife and special status species that inhabit these areas from reduced surface disturbing and disruptive activities associated geophysical exploration.

Alternative C has 126,732 acres available for leasing and development with standard leasing terms, which have fewer protections to wildlife resources. Acres open with standard leasing terms for all Alternatives are as follows: A (264,534); B (67,726); C (126,732); D (6,158)

Locatable Minerals

Impacts would be the same as described under Alternative A, except under Alternative C 36,955 acres within the decision area closed and recommended for withdrawal from mineral entry, less than A (39,700), B (270,977), and slightly less than D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives, except under Alternative C 251,927 acres would be closed to mineral material disposal, including PPAs.

4.2.7.5.12 Impacts from Forestry and Woodland Products

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, the PSQ is set at 250 MBF per year, approximately 66 acres of forest harvest per year, impacting 1,320 acres over the 20 year life of this plan.

4.2.7.5.13 Impacts from Lands and Realty

Land Tenure

Under Alternative C, 4,223 acres would be available for disposal and 429,931 acres would be retained. The effects of land tenure on wildlife and special status species would be beneficial through the consolidation and acquisition of lands that contain habitat and provided protection that would not be afforded by non-federal ownership.

Rights-of-Way, Leases and Permits

Impacts would be similar to those listed under Alternative A, except under Alternative C, 39,491 acres would be designated for ROW exclusion and 355,601 acres, including L&CNHT and NPNHT, would be designated for ROW avoidance.

Withdrawals

Impacts would be similar to those listed under Alternative A, except under Alternative C, 36,955 acres would be currently closed and recommended for withdrawal from mineral entry, increasing the amount acres and benefits to wildlife and special status species and associated habitats.

Impacts from Livestock Grazing

Impacts to wildlife and special status species would be similar to Alternative B. Under Alternative C, approximately 386,822 acres would be permitted for grazing. Existing management categories would remain the same on all allotments; therefore, management priorities for sage grouse habitat would not change, similar to Alternative A. To prevent possible disease transmission to bighorn sheep, no change in livestock conversions from cattle to domestic sheep or goats would be allowed in allotments within occupied wild sheep habitat. New sheep and goat allotments or conversions from cattle to sheep or goats would be permitted a minimum of 12.4 miles from known bighorn sheep habitat. This distance could be adjusted, if deemed necessary, through site specific analysis.

In Alternative C there is some increased risk to riparian health and important habitat due to the requirement to monitor riparian health on a ten year rotation. This would allow some riparian and aquatic conditions to deteriorate before a decreasing trend is recognized; having adverse impacts on wildlife resources.

Areas with active surface disturbance would be available to livestock grazing, though these areas would be temporarily suspended. Various methods would be used to exclude grazing from these areas (fencing, pasture rotation, closing pastures). Impacts to wildlife from this action would be beneficial in the long term as recovery of vegetative cover would be accelerated without grazing pressure. However, if fencing was used to exclude livestock, direct impacts to wildlife would be increase, including collision and habitat fragmentation for some species.

Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives.

In addition, a CSU would be stipulated in developed recreation areas and areas receiving high concentrated use would have beneficial impacts to wildlife resources by minimizing surface disturbing and disruptive activities.

Impacts from Trails and Travel Management

Impacts would be the same as described in impacts common to all Alternatives. Based on assumptions, the more route miles open would have more impacts to wildlife and wildlife habitat.

Under Alternative C, there would be 893 miles of open routes (90 percent of all route miles). This Alternative Closes or limits to administrative access fewer route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative D designates 62 percent of route miles as open.

An analysis of specific effects of routes open under this Alternative, with proximity to various sensitive wildlife habitats (big game winter range, proximate to leks, PPAs, RAs, General Sage grouse habitat, and Prairie Dog towns), can be found in Appendix O.

4.2.7.5.14 Impacts from Renewable Energy

Impacts would be the same as Alternative B; however Greater Sage-Grouse PPAs, RAs and GHAs, and cave and karst areas would be managed as avoidance areas rather than exclusion areas. Additionally, the ½ mile buffer from riparian areas, wetlands, waterbodies, and 100 year floodplains would be removed, however these riparian areas, wetlands, waterbodies, and 100 year flood plains would be managed as avoidance areas. These changes could increase disturbances to wildlife in these areas, and cause displacement of species that avoid tall structures. Under Alternative C 82,019 acres would be managed as exclusion areas, and 326,722 acres would be managed as avoidance areas. Exclusion areas are more than Alternatives A (47,496 acres) and D (78,088 acres), but less than Alternative B (345,491 acres).

4.2.7.5.15 Impacts from Transportation Facilities and Access

Impacts would be the same as impacts common to all Alternatives.

4.2.7.5.16 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves wildlife habitat (if not directly, then cumulatively). There are some variations in acreage of special designations across the Alternatives; Alternative A establishes 66,527 acres of special designations and 14 miles of WSR eligible stream segments; Alternative B establishes 209,806 acres and 14 miles of WSR suitable stream segments; alt. C establishes 95,710 acres and 14 miles of WSR eligible stream segments; alt. D establishes 67,417 acres and 14 miles of WSR suitable stream segments. The difference in acres between Alternatives determines the level of impacts to wildlife resources as described in impacts common to all Alternatives.

4.2.7.6 Alternative D (Preferred Alternative)

4.2.7.6.1 Impacts from Soil

Impacts would be similar to those described under Alternative B. Under Alternative D, oil and gas activities would be allowed with a CSU stipulation on slopes less than 30 percent. CSU stipulations impose fewer protections to wildlife compared to NSO stipulations, therefore providing fewer protections to wildlife resources. Impacts to wildlife resources by the use of rangeland health standards and BMPs to manage authorized surface disturbing activities including those on fragile and unstable soils would be the same as Alternative C.

4.2.7.6.2 Impacts from Water

Impacts would be similar to impacts in Alternative A, except: actions in Alternative D would restrict fluid mineral development with an NSO stipulation within 300 feet of Riparian areas, Water Bodies, Perennial Streams and Floodplains of Perennial Streams (15,653 acres Federal Mineral Estate), and other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but it is only applied to surface ownership (9,087 acres BLM); actions also restrict or limit activities that contribute to deteriorating watershed conditions by closing and reclaiming roads and avoiding disposal of new surface discharge of produced waters on public lands. These actions would protect wildlife resources by maintaining or improving watershed conditions that would be beneficial to wildlife habitat.

4.2.7.6.3 Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as Alternative B, except Alternative D allows forest management to benefit other resource values, unless otherwise restricted.

Rangelands

Impacts would be the same as Alternative C, except more area (12,000 acres) of crested wheatgrass would be converted to native sagebrush/grassland.

Riparian and Wetlands

Impacts would be similar to Alternative B, except the buffer to fluid mineral development and surface disturbing activities on riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams would be reduced from ¼ mile to 300 feet, resulting in 15,853 acres of NSO as opposed to 56,312 acres in Alternative B. Also, fluid mineral development and surface disturbing activities would be restricted within ½ mile of Blue Ribbon streams and YCT populations (8,256 acres), whereas Alternative B stipulates this buffer with the addition of Red Ribbon streams and YCT suitable habitat (54,309 acres). Additionally, 51 miles of high priority riparian areas would be established (in Alternative B 189 miles). Alternative D is slightly less protective or beneficial to wildlife resources as compared to Alternative B.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives.

Special Status Species

Impacts would be the same as impacts common to all Alternatives.

4.2.7.6.4 Impacts from Wildlife Habitat and Special Status Species

Generally, the impacts would be the same as those described under Alternative B with less protection to wildlife resources due to smaller buffers and fewer exclusion areas for ROWs and other potential development. Differences are noted below.

Under Alternative D, oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities would be allowed: within big game winter range (approximately 258,582 acres CAPS score 1, and 266,819 acres CAPS score 2) with mitigation (CSU) and when timing allows (TL); and between March 1 to June 15 in sharp-tailed grouse habitat within 2 miles of a lek (TL) (approximately 54,101 acres). These management actions would provide the least protection to these species of any Alternative.

Management actions for surface disturbance and oil and gas activities would be less beneficial to wildlife and special status species than actions provided under Alternative B, creating the potential for more adverse impacts from human disturbance and habitat loss from surface disturbing activities.

A TL would be stipulated for geophysical exploration within two miles of sharp-tailed grouse lek sites. These actions would minimize disruption to grouse leks and nesting habitats.

The management of road densities would prohibit a net increase in areas where open road densities are 1.0 mi/mi2 or less in big game winter and calving ranges unless not possible due to rights-of-way, leases or permits. All practicable measures would be taken to assure that important habitats with low road densities remain in that condition. The BLM would manage to reduce open road densities in big game winter range and calving ranges where they exceed 1.0 mi/mi^2. These management actions under Alternative D would protect big game winter range and calving ranges from disturbance and possible displacement of individuals and potential habitat fragmentation for big game as well as other wildlife and special status species that occur within these areas.

Impacts from prairie dog management under Alternative D would be similar to Alternative B, with a reduction of the oil and gas leasing and geophysical exploration NSO buffer from ½ mile in Alternative B to ¼ mile in Alternative D. This action would minimize surface disturbing and disruptive activities associated with fluid mineral development and other surface disturbing activities.

Mountain plover habitat and populations would be protected by stipulations prohibiting oil and gas development and exploration within ¼ mile of nest sites with a TL for short-term or temporary disturbances and an NSO for permanent or long-term actions.

Management actions addressing oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities, on eagle nest sites, would be less restrictive than Alternative B, allowing activity with an NSO stipulation within ½ mile of nest

sites occupied within the last five years. However, this is an adequate buffer as recommended in the Montana Bald Eagle Management Plan, so no adverse impacts would be expected.

Under Alternative D, the acreage designated for greater sage-grouse PPAs would be the same as Alternative C. Within PPAs, oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities would be similar to Alternative B. (Alt. B is Closed to leasing and Alternative D is an NSO). This action would minimize surface disturbing and disruptive activities associated with fluid mineral development.

The Greater Sage-Grouse PPA area would not be designated as an ACEC. However, the area would be managed with the same protections as described and provided for in the Greater Sage-Grouse PPA areas which would result in the same as described in that section (see above paragraph for a description of direct, indirect, and cumulative impacts).

Refer to the "Impacts from Livestock Grazing" section for a summary of impacts from the designation of grazing allotments in PPAs as management Category I allotments.

Refer to Section 4.3.1.2, Fluid Minerals, for a summary of acres affected by Oil and Gas Stipulations by Alternative and Development Potential. Table 2-5, summarizes "Lease Terms and Stipulations by Alternative."

Renewable Energy and ROWs in PPAs, RAs, and General Sage Grouse Habitat are designated avoidance areas under Alternative, with the same impacts as Alternative C.

4.2.7.6.5 Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as common to all Alternatives and those impacts described in riparian resources in Alternative D. Additionally, spring developments in riparian areas and wetlands would be managed and have the same impacts as in Alternative C. Livestock grazing associated with YCT bearing and other sensitive habitats would be managed the same as Alternative C with the same impacts.

4.2.7.6.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts in Alternative C.

4.2.7.6.7 Impacts from Visual Resources

Impacts would be similar to Alternative A.

4.2.7.6.8 Impacts from Fire Ecology and Management

Impacts from wildfire would be the same as impacts from Alternative B. Additionally, prescribed fire would be managed the same as Alternative C.

4.2.7.6.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives. Alternative D designates 13,653 acres with Wilderness Characteristics, the most acres of all Alternatives. (Alternative A 1,925; Alternative B 27,292; Alternative C 3,379)

4.2.7.6.10 Impacts from Cave and Karst Resources

Impacts would the same as impacts from Alternative C, except surface disturbing or disruptive activities within ¼ mile of cave entrances could be allowed if the activity benefits the resource. This would minimize surface disturbance and disruptive activities that would impact wildlife species utilizing cave and karst areas.

4.2.7.6.11 Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as described under Alternative A, except under Alternative D 280,971 acres would be closed to leasing, including PPAs and RAs. Alternative D is therefore, less restrictive than Alternative B, but more restrictive than Alternative A or C.

Fluid Minerals

Impacts to wildlife resources would be the same as impacts described in impacts common to all Alternatives. Management actions under Alternative D would stipulate major and minor constraints for the protection of wildlife resources, including: 72,915 acres closed to leasing, 263,185 acres with an NSO, 336,753 acres with a CSU or a TL. Additionally, geophysical exploration would not be allowed within designated ACECs. Alternative D includes stipulations to protect raptors from the disturbance of geophysical exploration activities that would directly benefit a variety of species inhabiting these areas. Geophysical exploration would be prohibited within ¼ mile of bald eagle nest sites that have been active within the past seven years and within bald eagle nesting habitat in riparian areas and within ¼ mile of ferruginous hawk nest sites that have been active within the past two years. Geophysical exploration would also be prohibited within 1 mile of peregrine falcon nesting sites and within ¼ mile of all other raptor nests from March 1 to August 1 that have been active in the last two years. These stipulations would protect other wildlife and special status species that inhabit these areas from reduced surface disturbing and disruptive activities associated geophysical exploration. Alternative D has 6,158 acres available for leasing and development with standard leasing terms, which have fewer protections to wildlife resources. Acres open with standard leasing terms for all Alternatives are as follows: A (264,534); B (67,726); C (126,732); D (6,158).

Locatable Minerals

Impacts would be the same as described under Alternative A, except under Alternative D 54,761 acres within the decision area closed and recommended for withdrawal from mineral entry, more than A (39,700), less than B (270,977) and more than C (36,955).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives, except under Alternative D 272,122 acres would be closed to mineral material disposal, including PPAs.

4.2.7.6.12 Impacts from Forest and Wood Products

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, the PSQ is set at 125 MBF per year, approximately 33 acres of forest harvest per year, impacting 660 acres over the 20 year life of this plan.

4.2.7.6.13 Impacts from Lands and Realty

Under Alternative D, 170 acres would be available for disposal and 433,984 acres would be retained. The effects of land tenure on wildlife and special status species would be beneficial through the consolidation and acquisition of lands that contain habitat and provided protection that would not be afforded by non-federal ownership.

Rights-of-Way, Leases and Permits

Impacts would be similar to those listed under Alternative A, except under Alternative D, 48,258 acres would be designated for ROW exclusion and 349,358 acres would be designated for ROW avoidance.

Withdrawals

Impacts would be similar to those listed under Alternative A, except under Alternative D, 54,761 acres would be currently closed and recommended for withdrawal from mineral entry, increasing the amount acres and benefits to wildlife and special status species and associated habitats.

4.2.7.6.14 Impacts from Livestock Grazing

Impacts to wildlife and special status species would be similar to Alternative B. Under Alternative D, approximately 387,057 acres would be permitted for grazing. Areas with active surface disturbance would be managed the same as in Alternative C, with the same impacts. AUMs could be adjusted, based on monitoring data and range conditions. In the long term, this could provide beneficial habitat to wildlife by reducing livestock grazing pressure.

Grazing allotments in PPAs would be designated as management Category I allotments. This would increase the priority for sage grouse habitat management within those allotments. More intensive habitat and rangeland monitoring would occur in those allotments, along with a greater priority for funding. This would improve sage grouse habitat conditions and protections more rapidly than other management category allotments and increase or maintain sage grouse populations in those areas. This would add an additional 84 allotments to the Category I allotments or 134,119 acres when compared to Alternatives A and C. There would be a total of 105 Category I allotments and 259,690 total public land acres. Of those 105 allotments, 14 allotments are not meeting rangeland management health standards or about 40,165 public land acres. Eighty-six allotments are meeting rangeland health standards or about 194,762 public land acres.

4.2.7.6.15 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Additionally, under Alternative D 97,013 acres of SRMAs would be managed with an NSO stipulation on fluid

mineral development and exploration and surface disturbing activities. 87,282 acres would be managed with a CSU stipulation on three TMAs and Asparagus Point. Alternative D also designates 110,862 acres in 9 areas as SRMAs, which is less acres than Alternative C (147,181), and more than Alternatives A (1,171) and B (90,783).

4.2.7.6.16 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts common to all Alternatives. Based on assumptions, the more route miles open would have more impacts to wildlife and wildlife habitat.

Under Alternative D, there would be 614 miles of open routes (62 percent of all route miles). Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative C designates 90 percent of route miles as open.

An analysis of specific effects of routes open under this Alternative, with proximity to various sensitive wildlife habitats (big game winter range, proximate to leks, PPAs, RAs, General Sage grouse habitat, and Prairie Dog towns), can be found in Appendix O.

4.2.7.6.17 Impacts from Renewable Energy

Impacts would be the same as Alternative C; however a ¼ mile buffer would be place on riparian areas, wetlands, waterbodies, and 100 year flood plains, potentially increasing protections of these habitats, and wildlife that rely on these areas. Under Alternative D 78,088 acres would be managed as exclusion areas. This is less than Alternative B (345,491) less than C (82,019 acres), and more than A (47,496 acres). Alternative D designates 331,088 acres as avoidance areas, more than all other Alternatives: A 25,141 acres, B 85,458 acres, C 326,772 acres, and D 331,088 acres.

4.2.7.6.18 Impacts from Transportation Facilities and Access

Impacts would be the same as impacts common to all Alternatives.

4.2.7.6.19 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.7.7 Cumulative Impacts

Cumulative effects include other future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. The Billings/Pompeys Pillar planning area is interspersed with parcels of non-BLM managed lands including federal, tribal, state, and privately owned lands. Activities taking place on these lands do have the potential to cumulatively impact natural resources within the planning area.

Existing and proposed activities on non-federal lands in the planning areas that have the potential to cumulatively affect wildlife and special status species include:

- Increasing popularity of non-motorized recreation in the Pryor Mountains (e.g. wild horse viewing tours)
- Increasing recreation demand on public lands, primarily OHV
- Wildlife habitat fragmentation from scattered land ownership patterns
- Sage-grouse habitat fragmentation (e.g. fencing, habitat conversion)
- Wind energy development on private lands
- Coal activity on private lands near Roundup
- Demands on travel management (private access across public lands)
- Developments on private land, including subdivisions
- Mineral development and coal gasification plant project on the reservation in Big Horn County, Montana.

The geographic area for cumulative impacts to wildlife and special status species includes the entire planning area. Ongoing and future interrelated actions would continue to impact wildlife and special status species. Where these existing and future activities on non-BLM lands interface with the fish and wildlife habitats, they would cumulatively add to the impacts of activities authorized in the decision area. Quantified data on the future extent of these land uses are not available.

Land use activities (on all ownerships within the planning area) where data is available are wildfire burned area acreages, cropland acres, CRP acres and trends, and oil and gas existing leases and production. These activities would have long-term direct impacts to wildlife habitat. Over the last 10 years (2000-2010) in Carbon, Yellowstone, Musselshell, and Golden Valley counties a total of 165,313 acres have burned in wildfires. These counties comprise the largest percentage of public lands within the planning area. Within the four counties, land uses average an estimated 71 percent for rangelands, 15 percent cropland (dryland and irrigated), and 10 percent forest land, with the balance of acreages developed or unclassified. Within the four-county area, 127,121 acres are leased for oil and gas with an average of less than 1 percent in production.

Table 4-23 Sage Grouse Core Area / Oil and Gas Activity Summary Table

Core Area	Federal # Producing Wells	Private / Other # Producing Wells	Total # of Wells	Federal Nonproducing Wells	Private / Other Nonproducing Wells
#4 (NW)	0	0	46	6	40
#5 (NE)	3	31	749	81	718
#11 (South)	25	25	157	107	132

Note:

Data Source: Montana Board of Oil and Gas Conservation website, www.BOGC.dnrc.mt.gov, 9/2011 with Sage Grouse BLM GIS data. Note: Oil and gas leasing data on Private and Other Lands were not available; therefore, oil and gas well data were used to describe potential impacts from oil and gas activities to sage grouse.

Table 4-23 above demonstrates that Sage Grouse Core Area #5 (NW) has the greatest direct potential threat to sage grouse and their habitat in the long term, although due to the high number of nonproducing wells, this area could also have the greatest opportunity for reclamation of sage grouse habitat. Because this area is mixed ownership with scattered public lands and BLM lands could have more restrictions for oil and gas leasing, oil and gas development companies would develop adjacent private and other lands rather than lease public lands. Wildlife management opportunities for the BLM are very limited in scattered land ownership areas due to the influence of developments on adjacent private lands. Mobile wildlife species, such as big game and birds, could be directly affected by management of habitat on surrounding ownerships.

Alternative A would allow greater impacts to wildlife and Special Status Species (SSS) to occur and less beneficial wildlife habitat treatments would be developed than Alternatives, B, C, and D. Actions not addressed in this alternative, are travel management or road densities within important wildlife habitats, guidelines for stipulations to be applied to the operation and maintenance of production facilities or other projects, or restrictions for oil and gas leasing, development, and exploration within designated State Wildlife Management Areas. As a result, impacts to wildlife and associated habitat could include short-term and long-term adverse habitat loss and fragmentation, species displacement due to disturbance, and degradation of habitat quality.

Particularly for sage grouse, recent research findings, have provided updated and more accurate seasonal timing restrictions and expanded protection distances. Research has demonstrated that both the ¼ mile and two mile buffer distances are not adequate for the protection of sage grouse populations. Leks with at least one oil and gas well within a 0.4 km (0.25 miles) radius had 35-91 percent fewer attending males than leks with no well within this radius (Harju et al. 2010). A study in Musselshell and Golden Valley counties found that 98 percent of nest locations were within three miles of an active lek (Sika 2006). With regard to existing stipulations applied by the BLM (Walker et al. 2007a) research has demonstrated that the 0.4 km (0.25 mile) NSO stipulation is insufficient to conserve breeding sage grouse populations in fully developed gas fields because this buffer distance leaves 98 percent of the landscape with 3.2 km. (2 miles) open to full-scale development. Full-field development of 98 percent of the landscape with 3.2 km. (2 miles) of leks in a typical landscape in the Powder River Basin reduced the average probability of lek persistence from 87 percent to 5 percent (Walker et al. 2007a). Holloran (2005) shows that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road, and that development influence counts of displaying males to a distance of between 4.7 and 6.2 km (2.9 and 3.9 miles). Models with development at 6.4 km (4 miles) had considerably less support, but the regression coefficient indicated that impacts were still apparent out to 6.4 km (4 miles) (Walker et al. 2007a).

Alternative B has additional protection for wildlife resources, including updated and larger scale stipulations for development versus Alternatives A and C. Alternative B would provide

more protection than other Alternatives to wildlife and special status species from surface disturbance and disruptive activities, including travel management and road densities. This Alternative Closes or limits to administrative access more route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative C designates 90 percent of route miles as open, and Alternative D designates 62 percent of route miles as open.

This Alternative, including Alternatives C and D, designates sage grouse habitat areas (PPAs, RAs, and General Habitat areas) versus Alternative A that does not recognize any special designation for sage grouse habitat. PPA's would be closed to future oil and gas leasing, exploration, and development, and grazing allotments would be designated management Category I allotments. This alternative provides the greatest protection for the management of sage grouse and sage grouse habitat.

Generally, the impacts to wildlife and SSS would be greater under Alternative C than those described under Alternatives B and D, with less protection to wildlife resources due to smaller buffers and fewer avoidance areas for ROWs and other potential development. There would be less impact to wildlife than Alternative A with greater restrictions and areas closed to travel, and other development.

This alternative provides less protection for sage grouse and sage grouse habitat than Alternatives B and D and more protection than Alternative A. This is due to decreased protection distances and less restrictions than Alternatives B and D.

The impacts to wildlife and SSS, would be the same under Alternative D as those described under Alternative B, with less protection to wildlife resources due to smaller buffers and fewer exclusion areas for potential development. Management actions would be less beneficial to wildlife and special status species than actions provided under Alternative B, creating the potential for more adverse impacts from human disturbance and habitat loss from surface disturbing activities, although protections would be greater than Alternatives A and C. Under Alternative D, there would be 614 miles of open routes (62 percent of all route miles). Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative C designates 90 percent of route miles as open.

Within sage grouse PPAs, oil and gas leasing, development, and geophysical activities, as well as surface disturbance and disruptive activities would be similar to Alternative B. However, Alternative B is closed to oil and gas leasing and Alternative D is an NSO. Grazing allotments would be designated management Category I allotments.

4.2.7.8 Montana State Conservation Reserve Program Trends

Conservation Reserve Program (CRP) acreage trends have been reversed since 2007, when enrollment acreage began to decline. This reversal in enrollment trends would have a long-term direct negative impact on species dependent on intact vegetation cover.

According to statistics from the Farm Service Administration (FSA), the State of Montana had 3,316,018 acres enrolled in CRP in 2007 and currently has 2,858,721 acres enrolled as of April

2011. CRP acreage in Montana has declined by 14 percent since 2007. (Source: http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=rns-css)

About 226.8 thousand acres of land was newly developed in Montana between 1982 and 2007. The state now has over 1 million acres of developed land. This represents a 27 percent increase in the past 25 years.

Estimates from 2007 show that cultivated cropland, in Montana, decreased by approximately 3.3 million acres between 1982 and 2007. This represents a 23 percent decrease from the 1982 total. Nearly 90 percent of the decrease was a result of cultivated cropland enrolled in the USDA's Conservation Reserve Program (CRP).[2]

In 2008, the State of Montana designated core sage grouse habitat areas. These areas were designated to target conservation management practices. Core area 11 is located in Carbon County[3] (Greater Sage-grouse Habitat Conservation Strategy, May, 2009). Core area 11 consists of approximately 284,431 acres, of which 106,503 acres are located on BLM. Currently there has been limited work in this core area to improve conservation practices. Portions of core areas 4 and 5 occur in Musselshell and Golden Valley Counties. In 2010, the Natural Resource Conservation Service (NRCS) began working with grazing operators to improve grazing management in core area 4 under the Sage Grouse Initiative. BLM recently approved applications to construct fences in accordance with ongoing projects with the Sage Grouse Initiative. As a result of this initiative grazing management would be improved on over 100,000 acres in core area 4.

The majority of cumulative impacts on wildlife and special status species habitat would result from surface disturbing and disruptive activities such as increasing demands on development and travel management on private, State, and other lands within the planning area. Surface disturbances could remove or degrade native vegetation, fragment habitats, introduce invasive weeds, displace species, cause abandonment of nesting and breeding areas, reduce availability of key habitat components, and reduce reproduction and survivability. Loss of vegetation attributed to development activities would result in a reduction of available habitat and of habitat quality and could result in increasing forage competition among grazing animals. Habitats might be made unavailable to wildlife because of human disturbance factors (e.g., traffic or noise during sensitive time periods such as winter, birthing, nesting, and early rearing of young). Impacts on wildlife could be potentially significant if increased development and surface disturbance alter existing migration corridors where access to important habitat areas would be greatly reduced.

Depending on the extent and timing of activity, increasing recreation demand could cause slight to major changes to habitats that could be occupied by wildlife and special status species or provide necessary habitat components over time. Such impacts could include trampling habitats, introducing noise or dust that can disturb species during sensitive periods, introducing invasive weeds or disease, degrading habitat, and causing direct or stress-related mortality.

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2 Source : http://www.mt.nrcs.usda.gov/technical/nri/nri2007/landuse.html

3 Numbered Core Area Designations are from: ftp://ftp-fc.sc.egov.usda.gov/MT/www/technical/biology/SageGrouseStrategy/SageGrouseStudyMap.pdf

With the eventual increases of recreation use resulting from increased populations or popularity of the area for recreation activity, cumulative impacts could become significant for some species.

4.2.7.9 Irreversible and Irretrievable Commitments of Resources

Implementation of the RMP management actions would result in surface-disturbing activities, including dispersed recreation, recreational OHV use, fire and fuels management, mineral and energy development, livestock grazing, and infrastructure development that could permanently alter wildlife and special status species habitats. Habitats in nonfunctional condition could sustain sufficient degradation that they could no longer be capable of being restored to original site potential. However, management actions and BMPs are intended to reduce the magnitude of these impacts and restore some of the habitat lost.

4.2.7.10 Unavoidable Adverse Impacts

Surface-disturbing activities could cause unavoidable adverse impacts to wildlife and special status species habitats. Although these impacts are mitigated to the extent possible, unavoidable damage is inevitable. Conversion of habitat to other uses, such as transportation, mineral and energy development, facility development and recreation use reduces the quantity of available habitat. Although these impacts are unavoidable, they are usually concentrated in previously disturbed areas, which reduce the spread of impacts to more remote or less frequented areas. However, resource uses are mitigated to the extent possible to minimize impacts and avoid wildlife habitat values when possible. Competition is anticipated for habitat resources between wildlife, livestock, and wild horses and burros. The extent of the impacts varies by season as well as by drought cycle. Although there could be short-term periods of significant impacts, long-term management would endeavor to make these uses compatible to the extent possible.

In scattered public land ownership areas, density and disturbance Controlled Surface Use (CSU) or No Surface Occupancy (NSO) stipulations could force development onto adjacent private lands where development could expand at uncontrolled levels. This would defeat the intentions of the stipulations. On large blocks of public land, the CSU stipulation would be effective for controlling the level of surface activities to protect key habitat such as sage grouse core areas and big game winter ranges.

4.2.8 Fisheries Habitat and Special Status Species

This section describes the impacts to fisheries and special status fish resources that could result from the implementation of the actions associated with each of the RMP Alternatives. The activities that disturb the lands surface, especially wetlands and riparian areas, altering vegetative cover, disrupting soil profiles and natural drainage patterns, can cause direct, indirect, and cumulative impacts to fisheries resources quality.

For the purpose of this analysis, the primary indicator of effects to fishery resources is the amount of acres of surface disturbance caused by allowable uses and management actions. The types of impacts that are projected to occur to fishery resources 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. The direct and indirect impacts resulting from BLM authorized surface disturbing activities that would affect fisheries resources are:

- Increased sediment loading in waters, which can cause loss of recruitment, stress, habitat alteration, and habitat loss for some species.
- Direct habitat alteration that is detrimental to some species or more conducive to non-native or undesirable species.
- Increased temperatures, stress, reduced productivity, and impacts on food webs from riparian disturbances.
- Alterations in important water quality parameters, including pH, dissolved oxygen, temperature, hardness, alkalinity/salinity, and turbidity.

Existing conditions for fisheries resources are described in Chapter 3.

4.2.8.1 Methods and Assumptions

To analyze the potential effects of the Alternatives on fisheries habitat and special status species, information was gathered from existing inventories, management and recovery plans, coordination with the U.S. Fish and Wildlife Service (USFWS), Montana Fish Wildlife and Parks (MFWP), Montana Natural Heritage Program database, relevant scientific literature, computer habitat models, and other sources identifying the potential distribution of these species in and adjacent to the planning area. The analysis is also based on the professional expertise of BLM specialists.

This analysis was based on the following assumptions:

- The BLM is responsible for managing habitats, whereas state and federal wildlife management agencies (e.g., MTFWP, USFWS) oversee management of wildlife species.
- Local climate patterns of historic record and related conditions for plant growth would continue during the analysis period.
- Surface disturbances, transportation networks, ungulate use, and recreational activities increase the likelihood of noxious plant species spread in an area.
- Buffers of relatively intact vegetation in riparian and wetland areas would reduce impacts on water quality, channel morphology, aquatic biota, and fisheries habitat.
- The functioning condition of some riparian areas is reduced due to factors sometimes outside the control of BLM's management, i.e. roads, upstream dams, ownership patterns, etc.

- There is a direct correlation between the amount of quality habitat and fish populations and changes in habitat quality could cause an increase or decrease in fish numbers.
- The more acres within a No Surface Occupancy stipulation or No Lease oil and gas area, the more overall protection a fish species would have from oil and gas development. When comparing Alternatives, those Alternatives with more acres in NSO or NL would provide the least negative impacts to fisheries resources.
- Proposed decisions that limit surface-disturbing activities or that protect or restore soil, water, and vegetation resources could protect or improve water quality and fisheries habitat.
- Some surface-disturbing actions, such as vegetation management projects, could cause short-term adverse impacts to water quality immediately following treatments but could benefit water quality in the long term as vegetation becomes reestablished.
- BLM-authorized activities would comply with state and federal regulations, Montana Range Land Health Standards, conservation agreements, and BMPs to protect the chemical, physical, and biological integrity of the water and aquatic habitat.
- Properly Functioning Condition generally describes conditions in the riparian zone that promote good water quality and fisheries habitat, however, in some cases, PFC is not sufficient to ensure water quality standards are being met. In some cases, a higher status of ecological integrity must be achieved to meet federal and state water quality standards.
- Conservation measures to improve and secure special status species habitat would continue to receive special consideration during planning.
- The discussions of impacts on fisheries from the four Alternatives are based on the best available data. Knowledge of the analysis area and professional judgment from observation and analysis of conditions and responses in similar areas are used to infer environmental impacts where data is limited.
- Roads in the Billings Field Office would continue to erode from natural causes resulting in potential impacts on water quality and fisheries resources in adjacent streams; increased vegetative cover would lead to reduced soil erosion and in certain instances reduced deposition of sediments into streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surfaces, changes in water routing, and loss of vegetation. It is assumed that the greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment and/or other pollutants would enter the stream and contribute to the loss of riparian and wetland functionality, which would have a negative impact to

fisheries habitat. This analysis, therefore, focuses on the degree of surface disturbance anticipated to occur under each Alternative.

4.2.8.2 Environmental Consequences

The management actions associated with the resources listed below could have impacts on water, riparian vegetation, fisheries, and special status fish species resources.

- Soil
- Water
- Vegetation
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Wild Horses and Burros
- Visual Resources
- Fire Ecology and Management
- Wilderness Characteristics
- Energy and Mineral Resources
- Forestry and Woodland Products
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Special Designations

Other programs were determined to have little or no impact on fisheries habitat and special status fish species resources.

4.2.8.3 Impacts Common to All Alternatives

4.2.8.3.1 Impacts from Soil

Actions common to all Alternatives in soil resources would have positive impacts on fisheries and water resources, minimizing soil erosion potential by requiring reclamation plans associated with BLM authorized surface disturbing activities or wildfire effects that destabilize watershed soil conditions. Soil erosion can adversely impact fisheries resources by smothering eggs in redds (fish nests), directly altering fish habitat and changing invertebrate diversity and abundance, which directly effects the aquatic food chain.

4.2.8.3.2 Impacts from Water

Actions common to all Alternatives in water resource management would have positive impacts on fisheries resources. By requiring authorized actions to comply with meeting federal and state water quality standards, participating in water quality restoration plans and using strategies to meet the Standards for Rangeland Health, water quality would be maintained to

the extent possible considering the fragmented ownership pattern of BLM public lands in the Billings Field Office.

Degraded water conditions that can occur include but are not limited to: increased temperatures, increased sediment loads, nutrient loading, chemical and metal pollution, oxygen depletion, and increased total dissolved solids. All of these pollutants have the ability to adversely impact fisheries resources. The extent of these impacts would depend on site specific conditions and fish species present, as some species are more sensitive to pollutants than others.

4.2.8.3.3 Impacts from Vegetation

Forests and Woodlands

Forest and Woodland management is consistent with fisheries resource objectives. These actions include forest stand inventories; managing vegetation structure, density, and species composition; and managing patch size, pattern, and distribution in a manner which reduces the occurrence of severe wildfires and forest insect outbreaks. These actions use adaptive management strategies that address climate change in order to maintain or enhance forest based ecosystems. While typically very small, short-term soil disturbances could occur during project implementation, to minimize the extent of these disturbances site-specific BMPs would be implemented. Since these actions are designed to improve upland health, long-term benefits are expected as watershed functions are maintained or restored.

Rangelands

Management actions common to all Alternatives in upland vegetation resources have beneficial impacts on fisheries resources depending on the scale of treatment and proximity to fisheries. Rangeland conditions were identified as potential source of water quality problems, which can impact fisheries. Management actions that improve rangeland health would directly address this source and should improve water quality. While short-term adverse effects are possible, during and immediately following implementation, these impacts would be minimized through site-specific BMPs. Planning area wide, the cumulative impacts of these actions promotes healthy drainage which benefits fisheries.

Riparian Vegetation

The “alteration of streamside vegetation” was identified as a potential cause of water quality impairment (Table 3-11), which can have adverse impacts on fisheries resources. Implementing strategies to maintain healthy communities or to restore degraded systems would benefit fisheries resources. These benefits could include reductions in sediment production, reductions in nutrient loading, increased stream shading and increased potential for large woody debris recruitment for habitat, which have direct impacts to fisheries resources.

While only 3.5 percent of the decision area is comprised of riparian areas, impacts to these areas have a disproportionate contribution to nonpoint source pollution and possible impacts to fisheries resources. Currently 40 percent are in Properly Functioning Condition (PFC) and are unlikely to be contributing unacceptable levels of Non-Point Source pollution (NPS), having negligible impacts to fisheries resources. 46 percent of surveyed riparian areas are Functioning

At Risk (FAR). Corrective actions have been taken to move these ratings towards PFC on many areas; however quantifiable data is not available. In areas where corrective action has not yet been taken, the NPS pollution would likely continue. Corrective action would occur in all areas to help move the functional rating in a positive trend towards PFC. Six percent are rated as Non-Functioning (NF). These areas are likely sources of substantial NPS and are contributing to adverse impacts to fisheries resources, at least on a watershed scale. Corrective action would be required under all Alternatives. These improvements would reduce the NPS throughout the Decision Area and reduce adverse impacts to fisheries resources. Currently, 8 percent of riparian areas have not been surveyed. These are comprised of bluffs and steep banks along the Yellowstone River and on several islands; it is likely they are in PFC due to known conditions along the river and on its islands.

Managing riparian areas to comply with Montana Rangeland Health Standards and complying with the Montana Streamside Management Zone law for forest treatments would help improve or maintain fisheries resources through the decision area. Impacts would vary depending on the scale and proximity of activities to fisheries resources. Much of the BLM administered lands in the Billings Field Office are located in arid areas with little to no influence on fisheries resources. In the long term, managing all lands to promote healthy, native vegetative communities and properly functioning riparian areas has a net beneficial impact to fisheries resources in the decision area.

Invasive Species and Noxious Weeds

Invasive species management actions would benefit fisheries resources by minimizing impacts from invasive species spread and infestations. Invasive species infestations can degrade riparian and upland conditions, promoting erosion, lowering native plant diversity and abundance, and creating degraded functioning condition in riparian areas. These impacts would vary in degree by project scale and proximity to fisheries resources, but on a watershed scale would have a beneficial long-term impacts.

Special Status Plants

Impacts from management actions of special status plant species would have beneficial impacts to fisheries and water resources. By requiring habitat to meet or exceed Montana Standards for Rangeland Health, overall watershed health would be promoted. Evaluating impacts to special status plant species on all authorized activities would potentially decrease surface disturbing activities.

4.2.8.3.4 Impacts from Wildlife Habitat and Special Status Species

Wildlife management actions have beneficial impacts to fisheries resources.

Management techniques, including but not limited to prescribed and managed wildfire, prescriptive livestock grazing, planting, exclusion to intense disturbance, timber harvest and other mechanical methods would be used to restore, maintain or improve the desired ecological conditions of vegetation communities for the purpose of improving forage, nesting, breeding, and security habitat, hiding cover and travel corridors for a wide diversity of terrestrial and

aquatic species, which all contribute to healthy watershed conditions, improving riparian functionality and water quality.

Enhancing or restoring habitat composition and structure beyond PFC in riparian habitats, where and when appropriate, for migratory bird habitat would have beneficial impacts on fisheries resources.

4.2.8.3.5 Impacts from Fisheries Habitat and Special Status Species

Actions common to all fisheries Alternatives are beneficial to fisheries resources. These actions impact fisheries resources by promoting overall watershed health, which contributes to healthy aquatic conditions.

4.2.8.3.6 Impacts from Wild Horses and Burros

Actions associated with wild horse and burro management aim to ensure a thriving natural ecological balance, promoting healthy watershed conditions. Due to the proximity to fisheries resources, impacts to fisheries would be negligibly beneficial.

4.2.8.3.7 Impacts from Visual Resources

Those acres managed as VRM Class I & II (approximately 42,000 acres across all Alternatives) could limit some surface disturbance and the associated compaction, erosion and damage to soil crusts. This would benefit fisheries resources, at least cumulatively on a watershed scale.

4.2.8.3.8 Impacts from Fire Ecology and Management

Actions from Fire Ecology and Management would help to protect and enhance fisheries habitat and promote water resource values, by suppressing and using wildfire as needed to achieve wildlife objectives and promote watershed health.

Impacts are not quantifiable due to the unknown frequency and scale of wildfire events. Prescribed fire treatments, in action Alternatives, would be allowed on up to 5 percent of BLM administered lands.

4.2.8.3.9 Impacts from Wilderness Characteristics

Management of Lands with Wilderness Characteristics, through minimizing surface disturbing activities which can lead to accelerated erosion and reduced water quality, are expected to have long-term beneficial impacts to fisheries resources. There are negligible differences in impacts between all Alternatives.

4.2.8.3.10 Impacts from Energy and Minerals

Energy and mineral resource development is expected to continue at the current level over the life of this plan. After the completion of energy and mineral development, the area would be reclaimed. However, reclamation efforts do not guarantee that habitat would return to its original function. Reclaimed areas might be more vulnerable to invasion of noxious weeds and might not provide the same habitat, forage, or cover that the original area provided.

Coal

The requirement of site specific environmental analysis prior to solid leasable mineral leases would ensure fisheries resources would be protected from impacts that would result from development activities. Negligible impacts to fisheries resources would be expected.

Fluid Minerals

Stipulations designed to protect fisheries resources and applied to fluid mineral exploration and development, coupled with the low RFD for fluid mineral development (approximately 4 well per year), as well as the distant proximity to fisheries resources most fluid mineral activity takes place, would result in negligible impacts to fisheries resources. By Alternative, protective stipulations vary in buffer width to riparian and fisheries resources.

Locatable Minerals

Process notices and plans would be required (43 CFR 3809) to ensure the proposed action does not create unnecessary or undue degradation of the environment. Currently most claims are concentrated in Carbon county (and are expected to remain there) and potentially impact 7,323 acres (including future expansion of existing claim), which represents 3.3 percent of BLM public lands in Carbon county and 0.4 percent of the total county. These claims and activity are located in an area of the decision area with distant proximity to any fisheries resources. Impacts from locatable mineral development would be negligible.

Mineral Materials

The requirement of site specific environmental analysis (NEPA) prior to mineral material sales or development would ensure impacts from development activities to fisheries resources would be mitigated or at an acceptable level. Impacts from actions associated with mineral material development, in all Alternatives, would have negligible impacts to fisheries resources.

Impacts from Forestry and Woodland Products

Commercial harvest of forest products would normally be associated with vegetative restoration (including forest health) and fuels treatments and would be designed to meet objectives for wildlife habitat management, including riparian, fisheries and water quality preservation where applicable. Forest products would be managed according to sustainability limits and where consistent with other resource management objectives. These actions protect fisheries resources; short-term impacts would be negligible and long-term impacts due to increased forest health would benefit associated fisheries.

Impacts from Lands and Realty

Impacts form Lands and Realty would primarily be associated with ROW needs and associated development. ROWs are generally associated with new roads, power lines and oil and gas pipelines, which can disturb the soil and vegetation, leading to degraded watershed health. ROWs are subject to environmental analysis (NEPA), and impacts to fisheries resources would be analyzed, requiring any ROW and associated development to comply with fisheries resource objectives. By Alternative, varying acreages in the Decision Area are designated ROW

avoidance or exclusion areas, which would reduce surface disturbance and associated impacts to watershed health in those areas, having a beneficial impact on fisheries resources.

4.2.8.3.11 Impacts from Livestock Grazing

Without proper management and monitoring, livestock grazing can have major impacts on riparian function and water quality, having a detrimental effect on fisheries habitat and fish populations. Impacts include decreasing riparian vegetation abundance and diversity, nutrient loading to water bodies and direct stream bank alteration leading to increases erosion and sedimentation. Several management actions common to all livestock grazing Alternatives are designed to protect riparian and aquatic resources: Adjusting livestock numbers during periods of drought; excluding livestock from springs and other areas that, for various reasons, cannot meet Rangeland Health Standards; site specific riparian protections; adapting grazing systems to new research, science, and methods.

4.2.8.3.12 Impacts from Recreation and Visitor Services

SRMA designation has the potential to direct more human activity into these areas or even cause surface disturbance and direct habitat alteration from facility development. Several of these areas are already developed in such fashion and receive high concentrated use, while others have very little potential for development. Furthermore, most SRMAs have no fisheries resources associated with them. There would be no adverse impacts expected to fisheries resources from this level of designation. The amount of land designated as SRMAs varies by Alternative as follows: Alternative A (1,171); B (87,658); C (147,181); D 110,862.

4.2.8.3.13 Impacts from Trails and Travel Management

The primary issues related to fisheries resources are erosion, drainage from road surfaces into wetlands and water bodies, and the potential spread of noxious weeds or other invasive plant species that can degrade riparian and upland conditions. The existence of routes with their areas of surface disturbance, as well as the use of motor vehicles on those routes that are associated with various proximities to water courses and/or sensitive soils and riparian areas constitutes a primary activity that has the potential to adversely affect fisheries resources. Relative to travel management, this can occur by improper placement of routes; high traffic levels on routes; inappropriate behavior by visitors in these areas; or unauthorized off-road vehicle use.

Therefore, the number of open routes and associated route miles and spatial extent of travel access networks for motor vehicles is an important component for managing or providing various levels of protection for fisheries resources.

Motorized and mechanized modes of travel on BLM-administered land (outside of established TMAs) would be limited to existing roads and trails. Site specific travel planning would be initiated if fisheries resources were impacted (not meeting Land Health Standards, excessive erosion). In all Alternatives, the BLM could close or restore unauthorized, user created roads and trails to prevent resource damage. Prohibiting off road travel reduces erosion and protects water quality and fisheries habitat.

4.2.8.3.14 Impacts from Special Designations

Special Designations generally place a higher level of ecological protection on the land, which restricts surface disturbing activities and conserves aquatic resources by maintaining natural drainage conditions (if not directly, then cumulatively). There are some variations in acreage of special designations across the Alternatives; however, the difference in effects to fisheries resources would be negligible. Most of the special designations are in arid portions of the field office and have no surface water or fisheries resources. In the event a special designation does encompass an aquatic resource, the fisheries resources would benefit from decreased surface disturbance and associated impacts.

4.2.8.4 Alternative A

4.2.8.4.1 Impacts from Soil

Limiting logging with wheeled and tracked vehicles to slopes less than 35 percent and fluid mineral development to slopes less than 30 percent would protect fisheries resources from accelerated erosion derived from surface disturbing activities on steeper slopes. The slope restrictions have the potential to affect 47,795 acres (30 percent) and 33,908 acres (35 percent).

4.2.8.4.2 Impacts from Water

Impacts would be the same as those described in impacts common to all. In Alternative A, a NSO on riparian areas, 100 year floodplains of major rivers, streams and water bodies excludes oil and gas development activities on 13,984 acres of BLM surface and split estate (federal minerals, no surface). This action, as well as complying with Rangeland Health Standards and Guidelines and MT DEQ water quality standards would protect fisheries resources from impacts associated with BLM authorized activities in the decision area.

4.2.8.4.3 Impacts from Vegetation

Forests and Woodlands

Impacts would be the same as impacts from actions common to all. In this Alternative, 9,500 acres of forested land would be protected from cutting, except where needed for other resource values and forest management would include harvest activities on up to 68 percent of forested land (21,807 acres) over the life of the plan.

Rangelands

Impacts would be the same as impacts common to all Alternatives.

Riparian Vegetation

Alternative A, with PFC assessments on a 10 year monitoring rotation, could allow for potentially degraded conditions to develop, contributing to poor water quality and fisheries habitat conditions; fluid mineral development stipulates NSO on 100 yr flood plains of major rivers, riparian areas, wetlands and water bodies, resulting in 13,984 acres, as well as a ¼ mile NSO on designated reservoirs with fisheries (undetermined acreage due to unknown and very

limited resources). These stipulations would protect fisheries resources by reducing potential surface disturbing activities which can lead to degraded watershed and water quality conditions.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Based on current rates and assumptions, under Alternative A management, 54,883 acres of weed treatment would occur within the decision area. Alternative B would treat 9,280 acres, Alternative C 41,760 and Alternative D, 22,272. Actions to specifically managing treatment activities near riparian areas and water bodies to ensure chemical pollution does not impact water quality would ensure protection of fisheries resources.

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.8.4.4 Impacts from Wildlife Habitat and Special Status Species

A number of actions in this Alternative restrict surface disturbing activities from various terrestrial wildlife species habitats, particularly nesting areas, winter ranges and other priority habitats. These restrictions would improve upland and riparian habitat conditions, minimizing erosion and unnatural drainage patterns, therefore promoting fisheries resources.

4.2.8.4.5 Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as impacts common to all Alternatives. Alternative A management of fisheries resources uses water quality and riparian management through Montana Rangeland Health Standards to ensure healthy habitat conditions for streams with active fisheries. An NSO stipulation for oil and gas development and exploration exists on riparian areas, designated 100 year floodplains of major rivers, and on water bodies and streams, resulting in 13,984 acres NSO. Another NSO stipulation exists that does not have quantifiable data; NSO with ¼ mile of designated reservoirs with fisheries. This stipulation would protect water quality of identified reservoirs with fisheries.

MOU agreement guidance ensures Yellowstone cutthroat trout (YCT) habitat and watershed health is managed to protect ecological values necessary to maintain or enhance YCT populations.

4.2.8.4.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.8.4.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.8.4.8 Impacts from Fire Ecology and Management

Impacts would be similar to impacts common to all Alternatives. Wildfire management under Alternative A utilizes national fire suppression guidelines, which are developed to protect riparian and aquatic resources, including fisheries. Resource advisors are consulted to determine resource friendly tactics and develop mitigation plans to protect fisheries resources.

Fuels management projects are designed to meet resource objectives. Short-term negative impacts to the resources could occur, although long-term benefits to the watershed are expected. Mitigation measures to restore watershed health are implemented when implementation fails to meet objectives.

4.2.8.4.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.8.4.10 Impacts from Energy and Mineral Resources

Coal

Impacts would be the same as impacts common to all resources. Acreages designated as closed to coal development would reduce the potential for surface disturbing activities that can degrade watershed health and water quality, having a direct impact on fisheries resources. Therefore, the more acres designated closed, the less adverse impacts would be expected to fisheries resources. Site specific conditions and proximity to fisheries resources would be necessary to determine the actual impacts. Alternative A designates the least acres as closed (26,131), while Alternative B would close 290,048, Alternative C (264,450), and D (280,971).

Fluid Minerals

Impacts would be the same as impacts common to all resources. NSO stipulations on fluid mineral development, described in Water, Fisheries, and Riparian resource sections would help to protect fisheries resources from adverse impacts associated with fluid mineral development. 13,984 acres of riparian areas, water bodies, wetlands, and 100-year floodplains would be protected from fluid mineral surface occupancy under this Alternative.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives. Each Alternative designates areas to be closed and withdrawn from mineral entry. The more acres closed to mineral entry, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative A, 39,700 acres are closed and or withdrawn from mineral entry: Alternative B (270,977); Alternative C (36,955); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material disposal, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative A, 44,583 acres are closed, the least of all Alternatives: B (343,745); C (251,927); D (272,122).

4.2.8.4.11 Impacts from Forestry and Woodland Products

Generally, impacts would be the same as impacts common to all Alternatives. Forest and woodland product harvest activities would utilize BMPs to minimize impacts to fisheries resources. A PSQ of 70 MBF per year impacts approximately 18 acres/year. Over the 20 year life of this plan only 3 percent (840 acres) of the forest (32,100 acres) would be treated. Many of the forested areas in the field office do not have close proximity to fisheries resources. Forest and woodland product harvest activities under Alternative A would have negligible impacts on fisheries resources in the decision area.

4.2.8.4.12 Impacts from Land and Realty

Rights-of-Way, Leases and Permits

Impacts would be the same as impacts common to all Alternatives. Additionally, under Alternative A, 44,014 acres would be designated for ROW exclusion. 24,203 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.8.4.13 Impacts from Livestock Grazing

Alternative A permits grazing on 387,057 acres. While most impacts would be similar to impacts common to all Alternatives, there is some increased risk due to the requirement to monitor riparian health on a ten year rotation. This would allow some riparian and aquatic conditions to deteriorate before a decreasing trend is recognized; having adverse impacts on fisheries resources.

4.2.8.4.14 Impacts from Recreation and Visitor Services

Alternative A management of recreational resources on Billings Field Office lands has negligible impacts to fisheries resources. Motorized vehicle use, which has the potential to increase erosion and the spread of noxious weeds or other invasive species, is restricted to existing roads and trails. These existing routes generally avoid wetlands and riparian areas and use improvements such as culverts and water bars to mitigate the effects of storm run-off.

The allowance of motorized cross-country travel to establish a campsite within 300 feet of existing roads and trails could cause accelerated erosion, especially in areas with wet soil conditions. This impact has not been recognized as detrimental to fisheries resources, but could become more common if recreation increases. There is no data to quantify current or potential impacts from this activity.

4.2.8.4.15 Impacts from Trails and Travel Management

Impacts would be the same as impacts common to all Alternatives. Based on assumptions, the more route miles open, the more impacts would affect fisheries resources. Under Alternative A, there would be 824 miles of open routes (83 percent of all route miles). This Alternative opens more routes than Alternative B (35 percent) and D (62 percent) and fewer routes than Alternative C (90 percent).

An analysis of specific effects of route miles open under this Alternative, on fisheries resources, with proximity to fisheries and sensitive or crucial habitats associated with fisheries resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.8.4.16 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.8.5 Alternative B

4.2.8.5.1 Impacts from Soil

Surface disturbing activities and O&G development are restricted from slopes of greater than 30 percent, resulting in 47,795 acres removed from activities which can increase erosion and NPS pollution sources. Actual impacts would be determined by activity scale and proximity to fisheries resources.

4.2.8.5.2 Impacts from Water

Impacts would be similar to impacts in Alternative A, except:

In Alternative B, fisheries resources are further protected with several actions, including:

- One-quarter-mile NSO on riparian areas, water bodies, perennial streams and floodplains of perennial streams (56,312 acres Federal Mineral Estate). Other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but only surface ownership is effected (24,373 acres BLM).
- Closing and reclaiming roads contributing to a decline in water quality.
- Prohibiting surface discharge of produced waters into streams or flow-connected water sources.

These actions result in less potential for fisheries habitat degradation by reducing soil erosion and non-point source pollution in close proximity to fish habitat, as well as maintaining vegetative communities adjacent to perennial streams and water bodies; allowing for functional riparian areas that shade streams and filter pollutants from overland flows before they reach water bodies and fisheries.

4.2.8.5.3 Impacts from Vegetation

Forests and Woodlands

Impacts would be similar to those discussed under Alternative A, except Alternative B restricts operation of wheeled and tracked vehicles from slopes greater than 30 percent, resulting in 2,566 fewer acres of disturbance compared to Alternative A which restricts this activity to

slopes greater than 35 percent. This would have net beneficial impacts to fisheries resources on a watershed scale.

Rangelands

Impacts would be the same as impacts common to all Alternatives.

Riparian and Wetlands

Actions specific to riparian vegetation are designed to protect or enhance riparian communities and consequently protect fisheries resources.

Alternative B establishes 78 miles of priority riparian habitat on perennial and fish bearing streams, where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Maintaining or restoring functionality to these areas would benefit fisheries by promoting healthy habitat conditions, including high water quality and increased riparian vigor.

Alternative B actions are the most restrictive in managing surface disturbing activities and oil and gas exploration and development in riparian areas, floodplains and on water bodies and streams associated with YCT and high value fisheries, offering the most resource protection of the four Alternatives.

A ¼ mile NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (56,312 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (24,373 acres BLM surface) .

YCT habitat, suitable habitat, Blue Ribbon and Red Ribbon Fisheries have ½ mile NSO stipulations for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance (erosion and sedimentation, weed infestation, direct habitat alteration).

Invasive Species and Noxious Weeds

Impacts would be the same as impacts from Alternative A.

Special Status Plants

Alternative B is more restrictive regarding surface disturbing activities among special status species habitat. Alternative B generally prohibits surface disturbing activities in these habitats, which would reduce erosion rates and water quality impacts more than any other Alternative. Alternatives C and D have similar actions, but allow surface disturbing activities if they are properly mitigated or if they are not in conflict with the desired outcomes for the resource. The net difference between Alternatives B, C and D impacts are negligible.

Impacts would vary, depending on the proximity of special status plant species populations to fisheries resources and the potential extent of surface disturbing activities this would apply to.

4.2.8.5.4 Impacts from Wildlife Habitat and Special Status Species

Impacts would be the same as impacts common to all. All wildlife management actions across the Alternatives protect water quality and fisheries resources. Alternative B proposes stipulations with larger buffers and less surface disturbance to wildlife habitats, especially nesting areas and winter ranges, than other Alternatives. The long-term and cumulative impacts from minimizing surface disturbance in these areas would benefit fisheries resources by reducing erosion, vegetation alteration and invasive species infestation potential. Actual impacts would vary, depending on the proximity and scale of proposed surface disturbing activities affected by these stipulations.

4.2.8.5.5 Impacts from Fisheries Habitat and Special Status Species

Management actions in Alternative B promote riparian resource protection and enhancement more than other Alternatives, resulting in increased protection of fisheries resources. This would lead to increased long-term and cumulative beneficial impacts, and increased short-term negative impacts to water quality. Implementation of fish habitat restoration projects increase surface disturbance, however, the projects are designed specifically to minimize surface disturbance and reclaim disturbed sites with native vegetation seeding and planting and surface mulching.

Increased monitoring on fish bearing streams and excluding livestock grazing from fish bearing streams would improve riparian conditions and potentially decrease NPS which can degrade water quality. Additionally, new spring developments would not be authorized. This could lead to concentrated livestock use in riparian areas and cause degraded riparian conditions and decreased water quality.

Alternative B actions are the most restrictive in managing surface disturbing activities and oil and gas exploration and development in riparian areas, floodplains and on water bodies and streams associated with YCT and high value fisheries, offering the most resource protection of the four Alternatives.

A ¼ mile NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (56,312 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (24,373 acres BLM surface) .

YCT habitat, suitable habitat, Blue Ribbon and Red Ribbon Fisheries have ½ mile NSO stipulations for oil and gas exploration and development (54,309 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (15,693 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation, direct habitat alteration.

4.2.8.5.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.8.5.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.8.5.8 Impacts from Fire Ecology and Management

Impacts would be the same as impacts from Alternative A.

4.2.8.5.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.8.5.10 Impacts from Energy and Minerals

Coal

Impacts would be the same as impacts from Alternative A, but with more acres closed to solid mineral leasing (290,048 acres). Alternative A (26,131); Alternative C (264,450); Alternative D (280,971).

Fluid Minerals

Development of oil and gas resources is expected to have the least impacts to fisheries resources from Alternative B management actions. NSO stipulations on fluid mineral development, described in Water and Riparian resource sections would help to protect fisheries resources from adverse impacts associated with fluid mineral development.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative B, 270,977 acres would be closed and withdrawn from mineral entry. Alternative A (39,700); Alternative C (36,955); Alternative D (54,761).

These restrictions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance (erosion and sedimentation, weed infestation, and direct habitat alteration).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material sales and development, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative B, 343,745 acres are closed. A (44,583); C (251,927); D (272,122).

4.2.8.5.11 Impacts from Forestry and Woodland Products

Impacts would be the same as impacts from Alternative A.

4.2.8.5.12 Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative B, 211,384 acres would be designated for ROW exclusion. 185,607acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.8.5.13 Impacts from Livestock Grazing

General impacts from Alternative B livestock grazing actions would be similar to Alternative A; however Alternative B also places priority management on allotments that are not meeting standards for rangeland health, which includes riparian areas that are not in PFC, on impaired streams, and establishes increased monitoring on fish bearing streams. These management actions would reduce grazing impacts on fisheries resources by taking actions to increase riparian functionality, directly or indirectly effecting fisheries resources depending on proximity.

4.2.8.5.14 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts common to all Alternatives. Recreation actions in Alternative B also stipulate NSO for oil and gas development, at seven special designations, including: Sundance Lodge Recreation Area (387), Four Dances Natural Area ACEC (784 acres), Shepherd Ah Nei Recreation Area (4,680), Acton Recreation Area (3,697 acres), Bundy Island (98), South Hills TMA (1,357 acres) and Pryor Mountain TMA (81,227 acres). The potential impacts associated with fluid mineral development are minimized for more than 92,000 acres, having a net beneficial impact on water quality and fisheries resources.

4.2.8.5.15 Impacts from Trails and Travel Management

In action Alternatives (B, C, D) the BLM established 11 Travel Management Areas (TMAs) to minimize impacts and provide a spectrum of motorized and non-motorized recreational opportunities. In each TMA, motorized and mechanized travel would be limited to designated roads and trails, except in designated open areas (ex: South Hills Motorcycle Area). Routes on BLM lands but outside of TMAs would be managed as in Alternative A, “limited to existing roads and trails”.

An implementation and monitoring plan would be initiated for the TMAs within 3-5 years of the ROD. The plan would include monitoring of impacts associated with continued use on designated open routes. The implementation plan would also identify criteria for route variances specific to each TMA. In this plan, the BLM could close or restore unauthorized, user created roads and trails to prevent resource damage. The travel plan would also allow for, upon project completion, roads used for commercial or administrative access on BLM-administered lands to be reclaimed, unless the route provides specific benefits for public access, minimizes impacts to the resources and would be considered on a case-by-case basis.

Impacts would be the same as described in impacts common to all Alternatives. Based on assumptions, the more route miles open would have more impacts to fisheries resources.

Under Alternative B, there would be 349 miles of open routes (35 percent of all route miles). This Alternative Closes or limits to administrative access more route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative C designates 90 percent of route miles as open and Alternative D designates 62 percent of route miles as open.

An analysis of specific effects of route miles open under this Alternative, on fisheries resources, with proximity to fisheries and sensitive or crucial habitats associated with fisheries resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.8.5.16 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.8.6 Alternative C

4.2.8.6.1 Impacts from Soil

Under Alternative C, surface disturbing activities would not be allowed in areas with highly erosive soils or on slopes greater than 45 percent (16,782 acres). Fluid mineral development would be allowed with a CSU to mitigate impacts on slopes greater than 30 percent (47,795 acres). These actions would allow for minimization of long-term disturbance on sensitive soils prone to erosion, which would maintain or improve water quality and fisheries resources.

In addition, Rangeland Health Standards and BMPs would be used to assess and mitigate soil disturbance, ensuring authorized activities do not create long-term adverse impacts to fisheries resources.

4.2.8.6.2 Impacts from Water

As in Alternative A, BLM would adhere to state and federal water quality standards and use rangeland health standards to ensure maintenance of surface and ground water quality. These regulations also protect fisheries and riparian vegetation resources.

In Alternative C, water and riparian resources are further protected with several actions, including:

- Seasonally closing and reclaiming roads contributing to a decline in water quality.
- Surface discharge of produced waters into streams or flow-connected water sources must comply with Montana DEQ standards and regulations.

- Surface disturbing activities within riparian areas, wetlands, water bodies, perennial streams, and floodplains of perennial streams, would not be allowed without an approved mitigation plan and compliance with fisheries resource objectives (6,666 acres).
- NSO for oil and gas development within riparian areas, wetlands, water bodies, perennial streams and floodplains of perennial streams (9,206 acres).

With smaller buffer zones and less restrictive protective measures, Alternative C has more potential to negatively impact fisheries than Alternatives B and D. However, with project level planning and NEPA analysis, all impacts should be avoided or mitigated. Water resources, hence, fisheries resources, are layered with protections from local, state and federal agencies as well as with the use of BMPs designed to protect water quality.

4.2.8.6.3 Impacts from Vegetation

Forests and Woodlands

Same as impacts common to all in respect to using BMPs and Standards for Rangeland Health in managing Upland and Forest/Woodland resources to reduce the risk of negative impacts to fisheries resources.

Alternative C allows for woodland treatments on approximately 79 percent of woodland habitats, versus 60 percent for Alternative B and 68 percent for Alternatives A and D. Allowing wheeled and tracked vehicle operations on slopes up to 45 percent would increase the potential of contributing fine sediment to streams due to erosion of disturbed soils on steep slopes, adversely impacting fisheries resources. However, most timbered lands in the decision area are not proximate to fisheries or perennial water resources, minimizing any real impact.

Rangelands

Impacts would be the same as impacts common to all Alternatives.

Riparian and Wetlands

Alternative C would be less protective of fisheries resources with the same impacts described in Alternative B. There are fewer acres with an NSO stipulation due to smaller buffer allocations:

9,206 acres oil and gas NSO on riparian, water bodies, perennial streams, wetlands and floodplains of perennial streams for Federal Mineral Estate.

6,666 acres surface disturbance restrictions consistent with the oil and gas NSO on BLM surface managed lands.

2,051 acres are stipulated for oil and gas development with an (¼ mile) on YCT population habitat and Blue Ribbon Fisheries.

806 acres surface disturbance restrictions consistent with oil and gas ¼ mile NSO on BLM surface managed lands.

These NSO stipulations and consistent surface disturbing management actions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation and direct habitat alteration.

Alternative C establishes 13 miles of priority riparian habitat to promote functioning riparian areas associated with YCT population and suitable habitat, Blue and Red Ribbon fisheries and existing cottonwood galleries.

Invasive Species and Noxious Weeds

Same general impacts as Alternative B, with more acres treated per year (1,500-3,000 acres).

Special Status Plants

Alternative C is slightly less restrictive to surface disturbing activities; however, NEPA analysis and project specific design features would eliminate potential impacts to fisheries resources. There is negligible difference between impacts from the action Alternatives in special status plant species management. Special status plant management actions would have a net beneficial impact on fisheries resources.

4.2.8.6.4 Impacts from Wildlife Habitat and Special Status Species

Wildlife management actions in Alternative C are the least restrictive of surface disturbing activities. Overall management would still have beneficial impacts to fisheries resources, negligibly different than other Alternatives.

4.2.8.6.5 Impacts from Fisheries Habitat and Special Status Species

Management actions in Alternative C are the least restrictive to surface disturbing activities and oil and gas development, which have the potential to adversely impact fisheries resources; however these actions still promote aquatic resource protection and enhancement of water resources. Impacts would be the same as impacts from Riparian and Wetlands in Alternative C.

Additionally, allowing spring developments for livestock and wildlife uses, would have the potential to distribute livestock across the range and reduce grazing and watering pressure on existing riparian areas, promoting healthy riparian communities, high water quality and adequate fish habitat.

4.2.8.6.6 Impacts from Wild Horses and Burros

Impacts could be the same as impacts common to all.

4.2.8.6.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all.

4.2.8.6.8 Impacts from Fire Ecology and Management

Impacts would be the same as Alternative B, except that Alternative C does not specifically restrict heavy equipment use in riparian areas near streams, riparian areas and water bodies; however, resource advisors would be consulted to advise if there was proposed heavy

equipment use near streams or riparian areas, ensuring the protection of fisheries resources when wildfire is proximate to these resources.

4.2.8.6.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.8.6.10 Impacts from Energy and Minerals

Coal

Impacts would be the same as impacts from Alternative A, with more acres closed to solid leasable mineral development (264,450): Alternative A (26,131); Alternative B (290,048); Alternative D (280,971).

Fluid Minerals

Impacts to fisheries resources would be the same as impacts from Alternative B. Alternative C restricts fewer acres with an NSO stipulation for fluid mineral development, as described in Water and Riparian sections under this Alternative.

Locatable Minerals

Impacts would be the same as impacts common to all Alternatives and as described under Alternative A analysis. Under Alternative C, 36,955 acres are closed and or withdrawn from mineral entry: Alternative A (39,700); Alternative B (270,977); Alternative D (54,761).

Mineral Materials

Impacts would be the same as impacts common to all Alternatives. The more acres closed to mineral material sales and development, the less potential for surface disturbance and associated impacts to watershed health. Under Alternative C, 251,927 acres are closed, the least of all action Alternatives, but more than Alternative A (current management): A (44,583); B (343,745); D (272,122).

4.2.8.6.11 Impacts from Forestry and Woodland Products

Timber harvest rates, which would have the most potential impact on aquatic resources, would be increased with a PSQ of 250 mbf/year (66 acres per year). Surface disturbance restrictions where riparian areas and water sources intersect timber sale boundaries would protect fisheries resources from adverse impacts associated with harvest. Harvest plans are designed to comply with fisheries and wildlife habitat objectives. Many forested areas in the decision area do not have close proximity to fisheries resources, therefore, the actual impacts to fisheries resources is dependent on the location of projects.

4.2.8.6.12 Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative C, 39,491 acres would be designated for ROW exclusion and 355,601 acres would be designated

for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.8.6.13 Impacts from Livestock Grazing

Impacts would be the same as impacts from Alternative A.

4.2.8.6.14 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts from Alternative B.

4.2.8.6.15 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts described in Alternative B. Based on assumptions, the more route miles open would have more impacts to fisheries resources.

Under Alternative C, there would be 893 miles of open routes (90 percent of all route miles). This Alternative closes or limits to administrative access less route miles than all Alternatives. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative D designates 62 percent of route miles as open.

An analysis of specific effects of route miles open under this Alternative, on fisheries resources, with proximity to fisheries and sensitive or crucial habitats associated with fisheries resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.8.6.16 Impacts from Special Designations

Impacts would be the same as impacts common to all.

4.2.8.7 Alternative D (Preferred Alternative)

4.2.8.7.1 Impacts from Soil

Impacts would be the same as impacts from Alternative B.

4.2.8.7.2 Impacts from Water

BLM would adhere to state and federal water quality standards and use rangeland health standards to ensure maintenance of surface and ground water quality, protecting fisheries resources.

In Alternative D, fisheries resources are further protected with several actions, including:

- 300-foot NSO on riparian areas, water bodies, perennial streams and floodplains of perennial streams (15,653 acres). Other surface disturbing activities authorized by the BLM are managed consistent with the oil and gas stipulation, but only surface ownership is effected (9,087 acres BLM).
- Closing and reclaiming roads contributing to a decline in water quality.

- Avoiding surface discharge of produced waters into streams or flow-connected water sources; comply with MT DEQ regulations pertaining to produced water quality.

These actions result in less potential for fisheries habitat degradation than Alternatives A or C, by reducing soil erosion and non-point source pollution in close proximity to fish habitat, as well as maintaining vegetative communities adjacent to perennial streams and water bodies; allowing for functional riparian areas that shade streams and filter pollutants from overland flows before they reach water bodies and fisheries.

4.2.8.7.3 Impacts from Vegetation

Forests and Woodlands

Same as impacts common to all, in respect to using BMPs and Standards for Rangeland Health in managing Upland and Forest/Woodland resources to reduce the risk of negative impacts to fisheries resources.

Alternative D restricts surface disturbing activities in relation to slopes (no wheeled or tracked vehicle operation on 30 percent or greater slopes)(19,241 acres), therefore it would have slightly less potential to impact fisheries resources with soil erosion and sediment input to water bodies than Alternative C, with the same impacts as impacts from Alternative A and B.

Rangelands

Impacts would be the same as impacts from impacts common to all Alternatives.

Riparian and Wetlands

Alternative D would be less protective of fisheries resources with the same impacts described in Alternative B. There are fewer acres with an NSO stipulation due to smaller buffer allocations:

- 15,653 acres oil and gas NSO (300’) on riparian, water bodies, perennial streams, wetlands, and floodplains of perennial streams for Federal Mineral Estate.
- 9,087 acres surface disturbance restrictions consistent with the oil and gas NSO on BLM surface managed lands.
- 8,256 acres of oil and gas NSO (½ mile) on YCT population habitat and Blue Ribbon Fisheries.
- 2,068 acres surface disturbance restrictions consistent with oil and gas ½ mile NSO on BLM surface managed lands.

These NSO stipulations and consistent surface disturbing management actions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation and direct habitat alteration.

Alternative D establishes 78 miles of priority riparian habitat where project planning and monitoring efforts would be emphasized for recovery to properly functioning condition or desired future conditions. Alternatives B and C would establish 78 and 13 miles. Alternative D aims to promote healthy water quality, riparian areas and fish habitat associated with perennial streams and cottonwood gallery habitat in the decision area.

Invasive Species and Noxious Weeds

Same general impacts as Alternative B, with more acres treated per year (400-2,000 acres).

Special Status Plants

Impacts would be the same as impacts common to all Alternatives.

4.2.8.7.4 Impacts from Wildlife Habitat and Special Status Species

Management of wildlife resources in this Alternative has beneficial impacts fisheries resources by requiring minimal ground disturbing activities, compliance with Rangeland Health Standards, on and off site mitigation. There would be no long-term or cumulatively negative impacts to fisheries resources from actions associated with wildlife management. Short-term disturbances from vegetation enhancement projects could impact riparian areas until reclamation efforts matured, effectively having short-term negative impacts on fisheries resources. Long-term and cumulative impacts would benefit fisheries resources.

4.2.8.7.5 Impacts from Fisheries Habitat and Special Status Species

Management actions in Alternative D promote aquatic resource protection and enhancement. This would lead to increased long-term and cumulative beneficial impacts, and increased short-term negative impacts to water quality from project implementation. Implementation of fish habitat restoration projects could increase surface disturbance, however, the projects are designed specifically to minimize surface disturbance and reclamation of disturbed sites with native vegetation seeding and surface mulching to decrease erosion and surface run off.

A 300-foot oil and gas NSO stipulation on riparian areas, wetlands, water bodies, perennial streams and flood plains of perennial streams, would be implemented for oil and gas exploration and development (15,653 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (9,087 acres BLM surface) .

YCT habitat and Blue Ribbon Fisheries have ½ mile NSO stipulation for oil and gas exploration and development (8,256 acres Federal Mineral Estate) and surface disturbing activities authorized by the BLM (2,068 acres BLM surface).

These NSO stipulations and consistent surface disturbing management actions would protect fisheries resources by minimizing potential habitat degradation resulting from surface disturbance; erosion and sedimentation, weed infestation, direct habitat alteration.

Alternative D actions would decrease potential impacts on fisheries resources more than Alternative C but less than Alternative B.

4.2.8.7.6 Impacts from Wild Horses and Burros

Impacts would be the same as impacts common to all Alternatives.

4.2.8.7.7 Impacts from Visual Resources

Impacts would be the same as impacts common to all Alternatives.

4.2.8.7.8 Impacts from Fire Ecology and Management

Impacts would be negligibly different than Alternative B.

4.2.8.7.9 Impacts from Wilderness Characteristics

Impacts would be the same as impacts common to all Alternatives.

4.2.8.7.10 Impacts from Energy and Minerals

Coal

Impacts would be the same as impacts from Alternative A, with more acres closed solid leasable mineral development (280,971): Alternative A (26,131); Alternative B (290,048); alternative C (264,450).

Fluid Minerals

Impacts would be the same as impacts from Alternative B. Stipulations limiting fluid mineral development and surface disturbing activities with NSO on fisheries and riparian resources, as described in impacts from Riparian and Wetlands, would protect fisheries resources from the effects of surface disturbing activities associated with any authorized actions. The NSO stipulations cover less acreage than Alternative B and more than A and C. Acreages are listed in the Riparian and Wetlands section of Alternative D.

4.2.8.7.11 Impacts from Forestry and Woodland Products

Impacts would be the same as impacts from Alternative B.

4.2.8.7.12 Impacts from Lands and Realty

Rights-of-Way, Leases, and Permits

Impacts would be the same as impacts common to all Alternatives. Under Alternative D, 48,258 acres would be designated for ROW exclusion. 349,358 acres would be designated for ROW avoidance areas. Exclusion and Avoidance areas by Alternative: A (44,014, 24,203); B (211,384, 185,607); C (39,491, 355,601); D (48,258, 349,358).

4.2.8.7.13 Impacts from Livestock Grazing

Impacts to fisheries resources from livestock grazing actions in Alternative D would be negligibly different than those from Alternative B.

4.2.8.7.14 Impacts from Recreation and Visitor Services

Impacts would be the same as impacts from Alternative B.

4.2.8.7.15 Impacts from Trails and Travel Management

Impacts would be the same as described in impacts described in Alternative B. Based on assumptions, the more route miles open would have more impacts to fisheries resources.

Under Alternative D, there would be 624 miles of open routes (62 percent of all route miles). This Alternative closes or limits to administrative access more route miles than Alternatives A and C, but less than Alternative B. Alternative A designates 83 percent of route miles as open, Alternative B designates 35 percent of route miles as open and Alternative C designates 90 percent of route miles as open.

An analysis of specific effects of route miles open under this Alternative, on fisheries resources, with proximity to fisheries and sensitive or crucial habitats associated with fisheries resources (riparian areas, stream channels, areas with fragile or highly erodible soils) can be found in Appendix O.

4.2.8.7.16 Impacts from Special Designations

Impacts would be the same as impacts common to all Alternatives.

4.2.8.8 Cumulative Impacts

4.2.8.8.1 Reasonably Foreseeable Actions

Cumulative effects include future federal, state, tribal, local, or private actions that are reasonably certain to occur in the planning area. The planning area is interspersed with parcels of non-BLM managed lands including federal, tribal, state, and privately owned lands. BLM managed lands include 434,154 acres of surface and 1,839,782 acres of federal mineral estate (private or other agency surface ownership with BLM management of mineral resources). These lands are spread thinly across 10,804,549 total acres in nine counties. BLM managed resources occur in 12.8 percent of the planning area in these nine counties. Water resources are scarce and under heavy use in agricultural applications. Six major rivers transect the planning area and BLM lands, including: the Bighorn, Yellowstone, Musselshell, Clark's Fork of the Yellowstone, Stillwater, and Boulder. Other streams with important fisheries resources, including special status species, are spread throughout the planning area. However, BLM administers minimal amount of surface on all of these streams. For example the Musselshell River winds through the planning area for over 240 miles, while the BLM only manages ½ mile of its banks. In the Yellowstone Rivers meanderings through the planning area, BLM only manages approximately 18 miles of stream bank.

Activities taking place on these 11,896,455 acres cumulatively impact fisheries resources within the planning area. Existing and reasonably foreseeable actions on lands in the planning areas that have the potential to cumulatively affect fisheries resources include:

- Increasing recreation demand on public and private lands, primarily OHV
- Recreational fishing on streams and water bodies
- Spread of invasive noxious species including terrestrial and aquatic plants, fish and invertebrates
- Coal mining and associated activities
- Other mining operations including gold, palladium, gravels, etc.
- Demands on travel management (private access across public lands)
- Developments on private land (housing and industrial)
- Irrigation and livestock watering actions
- Agricultural activities that remove riparian vegetation or alter stream channels
- Livestock grazing, particularly in riparian areas and on streams and water bodies
- Vehicle traffic in and through riparian areas
- Oil and Gas development
- Severe or high intensity and localized wildfire events

Where these existing and future activities on non-BLM lands interface with the water and riparian resources, they would cumulatively add to the impacts, to riparian resources, of activities authorized in the decision area. Generally, impacts to riparian resources are associated with surface disturbance and vegetation loss in proximity to waterways that could lead to an increase in runoff and sediment, contaminant delivery and minimizing water infiltration into compacted and bare soils. Increased runoff and erosion following runoff could deliver sediment and contaminants to nearby waterways, impacting riparian habitat. Sedimentation in waterways can cause changes in water chemistry as well as geomorphic adjustments that could have negative effects on stream function. In addition, agricultural runoff would introduce nutrients, pesticides, and herbicides to surface water. Quantified data on the existing and future extent of these land uses is not available.

Under all Alternatives, fisheries resources would benefit from management in accordance with Rangeland Health Standards and applicable state and federal water-quality standards. Site-specific mitigation and BMPs for surface disturbing activities would further reduce impacts on fisheries resources. Adherence to these standards would reduce many of the adverse impacts from future actions. In addition, existing and proposed stipulations designed to protect water, riparian and fisheries resources would be beneficial by minimizing sediment and contaminant delivery potential by preventing or limiting surface-disturbing activities in proximity to hydrologic features. Stipulations and limitations for other resources that prevent or limit surface disturbing activities would provide additional protection for fisheries resources and thereby could be beneficial (e.g., fisheries, riparian). Furthermore, timing limitations could benefit

fisheries resources by limiting or preventing surface-disturbing activities during times of the year when saturated soil conditions exist or when precipitation and runoff are frequent (e.g., winter, spring). However, with the scattered distribution and sparse ownership of BLM administered lands in the planning area, stipulations and management actions to minimize impacts to fisheries resources could not prevent poor conditions on BLM waterways, as is the current situation in some areas.

Under Alternative A actions, impacts to fisheries resources primarily occur from erosion, sedimentation and degradation of riparian resources. Currently, priority fishery resources are not being impacted from BLM authorized activities. Other fisheries resources are impacted from sediment delivery and degraded water quality. The source of these impacts is hard to identify, as the Billings Field Office has a scattered land pattern (for example, in many cases only a ¼ or ½ mile of stream could be managed by the BLM, while the remaining 10 miles is under private ownership). Where riparian conditions are degraded, alternative A requires management actions to move the area towards PFC. BLM authorized surface disturbing activities have negligible impacts to fisheries resources in all alternatives, however, proposed development would restrict activities that degrade water quality or riparian functionality (hence, protecting fisheries habitat and water quality) under this alternative.

Actions under Alternative B provide the highest level of protection to fisheries resources. Larger buffers and more restrictions for surface disturbing activities would be implemented to conserve fish habitat. Perennial and fish bearing streams would be classified a “priority” for monitoring and improvement.

Impacts would be the same as described in Alternative A.

Under Alternative D, impacts to fisheries resources would be negligibly different than impacts from Alternative B.

4.2.8.9 Irreversible and Irretrievable Commitments of Resources

Implementation of the RMP management actions would result in surface-disturbing activities, including dispersed recreation, recreational OHV use, fire and fuels management, mineral and energy development, livestock grazing, and infrastructure development that could permanently alter watershed health. Water quality in “impaired” condition could sustain sufficient degradation, coupled with adjacent non-federal ownership management that it could no longer be capable of being restored to original site potential. This can have detrimental impacts on fisheries resources. However, management actions and BMPs are intended to reduce the magnitude of these impacts and restore some of the fisheries potential if feasible.

4.2.8.10 Unavoidable Adverse Impacts

Surface-disturbing activities on non-BLM lands could cause unavoidable adverse impacts to fisheries resources. Although these impacts are mitigated to the extent possible, unavoidable damage is inevitable due to the land ownership pattern and varying degrees of management.

BLM administered lands manage water, riparian and fisheries resources to protect their value; all Alternatives provide ample protective measures, coupled with other state and federal regulations, to allow for sustainable aquatic uses if feasible.

4.2.9 Wild Horses and Burros and Pryor Mountain Wild Horse Range

Wild horses are managed in accordance with the Wild and Free Roaming Horse and Burro Act of 1971 as amended. For managing on the range, the Act requires minimum feasible management, wild horses are only to be managed where presently found (as per 1971), ensure a thriving natural ecological balance, and maintaining multiple use relationships. The act as amended requires BLM to determine appropriate management levels and removing excess wild horses immediately until a thriving natural ecological balance and multiple use relationship exists. The long-term goal of wild horse management can be summed up to mean having healthy wild horses on healthy rangelands. The designation as a wild horse range mandates wild horses as the principal multiple use but not necessarily the exclusive use.

4.2.9.1 Methods and Assumptions

Impact analysis and conclusions are based on interdisciplinary team knowledge of resources, review of existing literature, information from other agencies' and material provided from knowledgeable public. When possible effects are quantified but many times analysis is qualified due to the scale of the analysis. Spatial analysis was conducted through BLM GIS database and analysis of the information. Impacts are described using ranges of potential impacts by Alternative from other resources or uses of public lands. The PMWHR provides specific protections for wild horses and public safety as opposed to direct management. BLM can only make allocation decisions for BLM administered lands within the PMWHR. BLM can make decisions for the wild horse population regardless of land tenure.

4.2.9.2 Environmental Consequences

The following resources or resource uses have been determined to have little or no impacts to wild horses or the Pryor Mountain Wild Horse Range from BLM authorized uses and management:

- Air
- Climate Change
- Geology
- Cave and Karst Resources
- Energy and Mineral Materials
- Forestry and Woodland Products
- Renewable Energy
- National Historic Trails
- Transportation and Facilities
- Wild and Scenic River

- Fisheries Habitat and Special Status Species
- Wildlife Habitat and Special Status Species

Impacts to Wild Horses and Burros and the Pryor Mountain Wild Horse Range would likely result from actions proposed under the following resources or resource uses:

- Soil
- Water
- Vegetation
    - Forests and Woodlands
    - Rangelands
    - Riparian and Wetlands
    - Invasive Species and Noxious Weeds
    - Special Status Plants
- Wild Horses and Burros
- Cultural Resources
- Paleontological Resources
- Visual Resources
- Fire Ecology and Management
- Lands with Wilderness Characteristics
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Special Designations

4.2.9.3 Alternative A

4.2.9.3.1 Impacts from Soil and Water

Managing wild horse habitat for Standards of Rangeland Health would have a long-term positive impact on erosion reduction and water holding capacity of soils resulting in healthier plant communities and forge availability. Reduction in herd size or maintaining appropriate management level (AML) to meet the standard would impact individual animals requiring removal, gather operations or other population controls (i.e. fertility and demographics).

4.2.9.3.2 Impacts from Vegetation

Managing wild horse habitat for Standards of Rangeland Health would have a long-term positive impact on erosion reduction and water holding capacity of soils resulting in healthier plant communities and forge availability. Reduction in herd size or maintaining appropriate management level (AML) to meet the standard would impact individual animals requiring removal, gather operations or other population controls.

Forests and Woodlands

No prescribed fire or forest/woodland treatments would continue to result in a situation that places the herd in danger of large scale severe or high intensity wildfire. Improvement of forage resources from limited stand treatments would continue to not be realized.

Rangelands

The current management overall benefits the population as a whole as it limits the amount of forge use keeping plants and the rangelands meeting standards for rangeland health providing better quality habitat and forage conditions. In order to meet the range management goals and objectives individual animals are removed impacting those individuals and disturbing the herd.

Riparian and Wetlands

Managing for Proper Functioning condition in riparian areas has an overall benefit to wild horses as intact riparian systems keep and retain more water vital to wild horses.

Invasive Species and Noxious Weeds

Treatment of noxious weeds ensures the rangeland's productivity is not reduced or eliminated benefiting wild horses by retaining forage species they are dependent upon. Control of invasive species occurs through managing the appropriate management level (AML) requiring removals of wild horses or maintenance of the appropriate management level (AML).

Special Status Plants

There are no avoidance areas that necessitate closure. The presence of these resources requires survey prior to any action and mitigation or avoidance of individual sites with SSS.

4.2.9.3.3 Impacts from Wild Horses and Burros

Wild horses impact themselves through reproducing to the point that the population expands in a relatively short time that they cause degradation to their habitat. As the population exceeds the capacity of the range the carrying capacity is slowly reduced. Overtime the land can sustain fewer animals. Individual impacts also occur from their own behavior. Stallions compete and fight amongst one another for mares sometimes resulting in injury or even death. Newborn foals are sometimes injured and killed by adult animals. Newly acquired mares are at times forcibly copulated by rival stallions. A constant cycle of pregnancy typically results in shorter and harder life for mares.

Managing wild horses within the current boundary of the wild horse range (24,595 BLM surface acres/37,494 acres all surface ownerships) would preclude inclusion of approximately 3700 acres of Herd Area that is currently closed. This closure due to the administrative pastures and private land conflicts would not allow for more winter use areas for wild horses with some potential for increase of the appropriate management level (AML).

4.2.9.3.4 Impacts from Cultural Resources

There are no avoidance areas that necessitate closure. The presence of these resources requires inventory prior to any action and mitigation or avoidance of individual cultural resources.

4.2.9.3.5 Impacts from Paleontological Resources

Under Alternative A there are no avoidance areas as the primary area with paleontological resources is within the closed portions of the HMA.

4.2.9.3.6 Impacts from Visual Resource Management

Class 1 designation due to WSA limits the amount of improvement projects and wild horse management that can occur. The area is managed for non-impairment of the view shed which limits range improvements that would benefit wild horses.

4.2.9.3.7 Impacts from Fire Ecology and Management

Little fuel reduction and managed fire has resulted in a fuels buildup of beetle kill conifers. The current management has resulted in a situation that places wild horses in danger of severe or high intensity wildfire. Uncontrolled wildfire could lead to injury or death of individual animals, but most likely result in removal of animals and temporary closure to rehabilitate the burned areas.

4.2.9.3.8 Impacts from Lands with Wilderness Characteristics

These areas provide protection from commercial development resulting in preservation of habitat for wild horses. The requirements for management as not to impair the wilderness characteristics results in limiting the management needed to properly manage wild horses. Installation of projects to benefit wild horses and rehabilitate impaired lands is substantially limited and results in overall deterioration of the range, thus negatively impacting wild horses.

4.2.9.3.9 Impacts from Lands and Realty

Issuance of filming permits has little effect on the wild horses. However, increased visitation from viewers of these commercial products results in higher and higher visitation and public awareness. The wild horses and their habitat get large amount of disturbance during certain times of year

4.2.9.3.10 Impacts from Livestock Grazing

There is no authorized active livestock grazing where wild horses are managed. These results in less competition for forage and water resources. Livestock trailing does occur through bad pass area of the herd management area at the Sykes entrance. Although this is not active grazing it is administered under the grazing regulations. Livestock trailing through does cause temporary disturbance and wild horses tend to shift their patterns during these events that individually last less than a day but occur numerous times in the spring and fall.

4.2.9.3.11 Impacts from Recreation and Visitor Services

Unrestricted recreation activities have resulted in a situation where wild horses are impacted by visitation. No facilities and little interpretation results in impacts to wild horses and their habitat during the spring and summer seasons. SRPs do serve to manage large groups of people

who wish to have a guided experience and in general serve the wild horses with managed and controlled viewing.

4.2.9.3.12 Impacts from Trails and Travel Management

Limiting travel to two routes results in wild horses having space for solitude and escape from pressure by the public. This also has had a positive impact to habitat by lowering the potential for habitat intrusion and degradation from overland travel as well as using existing two-tracks that are not open for travel. People racing for the top of the mountain during foaling season has had a deleterious effect on habitat as people drive off-road to get around snow drifts and downfall disturbing wider area and leaving a wider impact on the land reducing habitat.

4.2.9.3.13 Impacts from Special Designations

East Pryor ACEC

This provides no specific protection to wild horses; however it highlights the importance of other resources in the area.

Wilderness Study Areas

The Burnt Timber Canyon, East Pryor, and Bighorn Tack-On WSAs provide protection from commercial development resulting in preservation of habitat for wild horses. The requirements for management as not to impair the wilderness characteristics results in limiting the management needed to properly manage wild horses and their habitat. Installation of projects to benefit wild horses and rehabilitate impaired lands is substantially limited and results in overall deterioration of the range, thus negatively impacting wild horses.

Pryor Mountain Wild Horse Range

The PMWHR designation adds protection to the wild horses and reinforces that the area is managed principally but not exclusively for wild horses. There are currently no specific management prescriptions for the PMWHR under this Alternative.

4.2.9.4 Alternative B

4.2.9.4.1 Impacts from Soil and Water

Managing wild horse habitat beyond Standards for Rangeland Health would have a long-term positive impact on erosion reduction and water holding capacity of soils resulting in healthier plant communities and forge availability. This would however require a substantial Reduction in herd size.

4.2.9.4.2 Impacts from Vegetation

Managing wild horse habitat beyond Standards for Rangeland Health would have a long-term positive impact on forge availability and overall plant vigor. This would however require a substantial reduction in herd size. The mystic area would be closed to wild horse use as it is not

within the Secretarial Order. Rest and recovery from years of overgrazing would be allowed to occur in the closed areas.

Forests and Woodlands

No prescribed fire or forest/woodland treatments would continue to result in a situation that places the herd in danger of large scale severe or high intensity wildfire. Improvement of forage resources from limited stand treatments would continue to not be realized.

Rangelands

Under this Alternative a reduction in the number of wild horses that would be managed for would occur. This would need to occur in order to exceed standards for rangeland health. Better quality habitat and forage conditions would be realized and individual animals would benefit however the population as a whole would need to be intensively managed to reduce population size and could require more periodic augmentation of outside horses to help with genetic diversity.

Riparian and Wetlands

The impacts would be nearly the same as A since riparian systems are limited and within the Secretarial Order.

Invasive Species and Noxious Weeds

Treatment of noxious weeds ensures rangelands productivity isn't reduced or eliminated benefiting wild horses by retaining forage species they are dependent upon. Control of invasive species occurs through managing the appropriate management level (AML) requiring removals of wild horses or maintenance of the appropriate management level (AML).

Special Status Plants

Where special status plants occur, removal or reduction in wild horses could be necessary.

4.2.9.4.3 Impacts from Wild Horses and Burros

Impacts wild horses have on themselves would be the same regardless of Alternative.

Wild horses would only be managed within the original Secretarial Orders, (23,204 BLM acres/31,153 acres all surface ownerships) with no management except removals when population causes range deterioration. A smaller area for wild horses than any other Alternative would necessitate managing for the low range of the appropriate management level (AML) initially. Any project already in place would need to be removed in order to allow for as much of a natural state as possible. Wild horses would be protected from intrusion by visitors as the most accessible areas of the wild horse range would be closed, thus limiting opportunities for conflict with humans.

4.2.9.4.4 Impacts from Cultural Resources

There are no avoidance areas that necessitate closure. The presence of these resources requires survey prior to any action and mitigation or avoidance of individual cultural resources.

4.2.9.4.5 Impacts from Paleontological Resources

Under Alternative B there are no avoidance areas as the primary area with paleontological resources is within the closed portions of the HMA.

4.2.9.4.6 Impacts from Visual Resource Management

Class 1 designation due to WSA limits the amount of improvement projects and wild horse management that can occur. The area is managed for non-impairment of the view shed which limits range improvements that would benefit wild horses.

4.2.9.4.7 Impacts from Fire Ecology and Management

No direct impacts from fire or fuels management would occur. No hazardous fuel reductions would occur and any fire would not have full suppression if an ignition is started. This has the potential to have the greatest impact to wild horses. This would be the most natural interaction.

4.2.9.4.8 Impacts from Lands with Wilderness Characteristics

These areas provide protection from commercial development resulting in preservation of habitat for wild horses. The requirements for management as not to impair the wilderness characteristics results in limiting the management needed to properly manage wild horses. Installation of projects to benefit wild horses and rehabilitate impaired lands is substantially limited and results in overall deterioration of the range, thus negatively impacting wild horses.

4.2.9.4.9 Impacts from Lands and Realty

Issuance of filming permits has little effect on the wild horses. However, increased visitation from viewers of these commercial products results in higher and higher visitation and public awareness. The wild horses would be protected from much human interaction as they would be relegated to the most difficult areas of the wild horse range to access.

4.2.9.4.10 Impacts from Livestock Grazing

No potential for impact is expected since livestock trailing through Bad Pass would not be allowed.

4.2.9.4.11 Impacts from Recreation and Visitor Services

Recreational impacts would be lessened as the wild horses would be managed within the most difficult terrain to access.

4.2.9.4.12 Impacts from Trails and Travel Management

Impacts would be positive for the wild horses themselves as fewer conflicts between humans and wild horses potentially could occur.

4.2.9.4.13 Impacts from Special Designations

East Pryor ACEC

This provides no specific protection to wild horses; however it highlights the importance of other resources in the area.

Wilderness Study Areas

The Burnt Timber Canyon, East Pryor, and Bighorn Tack-On WSAs provide protection from commercial development resulting in preservation of habitat for wild horses. The requirements for management as not to impair the wilderness characteristics results in limiting the management needed to properly manage wild horses and their habitat. Installation of projects to benefit wild horses and rehabilitate impaired lands is substantially limited and results in overall deterioration of the range, thus negatively impacting wild horses.

Pryor Mountain Wild Horse Range

The PMWHR designation adds protection to the wild horses and reinforces that the area is managed principally but not exclusively for wild horses. The management prescriptions for Alternative B provide the most area-wide protections for the wild horses that can be given. This would result the least amount of human wild horse interaction possible while providing the maximum amount of public safety possible.

4.2.9.5 Alternative C

4.2.9.5.1 Impacts from Soil and Water

Managing wild horse habitat for Standards of Rangeland Health would have a long-term positive impact on erosion reduction and water holding capacity of soils resulting in healthier plant communities and forge availability. Reduction in herd size or maintaining the appropriate management level (AML) to meet the standard would impact individual animals requiring removal, gather operations or other population controls (i.e. fertility and demographics).

4.2.9.5.2 Impacts from Vegetation

Managing wild horse habitat for Standards of Rangeland Health would have a long-term positive impact on erosion reduction and water holding capacity of soils resulting in healthier plant communities and forge availability. Reduction in herd size or maintaining the appropriate management level (AML) to meet the standard would impact individual animals requiring removal, gather operations or other population controls.

Forests and Woodlands

Prescribed fire or forest/woodland treatments would continue to result in a situation that places the herd in danger of large scale severe or high intensity wildfire. Improvement of forage resources from limited stand treatments would continue to not be realized.

Rangelands

The current management overall benefits the population as a whole as it limits the amount of forage use keeping plants and the rangelands meeting standards for rangeland health providing better quality habitat and forage conditions. In order to meet the range management goals and objectives individual animals are removed impacting those individuals and disturbing the herd.

Riparian and Wetlands

Managing for Proper Functioning condition in riparian areas has an overall benefit to wild horses as intact riparian systems keep and retain more water vital to wild horses.

Invasive Species and Noxious Weeds

Treatment of noxious weeds ensures rangelands productivity would not be reduced or eliminated thus benefiting wild horses by retaining the forage species upon which they are dependent. Control of invasive species occurs through managing the appropriate management level (AML) requiring removals of wild horses or maintenance of the appropriate management level (AML).

Special Status Plants

There are no avoidance areas that necessitate closure. The presence of these resources requires survey prior to any action and mitigation or avoidance of individual sites with special status plants.

4.2.9.5.3 Impacts from Wild Horses and Burros

Impacts horses have on themselves would be the same regardless of Alternative.

Managing wild horses within a boundary encompassing the entire HA (28,622 BLM acres/44,855 acres all ownerships) of the wild horse range would include all lands inventoried for wild horse use after the Wild and Free-Roaming Horses and Burros Act of 1971 passed. This would allow for more winter use areas for wild horses with some potential for increase of the appropriate management level (AML) due to more available range.

4.2.9.5.4 Impacts from Cultural Resources

There are no avoidance areas that necessitate closure. The presence of these resources requires survey prior to any action and mitigation or avoidance of individual cultural resources.

4.2.9.5.5 Impacts from Paleontological Resources

Under Alternative C there are avoidance areas that would need to be mitigated.

4.2.9.5.6 Impacts from Visual Resource Management

Class 1 designation due to WSA limits the amount of improvement projects and wild horse management that can occur. The area is managed for non-impairment of the view shed which limits range improvements that would benefit wild horses. A default Class II would occur if

WSA is released, allowing more flexibility in the type of management actions that could benefit wild horses.

4.2.9.5.7 Impacts from Fire Ecology and Management

Short-term disturbance from fuels management would occur as more acreage is treated to reduce hazardous fuels. In the mid and long term, the threat of severe or high intensity wildfire and permanent habitat loss would be lessened. Potential areas would be opened that could provide additional forage as a side benefit.

4.2.9.5.8 Impacts from Lands with Wilderness Characteristics

Less land would be managed for wilderness characteristics. This would allow for ease of projects that would benefit wild horses.

4.2.9.5.9 Impacts from Lands and Realty

Issuance of filming permits has little effect on the wild horses. However, increased visitation from viewers of these commercial products results in higher and higher visitation and public awareness. The wild horses and their habitat receive large amount of disturbance during certain times of year

4.2.9.5.10 Impacts from Livestock Grazing

A livestock grazing allotment would be created from the Bad Pass Trail for trailing livestock only. This would be beneficial to wild horses as it would place greater constraints on livestock trailing. This would allow for the issuance of long-term grazing permits that would place greater control on livestock grazing, through terms and conditions, thus providing for better administration and enforcement of this activity. The PMWHR would remain closed to active livestock grazing.

4.2.9.5.11 Impacts from Recreation and Visitor Services

Unrestricted recreation activities result in a situation where wild horses are impacted by visitation. No facilities and little interpretation results in impacts to wild horses and their habitat during the spring and summer seasons. SRPs do serve to manage large groups of people who wish to have a guided experience and in general serve the wild horses with managed and controlled viewing. However no limit would be placed on the number of SRPs issues or number and size of groups.

4.2.9.5.12 Impacts from Trails and Travel Management

This would be the least restrictive. Conflicts and impacts would continue to increase and ultimately have a higher impact on wild horses and their habitat

4.2.9.5.13 Impacts from Special Designations

East Pryor ACEC

This provides no specific protection to wild horses; however it highlights the importance of other resources in the area.

Wilderness Study Areas

The Burnt Timber Canyon, East Pryor, and Bighorn Tack-On WSAs provide protection from commercial development resulting in preservation of habitat for wild horses. The requirements for management as not to impair the wilderness characteristics results in limiting the management needed to properly manage wild horses and their habitat. Installation of projects to benefit wild horses and rehabilitate impaired lands is substantially limited and results in overall deterioration of the range, thus negatively impacting wild horses.

Pryor Mountain Wild Horse Range

The PMWHR designation adds protection to the wild horses and reinforces that the area is managed principally but not exclusively for wild horses. There would be the least amount of area-wide restrictions on use and activities around wild horses.

4.2.9.6 Alternative D (Preferred Alternative)

4.2.9.6.1 Impacts from Soil and Water

Same as A.

4.2.9.6.2 Impacts from Vegetation

Managing wild horse habitat for Standards of Rangeland Health would have a long-term positive impact on erosion reduction and water holding capacity of soils resulting in healthier plant communities and forge availability. Reduction in herd size or maintaining the appropriate management level (AML) to meet the standard would impact individual animals requiring removal, gather operations or other population controls.

4.2.9.6.3 Forests and Woodlands

Same as C.

Rangelands

The current management overall benefits the population as a whole as it limits the amount of forge use keeping plants and the rangelands meeting standards for rangeland health providing better quality habitat and forage conditions. In order to meet the range management goals and objectives individual animals are removed impacting those individuals and disturbing the herd.

Riparian and Wetlands

Managing for Proper Functioning condition in riparian areas has an overall benefit to wild horses as intact riparian systems keep and retain more water vital to wild horses.

Invasive Species and Noxious Weeds

Treatment of noxious weeds ensures rangelands productivity isn't reduced or eliminated benefiting wild horses by retaining forage species they are dependent upon. Control of invasive species occurs through managing the appropriate management level (AML) requiring removals of wild horses or maintenance of the appropriate management level (AML).

Special Status Plants

There are no avoidance areas that necessitate closure. The presence of these resources requires survey prior to any action and mitigation or avoidance of individual sites with special status plants.

4.2.9.6.4 Impacts from Wild Horses and Burros

Impacts horses have on themselves would be the same regardless of Alternative.

Managing wild horses within a boundary encompassing the most HA of the wild horse range (27,095 acres BLM/ 39,944 acres all ownerships) would include all BLM lands inventoried for wild horse use after the Wild and Free-Roaming Horses and Burros Act passed; 27,094 BLM acres except for a buffer area of lands between private property and the county road. This would expand the HMA in a feasible way protecting wild horses and allowing for more winter use areas for wild horses with potential for increase of the appropriate management level (AML).

4.2.9.6.5 Impacts from Cultural Resources

There are no avoidance areas that necessitate closure. The presence of these resources requires survey prior to any action and mitigation or avoidance of individual cultural resources.

4.2.9.6.6 Impacts from Paleontological Resources

Under Alternative D there are no avoidance areas as the primary area with paleontological resources is within the closed portions of the HMA.

4.2.9.6.7 Impacts from Visual Resource Management

Same as C

4.2.9.6.8 Impacts from Fire Ecology and Management

Same as C

4.2.9.6.9 Impacts from Lands with Wilderness Characteristics

Similar to B

4.2.9.6.10 Impacts from Lands and Realty

Issuance of filming permits has little effect on the wild horses. However, increased visitation from viewers of these commercial products results in higher and higher visitation and public

awareness. The wild horses and their habitat receive a large amount of disturbance during certain times of year

4.2.9.6.11 Impacts from Livestock Grazing

There is no authorized active livestock grazing where wild horses are managed. These results in less competition for forage and water resources. Livestock trailing does occur through Bad Pass area of the herd management area at the Sykes entrance. Although this is not active grazing it is administered under the grazing regulations. Livestock trailing through the PMWHR does cause temporary disturbance and wild horses tend to shift their patterns during these events that individually last less than a day, but occur numerous times in the spring and fall.

4.2.9.6.11 Impacts from Recreation and Visitor Services

An SRMA would enhance the recreation experience as well as provide organized recreational activities allowing for protection of horses and their habitat. Non-organized recreation activities would be managed through PMWHR area-wide restrictions promoting less impact to wild horses and their habitat. SRPs would serve to manage large groups of people who wish to have a guided experience and in general serve the wild horses with managed and controlled viewing.

4.2.9.6.12 Impacts from Trails and Travel Management

Impacts would be positive for the wild horses themselves as fewer conflicts between humans and wild horses potentially could occur.

4.2.9.6.13 Impacts from Special Designations

East Pryor ACEC

This provides no specific protection to wild horses; however it highlights the importance of other resources in the area.

Wilderness Study Areas

The Burnt Timber Canyon, East Pryor, and Bighorn Tack-On WSAs provide protection from commercial development resulting in preservation of habitat for wild horses. The requirements for management as not to impair the wilderness characteristics results in limiting the management needed to properly manage wild horses and their habitat. Installation of projects to benefit wild horses and rehabilitate impaired lands is substantially limited and results in overall deterioration of the range, thus negatively impacting wild horses.

Pryor Mountain Wild Horse Range

Same as B

4.2.9.7 Cumulative Impacts

4.2.9.7.1 Past and Present Actions

The PMWHR is unique because a large portion of it was established under two Secretarial Orders in 1968 and 1969 prior to the Wild Free-Roaming Horses and Burros Act. The PMWHR was the second wild horse range established and the first public wild horse range. Herd areas were identified from 1971-1974 as areas occupied by wild horses at the passage of the Act. These areas identified where wild free-roaming horses and burros were "presently" found. Due to this, the wild horse range was able to be expanded beyond the Secretarial Orders' boundary.

The BLM also moved to long-range planning with the development of resource management plans (RMPs) and environmental impact statements (EISs). These EISs analyzed impacts of the RMPs' management direction for resources and uses including wild horses, as updated through BLM policies, rangeland program direction, and wild horse program direction. Allocations were made, and range monitoring studies were initiated to determine if objectives were being achieved or if progress toward allotment standards was being made. In the 1984 Billings RMP, the areas where wild horses would be managed were adjusted due to the need have facilities for the management of wild horses. Two administrative pastures were fenced to be used a gather pastures since all wild horse management was relegated to horseback gathers. The PMWHR Herd Management Area Plan was completed in 1984 and adopted the appropriate management level (AML) that was identified in the Billings RMP. During this time the Sorenson Extension was allowed for wild horse use under two five-year use permits issued to the BLM by the NPS. In 1992, the Sorenson Extension was not renewed. Subsequently, the appropriate management level (AML) was adjusted to the current level of 85 to 105. At the same time, the use of helicopters for gather operations was allowed as well as the management of the population as a whole instead of by separate herds.

Due to these laws, planning, and subsequent court decisions, wild horse management has occurred in the PMWHR. Twenty-four gathers have been completed on portions of the PMWHR. Approximately 660 wild horses have been removed from the PMWHR since 1968. Populations are thriving and have not been negatively impacted. An appropriate management level (AML) determination for the PMWHR was established through BLM planning process and completed in 1992. Fertility control has been used since 2001 in several different prescriptions.

Daily management of wild horses and other public land resources are managed under the 2009 PMWHR HMAP. Currently wild horses are managed based upon age and genetic representation and allowing the correction of any sex ratio problems that could occur. Program goals have expanded beyond establishing a thriving natural ecological balance by simply maintaining the appropriate management level (AML) for individual herds, but include achieving and maintaining healthy, vigorous, and stable populations.

Current mandates prohibit the destruction of healthy animals that are removed or deemed to be excess. Only sick, lame, or dangerous animals can be euthanized, and destruction (although legal) is no longer used as a population control method. The most recent amendment to the Wild Free-Roaming Horses and Burros Act allows the sale of excess wild horses that are over

10 years old or have been offered unsuccessfully for adoption three times. This sale authority has not been fully implemented, thus, facility space and funding for gathers is less available as more unadoptable wild horses are maintained in facilities. Fertility control is continuously being improved and researched presently for the best ways to utilize it.

Today, public interest in the welfare and management of wild horses is higher than it has ever been. Many different values pertaining to wild horse management form various perceptions on the management of wild horses. Wild horses are viewed by some as nuisances and by others as living symbols of the pioneer spirit.

The focus of wild horse management has also expanded to place more emphasis on achieving rangeland health as described in the Standards for Rangeland Health. Adjustments in numbers, grazing use, and allowable use are based on evaluating progress toward reaching the standards.

4.2.9.7.2 Reasonably Foreseeable Future Actions

Under Alternative A, management of the PMWHR and wild horses would remain the same as is currently occurring.

Under Alternative B the PMWHR would be limited to within the 1968 and 1969 Secretarial Orders only. The maximum amount of protection would be allowed for the wild horses and the rangeland resources. The wild horse population would initially be managed for 90 wild horses due to a reduction from the current size and limited water sources. All range improvements would be removed (i.e. water tanks, guzzlers, reservoirs), access would be limited and natural processes would be primary to other resources. Greater potential for loss of genetic diversity (if no animals are introduced) would happen. Greater wild horse removals and other population control methods would occur under this management scenario.

Under Alternative C the PMWHR would be managed within the entire Herd Area. This Alternative would result in extensive fencing of private property owners and re-routing of county roads. The length of time to implement this could be very long. Wild horses would abut to private property owners and domestic horses. The boundary fence on the south end of the PMWHR would be the private property fence line. Within the confines of meeting other multiple-use mandates (i.e. WSA, ACEC, SSS protections) habitat and range improvement work would be maximized. Very little management of recreational and visitor activities would occur. The conflict between people and wild horses would increase. Impacts to wild horse habitat would increase from visitation and recreation under this Alternative.

Under Alternative D the PMWHR would be managed to include a majority of the Herd Area. The administrative pastures would be re-opened and a buffer between private property and the wild horse range would be in place to reduce conflict and protection of wild horses. Within the confines of meeting other multiple-use mandates (i.e. WSA, ACEC, SSS protections) habitat and range improvement work would be maximized. Area-wide restrictions would be implemented to enhance protections for wild horses, habitat, and public safety. More intensive management of recreational uses and visitor activities would occur. Conflict between users in and around wild horses would be reduced.

4.2.10 Cultural and Heritage Resources

This section discusses impacts on cultural resources from management actions of other resources and resource uses. Impacts on the cultural resources would primarily result from surface disturbance such as excavation, soil compaction, mechanized surface disturbance , OHV use, fire suppression, unauthorized collection, vandalism (inadvertent or intentional) and trampling. Direct and indirect impacts on cultural resources result from any surface disturbing activity. Direct and indirect impacts could result in the vertical and horizontal displacement of soil containing cultural materials, which could affect the integrity of the site and its research potential, the site's setting, and ultimately the site's eligibility for inclusion on the National Register of Historic Places (NRHP). These resources also may be indirectly affected by changes in erosion patterns due to surface disturbance activities, illegal artifact collection due to increased access to an area, and the introduction of visual or auditory elements that are out of character with an archaeological site and disrupt the site's setting.

The protection and consideration of impacts on cultural resources is governed by numerous federal and state mandates, which include, but are not limited to Section 106 of the NHPA, as amended, the Archaeological and Historic Preservation Act (AHPA) of 1974, Federal Land Policy and Management Act (FLPMA), and the National Programmatic Agreement Montana State Protocol (for a complete list of guidance for cultural and heritage resources, see Appendix A). In accordance with these mandates, the BLM would determine whether management actions would have an adverse effect on any properties listed or eligible for listing on the NRHP. If the BLM determines that a property would be adversely affected, then mitigation would be proposed in accordance with federal laws and BLM management directives. Mitigation could include, but would not be limited to, one or more of the following measures: 1) avoidance through project redesign; 2) data recovery, which might include the systematic professional excavation of a NRHP-eligible site; 3) the use of landscaping or other techniques that would minimize or eliminate effects on the site's setting; and 4) the development of interpretive materials.

Federal actions defined as federal undertakings under Section 106 of the National Historic Preservation Act (NHPA) require the identification, evaluation, and treatment of adverse effects and the appropriate mitigation of the impacts. Impacts from unauthorized cross-country OHV travel, wildfires/fire suppression, and unauthorized collection and vandalism are not usually considered under Section 106 of NHPA and result in the unmitigated loss of cultural resource information. Most impacts are difficult to quantify because the locations of most cultural resource sites in the Billings and Pompeys Pillar National Monument planning area are unknown and the Alternatives to do not identify specific areas for surface disturbing activities.

Unavoidable adverse effects to NRHP-eligible sites would be mitigated through implementation of a treatment plan. For historic properties that are eligible under National Register Criteria A, B, or C, other forms of mitigation (e.g., oral history, historic markers, exhibits, interpretive brochures, or publications) could be considered in the plan in lieu of, or in addition to, data recovery. If data recovery is the preferred treatment option for a historic property, then the BLM would ensure that the developed treatment is based on an appropriate research design and is reviewed and approved by the BLM and Montana State Historic

Preservation Office (SHPO). Following BLM and SHPO review and consultation, the BLM would ensure that the plan is implemented within the timelines set forth in the plan.

4.2.10.1 Methods and Assumptions

To analyze the potential effects of the Alternatives on cultural resources, including resources important to Native American groups, information was gathered from cultural inventories and excavations in and adjacent to the planning area. However, less than 10 percent of the land managed by the BiFO has been inventoried and less than 0.2 percent of all sites have been excavated. The analysis also is based on professional expertise of BLM specialists at the BiFO, a review of the relevant scientific literature, and the 2009 Class I Overview of the BLM Billings Resource Management Plan Area (Ecosystems Management 2009).

The criteria for assessing impacts were those stipulated in the regulation for Protection of Historic Properties (36 CFR § 800), which state that an undertaking may have an adverse 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 adverse effects under Section 106 of the NHPA include:

- Physical destruction, damage, or alteration of all or part of the property;
- Alteration of a property that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR § 68);
- Removal of the property from its historic location;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant features;
- Neglect of a property which causes its deterioration, except where the neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe; and
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation.

Effects are quantified where possible. In the absence of quantitative data, best professional judgment was used. Impacts sometimes are described using a range of potential impacts or in qualitative terms, if appropriate. The intensities of impacts also are described, where possible.

This analysis was based on the following assumptions:

- Protection for all cultural resources, including resources important to Native American groups, would occur according to federal laws and BLM regulations

and agreements, regardless of whether the resources are specifically identified in the RMP.

- Section 106 inventories, evaluation, and mitigation would be conducted for all proposed projects, as required by the NHPA, under each Alternative.
- Compliance with Section 106 for federal undertakings would result in the continued identification, protection, mitigation, and nomination of cultural resource sites to the NRHP.
- The BiFO would continue to mitigate impacts to cultural resources from authorized uses through project abandonment, redesign, and if necessary, data recovery investigations in accordance with the BLM National Programmatic Agreement and State Protocol for Managing Cultural Resources on Land Administered by the BLM in Montana.
- Eligible sites would be mitigated through implementation of a treatment plan in consultation with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP). For Adverse Effects determinations, consultation could be required with the ACHP at the request of the SHPO. Projects involving other agencies or landowners, ACHP participation would be contemplated and for projects involving multiple agencies or landowners, the SHPO could require a Memorandum of Agreement and/or a Programmatic Agreement to be developed that would outline how Adverse Effects determinations would be addressed.
- Cultural resources would continue to be discovered throughout the planning area.
- Proactive Section 110 inventory, research, stabilization, and/or preservation would be accomplished in the planning area each year.
- NRHP-listed and some NRHP-eligible sites, as well as the cultural resources in the ACECs would be monitored for vandalism and protected or stabilized, as necessary.
- Cultural resource inventories and evaluations required before land tenure adjustments would ensure all identified cultural resources are documented, evaluated, and mitigated before ownership changes.
- All surface disturbing activities could adversely impact cultural resources.
- All cultural resources would be assessed according to BLM Use Categories (see Appendix F)
- The demand for use of cultural resources (public use, scientific use, conservation use, and traditional use) would remain at current levels or increase slightly.

- A direct relationship exists between the frequency of human use in an area and the potential for cultural resources to be adversely impacted.
- Wildfire and prescribed fire could damage rock art sites and those sites comprising of combustible materials.

4.2.10.2 Environmental Consequences

Impacts to cultural and heritage resources would likely result from actions proposed under the following resource programs:

- Water
- Vegetation
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Wild Horses and Burros
- Cultural and Heritage Resources
- Fire Ecology and Management
- Visual Resources
- Lands with Wilderness Characteristics
- Energy and Mineral Resources
- Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Renewable Energy
- Special Designations

Other programs were determined to have little or no impact on cultural and heritage resources.

4.2.10.3 Impacts Common to All Alternatives

4.2.10.3.1 Impacts from Water

There are no impacts to cultural and heritage resources from management actions common to all Alternatives.

4.2.10.3.2 Impacts from Vegetation

Vegetation treatments involve active and passive treatments to achieve healthy, resilient, and diverse ecological systems. Active restoration typically involves direct manipulations of vegetation resources and includes such activities as burning, chaining, tree cutting, and

plowing, all of which can negatively affect cultural resources. Mechanical treatments require the use of heavy equipment. The use of heavy equipment can directly impact cultural resources through surface disturbance and direct destruction of artifacts and features. Biological treatments would have no direct impacts on cultural resources because the biological agent targets the vegetation species treated. Manual treatments would have minimal effects on cultural resources because all treatment is done by hand, with no use of heavy equipment. Prescribed fire treatments could potentially affect cultural resources through directly burning or charring materials or otherwise damaging artifacts. Vegetation treatments would also have indirect impacts on cultural resources because of increased erosion and displacement and destruction of surface artifacts and, in some cases, destruction of surface and buried structures and features.

However, these impacts could be partially mitigated during compliance with NEPA and Section 106 of NHPA. Projects would be redesigned to avoid historic properties or those eligible for or listed on the NRHP, thus mitigating some of the direct and indirect impacts.

4.2.10.3.3 Invasive Species and Noxious Weeds

Treatment methods for noxious and invasive weed control could include chemical, mechanical, cultural, or biological methods. Of greatest concern are mechanical treatments, which can directly impact cultural resources. Application or treatment of noxious or invasive weeds would be done by spraying, which would have a negligible effect on cultural resources. These impacts would not vary by Alternative.

4.2.10.3.4 Impacts from Wildlife Habitat and Special Status Species

Cultural resources are impacted by wildlife use, similar to the impacts noted for livestock grazing and wild horses. These impacts include trampling, wallowing, and trailing, especially near fenced or unfenced watering areas, stream banks, and spring sources. These impacts would be mitigated on a case-by-case basis when discovered. Other wildlife impacts to cultural resources could occur as a result of vegetation management to increase forage production and improve range conditions. Stipulations on BLM-permitted activities to protect wildlife would also prevent possible damage to cultural resources that occur in these areas.

Surface disturbing activities are restricted or limited in sage-grouse general habitat areas (78,575 acres), sage-grouse Protection Priority areas (154,140 acres), and sage-grouse Restoration Areas (45,555 acres). These restrictions or limitations on surface disturbing would protect cultural resources from direct and indirect impacts due to project implementation activities. These acres and impacts remain the same across all Alternatives.

4.2.10.3.5 Impacts from Fisheries and Special Status Species

Direct effects to cultural resources located within riparian areas could occur as a result of spring development activities. These activities involve either the installation of structures (e.g., springboxes, discharge pipe, trough), livestock exclusion fence, or vegetation improvements to protect or restore a damaged spring. Although these projects typically are small in scope and the disturbance footprint is limited, impacts to archaeological sites would be expected due to

higher site density within riparian areas. Stipulations on BLM-permitted activities to protect fisheries would also prevent possible damage to cultural resources that occur in these areas.

4.2.10.3.6 Impacts from Wild Horses and Burros

Impacts to cultural resources from wild horses are similar to those described for wildlife and livestock grazing use. The impacts caused by wild horses are nearly indistinguishable from those caused by livestock. These impacts would be mitigated on a case-by-case basis as they are discovered. Other impacts to cultural resources associated with wild horses include range improvements and vegetation treatments.

4.2.10.3.7 Impacts from Cultural and Heritage Resources

Proactive cultural resource management through site use allocation determines management of cultural resource sites for their varied values before threats could occur. Allocating cultural resource sites to management uses would allow for cultural resource values to be managed based on varied values. Managing cultural resource sites for scientific use would allow for continued data recovery, as necessary. Allocation of unique cultural properties to conservation use would preserve sites for future study. Managing sites for traditional use would foster traditional values and purposes. Managing cultural resource sites for public use would provide public interpretation opportunities that could decrease incidents of inadvertent vandalism. This type of site management would require extensive inventories and other research so that the sites could be interpreted for the public. However, designated public use sites could also lead to damage and vandalism at or near the sites. Allocating cultural resources sites to experimental use would foster knowledge in the field of cultural resources. Discharging some cultural sites from management considers cultural resource values and would ensure that scarce resources are not spent maintaining sites where no cultural use is identified.

Sites allocated to scientific use could be impacted by data recovery at these sites. This use would positively benefit our knowledge of cultural resources; however, the data recovery work would also have a destructive effect on the resource. Compliance with Section 106 is therefore necessary when BLM recovers data from archaeological sites for scientific purposes.

Direct impacts to cultural resources eligible for the NRHP would be avoided or mitigated in accordance with federal and state laws. Indirect impacts in the form of illegal collecting, vandalism, or inadvertent damage to cultural resources would continue to increase over time as the number of visitors to the area increases.

Implementing protection measures for areas and items of traditional life-ways and religious significance as well as limited surface disturbing activities within these areas would protect these areas valued by Native American tribes.

4.2.10.3.8 Impacts from Visual Resources

Management under VRM Classes I and II would best preserve and protect the visual setting where cultural resources occur; however, such categories could also limit research excavations. WSAs would be managed as VRM Class I under all Alternatives, which would protect cultural resources and the visual setting in these areas.

4.2.10.3.9 Impacts from Fire Ecology and Management

The emergency nature of wildfire can lessen management ability and priority to conserve cultural resources. Surface disturbing impacts on cultural resources from wildfires would be largely associated with fire suppression activities. Wildfire suppression activities could damage prehistoric and historic sites through fireline construction (hand line and bulldozer line), establishment of helicopter bases, fire camps, and related activities. Fire camps and staging areas in or near known or unidentified prehistoric or historic sites could subject the associated surface artifacts to removal or displacement. Consulting a resource advisor for fires threatening public lands would reduce the potential for associated impacts in areas of known cultural resources.

Impacts from the fire itself vary based on the type of cultural material and the temperature and duration of exposure to fire. High heat and extended exposure can destroy the usefulness of datable deposits, as well as the deposit. In addition, smoke from the fire can discolor, degrade, and damage rock art.

4.2.10.3.10 Impacts from Lands with Wilderness Characteristics

The emphasis on naturalness and a lack of surface-disturbing activities within these areas would minimize impacts to cultural resources because there would be limited or no vehicular activity or other forms of disturbance that could affect cultural sites. Protection of wilderness characteristics lands can restrict methods of archaeological site excavations or research activities during which surface-disturbing activities would occur. However, resource inventories would not be precluded, and information gathered from these inventories would increase knowledge of cultural resources.

4.2.10.3.11 Impacts from Energy and Mineral Resources

Compliance with Section 106 for surface disturbance associated with mineral development would result in the continued identification, protection, mitigation, and nomination of cultural resource sites to the NRHP. Through this process, significant impacts on cultural resources eligible for listing in the NRHP would be avoided or mitigated; however, inadvertent damage could occur if cultural resources undetected during cultural surveys were identified during ground disturbing activities. In these cases, further surface disturbance would be ceased, and the cultural resource would be mitigated to minimize data loss.

4.2.10.3.12 Impacts from Forestry and Woodland Products

Forest and woodland harvest potentially could directly and indirectly impact cultural resources from cross-country travel, surface disturbance associated with woodcutting and timber harvest activities, and an increased number of people to the area.

4.2.10.3.13 Impacts from Lands and Realty

Lands and realty management would negatively impact cultural resources, most substantially in land exchanges and land sales. Impacts would be direct and long term depending on the location of the lands to be disposed of and the nature of the cultural resources on them.

Retaining significant cultural resources in federal ownership and acquiring non-federal lands with significant cultural resources would provide protection of these resources.

Lands disposed of would be subject to NEPA and Section 106 review prior to disposal. Implementation of standard operating procedures would prevent lands identified for possible disposal from being transferred to other ownership if they contain sites determined eligible for inclusion to the NRHP.

Construction, surface disturbing activities, and increased access associated with ROWs could directly and indirectly impact cultural resources. However, the negative impacts created by the construction of ROW corridors (e.g., transmission lines and pipelines) would be mitigated by adherence to the NHPA.

For more Impacts Common to All Alternatives from Lands and Realty see Special Designations.

4.2.10.3.14 Impacts from Livestock Grazing

Direct impacts associated with range improvements would be mitigated; however, other impacts could occur as a result of livestock grazing activities. Livestock congregation and trailing at or across cultural resource site locations can damage artifacts and the contexts in which they occur. Cattle shading and rubbing can damage standing historic structures and rock art. Excessive trampling at spring sources and along stream bands, cattle trailing, and poorly managed grazing can all lead to a denuding of protective vegetation cover and create indirect impacts to cultural resources by accelerating natural erosion and exposing artifacts to illegal surface collection and vandalism. These types of impacts generally would be localized at particular site locations, and could range from short-term to long-term to irreversible. Impacts associated with livestock activities would be mitigated on a case-by-case basis as discovered.

4.2.10.3.15 Impacts from Recreation and Visitor Services

Recreation development projects would be inventoried and impacts to cultural resources mitigated through compliance with the NHPA. Beyond that, recreation development can be both beneficial and detrimental in its relationship to cultural resources. On the one hand, a greater use of interpretive developments can increase public awareness and education, which can result in decreased illegal collecting and site vandalism. On the other hand, increased development, in general, attracts more people to the area and more visitors usually mean greater illegal collection and site damage. Developed recreation can be slightly more detrimental to cultural resources than dispersed recreation because it tends to concentrate people in small, predictable areas.

Dispersed recreation (e.g., hunting, hiking) tends to attract visitors to places that have not received much use in the past; however, this type of use is much less predictable and measurable. The effects of dispersed recreation would be mitigated on a case-by-case basis when discovered.

For more Impacts Common to All Alternatives from Recreation and Visitor Services see Special Designations.

4.2.10.3.16 Impacts from Trails and Travel Management

Instruction Memorandum 2007-30 (Clarification of Cultural Resource Considerations for Off-Highway Vehicle (OHV) Designation and Travel Management) outlines the steps necessary for compliance with the National Historic Preservation Act with regards to designation and management of areas, roads, and trails.

Inventory requirements would vary depending on the effect and nature of the proposed OHV activity and the expected density and nature of Historic Properties based on existing cultural inventory information:

- That (A) Class III inventory is not required prior to designations that
  - (1) allow continued use of an existing route;
  - (2) impose new limitations on an existing route;
  - (3) close an open area or travel route;
  - (4) keep a closed area closed.
- (B) Where there is a reasonable expectation that a proposed designation would shift, concentrate, or expand travel into areas where historic properties are likely to be adversely affected, Class III inventory and compliance with Section 106, focused on areas where adverse effects are likely to occur, is required prior to designation.
- (C) Proposed designations of new routes or new areas open to OHV use would require Class III inventory of the Area of Potential Effect (APE) and compliance with Section 106 would also be required prior to identifying new location proposed as staging areas or similar areas of concentrated OHV use.

OHV activities, particularly if unregulated, are increasingly responsible for damage to all types of cultural resources. Compaction, altered surface water drainage, and erosion are all negative impacts to the landscape and, by extension, to cultural resources. The weight and torque of OHVs can destroy fragile surface artifacts. In addition, as OHVs take people into generally unvisited or hard-to-reach areas, the integrity of cultural resources would be at greater risk of illegal collection, vandalism, surface disturbance, and site damage. Planned OHV events would be inventoried and impacts mitigated in accordance with the NHPA; however, impacts caused by dispersed off-highway vehicle activity would not be mitigated unless discovered.

4.2.10.3.17 Impacts from Route Designations

General Access

The primary issues for cultural resources regarding route designations and motorized access are the protection of cultural sites from physical damage related to motorized use; access opportunities related to scientific research; and public overuse and damage to certain cultural sites, either by inappropriate visitor behavior and/or too much motorized access to sites.

While restricting public motorized access to or near known cultural sites and/or areas could make it difficult to impossible for visitors to view and enjoy these resources, reductions in

public access to these areas could decrease the potential for further or future damage to sites and loss of the scientific information that they hold. Conversely, unrestrained, increased or widespread motorized use in such areas could increase the potential for such damage. Inasmuch as the use of motor vehicles on public routes constitutes the primary means of access to public lands for visitors, administrative personnel and researchers, the supply and spatial extent of travel access networks for motor vehicles is important.

Public Access Associated with Cultural Sites/Areas

Route networks that are open to all uses allow public access to and/or near both known and undocumented cultural resource sites and/or areas. Such access can indirectly impact cultural resources in ways that range from unintentional, unknowing damage from foot traffic to intentional, illegal destruction of sites and removal of artifacts. Managing the availability of public motorized access to and/or near known cultural sites and areas can, therefore, directly reduce the potential for these impacts to occur in the long term, which would contribute to minimizing damage to cultural resources and the potential for adversely affecting natural areas (43 CFR 8342.1(a)(d)).

Administrative and/or Research Access to Cultural Sites/Areas

Total closure of routes to or near these resources could have a detrimental effect on the ability of the scientific community to access sites and areas to conduct recordation, research, excavation, stabilization, restoration, or other related activities.

4.2.10.3.18 Impacts from Renewable Energy

Ground-disturbing activities, as well as the introduction of highly visible structures associated with renewable energy development would result in direct and indirect (visual) impacts to cultural resources. Visual elements (e.g., wind turbines) could diminish the integrity of a NRHP-eligible site's significant features or setting. Authorization of renewable energy projects would be evaluated using an interdisciplinary approach and site-specific NEPA analysis would occur for all renewable energy development projects.

4.2.10.3.19 Impacts from Special Designations

Areas of Critical Environmental Concern

Special designations (e.g., ACECs), with a greater emphasis on natural values, would benefit cultural resources by protecting and preventing irreparable damage to important cultural values, as well as historic and scenic values. The designation of special management areas would reduce or eliminate surface disturbances, which often are caused by activities such as off-highway vehicle use, grazing, range improvements, rights-of-way placements, and mineral entry.

Restricting these activities would result in increased ground cover, leading to a reduction in soil erosion, which would help to maintain the integrity of cultural sites. While a special designation may emphasize one or more unique resources, other existing multiple-use management can continue within a special designation as long as the uses do not impair the values for which the area was designated.

4.2.10.3.20 Impacts from Pryor Mountain Wild Horse Range, Recreation and Visitor Services, and Lands and Realty

The Pryor Mountain Wild Horse Range designation and the national and international attention the wild horses themselves receive as a result of the designation has impacted the integrity of cultural sites through collection of artifacts, destruction of cultural sites, loss of solitude, and contamination of religious/sacred sites located in the Pryor Mountains. These impacts are the same for all Alternatives.

The Pryor Mountains receive some of the most concentrated recreational use in the Billings Field Office (Fridays, Saturdays, Sundays, and Mondays, June through September, the Pyrors receive about 400 people a day to view the horses, with Tuesdays, Wednesdays, and Thursdays receiving slightly less visitation). The wild horses themselves are not the causing the impacts to cultural/sacred sites, but rather it is the human visitation to see/photograph/film the wild horses that is causing the impacts. As a result of BLM permitted activities, photography tours (SRPs – issued through recreation) and commercial film permits (issued through lands and realty), the permitted visitation in the Pryor Mountains increases every year. The casual recreation use also increases as a result of the BLM permitted activities (e.g. members of the public view the photographs/films of the wild horses then travel to the Pryor Mountains to see the wild horses in person).

The issuance of SRPs for photography tours and commercial film permits to film the wild horses results in indirect impacts to cultural resources and Native American religious/sacred sites. Members of the public, while in the Pryor Mountains to view/photograph the wild horses are collecting artifacts which results the loss of integrity to cultural sites; rock cairns, tipi rings, and vision quest sites are also being dismantled/destroyed to be used as campfire rings. The public visitation is impacting ongoing Native American religious practices that still occur in the Pryor Mountains. Solitude is required for many religious practices (e.g. fasting, vision quests) and due to the sheer number of visitors in the Pryors between Memorial Day and Labor Day each year, the opportunity for solitude is not there. Intentionally or unintentionally, the visitors to the Pryors have ‘contaminated’ many of these Native American religious/sacred sites just through the act of being present on/near these sites.

4.2.10.4 Alternative A

4.2.10.4.1 Impacts from Water

Erosion can displace surface and subsurface artifacts, which subsequently can produce a secondary deposit of archaeological material that contains no contextual integrity. Under Alternative A, watershed conditions would be stabilized where grazing management or range conditions are contributing to excessive erosion. BLM-authorized activities would not be restricted or limited in riparian areas.

4.2.10.4.2 Impacts from Vegetation

Forests and Woodlands

Impacts to cultural resources from forests and woodlands management include surface-disturbing activities associated with clearing forested areas. Under this Alternative, surface disturbing activities would be permitted on 68 percent (21,807 acres) of forested lands in the decision area over the life of this plan. Forested land in the Pryor Mountain WSA, Bighorn Tack-On WSA, Burnt Timber Canyon WSA, Bad Canyon, Young's Point, Asparagus Point, Shepherd Ah-Nei, and Acton would not be cut. Potential damage to cultural resources in these areas from harvest would not occur.

Rangelands

Under Alternative A, 160 acres of crested wheatgrass would be hayed or mechanically treated over the life of the plan, which could directly impact cultural resources through surface disturbance and direct destruction of artifacts and features.

Riparian and Wetlands

Riparian areas would be managed to prevent further degradation and maintain riparian health under this Alternative, which would protect cultural resource damage from erosion. Passive restoration focuses on the elimination or modification of activities that could degrade riparian areas and wetlands, such as vehicle traffic and oil and gas development. The elimination or modification of these types of activities would benefit cultural resources by restoring cultural landscapes and reducing impacts to archaeological sites. Under Alternative A, surface disturbing activities would be restricted on 10,114 acres of riparian and wetlands.

4.2.10.4.3 Impacts from Wildlife Habitat and Special Status Species

Under Alternative A, cultural resources would be protected from possible damage through approximately 7,984 acres designated as NSO for oil and gas development in order to protect wildlife habitat. There would be no restrictions on other surface disturbing activities in wildlife habitat under this Alternative and cultural resources would be subject to potential damage from these other uses.

4.2.10.4.4 Impacts from Fisheries Habitat and Special Status Species

Under this Alternative, there are no restrictions on surface disturbing activities in fisheries habitat under this Alternative and cultural resources would be subject to potential damage from these other uses.

4.2.10.4.5 Impacts from Wild Horses and Burros

Under Alternative A, wild horses would be managed on approximately 24,595 acres of BLM-administered lands (37,494 acres all ownership), which could inflict damage to cultural resources in these areas. Under this Alternative, range improvements would be authorized through site-specific analysis and vegetation conversion treatments would not be allowed, which could inflict damage to cultural resources during project installation.

4.2.10.4.6 Impacts from Cultural and Heritage Resources

Under Alternative A, cultural resources would continue to be managed for future Cultural Resource Use Allocations.

4.2.10.4.7 Impacts from Visual Resources

Under Alternative A, 29,843 acres would be managed under VRI Class A and 12,427 acres would be managed under VRI Class B, which would best preserve cultural resources and the visual setting in these areas. However, oil and gas activities would be allowed in VRM Class B areas with mitigation, which could expose cultural resources in these areas to potential damage.

4.2.10.4.8 Impacts from Fire Ecology and Management

Wildfire suppression activities (e.g., off-highway vehicle use, bulldozing control lines, and occupation of fire camps) potentially can damage cultural resources through surface compaction and soil displacement. Under Alternative A, the current fire management plan would be implemented, which includes areas where fires would be beneficial and where they could have negative impacts. No heavy equipment would be used to construct fire lines in areas containing cultural resources and cultural resources specialist or area resource advisors would be consulted for locations of identified areas before use or anticipated use of heavy equipment. Both of these actions would provide protection to known sites.

Under this Alternative, prescribed burning would be implemented to manipulate vegetation on 6,280 acres over the life of the plan. Prescribed fires can indirectly have a negative impact on archaeological sites by increasing short-term ground surface visibility. The greater visibility makes artifacts more accessible and can lead to increased illegal collection. These short-term impacts are mitigated through prior inventory, systematic surface artifact collection, and post-fire monitoring.

4.2.10.4.9 Impacts from Lands with Wilderness Characteristics

Under Alternative A, 1,925 acres would be managed as lands with wilderness characteristics. Maintaining wilderness characteristics would include minimizing or avoiding surface-disturbing activities, which would increase protection of cultural resources that could be located in these areas.

4.2.10.4.10 Impacts from Energy and Mineral Resources

Under Alternative A, approximately 1,659,861 acres would be open to minerals and energy production with varying restrictions. Cultural site densities throughout the management area are low enough to provide for the identification and avoidance of sites when lessees exercise initial development rights associated with oil and gas leases. The potential for indirect and inadvertent impacts would increase proportionally to the amount of land developed. Impacts to cultural resources associated with minerals and energy production would be avoided or mitigated in compliance with the NHPA, NEPA, and standing terms and conditions for mineral leasing.

4.2.10.4.11 Impacts from Livestock Grazing

Under this Alternative, 37,408 acres would continue to be unavailable to livestock grazing; 387,057 acres would continue to be available to grazing. The dispersed nature of livestock grazing can cause disturbance by livestock that is spread lightly over large areas, in most cases. In areas in which livestock congregate and trail, cultural resource sites could be impacted by short-term removal of protective vegetation cover, increased soil compaction, and some mixing of artifacts and contextual relationships. These types of impacts would be site-specific and localized.

4.2.10.4.12 Impacts from Recreation and Visitor Services

Under this Alternative, two areas totaling 1,171 acres would be managed as SRMAs: Sundance Lodge Recreation Area and Four Dances Natural Area ACEC. These areas would receive more use and therefore would be susceptible to illegal collection, vandalism, and inadvertent damage from recreation use. These areas would also be managed as NSO for oil and gas activity, which would also provide protection to cultural resources from such activity.

4.2.10.4.13 Impacts from Trails and Travel Management

Among the Alternatives, Alternative A would have the greatest adverse impacts to cultural resources because travel planning management areas are not designated. Off-highway vehicle use would be limited to existing roads and trails in the decision area, however in the following areas: Pryors, Acton, Shepherd Ah-Nei, and Horsethief, motorized travel would be restricted to designated routes. South Hills would be designated open for motorcycle use only.

In addition, motorized wheeled cross-country travel to a campsite would be restricted, and off-road big game retrieval would not be allowed, which would protect cultural resources from potential damage.

4.2.10.4.14 Impacts from Forestry and Woodland Products

Alternative A would accommodate demand for the sale of forest products as 70 mbf/year, 560mbf on 560 acres (8 years), and 1,750mbf on 750 acres (25 years), which could expose cultural resources in these areas to associated damage.

4.2.10.4.15 Impacts from Lands and Realty

Under Alternative A, a total of 26,616 acres would be retained by the BiFO, which would protect any cultural resources present in these areas, and 7,463 acres federally-owned land would be set aside for disposal, with an additional 2,088 acres identified for further study, which would remove federal protection of cultural resources on these lands after transferred.

Under Alternative A, approximately 44,014 acres would be managed as ROW exclusion areas, providing indirect protection of cultural resources by excluding these activities. Approximately 24,203 acres would be managed as ROW avoidance areas, where activity would be allowed but restricted depending on resources present. This would reduce the potential for damage to cultural resources. Only one ROW corridor is identified under this Alternative. As corridors

focus ROW activities on one area, cultural resources would be protected by ROW corridor designation.

4.2.10.4.16 Impacts from Renewable Energy

Under this Alternative, 49,496 acres would be closed to renewable energy exploration and facility development and developments would be processed on a case-by-case basis, which could expose cultural resources in proposed project areas to associated damage.

4.2.10.4.17 Impacts from Special Designations

Areas of Critical Environmental Concern

Under this Alternative, nine ACECs would be designated that would protect and preserve relevant and important cultural values. These would include Pompeys Pillar National Monument and ACEC, Bridger Fossil Area, Castle Butte, East Pryor, Four Dances Natural Area, Meeteetse Spires, Petroglyph Canyon, Stark Site, and Weatherman Draw.

4.2.10.5 Alternative B

4.2.10.5.1 Impacts from Water

Under Alternative B, fewer direct impacts to cultural resources would occur compared to Alternative A due to the restrictions and limitations on BLM-authorized activities that contribute to excessive erosion and deteriorating watershed conditions. Additionally, surface-disturbing activities would not be allowed within riparian areas where archaeological site density typically is high.

4.2.10.5.2 Impacts from Vegetation

Forests and Woodlands

Protection of cultural resources in areas where harvest would be restricted would be the same as Alternative A. Compared to Alternative A, emphasizing retention and acquisition of forested lands would place more of these areas under the umbrella of federal policy protecting cultural resources for permitted activities proposed in these areas.

Rangelands

Under this Alternative, a greater number of acres (22,414) would be converted of crested wheatgrass to native sagebrush/grassland over the life of the plan, which would result in more area where cultural resources could be impacted by the treatments compared to Alternative A.

Riparian and Wetlands

Alternative B would provide more protection to cultural resources than Alternative A by prohibiting surface disturbing activities on 24,373 acres, including BLM-authorized activities that could directly impact cultural sites located in riparian areas.

4.2.10.5.3 Impacts from Wildlife Habitat and Special Status Species

Under Alternative B, there would be an overall increase in limitations imposed on surface-disturbing activities and areas designated as NSO (119,597 acres are NSO as a result of wildlife) to oil and gas development within designated wildlife habitats, thereby reducing direct impacts to cultural resources compared to Alternative A.

4.2.10.5.4 Impacts from Fisheries Habitat and Special Status Species

Under Alternative B, fewer impacts to cultural resources would occur compared to Alternative A, because surface-disturbing activities in addition to oil and gas development would be restricted within riparian areas on 15,693 acres, where archaeological site density typically is high. In addition, no new spring developments would be authorized in these areas.

4.2.10.5.5 Impacts from Wild Horses and Burros

Under this Alternative, wild horses would be managed in a reduced acreage in the herd management area, thus increasing the potential for direct impacts to cultural resources in HMA. Range improvements and vegetation treatments would not be authorized in wild horse habitat, which would increase protection of cultural resources compared to Alternative A.

4.2.10.5.6 Impacts from Cultural and Heritage Resources

Under Alternative B, all NRHP-eligible sites, whether already recorded or projected to occur on the basis of existing data synthesis, would be allocated to specific uses according to their nature and relative preservation value. Once a site receives a use allocation it would be managed for that use, and other resource uses would be excluded if not compatible with the use allocation designation.

Under this Alternative, all known cultural sites identified under Alternative A, as well as sites or areas designated for conservation use, public use, or socio-cultural use would not be available for oil and gas leasing except for Young's Point. The following additional known cultural sites would be protected through an NSO for oil and gas stipulations: Bridger Cut-Off of the Bozeman Trail and Meeteetse Trail.

4.2.10.5.7 Impacts from Visual Resources

Under this Alternative, a total of 29,823 acres would be managed as VRM Class I and 15,688 acres would be managed as VRM Class II. However, surface disturbing activities would be allowed in VRM Class II areas with mitigation, which can expose cultural resources in these areas to potential damage.

4.2.10.5.8 Impacts from Lands with Wilderness Characteristics

Under Alternative B, 27,292 acres were identified as lands containing wilderness characteristics. However, Alternative B, as more acres were identified as containing wilderness characteristics; they would be managed for those resources, thereby increasing protection of cultural resources that could be located in these areas.

4.2.10.5.9 Impacts from Fire Ecology and Management

Under this Alternative, fewer direct impacts to cultural resources are anticipated compared to Alternative A. No heavy equipment would be used within areas of cultural resources sensitivity, providing protection to known sites. In areas not identified as full suppression, heavy equipment usage would be limited to existing roads and trails, or immediately adjacent to them, which would limit the potential for disturbance to previously undiscovered sites. Prescribed fires would occur on 21,700 acres over 10 years within the decision area to achieve measurable landscape objectives and reduce hazardous fuels, which would benefit cultural resources and their landscapes in the long term.

4.2.10.5.10 Impacts from Energy and Mineral Resources

Under this Alternative, fewer direct impacts to cultural resources would occur as more acres would be closed and recommended for withdrawal from mineral and energy production compared to Alternative A, only 714,486 acres out of 1,803,058 acres would remain open to energy and mineral resource development. If cultural resources were located in areas proposed for mineral extraction, development would be restricted if not compatible with cultural resource use allocations. No new coal leasing would be considered in the decision area.

4.2.10.5.11 Impacts from Forestry and Woodland Products

Alternative B would decrease direct and indirect impacts to cultural resources because no permits would be granted for wood harvesting, and no new roads would be constructed unless approved by a travel management plan. Impacts to cultural resources as a result of the sale of forest products would be the same as Alternative A.

Impacts from Lands and Realty

Under Alternative B, there would be a decrease in land identified for potential disposal and an increase in lands retained by the BiFO, which would provide greater protection of cultural resources compared to Alternative A. Under Alternative B, only 50 acres would be identified for disposal over the life of the plan.

Under this Alternative, more acres would be managed as ROW exclusion (211,384 acres) and avoidance (185,607 acres) areas compared to Alternative, thereby reducing potential direct impacts to cultural resources. All proposed transmission lines greater than 69 kV and pipelines greater than 10 inches in diameter would be encouraged to locate within existing designated corridors, which would reduce dispersed ROWs and result in fewer potential impacts to cultural resources.

4.2.10.5.12 Impacts from Livestock Grazing

Livestock grazing management activities under Alternative B would result in the same direct impacts to cultural resources as in other alternatives. Although under this alternative the most acres are closed to grazing which would result in less acres being impacted by livestock grazing activities.

4.2.10.5.13 Impacts from Recreation and Visitor Services

Under this Alternative, six areas totaling 90,783 acres would be managed as SRMAs: Sundance Lodge Recreation Area, Four Dances Natural Area ACEC, Shepherd Ah-Nei Recreation Area, Acton Recreation Area, Bundy Island, and Pryor Mountain TMA. A greater number of cultural sites would be susceptible to illegal collection, vandalism, and inadvertent damage in these concentrated recreation areas compared to Alternative A. Impacts would be mitigated on a case-by-case basis as discovered. These areas would also be managed as NSO for oil and gas activity, which would also provide protection to cultural resources from such activity.

4.2.10.5.14 Impacts from Trails and Travel Management

Under Alternative B, fewer impacts to cultural resources would be anticipated because fewer acres would be open to motorized vehicles and 11 TMAs would be designated to minimize impacts while providing motorized travel and non-motorized recreational opportunities. Increased restrictions placed on motorized wheeled cross-country travel to campsites would also minimize impacts to cultural resources when compared to Alternative A. Illegal collection and vandalism would continue to occur but not to the levels anticipated under Alternative A.

OHV use would be limited to existing roads and trails except in the 11 TMAs where OHV use would be limited to designated routes (391.5 miles closed to motorized vehicle use in the 11 TMAs and 348.1 miles open to motorized vehicle use in 11 TMAs). South Hills would be closed to motorized travel.

4.2.10.5.15 Impacts from Renewable Energy

Under Alternative B, fewer direct and indirect (visual) impacts to cultural resources would be anticipated since selected areas (e.g., ACECs, WSAs, cultural sites) would be closed to renewable energy exploration and facility development compared to Alternative A. Alternative B has the most acres closed to renewable energy development and the least amount of acres open to renewable energy development. This would provide the greatest amount of protection to cultural resources compared to all the Alternatives.

4.2.10.5.16 Impacts from Special Designations

Areas of Critical Environmental Concern

Under Alternative B, 12 ACECs would be designated, which would provide greater protection of important cultural resources and landscapes compared to Alternative A. These would include Pompeys Pillar National Monument and ACEC, Bridger Fossil Area, Castle Butte, East Pryor, Four Dances Natural Area, Grove Creek, Meeteetse Spires, Petroglyph Canyon, Pryor Foothills Research Natural Area, Stark Site, Weatherman Draw, and Greater Sage-Grouse Habitat.

4.2.10.6 Alternative C

4.2.10.6.1 Impacts from Water

Impacts to cultural resources would be the same as Alternative A.

4.2.10.6.2 Impacts from Vegetation

Forests and Woodlands

Compared to Alternative B, more potential impacts to cultural resources would be anticipated under this Alternative due to an increase in cutting of forested land for forest health and fuel management and the disposal of isolated forested land.

Rangelands

Impacts to cultural resources from converting crested wheatgrass to native sagebrush/grassland would be less than Alternative B as fewer acres are proposed to be treated over the life of the plan (7,500 acres). Under Alternative C, there are fewer restrictions on prescribed fire/treatment in sagebrush communities compared to Alternatives A and B, which could directly impact cultural resources through surface disturbance and direct destruction of artifacts and features.

Riparian and Wetlands

Surface-disturbing activities would be allowed and BLM-authorized activities would be less restricted or limited in riparian areas under this Alternative, which would result in more impacts to cultural resources compared to Alternative B. Under this Alternative the fewest amount of acres in riparian and wetland areas restrict surface disturbing activities (6,666 acres).

Impacts from Wildlife Habitat and Special Status Species

Under this Alternative, there would be a decrease in limitations imposed on surface-disturbing activities within designated wildlife habitats, which would increase the potential for direct impacts to cultural resources compared to Alternative B. Under Alternative C, only 26,848 acres are no surface occupancy for wildlife, which is the least wildlife NSO acreage for all the Alternatives.

Impacts from Fisheries Habitat and Special Status Species

Under this Alternative, there would be more impacts to cultural resources because of fewer restrictions on surface-disturbing activities, oil and gas development, and new spring developments compared to Alternatives A and B. Under this Alternative, only 806 acres in fisheries habitat have surface disturbance restrictions, the least of all the Action Alternatives.

Impacts from Wild Horses and Burros

Under Alternative C, wild horses would be managed in largest acreage for the HMA compared to Alternatives A and B, thereby decreasing the potential for cultural resources impacts as the wild horse use would be more disperse. The number of acres available for vegetation treatment and/or water development would be maximized under this Alternative, which would result in more direct impacts to cultural resources compared to Alternatives A and B.

Impacts from Cultural and Heritage Resources

Cultural resource impacts as a result of program-specific management activities would be similar to those described for Alternative B; however, the magnitude of effects would vary based on the resource use allocations identified for this Alternative (see Table 2-6.1 Cultural Resources). Known cultural sites identified under Alternative C would be protected through an NSO stipulation for oil and gas. The Bridger Cut-Off Trail and Meeteetse Trail would receive less protection through CSU stipulations for oil and gas.

Impacts from Visual Resources

Under Alternative C, a total of 26,040 acres would be managed as VRM Class I and 20,498 acres would be managed as VRM Class II. Similar to Alternative A, oil and gas activities would be allowed in VRM Class II areas with mitigation, which can expose cultural resources in these areas to potential damage. This Alternative would provide less indirect protection to cultural resources than Alternatives A and B since less area would be managed as VRM Class I.

4.2.10.6.3 Impacts from Fire Ecology and Management

The full suppression approach of Alternative C would initially reduce potential impacts to cultural resources but could increase impacts when fuel accumulations reach the point that suppression efforts fail to control large fires. Heavy equipment would be allowed in all areas, unless restricted (e.g., ACECs, WSAs), which would result in more direct impacts to cultural resources compared to Alternative B. Impacts to cultural resources associated with prescribed burning would be the same as Alternative B. Fuels treatment acres remain the same for all the action Alternatives, so the impacts for fuels treatments on cultural resources remain the same. No acres would be managed with wildfire to meet resource objectives, which could result in damage being done to cultural resources through suppression activities.

4.2.10.6.4 Impacts from Lands with Wilderness Characteristics

Under this Alternative, cultural resources impacts associated with lands with wilderness characteristics would be the same as Alternative B. However, fewer acres would be managed as containing wilderness characteristics (3,379 acres), which would result in less protection of cultural resources compared to Alternative B.

4.2.10.6.5 Impacts from Energy and Mineral Resources

Under Alternative C, fewer acres would be closed and withdrawn from mineral entry resulting in more direct impacts to cultural resources compared to Alternative B. Direct impacts to cultural resources would be avoided or mitigated in compliance with the NHPA, NEPA, and standard terms and conditions for mineral leasing. If cultural resources were located in areas proposed for mineral extraction, development would be restricted if not compatible with cultural resource use allocations.

4.2.10.6.6 Impacts from Forestry and Woodland Products

Under this Alternative, more direct and indirect impacts to cultural resources would be anticipated because the highest number of commercial forest products would be allowed, and a greater number of new roads could be constructed compared to Alternative B. There would be an increase in impacts to cultural resources related to the sale of forest products compared to Alternatives A and B.

4.2.10.6.7 Impacts from Lands and Realty

Under Alternative C, the fewest acres would be retained, among the action Alternatives, by the BiFO resulting in less protection for cultural resources compared to Alternatives B, which could offset the increased number of lands available for disposal (4,223 acres) compared to Alternative B.

Fewer acres would be managed as ROW exclusions (39,491 acres) and avoidance (355,601 acres) areas, which would result in more direct impacts to cultural resources compared to Alternative B. Placement of transmission lines and pipelines within two designated corridors would be encouraged, but not required, resulting in less protection of cultural resources compared to Alternative B.

4.2.10.6.8 Impacts from Livestock Grazing

Livestock grazing management activities under Alternative C would result in more direct impacts to cultural resources compared to Alternative B because there would be fewer acres closed to grazing (386,822 acres permitted for grazing).

4.2.10.6.9 Impacts from Recreation and Visitor Services

Under this Alternative, 11 areas totaling 147,181 acres would be managed as SRMAs: Sundance Lodge Recreation Area, Four Dances Natural Area ACEC, Shepherd Ah-Nei Recreation Area, Acton Recreation Area, Yellowstone River Corridor (½ mile corridor from centerline), South Hills TMA, Mill Creek/Bundy TMA, Pryor Mountain TMA, Horsethief TMA, 17 Mile, and Asparagus Point. A greater number of sites would be susceptible to illegal collection, vandalism, and inadvertent damage in these concentrated recreation areas compared to Alternatives A and B. Impacts would be mitigated on a case-by-case basis as discovered. These areas would also be managed as CSU for oil and gas activity, which would provide less protection to cultural resources from such activity than Alternatives A and B.

4.2.10.6.10 Impacts from Trails and Travel Management

Cultural resource impacts associated with TMAs would be similar to Alternative B. However, more impacts to cultural resources would be anticipated as a result of more acres open to motorized vehicles and motorized cross-country travel to campsites and big-game retrieval compared to Alternative B.

OHV use would be limited to existing roads and trails except in the 11 TMAs where OHV use would be limited to designated routes (5.6 miles closed to motorized vehicle use in the 11 TMAs and 831.1 miles open to motorized vehicle use in 11 TMAs).

4.2.10.6.11 Impacts from Renewable Energy

Under Alternative C, there would be an increase in direct and indirect (visual) impacts to cultural resources due to the increase in areas open to renewable energy compared to Alternative B, 21,349 acres are open to renewable energy development and only 82,019 acres are closed to renewable energy development. Renewable energy development would be subject to NEPA and Section 106 review.

4.2.10.6.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Under this Alternative, protection of cultural resources under an ACEC designation would be the same Alternative B.

4.2.10.7 Alternative D (Preferred Alternative)

4.2.10.7.1 Impacts from Water

Management of water resources under this Alternative combines the actions to control excessive erosion from grazing in Alternative A and the restriction on BLM-authorized activities that contribute to excessive erosion in Alternative C, which would provide the most protection of cultural resources of all Alternatives considered.

4.2.10.7.2 Impacts from Vegetation

Forests and Woodlands

Impacts to cultural resources from management of forests and woodlands would be the same Alternative C, except emphasis would be placed on retention and acquisition of forested lands, providing additional protection of cultural resources similar to Alternative B.

Rangelands

Although treatment acres vary (12,000 over the life of the plant) slightly under this Alternative, impacts to cultural resources as a result of treatment of sagebrush communities and crested wheatgrass treatment would be the same as Alternative C.

Riparian and Wetlands

Under this Alternative, surface-disturbing activities would not be allowed on 9,087 acres, resulting in impacts similar to Alternative B.

4.2.10.7.3 Impacts from Wildlife Habitat and Special Status Species

Alternative D would result in fewer impacts to cultural resources as a result of wildlife management compared to Alternatives A and C as 236,392 acres are NSO as a result of wildlife.

4.2.10.7.4 Impacts from Fisheries Habitat and Special Status Species

Impacts to cultural resources as a result of surface-disturbing activities in fisheries habitat would be less than Alternative A and C, but more than in Alternative B as 2,068 acres in fisheries habitat have surface disturbance restrictions.

4.2.10.7.5 Impacts from Wild Horses and Burros

Under Alternative D, wild horses would be managed in an HMA slightly smaller than Alternative C, thereby the potential for direct impacts compared to Alternatives A and B is less as the horse use would still be dispersed. Direct impacts associated with range improvements would be the same as Alternative C.

4.2.10.7.6 Impacts from Cultural and Heritage Resources

Under this Alternative, cultural resource impacts as a result of program-specific management activities would be similar to those described for Alternative B; however, the magnitude of effects would vary based on the resource use allocations identified for this Alternative. Protection of known cultural sites would be the same as Alternative C.

4.2.10.7.7 Impacts from Visual Resources

Under Alternative D, a total of 28,861 acres would be managed as VRM Class I and 13,648 acres would be managed as VRM Class II. Overall, this Alternative would provide less indirect protection of cultural resources than Alternatives B and C. Similar to Alternative B, surface disturbing activities would be allowed in VRM Class II areas with mitigation, which can expose cultural resources in these areas to potential damage. This Alternative would provide less indirect protection to cultural resources than Alternatives A and B since less area would be managed as VRM Class I, but would provide slightly more VRM Class I area than Alternative C.

4.2.10.7.8 Impacts from Fire Ecology and Management

Under this Alternative, there would be increased restrictions on where heavy equipment could be used to control fires thereby providing more protection to cultural resources than compared to Alternatives A, B, and C. Under Alternative D, 62,937 acres, over 10 years, would be managed to meet resource objectives, which could decrease impacts to cultural resources as a result of suppression tactics. Fuels treatment acres (21,700 acres over 10 years) would remain the same as Alternatives B and C and the impacts would remain the same.

4.2.10.7.9 Impacts from Lands with Wilderness Characteristics

Under this Alternative, cultural resources impacts associated with lands with wilderness characteristics would be the same as Alternative B. More acres would be managed as containing wilderness characteristics (13,653 acres), which would result in more protection of cultural resources compared to Alternatives A and C.

4.2.10.7.10 Impacts from Energy and Mineral Resources

Under this Alternative, fewer acres (581,700 acres) would not be available or closed and withdrawn from mineral entry resulting in more direct impacts compared to Alternatives A and C. Direct impacts to cultural resources would be avoided or mitigated in compliance with the NHPA, NEPA, and standard terms and conditions for mineral leasing. If cultural resources were located in areas proposed for mineral extraction, development would be restricted if not compatible with cultural resource use allocations.

4.2.10.7.11 Impacts from Forestry and Woodland Products

Under this Alternative, fewer direct and indirect impacts to cultural resources associated with wood harvesting and new road construction would be anticipated compared to Alternatives A and C. Impacts to cultural resources associated with the sale of forest products would be less than Alternative C.

4.2.10.7.12 Impacts from Lands and Realty

Under Alternative D, less land (170 acres) would be available for disposal, thereby decreasing impacts to cultural resources compared to Alternatives A and C.

More acres would be managed as ROW exclusions (48,258 acres) and avoidance areas (349,358 acres), which would result in fewer direct impacts to cultural resources compared to Alternatives A and C. Impacts to cultural resources associated with placement of transmission lines and pipelines within the two designated corridors would be the same as Alternative C.

4.2.10.7.13 Impacts from Livestock Grazing

Cultural resources impacts associated with livestock grazing management activities would be the same as Alternative C.

4.2.10.7.14 Impacts from Recreation and Visitor Services

Under Alternative D, nine areas totaling 110,862 acres would be managed as SRMAs: Sundance Lodge Recreation Area, Four Dances Natural Area ACEC, Shepherd Ah-Nei Recreation Area, Acton Recreation Area, Yellowstone River Corridor (½ mile corridor from centerline), Asparagus Point, South Hills TMA, Pryor Mountain TMA, and Horsethief TMA. A greater number of sites would be susceptible to illegal collection, vandalism, and inadvertent damage in these concentrated recreation areas compared to Alternatives A and B. Impacts would be mitigated on a case-by-case basis as discovered. Five of the SRMAs would be managed as NSO to oil and gas leasing, including Sundance Lodge Recreation Area, Four Dances Natural Area ACEC, Shepherd Ah Nei Recreation Area, Acton Recreation Area, and Yellowstone River Corridor (½ mile corridor), which would also provide protection to cultural resources from such activity. The remaining four SRMAs would be managed as CSU to oil and gas activity, which would provide less protection to cultural resources from such activity.

4.2.10.7.15 Impacts from Trails and Travel Management

Cultural resource impacts associated with TMAs and big game retrieval would be similar to Alternative B. Approximately fewer acres would be open to motorized vehicles and there would fewer impacts to cultural resources as result of motorized cross-country travel to a campsite compared to Alternatives A and C.

Travel management areas (TMAs) area delineated in the decision area. OHV use is limited to existing roads and trails except in the 11 TMAs where OHV use is limited to designated routes (59.9 miles closed to motorized vehicle use in the 11 TMAs and 616.7 miles open to motorized vehicle use in 11 TMAs). South Hills would be designated open for motorcycle use only.

4.2.10.7.16 Impacts from Renewable Energy

Direct and indirect (visual) impacts to cultural resources associated with renewable energy development would be similar to Alternative B. The number of acres open (20,937 acres) and closed (78,088 acres) are very close to those of Alternative C, so the impacts would be very similar to those of Alternative C

4.2.10.7.17 Impacts from Special Designations

Areas of Critical Environmental Concern

Under this Alternative, protection of cultural resources under an ACEC designation would be the same Alternative B.

4.2.10.8 Cumulative Impacts

Cumulative impacts to cultural resources could occur through incremental degradation of the resource base from a variety of sources, which reduce the information and interpretive potential of cultural properties. Other regional resource, land use, and economic development planning efforts could affect the types and intensity of uses on private, state, or other federal lands within the management area and could, therefore, potentially affect the regional cultural resource database. Development of lands that are not protected by federal or state cultural resource status and regulatory protections could decrease the regional resource base and potentially limit management options within the management area.

Surface disturbance activities associated with mining, renewable energy, road development, transmission lines, and fire management would be subject to NEPA review prior to project activities in adherence to federal and state laws. As directed by law, cultural resources eligible for the NRHP have been avoided, or if this was not possible, recovered for their scientific value. Data recovery of important cultural sites has expanded the regional database and knowledge of prehistoric and historic contexts. Future actions involving surface-disturbing activities would require a similar set of procedures. This could result in the identification of more cultural resource sites, and an increase in information concerning cultural resources within the decision area.

Impacts associated with dispersed/casual recreation, OHV use and livestock grazing have contributed to the degradation of site settings and incidental damage to cultural sites. Continued increases in OHV use would increase impacts on cultural resources. Without sufficient law enforcement, actions such as off-road travel, vandalism, and pot hunting would result in significant impacts on cultural resources. Livestock and wildlife would increase cumulative impacts associated with wildlife congregation at or across cultural resource sites. Excessive trampling at spring sources and along stream banks, as well as trailing, could remove protective vegetation cover and increase compaction, which could affect cultural resources by accelerating natural erosion and exposing artifacts to illegal surface collection and vandalism. Although these impacts would be localized to individual sites, when combined with similar effects from livestock grazing, impacts on cultural resources would increase in magnitude. These impacts would be mitigated on a case-by-case basis as discovered. Natural-caused disturbances, such as wildfires, damage or completely destroy cultural resources, in particular historic structures and rock art.

Under Alternative A only specific identified/recorded sites would be allocated to conservation or socio-cultural use.

Under Alternative B the majority of National Register eligible sites would be allocated and managed by site type for Conservation, Traditional and/or Scientific Use. No interpretative sites would be considered or developed.

Under Alternative C the majority of National Register eligible sites would be allocated and managed by site type for Conservation, Scientific, Public and/or Traditional Use (as appropriate). Interpretative sites could be developed.

Under Alternative D the majority of National Register eligible site types would be allocated and managed by site type for Conservation, Scientific, Traditional, and/or Public Use. Interpretative sites would be considered and developed as appropriate for the resource.

4.2.10.9 Irreversible and Irretrievable Commitments of Resources

Laws protecting cultural resources would provide for mitigation of irreversible and irretrievable impacts on cultural resources from permitted activity.

4.2.10.10 Unavoidable Adverse Impacts

Unavoidable damage to cultural resources from permitted activities could occur if resources undetected during surveys were identified during ground disturbing activities. In these instances, further impacts would be ceased upon discovery and the resource would be mitigated to minimize data loss. Although mitigation measures could be implemented for scientific data recovery (leaving portions of cultural resource sites undisturbed for future exploration), the area of excavation would be destroyed and future research would not be possible.

Unavoidable loss or destruction of cultural resources would also occur from unpermitted activities, dispersed/casual recreation and OHV use, specifically in areas of high cultural sensitivity. Unavoidable loss of cultural resources due to non-recognition, lack of information

and documentation, erosion, casual collection, and inadvertent destruction or use would also occur. Broad-scale sampling and classification of areas with a high likelihood of containing cultural resources would be expected to greatly reduce the probability of unavoidable adverse impacts to the resource.

4.2.11 Paleontological Resources

This section discusses impacts on paleontological resources from management actions of other resources and resource uses. Impacts on paleontological resources occur from natural weathering and erosion and from surface disturbing activities, excavation, and theft or vandalism. In general, impacts on paleontological resource include the physical destruction or damage of fossil-bearing geological formations and resulting loss of vertebrate fossils or other scientifically significant fossil resources. Without removing some rock surrounding fossils, the fossils would remain largely undetected; therefore, management actions that result in erosion do not necessarily result in damage to paleontological resources. Excessive erosion, especially from other surface disturbance, could damage fossils at the surface. A complete inventory and classification of outcrops, formation, and fossil locations is not available. While the location of every significant paleontological locality in the field office is not known, the analysis considers the different management actions and their potential to directly or indirectly affect paleontological resources.

For this analysis, impacts on paleontological resources would be significant if there were any substantial direct or indirect damage or destruction to or loss of vertebrate fossils or other scientifically significant fossil resources.

4.2.11.1 Methods and Assumptions

The BLM has authority to manage and protect paleontological resources under the Paleontological Resources Preservation Act (PRPA) 2009 (P.L. 111-011 Title VI Subtitle D). PRPA directs the BLM to manage, protect, and preserve paleontological resources using scientific principles and expertise as well as provide for public education and awareness, scientific research, curation, and other proactive efforts. Specific guidance is found in Instruction Memorandums 2008-009 and 2009-011 regarding the use of the Potential Fossil Yield Classification (PFYC) system and the "Assessment of Mitigation of Potential Impacts to Paleontological Resources." The BLM manages paleontological resources for their scientific, educational, and recreational values and to ensure that any impacts are mitigated.

This analysis was based on the following assumptions:

- Scientifically significant fossils would continue to be discovered throughout the Billings Field Office decision area. Most discoveries would occur in PFYC Class 4 and 5 areas.
- Only small discrete portions of the decision area have been formally inventoried for paleontological resources. There are known fossil-bearing geologic

formations and exposures, and there is some potential for paleontological resource occurrences in other discrete locations in the decision area.

- Inventories conducted before surface disturbing activities in PFYC Class 3, 4, or 5 areas would result in the identification and evaluation of previously undiscovered resources, which BLM would manage accordingly.
- Vandalism and unauthorized collecting can destroy important fossils or remove them from their context and availability for scientific study and public interpretation. Small quantities of common invertebrate fossils may be removed without permit for non-commercial use.
- Scientific, commercial, and popular interest in fossils and paleontological resource is expected to continue or increase.
- Exposed fossils or other scientifically important paleontological resources can be damaged by wind and water erosion, animal and human intrusion, and natural deterioration.
- Mitigation may be warranted where risks to vertebrate fossils or scientifically significant occurrences of invertebrate or plant fossils are expected. Mitigation may be accomplished, for example by collecting data and fossil material, by obtaining representative samples of the fossils, by avoiding areas where fossils are found, or in some cases, by no action.
- Unmitigated surface disturbing activities would dislodge or damage paleontological resources and features that were not visible before surface disturbance.

Impacts on paleontological resources would result from management actions that could cause surface disturbance. Because of their widespread occurrence and generally unsupervised nature, casual recreation and OHV use would likely have the greatest impact on paleontological resources. Unlike permitted activities (e.g. oil and gas development or ROW development) that are subject to site-specific evaluations and monitoring, recreation and OHV activity are not under much scrutiny. Lands and realty actions could also remove or add land subject to federal protections for paleontological resources. To a lesser extent, effects on paleontological resources could occur from actions that open or close land to minor surface disturbances, allow potentially incompatible uses, and actions that could affect natural processes such as erosion.

At the implementation level, evaluating all proposed surface disturbing actions and identifying and implementing mitigating measures would locate, evaluate, and protect, where appropriate, vertebrate fossils or other scientifically significant fossil resources in the decision area. Mitigation measures include project relocation or redesign (avoidance), or various scientific data recovery methods such as recordation, surface collection, subsurface testing, or excavation. These mitigation actions would prevent significant impacts on paleontological resources and increase the knowledge and understanding of the area's paleontological resources and of the history of life on earth. These actions would minimize the potential for unmitigated

impacts on known paleontological resources. Through this evaluation process, proposed land uses initiated or authorized by BLM would not destroy important vertebrate fossils or other scientifically significant fossil resources. Proposed land uses would include actions such as mineral exploration and development (including oil and gas development), development and construction within ROWs, recreation site development, vegetation treatment projects, forest and woodland product harvest, special recreation permitting, or construction of range improvements. However, inadvertent damage to paleontological resources that are undetected during the evaluation process (found during and not before ground disturbing activities) could occur.

Permitted ground disturbance can lead to positive effects such as the discovery of scientifically important paleontological resources. In these cases, there would be requirements to stop work and allow the BLM to evaluate the discovery and take appropriate action to protect or remove the resource. Scientific research would also continue under BLM permits, leading to the discovery, recovery, and interpretation of paleontological resources.

4.2.11.2 Environmental Consequences

Impacts to paleontological resources would result from actions proposed under the following resource management programs:

- Soil
- Water
- Vegetation
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Cultural Resources
- Paleontological Resources
- Fire Ecology and Management
- Lands with Wilderness Characteristics
- Energy and Mineral Resources
- Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Renewable Energy
- Special Designations

For all Alternatives, Paleontological Resources would not be impacted by Air, Climate Change, Geology, Wild Horses and Burros, Visual Resources, Cave and Karst Resources, or Transportation and Facilities.

4.2.11.3 Impacts Common to All Alternatives

The impacts to paleontological resources do not vary by Alternative, the intensity of impacts could vary, but the impacts are the same regardless of the Alternative.

4.2.11.3.1 Impacts from Soil

Measures under all Alternatives to limit soil erosion and surface disturbing activities would indirectly impact the preservation of fossils, if present, by reducing exposure of paleontological resources and direct impacts to paleontological resources. While management actions vary by percent slope, the short and long-term impacts to paleontological resources would remain the same across all Alternatives.

4.2.11.3.2 Impacts from Water, Vegetation – Riparian and Wetlands, Wildlife Habitat and Special Status Species, and Fisheries Habitat and Special Status Species

Measures under all Alternatives to limit surface disturbing activities would indirectly impact the preservation of fossil, if present, by reducing exposure of paleontological resource and direct impacts to fossil resources. While management actions vary by acres of surface disturbance restrictions, the long and short-term impacts to paleontological resources would remain the same across all Alternatives.

4.2.11.3.3 Impacts from Vegetation – Forests and Woodlands, Rangelands, Invasive Species and Noxious Weeds, Livestock Grazing, and Forestry and Woodland Products

Under all Alternatives, the impacts to paleontological resources from Vegetation – Forests and Woodlands, Rangelands, Invasive Species and Noxious Weeds, and Forestry and Woodland Products management would remain the same. Surface disturbing activities associated with these resources and resource uses could damage or dislocate paleontological resources that were not discovered prior to surface disturbance. Some methods of vegetation treatment could disturb the surface (e.g. creation of access roads, use of heavy equipment) often creating impacts on mineral soils. While such surface disturbance could damage or destroy paleontological resources, in most areas throughout the decision area with paleontological resources present at or near the surface would not be conducive to supporting significant vegetation.

4.2.11.3.4 Impacts from Cultural Resources

Paleontological resource could be identified during cultural resource inventories, site recordations, site evaluations, and data recovery excavations. This could result in the identification and documentation of paleontological resources. Actions to protect cultural resources that restrict surface disturbing activities, incompatible land uses, or access would reduce the potential for these activities to damage paleontological resources that are not inventoried. Paleontological resources found in context with archaeological resources are considered archaeological resources for purposes of ARPA and NHPA. There would be long-term effects on paleontological resources resulting from awareness and enforcement of cultural

resources protection measures. These impacts to paleontological resources would be the same for all Alternatives.

4.2.11.3.5 Impacts from Paleontological Resources

Under all Alternatives, the impacts to paleontological resources from paleontological resource management would remain the same. Ongoing and planned management measures would include identifying areas where resources could be present, determining whether a field inventory is needed, identifying resource conflicts, avoiding and mitigating impacts, adhering to the requirement to report discoveries, and enforcing permit requirements through scientific uses. Impacts would be avoided in the long term through these management measures, which are designed to identify and protect scientifically important resources in planning and project activities.

4.2.11.3.6 Impacts from Fire Ecology and Management

Wildfire suppression can involve ground disturbing activities at depths that could directly affect paleontological resources. These actions include fire line construction, bulldozing access roads, and heavy equipment use.

Both wildfire suppression actions and prescribed fire actions can remove vegetation and expose previously undiscovered resources, allowing their study and protection. However locations exposed by fire can be susceptible to erosion, vandalism, and unauthorized collecting. The expected depth, intensity, and location of ground disturbance associated with prescribed fire and other fuels treatments would not likely affect paleontological resources in most cases.

Stipulations for Fire Ecology and Management address a range of resource concerns associated with fire suppression, prescribed fire, non-fire treatments, and restoration activities. Although some paleontological resource locations are discrete and non-vegetated, it is not possible to anticipate all resource locations and as a result, some impacts could occur. The Alternatives would vary in amount of wildfire suppression and other fuels treatments that are permitted or anticipated to occur. Over the next 10 years, fuels treatments would range from 6,280 acres (Alternative A) to 21,700 acres (Alternatives B-D). The risk of impacts would be similar under all of the Alternatives.

4.2.11.3.7 Impacts from Lands with Wilderness Characteristics, Special Designations (ACECs, Wilderness Study Areas, and Pryor Mountain Wild Horse Range)

Management that would restrict ground disturbance would indirectly provide protection for any paleontological resources that could be present. Special designations established as a result of the presence of paleontological resources (i.e. Bridger Fossil Area ACEC, Bridger Fossil Area National Natural Landmark, Crooked Creek Natural Area, Crooked Creek National Natural Landmark) or where paleontological resources are one of the values for the special designation (East Pryor ACEC, Pryor Mountain WSA) have management prescriptions in place specifically for paleontological resources. The potential for impacts would be similar and low for all

Alternatives and would be addressed through planning and permitting stipulations at the implementation level.

4.2.11.3.8 Impacts from Energy and Mineral Resources

Anticipated levels of energy and mineral development and resulting surface disturbance are similar under all Alternatives. Energy and mineral development for fluid minerals includes planning review and stipulations to protect resources. Energy and mineral development could expose new outcrops or fossil locations that could be made available for study or public education and interpretation.

Mineral materials development in alluvial areas could expose vertebrates. Permits to remove mineral materials typically include approval conditions that require consultation with BLM and possibly cessation of activities if vertebrate paleontological resources are uncovered.

The potential for impacts would be similar and for all Alternatives and would be addressed through planning and permitting stipulations.

4.2.11.3.9 Impacts from Lands and Realty

Paleontological resources could be identified during paleontological assessments of lands acquired or disposed of during land tenure adjustments. This management action could result in the identification and documentation of paleontological resources. For land tenure adjustments, ensuring that resources are documented, evaluated, and mitigated prior to land ownership changes would ensure that lands with scientifically significant paleontological resources are retained or obtained, thus providing protection under federal management policies.

4.2.11.3.10 Impacts from Recreation and Visitor Services

The potential for impacts to paleontological resources would be greater from non-developed recreation sites than from developed recreation sites. While non- developed recreation sites would be dispersed, reducing impacts such as compaction or inadvertent damage or removal of scientifically significant paleontological resources, non- developed recreation sites are usually established by public/users and therefore do not undergo paleontological resource assessments or inventories prior to being established. Paleontological resources could be moved from their original locations, damaged, destroyed, vandalized, or stolen. These impacts would not be mitigated before disturbance because of the dispersed, unpermitted nature of casual recreation use. These impacts, in some cases, could be mitigated on a case-by case basis when discovered.

4.2.11.3.11 Impacts from Trails and Travel Management

The expected depth and intensity of surface disturbance, soil compaction, altered surface water drainage, and erosion associated with dispersed recreation and OHV use would affect paleontological resources in most cases if not previously mitigated with trail designation and/or travel plans. In addition, OHV use can provide easy access to paleontological resources, leading to vandalism and unauthorized collection. The potential for these kinds of impacts would increase as population and recreational use increases. Route designations and increased

routes closed to OHV/travel use would be proposed under Alternatives B, C, and D. These actions would help protect paleontological resources that are located on or near travel routes.

4.2.11.4 Cumulative Impacts

Cumulative impacts on paleontological resources include consideration of the proposed Alternatives in the context of past, present, and reasonably foreseeable future actions within the decision area. The impacts to paleontological resources are the same for all Alternatives, only varying with the intensity of impacts. Management actions with the most potential to impact paleontological resources include minerals and energy development, fire suppression, vandalism, dispersed recreation, and unauthorized collection of paleontological resources. Management actions in the RMP are not expected to result in cumulative impacts to paleontological resources.

4.2.11.5 Irreversible and Irretrievable Commitments of Resources

Laws protecting paleontological resources would provide for mitigation of irreversible and irretrievable impacts on paleontological resources from permitted activities.

4.2.11.6 Unavoidable Adverse Impacts

Unavoidable damage to paleontological resources from permitted activities could occur if resources undetected during surveys were identified during ground disturbing activities. In these instances, further impacts would cease upon discovery with a work stop provision and the resource would be mitigated to minimize data loss. Although mitigation measures could be implemented for scientific data recovery, the area of excavation would be destroyed and future research would not be possible.

Unavoidable loss or destruction of paleontological resources would also occur from unpermitted activities, such as casual/dispersed recreation and OHV use. Unavoidable loss of paleontological resources due to non-recognition, lack of information and documentation, erosion, casual collection, and inadvertent destruction or use would also occur. Broad-scale sampling and classification of areas with a high likelihood of containing paleontological resources would be expected to greatly reduce the probability of unavoidable adverse impacts to the resource.

4.2.12 Visual Resources

The BLM's VRM class objectives were used in analyzing impacts on visual resources. These objectives provide a baseline for determining how much a proposed management action would affect visual resources/scenic quality, sensitivity levels and distance zones, as well as determining the level of disturbance an area can support while still meeting visual resource objectives. The following BLM VRM class objectives and descriptions are summarized from BLM Manual Handbook H-8431-1 (1986).

- VRM Class I – The objective of Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activities. The level of change to the characteristic landscape should be very low and should not attract attention. Currently WSAs are managed under a number of different VRM classes. In accordance with BLM IM-2000-096, all WSAs would be managed as VRM Class I following completion of this RMP.

- VRM Class II – The objective of Class II is to retain the existing character of the landscape. The level of change to the landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes to the landscape must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- VRM Class III – The objective of Class III is to partially retain the existing character of the landscape. The level of change to the landscape should be moderate. Management activities may attract the attention of the casual observer, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- VRM Class IV – The objective of Class IV is to provide for management activities that require major modifications to the existing character of the landscape. The level of change to the landscape can be high. The management activities could dominate the view and may be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic visual elements of form, line, color, and texture.

The criteria for analysis were the number of acres proposed for designation under the VRM classes, and the level of impacts and surface disturbances permitted under each class. Analyses of the impacts on visual resources are discussed in terms of the number of acres in each VRM category because the proposed RMP management actions would be required to comply with (e.g., not exceed) the approved VRM class objectives.

4.2.12.1 Methods and Assumptions

The following assumptions regarding future management of visual resources are made:

- Activities proposed that would not initially meet VRM objectives for the area would be mitigated to the extent needed to meet the objectives. Those activities proposed that could not be mitigated would not be authorized.

- The greater the size and/or severity of surface disturbance, the greater the impact there would be to scenic quality, sensitivity levels, and distance zones.

- All actions proposed during the RMP process must consider the importance of the visual values and the effects the project may have on these values.

4.2.12.2 Environmental Consequences

Impacts to Visual Resources would result from actions proposed under the following resource management programs:

- Vegetation
- Wildlife habitat and Special Status Species
- Fisheries habitat and special status species
- Cultural Resources
- Visual Resources
- Wildland Fire Ecology and Management
- Energy and Mineral resources
- Impacts from Forestry and Woodland Products
- Lands and Realty
- Livestock Grazing
- Recreation
- Trails and Travel Management
- Renewable Energy
- Special Designations

Other programs were determined to have little or no impact on visual resources.

4.2.12.3 Impacts Common to All

4.2.12.3.1 Impacts from Vegetation

Over the long term, restoration and vegetative treatments designed to improve ecological conditions could indirectly enhance visual resources on a localized basis. However, in the short term, methods used to achieve improved ecological conditions could directly create visual changes to landscape form, line, color, and texture. Such impacts would range from minor to moderate, depend on scope and magnitude of treatment and the methods used. Chemical and biological methods would tend to gradually create visual contrasts that mimic natural ecological change, whereas fire and mechanical methods would create such contrasts more suddenly and noticeably. Depending on the VRM class where a particular treatment is conducted, impacts to the landscape could either meet or not meet the visual objective for the class. For example, treatments that create moderate change in VRM Class III areas would likely meet the visual standard, whereas moderate change that attracts attention in a VRM Class I or II area would not.

The Alternatives allows for a full range of treatment methods (including mechanical, wildfire and/or prescribed fire, and chemical methods). Some of the treatments methods proposed (e.g., mechanical and chemical) would result in localized and short-term impacts to visual resources by creating visual contrasts. What changes by Alternative is the size and the type of treatment as well as the areas potentially available for treatment.

Noxious weeds could affect visual resources to a minor degree by replacing native vegetation and creating changes in existing landscape form, color, or texture. Efforts to control or eliminate noxious weeds would reduce such impacts. Visual impacts created by the localized, small-scale collection or use of vegetative materials would be negligible; however, any vegetation removal associated with larger-scale research or restoration efforts could produce impacts similar to those described above for mechanical vegetative treatments.

4.2.12.3.2 Impacts from Wildlife Habitat and Special Status Species

All Alternatives prohibit actions that destroy, adversely modify, or fragment Federally-listed species habitat; proposes habitat improvements for special status species; and consider special status species habitat in all wildland fire suppression efforts.

4.2.12.3.3 Impacts from Fisheries Habitat and Special Status Species

All Alternatives include, by policy and Manual, provisions to avoid or reduce habitat fragmentation such as collocating facilities, employing directional drilling, reclaiming redundant roads, and reclaiming roads no longer serving their intended purpose, and using topographic and vegetation screening to reduce the influence of intrusions. These measures would generally complement the maintenance of landscape character and the conservation of visual resources.

Restoration measures that involve surface or vegetation disturbing components, however, would create noticeable contrast or reduce scenic quality ratings. Such impacts would be direct and short term, and could range from minor to moderate, depending on the type of treatment/restoration and the amount of change that it would cause to existing landscape form, line, color, or texture.

4.2.12.3.4 Impacts from Cultural Resources

The protective management of cultural resources would generally complement the maintenance of landscape character and the conservation of visual resources. Where excavation or restoration measures involving surface or vegetation disturbing activities, noticeable contrast or reduced scenic quality ratings could result. Impacts would be direct, localized, and short-term and would depending on the type, scope, and magnitude of excavation/restoration and the amount of change that it would cause to existing landscape form, line, color, or texture. The potential for reducing or restricting public access to cultural resources could reduce public opportunities to view some scenic resources. Such reduced opportunities would depend on the type and location of the restriction and its overlap with known scenic viewing locations.

4.2.12.3.5 Impacts from Visual Resources

Alternative A represents the VRI classes currently in place without Visual Resource Management Class designation. Per BLM policy, WSAs would be managed as VRM Class I under all Alternatives to preserve their scenic value. Under Alternative A, actions to restore natural conditions or appearance in areas already modified may succeed on a localized basis, reducing some visual contrast in the long-term.

In the other Alternatives, Areas managed as VRM Class I or II would experience little to no change to their landscape character and, thus, their scenic value. Areas managed as VRM Class III would allow for moderate modifications of the landscape. Use of the VRM contrast rating process would continue to provide site-specific visual analysis of proposed surface disturbing activities to ensure that such projects meet visual objectives in project areas through design features and/or mitigation. Both short-term and long-term, indirect effects would accrue over the life of the RMP as management practices are constrained by the contrast rating process to sustain or enhance visual landscapes. Proposals would be required to mitigate impacts to scenic quality through project design (such as requiring new facilities to be painted to blend in with the surrounding landscape) and location and conform to the designated VRM class objectives.

4.2.12.3.6 Impacts from Wildfire Ecology

Impacts to visual resources from prevention and mitigation programs aimed at reducing unwanted ignitions in wildfire use and non-wildfire use areas would be similar to those described above for vegetative treatments. However, actions related to prevention could reduce human-caused ignitions and related visual impacts caused by fire. Post fire rehabilitation methods, such as seed drilling, mulching, netting, or hydroseeding, could directly result in localized visual contrasts. Impacts would be minor to moderate in the short term, but become negligible in the long-term. Wildfires and prescribed fires would result in smoke, causing short-term minor to moderate impacts on visual resources. Such fires would also affect visual resources due to increased vehicle traffic, fire lines, and the contrast between burned and unburned areas. The latter could vary in size from a few acres to thousands of acres.

Potential visual effects from a severe wildfire may include loss of trees, blackening of the landscape, blackened deadfall, including the disruption of line and form from ground disturbing activities. Large areas, including the more visually sensitive areas in VRM Classes I and II could be blackened and charred and large amounts of smoke could be produced.

4.2.12.3.7 Impacts from Forestry and Woodland Products

Except where these kinds of actions may be restricted (WSAs, several of the Recreation Management Areas, ACECs) the impacts would be the same in all Alternatives as those described below. The changes by Alternative are the size and the areas where these activities would be allowed or restricted.

Over the long term, impacts from forestry and woodland product activities designed to improve ecological conditions could indirectly enhance visual resources on a localized basis. However, in the short term, methods used to achieve improved ecological conditions could directly create visual changes to landscape form, line, color, and texture. Such impacts would range from

minor to moderate, depending on scope and magnitude of the activity, the landscape and the methods used. Existing mitigation methods would tend to gradually reduce visual contrasts that mimic natural ecological change, but activities could create such contrasts more suddenly and noticeably as well. Depending on the VRM class where a particular treatment is conducted, impacts to the landscape could either meet or not meet the visual objective for the class. For example, treatments that create moderate change in VRM Class III areas would likely meet the visual standard, whereas moderate change that attracts attention in a VRM Class II area would not. Lands within WSAs (VRM Class I) would be managed by the IMP and these actions would not be allowed.

The Alternatives allows for a full range of activities using different methods. Some of the methods proposed would result in localized and short-term impacts to visual resources by creating visual contrasts. All proposed actions would be addressed on a case-by-case basis through NEPA.

4.2.12.3.8 Impacts from Land and Realty

Land tenure decisions include both the disposal and acquisition of land. When public lands are disposed of, BLM no longer controls the scenery and development could affect the visual qualities of adjoining public lands. Since it is unknown what lands if any may be sold over the next 15 to 20 years, it is unknown if these would be of high value due to visual interest. If the BLM acquires lands, it also acquires responsibility for the scenery. Acquired lands would be managed according to VRM objectives on adjoining parcels.

Although the BLM would no longer control the scenery on lands disposed of by FLPMA Section 203 sales and their development could create minor to major, long-term, direct, localized visual contrasts with the surrounding landscape, the lands identified for sale are usually isolated, hard-to-manage parcels or are adjacent to developed areas in established communities. These lands would therefore have less potential of being high value for visual interest, so the potential for the loss of public viewing of scenic resources on these lands would be low.

Impacts to visual resources could result from issuance of land use authorizations (ROWs, permits, leases, easements, etc.). Impacts from issuance of these authorizations would vary based upon the nature and purpose of the authorization and the amount of change it would cause to existing landscape form, line, color, or texture. These authorizations could include a reduction in scenic quality ratings. Impacts generally be minor to moderate and would be addressed in site-specific NEPA analysis.

Where possible, new rights-of-way and communication sites would be co-located in existing corridors or sites. Although such developments could change landscapes, collocating new development with existing facilities would protect undisturbed areas from visual intrusions.

4.2.12.3.9 Impacts from Livestock Grazing

Where livestock grazing continues to be authorized, the installation of additional fences or livestock improvements (cattle guards, water developments, and roads necessary to access

improvement sites) could directly impact visual resources by adding forms, lines, colors, and textures not found in the surrounding landscape. Such impacts would be localized, long term, and could range from negligible to moderate. Where livestock grazing would not be authorized, the potential for the abovementioned impacts would be eliminated, effectively maintaining visual resource integrity over the long-term. Any removal of livestock facilities in these areas would enhance visual resources in the long-term by bringing the area back into its natural or near-natural condition. Areas where livestock tend to congregate would create contrasts that would be noticeable to the casual observer. These impacts would typically be long term, direct, and localized. Implementing Montana's Standards for Rangeland Health would increase the potential for directly improving or enhancing visual resources.

4.2.12.3.10 Impacts from Recreation

Overall recreation guidance, ERMA management decisions, and the continued issuance of special recreation permits would not affect visual resources. No specific facilities are proposed, but any constructed would be based on needs for resource protection and user demand. New facilities or new types of commercial activities could result in changes to the landscape. However, specific projects are not identified at this time and therefore cannot be analyzed.

SRMAs would likely attract more visitor use to the BiFO in the long-term. Increased visitor use could generate localized visual contrasts in the form of dust from traffic, changes to camping areas, and potential impacts from illegal, off-road driving. More intensive management of these areas may enhance public access to scenic views and overlooks. SRMA management decisions could affect scenic resources.

Recreational activities have site-specific impacts near frequent and high-use areas such as parking lots, trailheads, and other recreation-related use areas. Long duration trail use (e.g., walking, equestrian, OHV, and mountain biking), especially during wet periods, could result in loss of vegetation cover; large group recreation events and camping could compact soils, which could lead to changes in plant vigor. These impacts would change the characteristic landscape and would be site-specific and localized. Dispersed recreation activities would create fewer impacts to visual resources than these more intensive, concentrated recreation uses. Closing and/or rehabilitating undeveloped sites would restore the visual resources of those sites.

4.2.12.3.11 Impacts from Travel Management

The designation of OHV open areas can cause adverse impacts to landscapes and visual values. The level of use, season of use, type of soil, and vegetative community influence the amount of change to the landscape. Cross-country OHV use can result in visual contrasts in color from disturbed soils and vegetation and contrasting linear disturbance on the landscape. The length of time observed and distance from important viewpoints can influence the perceived changes to the overall visual values. In Alternatives C and D there is an SRMA at the South Hills area specifically for OHV cross country use. The lands are inventoried as Class C and designated as VRM Class III in all Alternatives. The management of this type of OHV use (hill climbs) can meet the objectives for VRM Class III but there would be adverse impacts.

See also the Travel Management Appendix O for a detailed analysis of the consequences of route proliferation, route density, general travel, and safety considerations.

4.2.12.3.12 Impacts from Renewable Energy

Although the potential for development appears low at this time, if wind and/or solar energy were developed in the lands managed by the BiFO, it would impact visual resources. Introducing large wind structures and solar arrays would be a noticeable change to the landscape. In all Alternatives exploration and development would be considered on a case-by-case basis. Because of the potential for a high level of change to the landscape, these developments would only be consistent with VRM Class III and IV objectives. Although lands designated as VRM Class III would be managed for avoidance, this designation does not automatically preclude development; however it does place more restrictions on development by allowing only moderate impacts as opposed to major impacts in VRM Class IV lands.

Wind and/or solar energy development would be considered throughout the lands managed by the BiFO except for WSAs (VRM Class I) areas. Given the landscape characteristics of the BiFO and other designations being considered in the Alternatives for other resources, none of the VRM Class II lands would be likely to be developed regardless of VRM Classification. These lands would be designated as “exclusion” for development.

4.2.12.3.13 Impacts from Special Designations

Areas of Critical Environmental Concern

Although ACEC designation alone does not necessarily provide protection, management actions included in ACECs are often more restrictive, which indirectly provides protection for visual resources. Protections associated with ACEC designation that would affect visual resources include managing oil and gas leasing as closed or open with no surface occupancy; more restrictive VRM designations; restricting livestock grazing to protect resource values; and travel limitations.

Wilderness Study Areas

Managing wilderness study areas under BLM Manual 6330 would prevent most ground disturbing activities. This would contribute to preserving existing landscape character to a major degree over the long-term.

4.2.12.4 Alternative A

4.2.12.4.1 Impacts from Vegetation

Same as Common to All section described above. Alternative A allows for a full range of treatment methods (including mechanical, wildland and/or prescribed fire, and chemical methods). Some of the treatments methods proposed (e.g., mechanical and chemical) would result in localized and short-term impacts to visual resources by creating visual contrasts. In this Alternative there are few restrictive areas.

4.2.12.4.2 Impacts from Wildlife Habitat and Special Status Species

Impacts would be the same as identified in the Impacts Common to All section described above.

4.2.12.4.3 Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as described above in the common to All section and could be localized and long term, depending on the placement, design, and use of native materials and the area's VRM class designation.

4.2.12.4.4 Impacts from Cultural Resources

Same as described above in the Common to All section.

4.2.12.4.5 Impacts from Visual Resources

Alternative A represents the VRI classes currently in place. Per BLM policy, WSAs would be managed as VRM Class I under all action Alternatives to preserve their scenic value. Areas managed as VRI Class A would experience little to no change to their landscape character and, thus, their scenic value. Areas managed as VRI Class C would allow for major modifications of the landscape. Use of the VRM contrast rating process would continue to provide site-specific visual analysis of proposed surface disturbing activities to ensure that such projects meet visual objectives in project areas through design features and/or mitigation. Both short-term and long-term, indirect effects would accrue over the life of the RMP as management practices are constrained by the contrast rating process to sustain or enhance visual landscapes. Proposals would be required to mitigate impacts to scenic quality through project design (such as requiring new facilities to be painted to blend in with the surrounding landscape) and location and conform to the designated VRI class.

Under Alternative A, actions to restore natural conditions or appearance in areas already modified may succeed on a localized basis, reducing some visual contrast in the long-term.

4.2.12.4.6 Impacts from Fire Ecology and Management

Impacts to visual resources from prevention and mitigation programs aimed at reducing unwanted ignitions in wildfire use and non-wildfire use areas would be similar to those described above for vegetative treatments and in the Common to All section for Fire Ecology and Management.

4.2.12.4.7 Impacts from Energy and Mineral Resources

Leasable Minerals

The oil and gas reasonably foreseeable development (RFD) scenario identified several areas with moderate potential where projected leasing and subsequent development could occur. Total annual disturbance for federal wells is approximately 13.5 acres to 27 acres of short-term disturbance and 5.5 to 15.5 acres of long-term disturbance for federal wells drilled in the Billings FO. In the area with moderate development potential generally has a natural-appearing

landscape but allows for screening of most projects because of topography and vegetation. Road construction in these areas could require more cutting and filling, which would be more visible on the landscape. However, this area would still contain relatively few wells, with few disturbance acres spread over a large area, resulting in minimum impacts to visual resources.

The area with low development potential is generally more remote, with natural-appearing landscapes, and visitors may be more sensitive to landscape changes. Therefore, a few wells spread over such a large area would have a minimal impact on visual resources. The overall landscape character and vistas would not change.

Locatable Minerals

Exploration and development of locatable minerals create surface disturbances that could adversely impact visual resources. Impacts to visual resources would be unavoidable because of major surface disturbing activities to mine for the mineral sources. However, little development of locatable minerals is expected during the next 15 to 20 years. Under this Alternative there would be approximately 39,700 acres withdrawn (and continue to be recommended for withdrawal) from locatable minerals. This would protect and preserve view sheds in those areas.

Mineral Materials

Salable minerals are under the same restrictions as oil and gas resources. The same lands that are open to leasing subject to the standard terms and conditions or open to leasing subject to moderate constraints (TL, CSU) would be available for salable mineral disposal, just as those lands that are either closed to leasing or open to leasing subject to major constraints (NSO) would be unavailable for salable mineral disposal.

Under Alternative A, 44,583 acres would be closed to disposal of mineral materials and 26,131 acres would be closed to leasable solid minerals. Closing or withdrawing areas from mineral operations would prevent impacts to scenery because no surface-disturbing activities associated with mining of salable minerals would be allowed in those areas.

4.2.12.4.8 Impacts from Forestry and Woodland Products

Same as Common to All Alternatives described above.

4.2.12.4.9 Impacts from Lands and Realty

The impacts would be the same as described in the Common to All section, above

4.2.12.4.10 Impacts from Livestock Grazing

The impacts would be the same as described in the Common to All section, above

4.2.12.4.11 Impacts from Recreation

The impacts would be the same as described in the Common to All section, above

4.2.12.4.12 Impacts from Travel Management

Impacts from Travel Management decisions on visual resources in this Alternative are that on about 101, 027 acres site specific travel planning has been completed and through these decisions the visual resources would be protected by actions that reduce route proliferation and density and their impacts. However, in the areas designated as "limited to existing roads and trails" visual impacts could continue to escalate as unauthorized route creation and proliferation by users makes the 'existing network' ever-changing. Current management decisions of 'closed', 'limited', or 'open with restrictions' on some 107 routes (190 miles), would continue to maintain a reduced potential for new, unauthorized routes by maintaining a reduced accessibility on 18 percent of the routes of concern. This would continue to directly reduce the potential for illegal route creation in the long term, which would contribute to minimizing visual impacts on these specific routes.

4.2.12.4.13 Impacts from Renewable Energy

The impacts would generally be the same as described in the Common to All section, above. In this Alternative, the potential for activities would be within the Class B and C inventory lands. Subject to case-by-case NEPA, there would be less mitigation measures required in the Class C lands.

4.2.12.4.14 Impacts from Special Designations

ACECs

Alternative A designates no new ACECs, so no special management to protect the scenic landscape (such as managing oil and gas leasing as closed or open with no surface occupancy, more restrictive VRM designations, or travel limitations) is proposed on those acres proposed for ACEC designation in other Alternatives. Allowing surface disturbing uses that could cause irreparable damage to the relevant and important values in these areas could impact visual resources.

Scenic qualities were recognized in the existing Four Dances SRMA/ACEC and Meeteetse Spires ACEC and for these areas; the scenic values are specifically protected. Management actions proposed in the other existing ACECs also provides indirect protection for visual resources, as described in the Common to All Section.

Wild and Scenic Rivers

Protecting the outstandingly remarkable values of the eligible wild and scenic rivers would help protect visual resources by preventing ground disturbing activities that would impact the scenic character in the river corridors. All eligible segments (7 segments – 14.08 miles) would be managed to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under this Alternative. This would preserve the existing character of the landscape in these areas.

4.2.12.5 Alternative B

4.2.12.5.1 Impacts from Vegetation

Same as Common to All section described above. Alternative A allows for a full range of treatment methods (including mechanical, wildland and/or prescribed fire, and chemical methods). Some of the treatments methods proposed (e.g., mechanical and chemical) would result in localized and short-term impacts to visual resources by creating visual contrasts. In this Alternative there are few restrictive areas.

4.2.12.5.2 Impacts from Wildlife Habitat and Special Status Species

Impacts would be the same as identified in the Impacts Common to All section described above.

4.2.12.5.3 Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as described above in the common to All section and could be localized and long term, depending on the placement, design, and use of native materials and the area's VRM class designation.

4.2.12.5.4 Impacts from Cultural Resources

Same as described above in the Common to All section.

4.2.12.5.5 Impacts from Visual Resources

Generally, the consequences are described in the Common to All Section, above. Per BLM policy, WSAs would be managed as VRM Class I under all action Alternatives to preserve their scenic value. Areas managed as VRM Class II would experience little to no change to their landscape character and, thus, their scenic value. Areas managed as VRM Class III would allow for moderate modifications of the landscape. Use of the VRM contrast rating process would continue to provide site-specific visual analysis of proposed surface disturbing activities to ensure that such projects meet visual objectives in project areas through design features and/or mitigation. Both short-term and long-term, indirect effects would accrue over the life of the RMP as management practices are constrained by the contrast rating process to sustain or enhance visual landscapes. Proposals would be required to mitigate impacts to scenic quality through project design (such as requiring new facilities to be painted to blend in with the surrounding landscape) and location and conform to the designated VRM class.

In this Alternative there is approximately the same acreage in VRM Class I and II as in Alternative C, and approximately the same VRM Class III lands as in Alterative D, but more than in Alternative C. Visual protection measures for other resources are the reason for the changes but since the overall acreages vary by a small amount, there is not substantial impact difference.

4.2.12.5.6 Impacts from Fire Ecology and Management

Impacts to visual resources from prevention and mitigation programs aimed at reducing unwanted ignitions in wildfire use and non-wildfire use areas would be similar to those described above for vegetative treatments and in the Common to All section for Fire Ecology and Management

4.2.12.5.7 Impacts from Energy and Mineral Resources

Leasable Minerals

The types of impacts experienced as a result of fluid leasable minerals development would be similar to those described under Alternative A. Development of oil and gas resources could affect scenic landscapes because of the surface disturbances associated with such development. However, designating more areas as closed to leasing (302,713 acres) and designating 28,110 acres as open to leasing subject to major constraints (NSO) would also provide protection to visual resources by precluding fewer surface-disturbing activities.

Locatable Minerals

The types of impacts experienced as a result of locatable minerals activities would be similar to those described under Alternative A, except Alternative B recommends more acres of mineral withdrawals (270,977 acres). Thus, impacts associated with locatable minerals mining would be negligible in this Alternative.

Mineral Minerals

The types of impacts experienced from disposal of salable minerals would be similar to those described under Alternative A, except that Alternative B proposes more acres closed to solid leasables (290,048 acres) and closed to mineral materials (343,745 acres). Thus, impacts associated with disposal of salable minerals would result in minor, short-term impacts to visual resources.

4.2.12.5.8 Impacts from Forestry and Woodland Products

Same as Common to All Alternatives described above.

4.2.12.5.9 Impacts from Lands and Realty

The impacts would be the same as described in the Common to All section, above.

4.2.12.5.10 Impacts from Livestock Grazing

The impacts would be the same as described in the Common to All section, above.

4.2.12.5.11 Impacts from Recreation

The impacts would be the same as described in the Common to All section, above.

4.2.12.5.12 Impacts from Travel Management

This Alternative would allow for the use of vehicle travel to designated roads and trails on 282,285 acres and limited to existing roads and trails on 145,303 acres of BLM public lands in the BiFO. The designation of existing routes protects the visual resources by reducing the potential for the creation of additional routes and changes to the landscape such as soil disturbance, erosion, and loss of vegetation. Existing sites with access would continue to be used, but there is potential for the number of these sites to increase under this Alternative, causing changes to the landscape.

OHV routes create visible lines on the landscape. Depending on topography, the vegetation community, and observation point(s), those lines are visible to varying degrees. Further, removal of vegetation would reveal the soil underlying, often a contrasting color and texture with the surrounding vegetation. This would further accentuate the change to the landscape. In those areas were OHV use is limited to designated routes would limit impacts on the landscape to the existing transportation system, and eliminate the creation of new routes that would result in further changes to the landscape and visual quality.

Additionally, under Alternative B, South Hills (1,357 acres) would be designated as closed to all motorized modes of travel. This would result in a direct, long-term impact to motorized users (motorcycle only) resulting from the area closure of the South Hills OHV area while the closure would eliminate un-natural visual contrasts to form, line, color and texture.

4.2.12.5.13 Impacts from Renewable Energy

Same as described in the Common to All section. There are no lands designated as VRM Class IV in this Alternative. Managing for VRM Class III objectives could be somewhat difficult to attain since the level of impacts should be lower and actions may require more mitigation measures. Management objectives for VRM Class II lands would be more restrictive and require more mitigation measures, which given topography and vegetation screening factors and other management considerations from other resources, may generally preclude development. Under this Alternative, 345,491 acres would be closed to renewable (wind) energy. This would result in the most amount of protection to viewsheds from potential development of wind farms.

4.2.12.5.14 Impacts from Special Designations

ACECs

In this Alternative, three new ACECs (and a total of 181,175 acres) are established and the acreages of three others change, in one case deceasing in size. Management actions included in ACEC management are often more restrictive, which indirectly provides protection for visual resources. Protections associated with designation of these ACECs for the protection of the relevant and important values that would affect visual resources include recommending for withdrawal from mineral entry; managing oil and gas leasing as closed; authorizing no new facilities or improvements; acquisition of inholdings; closing to forestry and woodland products harvesting; restricting livestock grazing; and closing to OHV use. All of these actions would reduce surface disturbing activities within those areas and indirectly protect visual resources.

Wild and Scenic Rivers

Protecting the outstandingly remarkable values of the eligible wild and scenic rivers would help protect visual resources by preventing ground disturbing activities that would impact the scenic character in the river corridors. All suitable segments (7 segments – 14.08 miles) would be managed to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under this Alternative. This would preserve the existing character of the landscape in these areas.

4.2.12.6 Alternative C

4.2.12.6.1 Impacts from Vegetation

Same as Common to All section described above. Alternative B allows for a full range of treatment methods (including mechanical, wildland and/or prescribed fire, and chemical methods). Some of the treatments methods proposed (e.g., mechanical and chemical) would result in localized and short-term impacts to visual resources by creating visual contrasts.

4.2.12.6.2 Impacts from Wildlife Habitat and Special Status Species

Impacts would be the same as identified in the Impacts Common to All section described above.

4.2.12.6.3 Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as described above in the Common to All section and could be localized and long term, depending on the placement, design, and use of native materials and the area's VRM class designation.

4.2.12.6.4 Impacts from Cultural Resources

Same as described above in the Common to All section.

4.2.12.6.5 Impacts from Visual Resources

Generally, the consequences are described in the Common to All Section, above and Alternative B, also above.

In this Alternative there is slightly less acreage in VRM Class I and slightly more acreage in VRM Class II as in Alternatives B and D, and approximately the same VRM Class III lands as in Alterative B, but less than in Alternative D. Visual protection measures for other resources are the reason for the changes but since the overall acreages vary by a small amount, there is not a significant l impact difference.

4.2.12.6.6 Impacts from Fire Ecology and Management

Impacts to visual resources from prevention and mitigation programs aimed at reducing unwanted ignitions in wildfire use and non-wildfire use areas would be similar to those

described above for vegetative treatments and in the Common to All section for Fire Ecology and Management.

4.2.12.6.7 Impacts from Energy and Mineral Resources

Leasable Minerals

The types of impacts experienced as a result of leasable minerals decisions would be similar to those described under Alternative A.

Locatable Minerals

The types of impacts experienced as a result of locatable minerals decisions would be similar to those described under Alternative A. However, this Alternative proposes more acres of mineral withdrawals (36,955 acres) than does Alternative A, precluding mining activities in those areas and thus allowing fewer disturbances to the visual landscape.

Mineral Minerals

The types of impacts experienced as a result of mineral minerals decisions would be similar to those described under Alternative A. However, under this Alternative, slightly fewer acres would be closed to disposal of salable minerals or open to salable mineral disposal with restrictions. There would be 251,927 acres closed to mineral materials and 264,450 acres closed to solid leasable minerals. Closing or withdrawing areas from mineral operations would prevent impacts to scenery.

4.2.12.6.8 Impacts from Forestry and Woodland Products

Same as Common to All Alternatives described above.

4.2.12.6.9 Impacts from Lands and Realty

The impacts would be the same as described in the Common to All section, above.

4.2.12.6.10 Impacts from Livestock Grazing

The impacts would be the same as described in the Common to All section, above.

4.2.12.6.11 Impacts from Recreation

The impacts would be the same as described in the Common to All section, above.

4.2.12.6.12 Impacts from Travel Management

Under Alternative C, vehicle travel would be limited to designated roads and trails on 282,285 acres and limited to existing roads and trails on 145,303 acres of BLM public lands in the planning area. This would the same as Alternative B and the visual impacts would be essentially the same as described in Alterative B. Under Alternative C, within the South Hills OHV Area, 1,296 acres as open to motorized vehicle use (limited to motorcycle use only), and would identify a 61 acre closure area to motorized use (all uses) in the South Hills OHV Area to provide a buffer to adjacent residential areas. This would be an increase of 199 acres for an

open area designation from Alternative A. Visual impacts in the South Hills area would continue outside of the small area closed to use.

4.2.12.6.13 Impacts from Renewable Energy

Same as described in the Common to All section. There are no lands designated as VRM Class IV in this Alternative. Managing for VRM Class III objectives could be more difficult to attain since the level of impacts should be lower and actions may require more mitigation measures. Management objectives for VRM Class II lands would be more restrictive and require more mitigation measures, which given topography and vegetation screening factors and other management considerations from other resources, (ex: ACEC designation for cultural concerns) would preclude development. In this Alternative all VRM Class II lands are managed as exclusion areas and there would be no development. There are no lands managed as VRM Class II which overlay areas of high potential development however. There are slightly more lands in this classification than in Alternative B or D. Under this Alternative, 326,722 acres could be managed as Avoidance for renewable energy development, which would mitigation impacts to scenery at the project level, but could still have long-term impacts to scenery should subsequent development occur in those areas with VRM Class III areas.

4.2.12.6.14 Impacts from Special Designations

ACECs

The types of impacts experienced as a result of ACEC designations would be similar to those described under Alternative A and B, except that Alternative C designates 11 areas, totaling 67,079 acres. Scenery was not one of the relevant and important values identified for most of these ACECs (only 2, 957 acres in 2 units). However, management actions included in ACEC management are often more restrictive, which indirectly provides protection for visual resources. Protections associated with designation of these ACECs for the protection of the other relevant and important resource values that would affect visual resources include recommending for withdrawal from mineral entry; managing oil and gas leasing as open with no surface occupancy; authorizing no new facilities or improvements; acquisition of inholdings; closing to forestry and woodland products harvesting; restricting livestock grazing; and designating routes for OHV use. All of these actions would reduce surface disturbing activities within those areas and indirectly protect visual resources. This Alternative provides the largest acreage of ACECs which would receive protective measures benefiting visual resources.

Wild and Scenic Rivers

No eligible segments would be managed as suitable and there would be no actions to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under this Alternative. This would not preserve the existing character of the landscape in these areas. Ground disturbing activities could impact the scenic character in the river corridors. However, most river segments are not in areas subject to potential ground disturbing activities which might affect the visual qualities.

4.2.12.7 Alternative D (Preferred Alternative)

4.2.12.7.1 Impacts from Vegetation

Same as Common to All section described above. Alternative B allows for a full range of treatment methods (including mechanical, wildland and/or prescribed fire, and chemical methods). Some of the treatments methods proposed (e.g., mechanical and chemical) would result in localized and short-term impacts to visual resources by creating visual contrasts.

4.2.12.7.2 Impacts from Wildlife Habitat and Special Status Species

Impacts would be the same as identified in the Impacts Common to All section described above.

4.2.12.7.3 Impacts from Fisheries Habitat and Special Status Species

Impacts would be the same as described above in the Common to All section and could be localized and long term, depending on the placement, design, and use of native materials and the area's VRM class designation.

4.2.12.7.4 Impacts from Cultural Resources

Same as described above in the Common to All section.

4.2.12.7.5 Impacts from Visual Resources

Generally, the consequences are described in the Common to All Section, above and Alternative B, also above.

In this Alternative there is slightly less acreage in VRM Class II and slightly more acreage in VRM Class I as in Alternative C and slightly more VRM Class III lands as in Alternatives B and C. Visual protection measures for other resources are the reason for the changes but since the overall acreages vary by a small amount, there is not substantial impact difference.

4.2.12.7.6 Impacts from Fire Ecology and Management

Impacts to visual resources from prevention and mitigation programs aimed at reducing unwanted ignitions in wildfire use and non-wildfire use areas would be similar to those described above for vegetative treatments and in the Common to All section for Fire Ecology and Management

4.2.12.7.7 Impacts from Energy and Mineral Resources

Leasable Minerals

The types of impacts experienced as a result of leasable minerals decisions would be similar to those described under Alternative A and Impacts Common to All Alternatives.

Locatable Minerals

The types of impacts experienced as a result of locatable minerals decisions would be similar to those described under Alternative C. However, Alternative D proposes more acres of mineral withdrawals (54,761 acres), thus precluding mining activities in those areas and allowing less modification to the landscape

Mineral Minerals

The types of impacts experienced as a result of salable minerals decisions would be similar to those described under Alternative C. However, under Alternative D, 280,971 acres would be closed to solid leasables and 272,122 acres would be closed to mineral materials. Closing or withdrawing areas from mineral operations would prevent impacts to scenery by allowing less modification to the landscape.

4.2.12.7.8 Impacts from Forestry and Woodland Products

Same as Common to All Alternatives described above.

4.2.12.7.9 Impacts from Lands and Realty

The impacts would be the same as described in the Common to All section, above.

4.2.12.7.10 Impacts from Livestock Grazing

The impacts would be the same as described in the Common to All section, above.

4.2.12.7.11 Impacts from Recreation

The impacts would be the same as described in the Common to All section, above.

4.2.12.7.12 Impacts from Travel Management

Under Alternative D, vehicle travel would be limited to designated roads and trails on 282,285 acres of BLM public lands and limited to existing roads and trails on 145,303 acres of BLM lands in the planning area. This would be the same as Alternatives B and C. The impacts would be similar to Alternative B and C as well.

Within the South Hills OHV Area under Alternative D, 982 acres would be designated as open to motorized vehicle use (limited to motorcycle use only), and 375 acres would be closed to provide for a buffer area to adjacent residential areas. This would result in an improved visual condition on those closed lands and a continued visual impact on the lands left open.

4.2.12.7.13 Impacts from Renewable Energy

Same as described in the Common to All section. There are no lands designated as VRM Class IV in this Alternative. Managing for VRM Class III objectives could be more difficult to attain since the level of impacts should be lower and actions may require more mitigation measures. Management objectives for VRM Class II lands would be more restrictive and require more mitigation measures, which given topography and vegetation screening factors and other management considerations from other resources, (ex: ACEC designation for cultural concerns)

may generally preclude development. There are slightly less lands in this classification than in Alternative B or C.

4.2.12.7.14 Impacts from Special Designations

ACECs

The types of impacts experienced as a result of ACEC designations would be similar to those described under Alternative C, except that while Alternative D designates the same number of areas as ACECs (11 areas), the total acreage is less than Alternative C, but more than Alternatives A and B, totaling 38,786 acres. The impacts would be similar but fewer lands would be affected. The lands not within the ACECs would not receive the protective measures which would benefit visual resources.

Wild and Scenic Rivers

Protecting the outstandingly remarkable values of the eligible wild and scenic rivers would help protect visual resources by preventing ground disturbing activities that would impact the scenic character in the river corridors. Some eligible segments would be managed as suitable (2 segments – 3.15 miles) and for these there would be actions to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under this Alternative. This would preserve the existing character of the landscape in these areas. The other 5 segments (10.93 miles of river) would not receive protective measures and could be subject to surface disturbing activities which could adversely impact their scenic qualities. However, other designations overlay several of these segments and provide management protection. There would be negligible to minimal impacts.

4.2.12.8 Cumulative Impacts

Past and present actions causing cumulative impacts to visual resources include various construction projects and activities on public lands (or visible from public lands due to proximity and topography), including fire suppression, vegetative treatments, prescribed burns, residential development, farming, and mineral exploration, development, and extraction. All of these activities produce surface disturbances and are examples of the types of activities that have created visual contrasts in the past and have resulted in contrasts of texture, form, line, and color that are often visible to the casual observer at varying distances.

Reasonably foreseeable future actions in the BiFO include these same types of actions, which would continue to create visual contrasts within the landscape. Recreational opportunities and use are also expected to increase, including OHV use, backcountry camping, mountain biking, rock climbing, and on-road sightseeing, with expected increased visitation to the adjacent National Parks, National Monuments and Recreation Areas and National Forests. Other foreseeable future increases include the demand for recreational facilities, and mineral exploration, development and extraction, including oil and natural gas well drilling.

The potential cumulative impacts of this RMP/EIS Alternative A, combined with past, present, and reasonably foreseeable future actions on visual resources could adversely affect visual resources and scenic quality from increasing minerals and recreation-related surface

disturbances and from wildfires. However, mitigation would likely limit the impacts in viewsheds with high scenic quality in the BiFO.

Past and present management, and reasonably foreseeable future actions, combined with the proposed action Alternatives (the RMP/EIS Alternatives B, C, and D), would reduce the potential for cumulative impacts on visual resources, and preserve scenic quality. The risks of wildfire would be reduced within the BiFO and on adjacent national forests through increased vegetation treatments to reduce fuel loads; recreation activities and off-road travel would be managed to limit surface disturbances by greatly reducing the potential for illegal or unrestricted OHV use, so that areas inventoried as having high scenic quality would be preserved. Mineral exploration, development, and extraction, including oil and natural gas well drilling, are expected to increase over the next 15 years to 20 years, but visual resource management and associated mitigation would likely limit the impacts in view sheds with high scenic quality and in the adjacent national parks and national forests. Visual resource management would include conformance of minerals exploration and development activities with VRM class objectives, which would preserve scenic quality in the long term in areas that the plan has designated for scenic quality protection.

The overall contribution of the management actions to the cumulative impact on visual resources is expected to be a minor incremental increase to the visual disturbances as a result of mineral resource development, transportation, wildfire, and vegetation treatments. Additionally, there would be incremental increases in the areas managed to protect visual resources.

4.2.13 Fire Ecology and Management

This analysis addresses potential impacts on fire and fuels management, caused by implementing the management actions under the Alternatives described in Chapter 2. Impacts on resources, resource uses, and designations resulting from implementation of the fire management program are discussed in those particular resource sections in this chapter. This analysis focuses on those management Alternatives or actions that affect fire intensity, frequency, and suppression efforts.

Many of the forest, woodland, and rangeland ecosystems in the BIFO are not functioning properly because of lack of disturbance such as fire. Decisions proposed in Chapter 2 for managing the various resources and resources uses would impact BLM’s ability to maintain or restore properly functioning vegetation and to manage hazardous fuel loads. The Alternatives could also impact the ability to manage wildfire to meet resource objectives, for resource benefit, wildfires, and prescribed fire programs.

4.2.13.1 Methods and Assumptions

Table 4-24 illustrates the assumptions for each fire management activity, by Alternative.

Table 4-24 Average Treatment Acreage by Alternative

Fire Management Activity	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Wildfire to meet Resource Objectives*	0 Acres	52,548 Acres	0 Acres	62,937 Acres
Fuels Treatment (Prescribed Fire and Non-Fire target acreage)**	6,280 Acres	21,700 Acres	21,700 Acres	21,700 Acres
Total**	6,280 Acres	74,248 Acres	21,700 Acres	83,637 Acres
Estimated Wildfire**	24,000 Acres	24,000 Acres	24,000 Acres	24,000 Acres

Note:

Post-Fire Rehabilitation: No annual acreage is listed. Emergency stabilization and rehabilitation (ESR) would be conducted on any acreage that is determined to have been damaged and in need of rehabilitation.

* Wildfire to meet resource objectives are candidate/possible acres.

** Acreage totals are for a 10- year period.

This analysis was based on the following assumptions:

- Fire is an important functional, natural disturbance in many of the ecological systems found in the BIFO.
- 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.
- A direct relationship exists between the density of human use within the BIFO and the frequency of human-caused fires.
- Fire size and intensity are more likely to increase as fuel loading increases.
- Wildfire use to meet resource objectives would not be expected to require rehabilitation. If inadvertent resource damage did occur, rehabilitation would be applied.
- Demand for fuels treatment would continue to increase over the life of the plan.
- All conservation measures pertaining to fire suppression operations would be followed, unless firefighter or public safety or the protection of property, improvements, or natural resources would render them infeasible during a particular operation. All conservation measures pertaining to fuels treatments would be followed when implementing wildfire for resource benefit, prescribed fires, and other vegetation treatments.

The analysis of potential impacts to fire and fuels management is based on the expertise of BLM resource specialists at the BIFO, the Montana/Dakotas BLM fire and fuels management program, information in the Montana Statewide Land Use Plan Amendment for Fire and Fuels

Management (BLM 2005e), and scientific literature. Effects were quantified, when possible. Best professional judgment was used when quantifiable data were unavailable.

In 2005, a Fire Management Plan (FMP) Environmental Analysis was completed for the Billings Field Office. The Final FMP amended the existing plans and proposed goals for desired conditions by using vegetation treatments including wildfire, prescribed fire, mechanical (including hand-cutting) and chemical treatments. The consequences analysis below discusses the effects that the various plan decisions would have on fire and fuels management.

This analysis addresses potential impacts on forest and woodland health and forest products by management actions in each of the Alternatives as described in chapter 2.

4.2.13.2 Environmental Consequences

Impacts to fire and fuels management would result from actions proposed under the following resource management programs:

- Air Quality
- Vegetation
- Special Status Species
- Fish and Wildlife
- Cultural Resources
- Visual Resources
- Fire and Fuels Management
- Forestry and Woodland Products
- Livestock Grazing
- Recreation
- Travel Management
- Minerals and Energy
- Special Designations

Other programs were determined to have little or no impact on fire and fuels management.

4.2.13.3 Impacts Common to All Alternatives

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 a slight possibility of losing control of prescribed fire and damaging above-ground right-of-way facilities.

4.2.13.4 Alternative A

4.2.13.4.1 Impacts from Air

Maintaining State of Montana Air Quality Standards could result in fewer acres burned by using prescribed fires because NAAQS cannot be exceeded. All projects must comply with the Montana Interagency Smoke Management Rule, which may limit the number of acres that could be burned or days on which burns could occur. If the air quality or Class I airsheds could be adversely impacted, wildfire for resource benefit and prescribed fires could be suspended.

Potential effects to air quality would be addressed during development of the burn plan for each prescribed fire. Emissions from wildfire are considered acts of nature and are outside the scope of this analysis. Over time, air quality management could create minor-to-moderate impacts to the fire and fuels management program.

4.2.13.4.2 Impacts from Vegetation

Continuing to manage vegetation as proposed under Alternative A would move vegetation toward a more ecologically sustainable condition over a multiple-year period, as disclosed in the 2005 Land Use Plan Amendment. Over time, management would also lower the risk of losing key ecosystem components because of severe wildfires. The need for post-fire stabilization, rehabilitation, and restoration to control soil erosion, loss of wildlife habitat, and other risks would decrease. Vegetation management decisions would provide no adverse impacts to fire and fuels management under Alternative A.

4.2.13.4.3 Impacts from Special Status Species (Including Fisheries and Wildlife)

Proposed decisions for Special Status Species (SSS) could impact the design of vegetation treatment projects, as determined through site-specific environmental analysis.

Under this Alternative, surface disturbing activities would be prohibited near Greater sage-grouse leks from March 1 through July 15 and within sage-grouse brooding/nesting habitat from April 1 through June 15. These proposed decisions to protect Greater sage-grouse breeding and nesting habitat would have a minor impact on vegetation treatments in the sagebrush steppe vegetation type. Project design would be mitigated to accommodate sage-grouse stipulations, increasing design and survey costs. Projects would be designed to limit introduction of invasive understory species. Measures to mitigate fire management actions in SSS habitats could increase suppression costs, limit suppression equipment choices and tactics, require additional effort from firefighters, and limit options for treating hazardous fuels in some areas.

Reintroductions of SSS could increase the areas in which these measures would be required. Impacts of the measures and reintroductions could range from negligible to minor, depending on the area and frequency and intensity of fires. Implementing species-specific restrictions could impact fire suppression activities and fuels treatment implementation.

Limiting available tools could reduce the effectiveness and efficiency of fuels reduction treatments, potentially resulting in negligible-to-moderate impacts, depending on the type of

fuels treated, size of the fuels treatment, and the threat of wildfire. A comprehensive analysis by vegetation type, for each species can be found in the 2005 Montana Land Use Plan Amendment for Fire and Fuels Management (BLM 2005).

Building new artificial water sources would provide water for fire suppression activities. Effects would be localized and would depend on whether fires occurred near the water developments. Impacts would range from negligible to minor.

4.2.13.4.4 Impacts from Cultural Resources

Proposed decisions for cultural resources could have some impact on the design of fuels treatment projects, as determined through site-specific environmental analysis. Projects would be designed with specific mitigations, as necessary, to inventory and protect cultural resources. Site-specific mitigations could change the design of and increase the costs of fuels treatment projects.

Cultural resources are often more at risk from impacts caused by fire suppression activities than from wildfire itself. Suppression efforts such as fire line construction (hand or mechanical) or the establishment of helicopter bases, safety zones, and fire camps may be ground disturbing and have the potential to destroy artifacts and the integrity of cultural resource sites. Mitigations for cultural resources could have moderate-to-major impacts for prescribed fire and mechanical treatments under Alternative A.

4.2.13.4.5 Impacts from Visual Resources

No Visual Resource Management (VRM) classes have been established in the planning area from a formal written decision document. While an existing Visual Resource Inventory (VRI) has been conducted in the area, the VRI data is unpublished and no VRI classes have been established formally through a planning decision. The RMP revision would formally address VRM through a range of Alternatives based on the VRI data, however in the interim, and as directed by BLM Manual 8400 (Visual Resource Management), the affected environment is described using the existing VRM classes.

Because fuels treatments would need to be compatible with VRM classes, the types and scope of fuels treatments would be limited in VRM Classes I and II. Alternative A includes 29,843 acres (7 percent of the BIFO) of VRM Class I areas and 12,427 acres (3 percent of the BIFO) of VRM Class II areas. Those acres managed as VRM Class I & II would have negligible-to moderate impacts on fire and fuels management, depending on the proposed site. There may be a direct conflict with VRM Class II areas if the wildland/urban interface abuts them. The National Fire Plan directs the agency to reduce hazardous fuels on federal lands adjacent to or near wildland/urban interface areas.

Proposed decisions for VRM could have some impact on the design of non-fire fuels treatment projects. Impacts to visual resources would be determined through site-specific environmental analysis. Potential effects to visual resources would be addressed during development of the wildfire implementation plan for each wildfire for resource benefit.

4.2.13.4.6 Impacts from Fire Ecology and Management

Projected annual acreage of fire management activity is shown in Table 4-24. Continuing wildfire management as proposed under Alternative A would (if funded) allow fire to begin to be reintroduced to fire-adapted ecosystems, reduce hazardous fuels to meet vegetative desired conditions, suppress wildfires appropriately, and support a full emergency site rehabilitation program for ecosystem rehabilitation.

4.2.13.4.7 Impacts from Minerals and Energy Resources

Development of oil and gas resources could create new facilities that would need to be protected from wildfire, thus limiting the ability to maintain or restore properly functioning vegetation through prescribed fire and wildfire for resource benefit and to reduce hazardous fuels. Impacts would range from negligible to major, depending on the actual location of the facilities and the type of vegetation onsite.

4.2.13.4.8 Impacts from Forestry and Woodland Products

Management actions implemented to support the objectives of the Healthy Forest Restoration Act of 2003 would complement the ability to maintain or restore properly functioning vegetation and reduce hazardous fuels. This management assumes that activity-created fuels would be treated. Fire and fuels management activities often complement or work in conjunction with forestry and woodland programs to move toward vegetative desired conditions, especially in fire-adapted vegetative communities. Much of the current forest cover is denser than the desired conditions. Fire and fuels reduction activities usually reduce density and convert cover types to a more desirable sagebrush-grass vegetative communities.

Commercial timber harvesting 70 mbf/yr would be allowed under Alternative A. The impact of this allowance would be minor to moderate, as the quantity of forest and woodland products harvested commercially are relatively small in the BIFO.

4.2.13.4.9 Impacts from Livestock Grazing

Livestock grazing could reduce fine-fuel loads and therefore the size and severity of wildfires, which includes both prescribed fire and wildfire for resource benefit. During the planning phases of prescribed fire, non-use or reduced use could be requested to mitigate the lack of fine fuels in necessary areas. This does not address fine-fuel usage by wildlife. Impacts would depend on the timing, season, and location of the fire.

4.2.13.4.10 Impacts from Recreation

Proposed decisions regarding recreation management would have minor-to-moderate impacts on the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels. Recreational use, such as hunting seasons and OHV special events, could limit the timing of prescribed fire or fuels treatment projects.

Increased participation in recreation activities and larger areas impacted by recreation would increase the potential for human-caused fires. More and improved facilities and trailheads

could cause an increased suppression workload, which would have a minor to moderate impact on fire and fuels management.

4.2.13.4.11 Impacts from Travel Management

The potential for human-caused wildfires would increase with increased human use in the BIFO. Areas accessible to motorized vehicles would likely be the most susceptible to human-caused wildfires, but increased ignitions and acreage burned because of increased access would be difficult to quantify.

Maintaining or upgrading designated routes could make these areas more accessible to fire suppression vehicles but would lead to increased public use. Increased mileage of roads and trails would result in less continuous fuels. In such areas, fires could not spread as rapidly as in areas in which fuels were more continuous, making it more difficult to restore fire to its historical role in fire-adapted vegetation.

Under Alternative A, 326,561 acres (76 percent) of the BIFO would be limited to existing roads and trails, allowing the potential for human-caused wildfires over a large portion of the BIFO and continued increase of user developed trails. Motor vehicles would be limited to designated routes on 101,027 acres (24 percent) of the BIFO; 260 acres (less than 1 percent) of the BIFO would be closed to motorized vehicle use. Under this Alternative, 885 miles of routes in the BIFO would be open to motorized use; the most under all the Alternatives.

4.2.13.4.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Alternative A continues the designation of nine ACECs (37,896 acres). Vegetation was specifically identified as a relevant and important value in the Meeteetse Spires and West Pryor ACECs. Allowing no uses that would cause irreparable damage to the relevant and important values in these areas would reduce surface-disturbing activities within those areas and would protect vegetation resources. Such management could include closing the areas to OHV use; managing the areas as either closed to leasing or open to leasing subject to major constraints (NSO), depending on the ACEC; making lands unavailable for livestock grazing in ACECs; and acquiring in-holdings. However, opportunities for vegetation treatments could be limited, thus inhibiting or preventing attainment of ecological objectives and desired conditions in these areas. ACECs within WSAs and management prescriptions are directed by the IMP.

This would create minor impacts to the fire and fuels management program.

Wilderness Study Areas

Managing WSAs precludes the use of mechanical (chaining, harrowing) and manual (chainsaw) fuels-reduction treatments. This preclusion could limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in some areas. Prescribed fire would still be available for treatments in appropriate areas. Fire might be used to move toward desired conditions.

The most effective methods of suppression that are also the least damaging to wilderness values, other resources, and the environment and that require the least expenditure of public funds (including rehabilitation of the area) would be used. Impacts would depend on the location and vegetation type in the WSA.

Wild and Scenic Rivers

Under Alternative A, all eligible river segments (7 segments—14.08 miles) would be managed to protect their outstandingly remarkable values, free-flowing nature, and tentative classification. Proposed treatments in these river corridors would be allowed only if it was determined that they would not result in impacts to the future suitability or classification of the river segment. This management could have some impact on the design of fuels treatment projects and could limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in these areas.

4.2.13.5 Alternative B

4.2.13.5.1 Impacts from Air

Impacts would be similar to those described under Alternative A. Although possibly more acres would be treated (both annually and over the life of this Proposed RMP), if the air quality or Class I airsheds would not be adversely impacted.

Consideration of regional haze could increase the restrictions on wildfire for resource benefit or prescribed fire. Potential effects to air quality would be addressed during development of the wildfire implementation plan for each wildfire for resource benefit and in the burn plan for each prescribed fire. Emissions from wildfire are considered acts of nature and are outside the scope of this analysis. Over time, air quality management could create minor-to-moderate impacts to the fire and fuels management program.

4.2.13.5.2 Impacts from Vegetation

The types of impacts experienced as a result of vegetation management would be similar to those described under Alternative A. However, under Alternative B, maximum treatment acreage limits would be set (averaging 2,170 acres annually for all treatment methods) and would complement the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels. However, differences between the two Alternatives would be negligible to minor because vegetation and fire and fuels goals and objectives would be similar.

4.2.13.5.3 Impacts from Special Status Species (Including Fisheries and Wildlife)

Generally, impacts would be similar to those described under Alternative A. However, this Alternative does not include any stipulations on surface disturbing activities within Greater sage-grouse brooding/nesting habitat. More acres are impacted as NSO, CSU, NL and TLs under this Alternative. Under this Alternative 28,110 acres are NSO, 251,459 acres are No Lease, and 76,556 acres are CSU. The additional acres could further influence treatment design and increase costs. Impacts would be minor to negligible and would have no measureable

cumulative effect. Potential effects to SSS would be addressed during development of the wildfire implementation plan for each wildfire for resource benefit.

4.2.13.5.4 Impacts from Cultural Resources

Impacts would be the same as those described under Alternative A.

4.2.13.5.5 Impacts from Visual Resources

Impacts would be the similar as those described under Alternative A. However, Alternative B includes 29,823 acres (7 percent of the BIFO) of VRM Class I areas and 15,688 acres (4 percent of the BIFO) of VRM Class II areas.

4.2.13.5.6 Impacts from Fire Ecology and Management

The types of impacts experienced as a result of fire and fuels management would be similar to those described under Alternative A. Projected annual acreage of fire management activity for Alternative A is shown in Table 4-24. Proposed decisions for wildfire management would increase the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels. This Alternative would allow the use of a full range of vegetation management tools, including mechanical, biological, manual, prescribed and wildfire for resource benefit, and chemical (herbicides). However, differences between the two Alternatives would be negligible to minor because vegetation and fire and fuels goals and objectives would be similar.

4.2.13.5.7 Impacts from Energy and Mineral Resources

Impacts would be the same as those described under Alternative A.

4.2.13.5.8 Impacts from Forestry and Woodland Products

Impacts would be the same as those described under Alternative A.

4.2.13.5.9 Impacts from Livestock Grazing

Impacts would be the same as those described under Alternative A.

4.2.13.5.10 Impacts from Recreation

Alternative B proposes to manage for primarily primitive and semi-primitive recreation opportunities.

Less motorized access would limit the number of human-caused fires, possibly lessening the need for suppression actions. Fewer facilities would also create less suppression needs.

4.2.13.5.11 Impacts from Travel Management

The types of impacts experienced as a result of travel management would be similar to those described under Alternative A. However, Alternative B identifies 145,303 acres (34 percent) of the BIFO as limited to existing routes; motor vehicles would be limited to designated routes on 282,285 acres (66 percent) of the BIFO; and 1,357 acres (less than 1 percent) would be closed

to motorized vehicle use. The acreage impacted by identified routes, although reduced in comparison to Alternative A, would still result in the potential for human-caused wildfires over a large portion of the BIFO.

Motorized vehicle use limited to designated routes would limit the potential for human-caused wildfires in the majority of the BIFO. Fuels would be more discontinuous with increased mileage of roads and trails in fire-adapted vegetation.

The establishment of eleven travel management areas would reduce the number of miles of routes and improve route monitoring and maintenance. Reduction of routes would lessen the negative impacts to forest resources, except for the possible reduction in access for harvest and forest treatments. The increased cost of constructing and decommissioning the temporary routes needed for treatment and harvest would reduce the amount of acres treated over the life of the plan.

Upon completion of a project, roads would be reclaimed. Reclamation at the culmination of each project would provide the conditions needed for quick forest regeneration. This Alternative closes or limits the most routes and reduces access for forest treatments and harvest more than other Alternatives. The current level of planning would limit access to areas such as Tin Can Hill and Mill Creek/Bundy causing forest treatments and harvest to be more expensive. The closures in this Alternative would restrict access and eliminate all but the most expensive hand treatments in portions of some areas such as Grove Creek.

Appendix O outlines the route status and number of miles by travel management area.

4.2.13.5.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Impacts would be the same as those described under Alternative A.

Wilderness Study Areas

Impacts would be the same as those described under Alternative A.

Wild and Scenic Rivers

Impacts would be the same as those described under Alternative A.

4.2.13.6 Alternative C

4.2.13.6.1 Impacts from Air

Impacts would be similar to those described under Alternative A. Although possibly more acres would be treated (both annually and over the life of this Proposed RMP), if the air quality or Class I airsheds could be adversely impacted, wildfire for resource benefit and prescribed fires could be suspended. Over time, air quality program management could create minor-to-moderate impacts to the fire and fuels management program.

Potential effects to air quality would be addressed during development of the burn plan for each prescribed fire. Emissions from wildfire are considered acts of nature and are outside the scope of this analysis. Over time, air quality management could create minor-to-moderate impacts to the fire and fuels management program.

4.2.13.6.2 Impacts from Vegetation

The types of impacts experienced as a result of vegetation management would be similar to those described under Alternative B, although under Alternative C, fewer acres would be treated annually (averaging 2,170 acres annually for all treatments). In addition, Alternative C proposes using only natural processes to manage vegetation. These processes could be less effective than conventional vegetation treatments and would not be effective in all vegetation communities. This management would limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in some areas.

Vegetation management decisions would have moderate-to-major impacts to fire and fuels management because the acreage treated would be limited.

4.2.13.6.3 Impacts from Special Status Species (Including Fisheries and Wildlife)

Impacts would be similar to those described under the Alternative A. However, Alternative C indicates fewer acres are NSO, CSU, NL or TLs under this Alternative. Under this Alternative 64,135 acres are NSO, 102,682 acres are CSU, and 63,160 acres are NL (closed to leasing). Impacts would be less than Alternative A, but more than Alternatives B &D. Impacts are expected to be long term, but minor to negligible

4.2.13.6.4 Impacts from Cultural Resources

Impacts would be the same as those described under Alternative A.

4.2.13.6.5 Impacts from Visual Resources

Impacts would be the same as those described under the Alternative B. Alternative C would be the most restrictive to fire and fuels management because it has the most VRM Class I and II acres (46,538 acres combined or 11 percent of the BIFO).

4.2.13.6.6 Impacts from Fire Ecology and Management

Projected annual acreage of fire management activity is shown in Table 4-24. The types of impacts experienced as a result of fire and fuels management would be similar to those described under Alternative B, although under Alternative C, fewer acres would be treated annually (averaging 2,170 acres annually for all treatments). In addition, this Alternative proposes using only natural processes to manage vegetation. These processes could be less effective than conventional vegetation treatments and would not be effective in all vegetative communities. Alternative C would limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in some areas, thus potentially creating greater threats to life, property, and other resources by allowing larger and more severe wildfires.

4.2.13.6.7 Impacts from Energy and Mineral Resources

Impacts would be the same as those described under Alternative A.

4.2.13.6.8 Impacts from Forestry and Woodland Products

Commercial timber harvesting 250 mbf/yr would be allowed under Alternative C, potentially resulting in decreased fuel loading. The impact of this allowance would be minor to moderate, as the quantity of forest and woodland products harvested commercially are relatively small in the BIFO.

4.2.13.6.9 Impacts from Livestock Grazing

Impacts would be the same as those described under Alternative A.

4.2.13.6.10 Impacts from Recreation

Alternative C proposes more acres available for recreational use and better access, which usually creates more human ignited wildfires. This Alternative proposes the most new facilities, which would need to be protected from wildfire. This need could increase the fire-suppression workload.

Increased access, either by trail or road, would break up the fuel continuity, making it more difficult to restore fire to its historical role in fire-adapted ecosystems. This lack of continuity could have a minor-to moderate impact, depending on trail/road density and location.

4.2.13.6.11 Impacts from Travel Management

The types of impacts experienced as a result of travel management would be similar to those described under Alternative B. However, Alternative C designates 61 acres as closed to motorized vehicles; motor vehicles would be limited to designated routes on 282,285 acres (66 percent) of the BIFO; and 145,303 acres (34 percent) would be limited to existing routes. The acreage impacted by identified routes, although reduced in comparison to Alternative A, would still result in the potential for human-caused wildfires over a large portion of the BIFO.

The impacts to forest resources would be the same as described in Alternative A. Compaction, loss of infiltration, erosion and vegetation loss would be somewhat less than Alternative A. This Alternative would allow similar access for forest treatment and harvest as Alternative A.

4.2.13.6.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Some proposed wildlife decisions for managing ACECs could limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels by using mechanical means. Proposed management direction (outside WSAs) for suppressing wildfires in the ACECs could limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels. Fire would be limited from playing a natural role because of the wildlife limitations in crucial deer habitat; this fire limitation could have a moderate-to-major

impact. Proposed management direction for other ACECs would have minor-to-moderate impact on managing vegetation and reducing hazardous fuels.

Wilderness Study Areas

Alternative C would limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in some areas, thus potentially creating greater threats to life, property, and other resources by allowing larger and more severe wildfires.

Wild and Scenic Rivers

Impacts would be the same as those discussed under Alternative B. All 7 suitable river segments (14.08 miles) would be managed to protect their outstandingly remarkable values, free-flowing nature, and tentative classification under Alternative B. Proposed treatments in these river corridors would be allowed only if it were determined that they would not result in impacts to the suitability or tentative classification of the river segment. This management could have some impact on the design of fuels treatment projects and could limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in these areas.

4.2.13.7 Alternative D (Preferred Alternative)

4.2.13.7.1 Impacts from Air

Impacts would be similar to those described under Alternative B. Although possibly more acres would be treated (both annually and over the life of this Proposed RMP), if the air quality or Class I airsheds would not be adversely impacted.

Consideration of regional haze could increase the restrictions on wildfire for resource benefit or prescribed fire. Potential effects to air quality would be addressed during development of the wildfire implementation plan for each wildfire for resource benefit and in the burn plan for each prescribed fire. Emissions from wildfire are considered acts of nature and are outside the scope of this analysis. Over time, air quality management could create minor-to-moderate impacts to the fire and fuels management program.

4.2.13.7.2 Impacts from Vegetation

Impacts would be the same as those described under Alternative B.

4.2.13.7.3 Impacts from Special Status Species (Including Fisheries and Wildlife)

Impacts would be similar to those described under Alternative A. However, Alternative D identifies more acres covered as NSOs, and CSUs under this Alternative. Under this Alternative 263,185 acres are NSO and 21,436 acres are CSU. These stipulations are expected to have a minor impact on implementation of vegetation treatments since treatments conducted within sage grouse habitat can be successfully completed outside the December 15 through July 15 timing limitation. Potential effects to SSS would be addressed during development of the wildfire implementation plan for each wildfire for resource benefit.

Some of the goals of the Alternative D are to restore historic habitats and native plant species and to enhance, maintain, and protect ecological resources. Short-term adverse impacts would be offset by long-term effects of rehabilitation activities (built into this Alternative for soil disturbing activities), protection of ecological resources (from effective fire suppression), and reduction of fuels (following prescribed fire, non-fire fuel treatment, or implementation of wildfire for resource benefit). The subsequent, gradual return to a more natural fire regime would result in long-term beneficial effects.

4.2.13.7.4 Impacts from Cultural Resources

Impacts would be the same as those described under Alternative A.

4.2.13.7.5 Impacts from Visual Resources

Because fuels treatments would need to be compatible with VRM classes, fuels treatments would be limited in VRM Classes I and II (in which the existing character of the landscape must be preserved or retained). Alternative D would be the most restrictive to fire and fuels management because it has the most VRM Class I and II acres (42,509 acres combined or 10 percent of the BIFO).

Because fuels treatments would need to be compatible with VRM classes, the types and scope of fuels treatments would be limited in VRM Classes I and II. Alternative D would designate 28,861 acres as VRM Class I and 13,648 acres as VRM Class II. These designations could have some impact on the design of non-fire fuels treatment projects, particularly in VRM Class II areas. These impacts would make it more difficult to manage fire and fuels to achieve their goals in these areas. Potential effects to visual resources would be addressed during development of the wildfire implementation plan for each wildfire for resource benefit.

4.2.13.7.6 Impacts from Fire Ecology and Management

Impacts would be the same as those described under Alternative B.

Impacts would be the same as those described under Alternative C; this Alternative most closely resembles the previously amended plans in fire and fuels management. The combination of all types of fire and fuels treatments, if funded appropriately in the future, could lead to increased vegetation function and reduction of hazardous fuel loads to a maintenance level. Additionally, allowing temporary nonrenewable use of targeted livestock grazing to reduce site-specific fuels or noxious and invasive weeds could maintain or improve upland fuel conditions and reduce cheatgrass, fine fuels, and other invasive weeds. In forests and woodlands, this action would reduce fine-fuel loads and noxious and invasive weeds, leading to improved health of these communities.

4.2.13.7.7 Impacts from Energy and Mineral Resources

Impacts would be the same as those described under Alternative A.

4.2.13.7.8 Impacts from Forestry and Woodland Products

Commercial timber harvesting 125 mbf/yr would be allowed under Alternative D, potentially resulting in decreased fuel loading. The impact of this loading would be minor to moderate, as the quantity of forest and woodland products harvested commercially are relatively small in the BIFO.

4.2.13.7.9 Impacts from Livestock Grazing

Impacts would be the same as those described under Alternative A.

4.2.13.7.10 Impacts from Recreation

Impacts would be similar to those described under Alternative C, except there would be less access under Alternative D. This would have moderate-to-major impacts to the fire and fuels management program.

Alternative D proposes to manage for a blend of motorized and non-motorized recreation opportunities. Less motorized access would limit the number of human-caused fires, possibly lessening the need for suppression actions. Fewer facilities (as compared to Alternative A) would also create less suppression needs.

4.2.13.7.11 Impacts from Travel Management

The types of impacts experienced as a result of travel management would be similar to those described under Alternative B. However, Alternative D designates 375 acres (less than 1 percent of the BIFO) closed to motorized use, eliminating the potential for human-caused wildfires in those areas. Motor vehicles would be limited to designated routes on 282,285 acres (66 percent) of the BIFO; and 145,303 acres (34 percent) would be limited to existing routes.

Impacts to forest resources would be the same as described in Alternative A.

4.2.13.7.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Proposed management direction for ACECs would have no impact on managing vegetation and reducing hazardous fuels. Management of the ACEC would provide for fire and fuels management activities. Proposed management to protect relict vegetation would have negligible impact on the fire and fuels management program.

Wilderness Study Areas

Impacts would be the same as those described under Alternative B.

Wild and Scenic Rivers

Under Alternative D, one suitable segment (3.15 miles) would be managed to protect its outstandingly remarkable values, free-flowing nature, and tentative classification. Treatments in this river corridor would be allowed only if it was determined that they would not result in impacts to the suitability or tentative classification of the river segment. This management

could have some impact on the design of fuels treatment projects and could limit the ability to maintain or restore properly functioning vegetation and to reduce hazardous fuels in this area.

4.2.13.8 Cumulative Impacts

Effects on fire frequency, intensity, and suppression activities resulting from actions taken by the BLM within the BIFO would combine with similar effects caused by activities sponsored by other groups and private interests to create cumulative impacts to fire management. As development, recreational activities, and general use of the area increases, so would the number of potential ignition sources and consequently the probability of wildfire occurrence, which would increase the need for federal, state, and local agencies to suppress wildfires to protect life, property, and sensitive resources. Development of the area would also increase the amount of Wildland Urban Interface (WUI) areas, which would put additional pressure on fire suppression efforts, as these areas are high-priority areas for fire suppression.

Suppression activities within WUI areas could be more dangerous, time-consuming, and expensive than suppression in undeveloped areas. Additionally, activities associated with fire suppression, recreation, development, and general land use would cumulatively contribute to the modification of the composition and structure of vegetation communities and increase the spread of noxious and invasive weeds. Such effects would, in turn, alter the fire regime of the planning area, potentially increasing the frequency, size, and intensity of wildfires. Developed areas and associated roads and right-of-way corridors could provide increased accessibility to remote areas for fire suppression equipment and provide fuel breaks in the case of wildfire events. Management actions would incrementally modify and improve the composition and structure of vegetation communities and move the decision area's fire regime towards condition Class I.

4.2.14 Wilderness Characteristics

This section presents potential impacts from resource management actions on lands with wilderness characteristics. Most impacts to wilderness characteristics come primarily from BLM authorized activities in the decision area and are associated with surface disturbances. Impacts from similar activities on private lands within the planning area (including increased vehicle traffic on highways and roads and industrial and community development, such as power plants, housing tracts, etc.) are outside the scope of this RMP.

The major sources of wilderness characteristics impact actions on public lands in the planning area are surface disturbing activities including: vehicle travel on unpaved roads, prescribed fire, wildfire, and construction or development activities.

4.2.14.1 Methods and Assumptions

Non-WSA lands with wilderness characteristics are those that have the appearance of naturalness and outstanding opportunities for solitude or primitive and unconfined recreation, and also comprise an area of 5,000 acres, or areas less than 5,000 acres that are contiguous to designated wilderness, WSAs, or other administratively endorsed for wilderness management

lands, or, in accordance with the Wilderness Act's language, areas "of sufficient size as to make practicable its preservation and use in an unimpaired condition, including road-less islands." BLM used the same criteria for determining wilderness characteristics as in the 1979 wilderness inventory. The 5,000 acre value was helpful to BLM in making preliminary judgments, but it was not considered a limiting factor. The size criterion of 5,000 acres was applied only to stand alone units, that is, units not contiguous with other federal lands previously determined to possess wilderness characteristics (e.g., BLM WSAs and NPS and USFS lands that are administratively endorsed for wilderness).

Units contiguous with federal lands with wilderness characteristics were evaluated for all wilderness characteristics found in the inventoried area. The presence of outstanding levels for opportunities for solitude or primitive recreation was evaluated as well.

The wilderness characteristics review process involved a BLM interdisciplinary team from the Billings Field Office staff that reviewed available information and followed up with field trips where necessary. The BLM interdisciplinary team also evaluated information provided by the public about these areas, their on-the-ground knowledge of these areas, information in case files and field files, master title plats, aerial photos, GIS data layers, and field inspections, and determined that all or parts of several areas have wilderness characteristics.

A total of 13 separate units, some with multiple distinctly separate tracts, were identified as initially meeting the criteria identified in BLM Manual 6301. These units are identified, resources and impacts described and finding summarized in the Appendix K. Official case files for the units would be maintained by the Billings Field Office and would be available for review by interested parties and individuals upon request. Some additional areas were identified as meeting the size criteria, but it was readily apparent to the BLM staff that they are extensively bisected by obvious roads and were thus not evaluated further. When doubt existed, the staff reviewed the area.

One specific example of available information was that the Montana Statewide Wilderness Study Report Volume II—Wilderness Study Area Specific Recommendations, (1991 Report) included the acreages found to be eligible in the 1984 RMP EIS and then additionally added as "Lands Outside of WSA Recommended For Wilderness" the acquired Montana State Trust Lands and portions of the tracts previously "segregated by roads".

In Alternative A, only those lands identified in the 1991 EIS are recommended for "lands with Wilderness Characteristics" management. This includes Pryor Mountain Tracts 1, 2, and 4, but not the lands in Wyoming; Burnt Timber Canyon Tracts 2, 3, and the portion of Tract 4 in Montana only). This Alternative includes the Tracts identified above in the 1991 EIS as being recommended for wilderness designation but which the new staff review determined do not possess wilderness character.

The following assumptions regarding the future management of non-WSA Lands with Wilderness Characteristics is made:

- Any new surface-disturbing activities proposed would be subject to NEPA analysis. Activities proposed that would not initially meet wilderness

characteristic objectives for an area being managed for those characteristics would be mitigated to the extent needed to meet the objective or would not be approved.

The proposed management actions would protect, preserve, and maintain the wilderness characteristics on portions or all of a total of 27,316 acres through the following land allocations and prescriptions:

- Designate as Visual Resource Management (VRM) Class II or VRM Class I.
- Limit motorized use to designated routes.
- Retain lands in public ownership.
- Designate areas as an Avoidance Area for rights-of-way (ROW).
- Designate leasing category as no surface occupancy (NSO), no exceptions, waivers, or modifications.
- Close to mineral material sales.
- Designate as unavailable for further consideration for coal leasing.
- Continue maintenance and use of existing facilities.
- Prohibit private or commercial woodland harvest or seed collection.
- Healthy Lands Initiative projects could be considered where they improve the overall goals and objectives for managing the wilderness characteristics of these areas.

Under Alternative A, management actions would protect, preserve, and maintain the wilderness characteristics on 1,709 acres. Alternative B management actions would protect, preserve, and maintain the wilderness characteristics on 27,461 acres. Alternative C management actions would protect, preserve, and maintain the wilderness characteristics on 3,573 acres and Alternative D management actions would protect, preserve, and maintain the wilderness characteristics on 13,818 acres.

4.2.14.2 Environmental Consequences

The types of impacts are described as being categorized based on the wilderness qualities of naturalness, undeveloped character, opportunities for solitude, or primitive and unconfined recreation and untrammeled quality. Impacts to non-WSA lands with wilderness characteristics would likely result from actions proposed under the following resource management programs:

- Vegetation
- Wildlife Special Status Species
- Fish Special Status Species
- Wild Horses and Burros
- Cultural Resources
- Visual Resources
- Wildland Fire Ecology and Management
- Wilderness Characteristics

- Minerals and Energy
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor services
- Travel Management
- Special Designations

Other programs were determined to have little or no impact on non-WSA lands with wilderness characteristics.

4.2.14.3 Impacts Common to All Alternatives

4.2.14.3.1 Impacts from Vegetation

Inventory of riparian areas not functioning or functioning at risk would result in the identification and implementation of measures to restore these areas to proper functioning condition, which would enhance the natural condition of the riparian portions of non-WSA lands with wilderness characteristics. Riparian zones are critical to the life cycles of many wildlife species (fish, amphibians, mammals, and birds). They are typically scenic and desired recreation settings. Maintenance and restoration of riparian zones, and retention of these zones in public ownership, would maintain and enhance opportunities for primitive recreation, including hiking, wildlife viewing, camping, nature study, fishing, and other activities dependent upon water courses and riparian ecosystems. Coordination of these efforts with neighboring Federal, State, Tribal, and local governments, and private conservation groups, would expand the benefits cited above to a larger scale and broader reach.

The use of aircraft for aerial reseeding of vegetation treatment areas, or the use of rangeland drills, would result in the presence and noise of people, vehicles, equipment, and aircraft that would diminish opportunities for solitude and conflict with primitive recreational activities. When reseeding was complete, however, these disruptions of opportunities for solitude and primitive recreation would end, and the opportunities would return.

Existing treatments would be maintained to provide suitable habitat for wildlife and adequate forage for wild horses. In the long term, maintenance of treatment areas with fire would maintain or enhance wildlife habitat and populations of species dependent on that habitat (deer, elk, wild horses, raptors, song birds). If these treatments occurred in non-WSA lands with wilderness characteristics, healthy animal populations would enhance opportunities for primitive recreation – wildlife viewing and hunting. In the short term, however, burning operations would result in disturbance of the landform and vegetation through fire line construction needed to manage the fire. Furthermore, the presence and noise of people, vehicles, equipment, and aircraft would eliminate opportunities for solitude and primitive and unconfined recreation in proximity to the fire. The impacts on opportunities for solitude and primitive recreation would be temporary, lasting for the duration of the burning operation and reclamation. When the fire and reclamation operations were complete, these opportunities would return. Soil and vegetation disturbance for fire line construction would diminish the

natural character of the non-WSA lands, but reclamation would restore the natural conditions in a relatively short period of time.

Weed control via mechanical, biological, and chemical methods would have the same effects on naturalness, solitude, and primitive recreation as described for vegetation treatments above. Restoring vegetation communities to a more natural composition of plants would improve the natural character of non-WSA lands with wilderness characteristics. However, mechanical treatments would have similar effects on naturalness as described above. Chemical and biological treatment would appear more natural. The noise and presence of people, vehicles, equipment, and aircraft used during treatment of weeds would temporarily reduce opportunities for solitude and conflict with primitive recreational activities.

4.2.14.3.2 Impacts from Wildlife Habitat and Special Status Species

All Alternatives includes management actions that focus on maintaining, protecting, and enhancing habitats for special status species. Decisions that could help protect non-WSA lands with wilderness characteristics include prohibiting actions that would destroy, adversely modify, or fragment the habitat of Federally-listed threatened or endangered species, maintaining the integrity of special status species habitats, and generally retaining habitats for federally listed and candidate species in Federal ownership. This would help to maintain the natural character of non-WSA lands with wilderness characteristics where they intersect with special status species habitat.

Virtually all non-WSA lands with wilderness characteristics have wildlife species that are special status. Conducting habitat improvement treatments for special status species (depending on the method used) could degrade the naturalness of the non-WSA lands. During the time the habitat manipulation is being conducted, the opportunity for solitude and primitive recreation would be disrupted, and the naturalness of the area could be impaired.

Allowing for the introduction, augmentation, translocation, and transplantation of special status species, if done within non-WSA lands with wilderness characteristics, could enhance the wildlife viewing opportunities often associated with primitive recreation experiences.

4.2.14.3.3 Impacts from Wild Horses and Burros

The Pryor Mountains Horse herd would be managed to maintain herds for genetic viability. The PMWHR overlaps portions or all of the Big Horn Tack-On, Burnt Timber Canyon, and Pryor Mountain non-WSA lands with wilderness characteristics. Maintaining the PMWHR at existing levels would continue to provide opportunities for viewing of wild horses which is often associated with primitive recreation experiences. Horse management activities and range facilities would impact solitude during roundups, etc.), naturalness (from non-native grazing impacts), and undeveloped condition (water troughs, guzzlers, etc.).

4.2.14.3.4 Impacts from Cultural Resources

The protective management of cultural resources would complement the conservation of wilderness characteristics. Where excavation or restoration measures involving surface or vegetation disturbing activities occur, noticeable contrast or reduction in wilderness character

could result. Impacts would be direct, localized, and short-term and would depending on the type, scope, and magnitude of excavation/restoration and the amount of change that it would cause to existing landscape character and recreational activities. The potential for reducing or restricting public access to cultural resources could reduce public opportunities to view some natural resources. Such reduced opportunities would depend on the type and location of the restriction and its overlap with known wilderness characteristics. Generally, the resources would be protected, while the activity may be reduced. The impacts would be minor.

4.2.14.3.5 Impacts from Visual Resources

There are four objectives for visual resources management (VRM Classes I – IV) that provide for various levels of landscape protection and change. The objective of Class I is to preserve the characteristic landscape, while the objective of Class IV provides for landscape modifications. Land use planning decisions to designate and manage areas by Class I objectives would preserve the characteristic landscape. In non-WSA lands with wilderness characteristics, this objective (Class I) would specifically preserve the natural character of the area. VRM Class II objectives would retain the characteristic landscape, allowing for minor changes to the landform and vegetation. This objective would generally protect the natural condition of the land in non-WSA areas. The objective of VRM Class III is to partially retain the existing character of the landscape, allowing for moderate changes to land and vegetation. This objective is not compatible with preserving the natural character of non-WSA lands. Class IV objectives provide for major modification of the landscape, clearly incompatible with preservation of the natural character of non-WSA lands. (Note: In this RMP there are no lands which have been found to possess wilderness character which would be designated as VRM Class IV).

Under Class I and II objectives, preserving the natural character of the non-WSA lands would also preserve and enhance the undeveloped setting needed to support opportunities for solitude and primitive forms of recreation. Since Class III VRM objectives would not preserve an undeveloped setting, opportunities for both solitude and primitive recreation would be diminished. Similarly, in Alternative A, any lands having the classification as Visual Resource Class “C” would not have enhanced protective measures and the lands could have adverse impacts from other activities, although the foreseeable potential does not appear to be high.

Where they overlap, VRM classifications proposed for SRMAs would also complement lands being managed for their Wilderness characteristics.

4.2.14.3.6 Impacts from Fire Ecology and Management

The BLM would attempt to manage fire and fuels, where appropriate, to restore natural systems to their desired future condition, considering the interrelated social and economic components. Restoration of fire to fire-dependent and -adapted ecosystems would restore a more natural vegetation community (in both species and composition), watershed conditions and wildlife populations dependent on those communities. In the short term, a burned landscape may reduce opportunities for primitive recreation. In the long term, however, a more natural landscape would benefit the natural character of non-WSA lands with wilderness characteristics and enhance the setting and opportunities for primitive forms of recreation, including hiking,

backpacking, hunting, wildlife viewing, and nature study. This would enhance the natural conditions of these areas.

Following any wildfire event, emergency stabilization and restoration (ESR) actions would be developed and implemented, as appropriate. Fuels treatment and management activities would be consistent with the resource goals and objectives in the RMP and may include mechanical treatments, manual treatments, prescribed fire, chemical spraying, or biological treatments and seeding.

Setting fire objectives through fire management categories would identify where fire is desired on the land, leading to the same benefits to natural conditions as restoring fire to fire-dependent and adapted ecosystems. When it is necessary to suppress fire in non-WSA lands with wilderness characteristics, development and implementation of the ESR plan would result in restoration of fire suppression related disturbances (e.g., fire line construction), which would also restore the natural character of the non-WSA areas. Fuels treatments in non-WSA lands with wilderness characteristics would aid in restoration of a more natural fire regime in these lands. The use of fire to accomplish this reduction would be compatible with the natural character of these areas. The use of mechanical treatments would leave an apparent imprint of human work on the land that would degrade the natural character of the non-WSA lands with wilderness characteristics.

In the short term, fire operations (aircraft over-flights, fire line construction, etc.) would degrade the natural landscape and character of the non-WSA lands with wilderness characteristics. The noise and presence of the people, equipment, and operations would also diminish opportunities for solitude and primitive forms of recreation. In the long term, however, surface disturbance associated with the fire treatment would be restored, with little to no net effect on naturalness. The effects of fire operations on opportunities for solitude and primitive recreation would cease, restoring those opportunities.

4.2.14.3.7 Impacts from Lands and Realty

When private lands would be acquired, they would be inventoried for their potential Wilderness characteristics, and if found to possess them, any impacts from actions that might potentially impact these resources would be analyzed through NEPA on a case-by-case basis.

The BiFO is available for other land use authorizations (such as film permits, leases, and easements) if the use associated with this authorization is compatible with other decisions throughout the RMP. Activities authorized under a permit, lease, or easement must be in conformance with OHV area designations, VRM management classes, etc. It is difficult to speculate where these activities might occur in the future and what the proposed activity would entail. If the proposal is for a minimally impactful activity, it is likely that no impacts to wilderness characteristics would occur from that activity. If, however, the proposed activity involves ground disturbance and use of motorized vehicles, then wilderness characteristics would likely be affected by impacting naturalness of the area, and creating loss of primitive recreation activities and solitude.

4.2.14.3.8 Impacts from Recreation

The decision to limit or control activities where long-term damage is observed or anticipated through designating campsites, providing permits, areas closures and limitations on numbers of users and duration of usage would help protect the naturalness values of wilderness characteristics under all Alternatives where such damage is occurring. In addition, encouraging the locations of public land recreational activities by designating and promoting recreational opportunities and experiences near population centers and highway corridors would help maintain the naturalness of the more remote lands with wilderness characteristics.

In general, most public lands in the Meeteetse Spires, Pryor Mountains and Bad Canyon non-WSA areas would be managed in a primitive, naturally appearing setting for a high probability of experiencing solitude and closeness to nature. This would be accomplished by preserving resources, managing access primarily as non-motorized, providing minimum improvements and no on-site interpretive facilities. This would protect the wilderness characteristics values of naturalness and enhance opportunities for solitude and primitive recreation in portions of these non-WSA lands with wilderness characteristics, regardless of designation. The area with significant change by Alternative is Meeteetse Spires Unit, Tract 6.

4.2.14.3.9 Impacts from Special Designations

Areas of Critical Environmental Concern (ACECs)

Overlapping designations of ACECs in the Pryor Mountain Unit, a portion of the Burnt Timber Canyon Unit, and in the Meeteetse Spires Units would provide similar types of protection and protect wilderness character and values.

Wilderness Study Areas

The WSA decisions that would impact non-WSA lands with wilderness characteristics resources are in regards to the release of the WSAs under Congressional decision and are beyond the scope of this plan.

Wild and Scenic Rivers

Overlapping designations of Wild and Scenic Rivers in a portion of the Burnt Timber Unit and in the Bad Canyon Unit would provide similar types of protection. The portions of the land with wilderness characteristics outside of the river corridor would not receive those protective measures however they would have some protective measures from other management decisions in the Alternative (Route designations, wildlife management, etc.). Alternative B provides the most river segments with compatible decisions which also specifically protect lands with Wilderness characteristic. And while Alternatives C and D further the decision process for Wild and Scenic Rivers the most (by establishing suitability decisions), the release of river segments in a number of wilderness character lands in Alternatives C and D does not adversely affect lands with wilderness characteristics decisions.

4.2.14.4 Alternative A

4.2.14.4.1 Impacts from Visual Resources

In this Alternative, there are no visual resource management class designations outside of the WSAs. However, the lands which have been managed for their wilderness characteristics in this Alternative have benefited from other designations (e.g., ACECs and PRWHR) which have preserved their landscape character. The lands are all inventoried as VRI Class B and are addressed in NEPA on a case by case basis with appropriate mitigation measures available. There are minimal adverse impacts in this Alternative.

4.2.14.4.2 Impacts from Lands with Wilderness Characteristics

Under Alternative A, there are no specific actions prescribed in the RMP to directly protect the naturalness and opportunities for solitude or primitive recreation of the non-WSA areas, resulting in no specific benefits to non-WSA lands. The lands would have the same considerations given WSAs in site-specific NEPA actions.

4.2.14.4.3 Impacts from Recreation

Extensive Recreation Management Areas (ERMAs) - No specified management for the ERMAs are described under this Alternative, therefore wilderness characteristics values could be affected by any number of recreational activities in any of the non-WSA lands with wilderness characteristics.

Special Recreation Management Areas (SRMAs) - Under this Alternative, there would be no SRMAs established that overlay non-WSA lands with wilderness characteristics; therefore there are no impacts to wilderness characteristics from SRMAs.

Recreation activities would continue without focused management provided through establishment of SRMAs. Impacts from other recreational surface disturbing activities would affect naturalness and opportunities for solitude and primitive recreation.

The issuance of SRPs would continue to be a discretionary action and with the existing stipulations for resource protection there would be no impacts to lands with wilderness characteristics

4.2.14.4.4 Impacts from Travel Management

In this Alternative there are only a few small parcels adjacent to the WSAs in the Pryor Mountains. The lands are already closed to motorized vehicles and the area has travel management restriction on it. There would be no impact to lands with wilderness characteristics.

4.2.14.4.5 Impacts from Special Designations

Areas of Critical Environmental Concern

Most but not all lands in the Pryor Mountain and Burnt Timber Canyon Units would have some of their resource values protected under existing ACEC designation. The lands in the Meeteetse Unit would have no additional protective measures with the exception of a portion of Tract 10 which has their resource values protected under an existing ACEC designation. Any new surface disturbing activities proposed would be subject to NEPA analysis. Activities proposed that would not initially meet wilderness characteristic objectives for the area would be mitigated to the extent needed to meet the objectives.

Wilderness Study Areas

Same as Common to All section, above.

Wild and Scenic Rivers

In this Alternative, eligible river segments would continue to be managed for the protection of their resource values. Overlapping areas in the Bad Canyon and some of the Pryor Mountains units along the Crooked Creek river segment would benefit lands with wilderness Characteristics. These resources would only be protected along the river corridor and not throughout the entire wilderness character tract however they would have some protective measures from other decisions.

4.2.14.5 Alternative B

4.2.14.5.1 Impacts from Visual Resource Management

All of the lands found to possess wilderness characteristics are directly managed for their characteristics in this Alternative. All these lands are designated as VRM Class I. Under VRM Class I objectives, preserving the natural character of the non-WSA lands would also preserve the undeveloped setting needed to support opportunities for solitude and primitive forms of recreation. The greatest area of change would be in the Meeteetse Spires Tract 6 unit and overall this Alternative would have the greatest positive visual protection level for lands with wilderness characteristics.

4.2.14.5.2 Impacts from Wilderness Characteristics

All Units with Wilderness Characteristics are recommended for some level of “wilderness characteristics” management in Alternative B. This Alternative best meets the guidelines of BLM Manual 6302, section 13.D. The actual difference in management practices between Alternatives means that there are no anticipated adverse impacts and only slight positive enhancements in lands with wilderness characteristics, mostly in Meeteetse Spires Unit Tract 9 (which is otherwise outside site specific management consideration in other Alternatives).

4.2.14.5.3 Impacts from Livestock Grazing

In this Alternative, the Bad Canyon Inventory Unit is managed for wilderness characteristics. There is a grazing allotment on this unit.

Livestock grazing is guided by objectives set in the Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration. Appropriate levels of livestock use are guided by these objectives. Thus, it is not anticipated that livestock grazing would have adverse impacts on non-WSA lands with wilderness characteristics because meeting these objectives would not permit degradation of the lands. When livestock use is properly managed, it does not affect the appearance of naturalness.

Grazing assessments completed by BiFO staff and any subsequent actions taken to remedy impending issues would enhance the natural character of non-WSA lands with wilderness characteristics. Further, improved natural condition would sustain the setting needed to support opportunities for primitive and unconfined recreation and the experience of solitude that visitors seek. While there could be some visual evidence of livestock use in the areas (presence of livestock, feces, trampling of soil, fences, and consumption of vegetation), rangeland health and riparian conditions would be maintained through proper management to meet or maintain Rangeland Health Standards and the implementation of Guidelines for Livestock Grazing, and the appearance of natural condition in these areas would continue.

For some visitors, the presence of livestock would be an adverse impact on the desired experience (connection with the natural world and experiences of solitude). However, this effect would be seasonal. At other times of the year, livestock would not be present, soils would recover, and vegetation would re-grow, reducing the impact on the visitor.

4.2.14.5.4 Impacts from Recreation

ERMAs

No lands in ERMAs affect lands with wilderness characteristics in this Alternative. Public lands with Wilderness characteristics are either within an SRMA or a parcel designated as NDPL.

SRMAs

Under this Alternative, the Pryor Mountains SRMA is established which overlays much of the non-WSA lands with wilderness characteristics. The management emphasis of both classifications in this Alternative is on primitive recreational opportunities and is compatible. The impacts would be positive.

Recreation activities would continue with focused management provided through establishment of this SRMA. Impacts from other recreational activities would not affect naturalness and opportunities for solitude and primitive recreation for the other units outside of the Pryor mountain area since they are closed to surface disturbing activities.

4.2.14.5.5 Impacts from Travel Management

There are seasonal Road Closures, primarily for wild horse protection: Motorized routes within the PMWHR would be designated according to the Pryor TMA. Burnt Timber Road, BLM Road 1018, from the East Pryor Mine (the abandoned uranium mine 4.5 miles north of the Crooked Creek Road) to the USFS boundary; and the Sykes Ridge Road, BLM Road 1033, from the horse trap (approximately 13 miles north of the Tillett Fish Hatchery Road) to USFS boundary would be closed to wheeled vehicles and motorized vehicles to protect wild horse foaling and their habitat (April 15 to June 15) providing consistency with the USFS seasonal closures. These road closures would limit access to Mystery Cave and other caves in the upper elevations until June 15, beyond the current cave seasonal closure. The overall impact would be localized to a few routes but while the natural condition, opportunity for solitude and primitive recreation within the Wilderness characteristics areas would be enhanced, the actual access would be more difficult.

4.2.14.5.6 Impacts from Special Designations

Areas of Critical Environmental Concern

Same as Common to All section, above.

Wild and Scenic Rivers

In this Alternative, less river segments would continue to be managed for the protection of their resource values as being suitable for wild and scenic river designation. Overlapping areas in the Bad Canyon and some of the Pryor Mountains units along the Crooked Creek river segment would benefit lands with wilderness Characteristics. These resources would only be protected along the river corridor and not throughout the entire wilderness character tract. This impact would be the same as Alternative A.

Pryor Mountain Wild Horse Range

The Pryor Mountain herd management area would continue to be designated as the Pryor Mountain Wild Horse Range and would be managed principally, but not necessarily exclusively, for the benefit of wild horses. The aspects of wild horse management that may affect recreational opportunities and experiences are based on access and are identified in the Travel Management Section, above. Overall the impacts from wild horse management are minor.

4.2.14.6 Alternative C

4.2.14.6.1 Impacts from Visual Resources

Four tracts of lands managed for their wilderness characteristics would be designated as VRM Class II in this Alternative. This objective would generally protect the natural condition of the land in non-WSA areas. The remainder of the tracts are not managed for their wilderness characteristics, with the exception of Meeteetse Unit Tract 9, all have VRM Class II

management established for other resource management concerns, thus having an indirect positive affect regardless of designation.

4.2.14.6.2 Impacts from Wilderness Characteristics

Four units with Wilderness Characteristics would be managed for their "wilderness characteristics" in Alternative C. The impacts are the same for these units as in Alternative B. The management of these lands for their wilderness characteristics would be compatible with adjacent lands and enhance the larger areas naturalness, opportunities for solitude and primitive recreation and provide protection for the other resources located on the land. The lands not managed for their wilderness characteristics would also benefit from other decisions, but not directly for their wilderness values.

4.2.14.6.3 Impacts from Livestock Grazing

In this Alternative, the Bad Canyon Inventory Unit is designated as being managed for its Wilderness Characteristics. It has a grazing allotment on it.

Livestock grazing is guided by objectives set in the Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration. Appropriate levels of livestock use are guided by these objectives. Thus, it is not anticipated that livestock grazing would have adverse impacts on non-WSA lands with wilderness characteristics because meeting these objectives would not permit degradation of the lands. When livestock use is properly managed, it does not affect the appearance of naturalness. Grazing assessments completed by RFO staff and any subsequent actions taken to remedy impending issues would enhance the natural character of non-WSA lands with wilderness characteristics. Further, improved natural condition would sustain the setting needed to support opportunities for primitive and unconfined recreation and the experience of solitude that visitors seek. While there could be some visual evidence of livestock use in the areas (presence of livestock, feces, trampling of soil, fences, and consumption of vegetation), rangeland health and riparian conditions would be maintained through proper management to meet or maintain Rangeland Health Standards and the implementation of Guidelines for Livestock Grazing, and the appearance of natural condition in these areas would continue.

For some visitors, the presence of livestock would be an adverse impact on the desired experience (connection with the natural world and experiences of solitude). However, this effect would be seasonal. At other times of the year, livestock would not be present, soils would recover, and vegetation would re-grow, reducing the impact on the visitor.

4.2.14.6.4 Impacts from Recreation

One of the proposed SRMAs (Pryor Mountains SRMA) would overlap portions of 8 non-WSA lands with wilderness characteristics units. There would be 12,003 acres of non-WSA lands that are within the SRMA.

Because this SRMA would be managed for its primitive values, the wilderness characteristics of this area would be maintained and opportunities for solitude and a primitive recreation experience would be protected and enhanced.

4.2.14.6.5 Impacts from Travel Management

The impacts for the affected parcels are the same as in Alternative B. In this Alternative, Meeteetse Unit Tract 9, Pryor Mountains Unit Tract 6, Pryor Mountains Unit Tract 5, Burnt Timber Unit Tract 2, and the River islands, are not managed for their Wilderness Characteristics. However, all of the same routes in all of the parcels are available as in Alternative B, so that there is no adverse effect to lands with wilderness characteristics.

4.2.14.6.6 Impacts from Special Designations

Areas of Critical Environmental Concern

In this Alternative, East Pryor ACEC designation would enhance and protect lands with wilderness characteristics within the Pryor Mountains, both WSAs and lands with wilderness characteristics. The Grove Creek ACEC and the Meeteetse Spires ACEC would similarly protect the resource values in the Meeteetse Spires Tract 9, which is not actively managed in this Alternative and the Meeteetse Spires Tract 10, which is managed for its wilderness character in this Alterative.

Wild and Scenic Rivers

In this Alternative, none of the river segments would be managed for the protection of their resource values as being eligible or suitable for wild and scenic river designation. There would be no overlapping designations in the Bad Canyon and some of the Pryor Mountains units along the Crooked Creek river segment. These resources would still be protected along the river corridor by other compatible resource decisions which would provide for application of complementary protection measures that would limit development along the river corridors but none specific to the Wild and Scenic River program.

4.2.14.7 Alternative D (Preferred Alternative)

4.2.14.7.1 Impacts from Visual Resources

Nine tracts of lands managed for their wilderness characteristics would be designated as VRM Class II in this Alternative. This objective would generally protect the natural condition of the land in non-WSA areas. While the remaining tracts are not managed for their wilderness characteristics, with the exception of Meeteetse Unit Tract 9, all also have VRM Class II management established for other specific resource management concerns, thus having an indirect positive affect regardless.

4.2.14.7.2 Impacts from Wilderness Characteristics

Nine units with Wilderness Characteristics are managed for “wilderness characteristics” in Alternative D. These are not all the same units as in Alternative C. The impacts are the same for these units as in Alternative B. The management of these lands for their wilderness characteristics would be compatible with adjacent lands and enhance the larger areas naturalness, opportunities for solitude and primitive recreation and provide protection for the other resources located on the land. The lands not specifically managed for their wilderness

characteristics would also benefit from other decisions, but these actions may only indirectly support their wilderness values.

4.2.14.7.3 Impacts from Livestock Grazing

In this Alternative, the Meeteetse Inventory Unit Tract 10 is specifically and actively managed for its wilderness characteristics. It has a grazing allotment on a portion of it. This would not affect wilderness characteristic management for the following reasons:

Livestock grazing is guided by objectives set in the Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration. Appropriate levels of livestock use are guided by these objectives. Thus, it is not anticipated that livestock grazing would have adverse impacts on non-WSA lands with wilderness characteristics because meeting these objectives would not permit degradation of the lands. When livestock use is properly managed, it does not affect the appearance of naturalness. Grazing assessments completed by BiFO staff and any subsequent actions taken to remedy impending issues would enhance the natural character of non-WSA lands with wilderness characteristics. Further, improved natural condition would sustain the setting needed to support opportunities for primitive and unconfined recreation and the experience of solitude that visitors seek. While there could be some visual evidence of livestock use in the areas (presence of livestock, feces, trampling of soil, fences, and consumption of vegetation), rangeland health and riparian conditions would be maintained through proper management to meet or maintain Rangeland Health Standards and the implementation of Guidelines for Livestock Grazing, and the appearance of natural condition in these areas would continue. For some visitors, the presence of livestock would be an adverse impact on the desired experience (connection with the natural world and experiences of solitude). However, this effect would be seasonal. At other times of the year, livestock would not be present, soils would recover, and vegetation would re-grow, reducing the impact on the visitor.

4.2.14.7.4 Impacts from Recreation

Impacts would be the same as under Alternative C, above.

4.2.14.7.5 Impacts from Travel Management

The impacts would be the same as Alternative A.

4.2.14.7.6 Impacts from Special Designations

Areas of Critical Environmental Concern

In this Alternative, the consequences are similar as the other Alternatives, although different tracts and acreages are involved. East Pryor ACEC designation would enhance and protect lands with wilderness characteristics within the Pryor Mountains, both actively managed lands and lands not specifically managed for the wilderness characteristics. The Grove Creek ACEC and the Meeteetse Spires ACEC would similarly protect the resource values in the Meeteetse Spires Tract 9, which is not specifically managed for its wilderness characteristics in this

Alternative and the Meeteetse Spires Tract 10, which is managed for its wilderness character in this Alterative.

4.2.14.8 Cumulative Impacts

The cumulative impact analysis boundary for areas with wilderness characteristics (WSAs, and non-WSA lands with wilderness characteristics) includes areas within the planning area with identified wilderness characteristics and those areas that overlap outside the planning area. In addition, areas with wilderness characteristics of adjacent land management agencies were considered as cumulative management of adjacent lands described above. Using this criteria, there are over 1 million acres of designated wilderness, BLM WSAs and FS administratively endorsed wilderness and non-WSA lands with wilderness characteristics being carried forward in the Proposed RMP for the purposes of evaluating cumulative impacts.

As a result of implementing the management prescriptions under the Proposed RMP, wilderness characteristics on approximately 13,818 acres of areas with wilderness characteristics would be protected, preserved, and maintained within the decision area. Because of BLM WSA management, and ongoing management of existing wilderness by the FS, the cumulative effect would be the protection of wilderness characteristics on over 1 million acres throughout the region.

Not managing 13,818 acres of non-WSAs lands with wilderness characteristic areas within the BiFO would contribute to a loss of areas with wilderness characteristics in the region. However, cumulatively the number of acres being protected for their wilderness characteristics in the region is much larger. In this context, the loss of wilderness characteristics in the decision area would not result in a significant incremental loss of these resources in the region. Preserving, protecting, and maintaining the 13,818 acres of non-WSAs lands with wilderness characteristics would enhance long-term ecological and scenic values, and generally it would maintain naturalness, solitude, opportunities for primitive recreation and special features. Managing any of the 13,818 non-WSAs with wilderness characteristics for other resource values could lead to long –term degradation of wilderness values on those lands, although generally those lands have other management prescriptions which could provide some similar protective measures.

4.2.15 Cave and Karst Resources

This analysis addresses potential impacts on cave and karst resources under the Alternatives described in Chapter 2. Impacts on resources, resource uses, and designations resulting from implementation of the cave and karst management program are discussed in those particular resource sections in this chapter. This analysis focuses on those management Alternatives or actions that affect fragile cave and karst resources.

Caves administered by the BiFO include Mystery Cave, Sykes Cave, Four-Eared Bat Cave, Frogg’s Fault Cave, Royce Cave, Salt Lick Cave, Snow Drift Cave, and Four-by-Four Cave. While Mystery Cave is generally recognized as meeting the definition of a significant cave, the

other caves have not been inventoried in order to determine significance. There are no current cave management plans in the RMP decision area.

4.2.15.1 Methods and Assumptions

Methods and analysis assumptions used in the impact analysis include the following:

- Protection of scientific values present within caves would be the overriding cave management objective. Protection of unique and scarce cave resource values would take precedence over recreational uses.
- Plants and animals living in caves occupy habitats that are generally free from large and rapid changes in environmental conditions. Species may be adapted to survival in a limited environment, or occupy a restricted habitat and any changes in, or damage to that environment, may unduly threaten their continued survival.
- Mineral deposits of scientific interest in caves form slowly over long periods of time. If these are damaged or destroyed through intentional vandalism to inadvertent actions they are typically irreversibly and irretrievably lost for the foreseeable future.
- When recreational use can be accommodated in caves, it would be managed in accordance with BLM Manual Section 8300.
- Mystery Cave is currently considered to be a Significant Cave, pending completion of a formal Cave Management Plan.
- Other caves in the Field Office may be designated as Significant Caves upon completion of inventory and analysis.
- It is likely that other caves would be discovered in the Field Office, and these caves would receive the same protection as currently known caves.
- Damage, theft, and vandalism is likely to increase with increased visitation.
- The wildlife (especially bats) that might live in caves could be impacted by vandalism, noise from visitors, and litter.
- Education of the public increases support for protection of caves and bats but also increases visitation.
- Actions associated with other resources that result in closure of surface-disturbing activities would have additional beneficial impacts (such as less chance of disturbance) on any caves that might be present.
- Monitoring specifically includes high priority monitoring bat populations for White Nose syndrome.

4.2.15.2 Environmental Consequences

Impacts to cave and karst management would likely result from actions proposed under the following resource programs:

- Wildlife habitat and Special Status Species
- Cave and Karst Resources
- Recreation
- Energy and Mineral Resources

Other programs were determined to have little or no impact on cave and karst resources.

4.2.15.3 Impacts Common to All Alternatives

4.2.15.3.1 Impacts from Wildlife Habitat and Special Status Species

Three separate studies have been conducted of bat populations in both natural caves and artificial tunnels created by uranium mining in the Pryor Mountains. Three species of bats are special status (BLM) or species of concern (MNHP and FWP) have been identified in the Mystery, Royce, and Four-Eared Bat Caves. Caves may be closed to public use to protect sensitive bat habitat. This would improve the survival chances of the bats but end general public access, appreciation and enjoyment. Inventories that may be required by BLM before allowing activities would increase BLM's knowledge on the location and extent of bat habitat and would enable it to better protect bats in the inhabited areas. These protections would also protect the associated cave resources.

Cave and Karst Resources

The BiFO is required to manage significant cave resources as mandated by the Federal Cave Resources Protection Act of 1988 to protect unique, non-renewable, and fragile biological, geological, hydrological, cultural, paleontological, scientific and recreational values for present and future users. Opportunities would be provided for scientific research, educational study, and recreational experiences which are compatible with protection of all biologic and non-biologic resources associated with caves and karst landforms. These actions would promote the long-term preservation and protection of cave and karst resources.

Interest, visitation, and increased cave use could result in damage to irreplaceable spelean and biologic resources. Coordination and partnership efforts with cave groups and agencies can be sought to ensure protection and appropriate management for cave resources in the decision area.

4.2.15.3.2 Impacts from Energy and Mineral Resources

Restrictions of oil and gas leasing from cave resources would protect cave and karst resources from potential development.

4.2.15.3.3 Impacts from Recreation

Increased use of other caves where access is not controlled may impact cave and karsts resources (particularly rare or endangered resources) in other caves. Increased and unauthorized use of caves where access is not controlled may cause safety concerns as well.

4.2.15.4 Alternative A

4.2.15.4.1 Impacts from Wildlife and Special Species Habitat

The impacts would be the same as the Common to All Alternative, above.

4.2.15.4.2 Impacts from Energy and Mineral Resources

Restriction of oil and gas leasing, and surface disturbing would have little effect as there is little potential for deposits which could be developed due to previous tectonic activity. All known caves are located in areas where current management restricts surface occupancy or surface disturbing activity.

4.2.15.4.3 Impacts from Recreation

Under the current management policies restrict access to Mystery Cave (permit only, June through October). A BLM guide is not required. There is a limit of two groups in Mystery Cave at one time. Persons desiring to enter the cave may be denied access if the limit of two groups has been reached. Access seasons may deny entry by persons who cannot schedule a visit during the period when permits are issued. BLM has had to close the cave to all access several times previously to address resource issues, mostly related to bat populations.

The current management program has no criteria for permitting access to caves except for Mystery cave. Visitation and cave use by users without qualified personnel may engage in behaviors which cause disturbance, injury, or the destruction of plant or animal species within caves, resulting in the negative impact or potential loss of cave and karst resources, including the damage or the destruction of mineralogical formations, geological features or paleontological deposits within caves.

4.2.15.5 Alternative B

This Alternative would prohibit surface disturbing or disruptive activities within ½ mile of cave entrances. And oil and gas leasing and exploration would be allowed with a no surface occupancy stipulation within ½ mile of cave entrances. The lands would be closed to locatable minerals and recommended for withdrawal from mineral entry; closed to solid leasable development and mineral sales. Cave and Karst areas would be managed as ROW exclusion areas. Access permits for entrance to Mystery Cave would be limited to scientific research. Other caves would still be open with other resource control measures. These restrictions and measures would benefit cave resources by ensuring their long-term protection.

4.2.15.5.1 Impacts from Wildlife Resources

Same as Impacts Common.

4.2.15.5.2 Impacts from Energy and Mineral Resources

Restriction of oil and gas leasing, and surface disturbing activities would have little effect as there is little potential for deposits which could be developed due to previous tectonic activity. All known caves are located in areas where management prescriptions for other resource concerns (e.g., ACEC designations, Wild Horse management, etc.) restrict surface occupancy or surface disturbing activity, thereby further protecting cave resources.

4.2.15.5.3 Impacts from Recreation

Management actions in Alternative B include restrictions that would enhance the protection of cave and karst resources. These include designating most of the known Cave and karsts within SRMAs, and managing these mainly for their primitive recreational opportunities and experiences (Closed to OHV use). Periodic safety accessibility and condition assessments would be mandated as well as increased routine monitoring, further benefiting these resources.

4.2.15.6 Alternative C

4.2.15.6.1 Impacts from Wildlife Resources

Wildlife resources would be protected from most human impacts. Cave use for scientific research would be extremely limited but management emphasis for wildlife concerns is increased. However, based on past activity there would be less than one visit to the cave annually.

4.2.15.6.2 Impacts from Energy and Mineral Resources

This Alternative would require surface occupancy restrictions for oil and gas leasing, exploration and/or surface development within ¼ mile of the entrance to Mystery Cave. Other cave and karst areas would be inventoried prior to oil and gas leasing, exploration and/or development. An approved mitigation plan would be required to avoid impacts to cave resources. Cave and karst areas would be managed as ROW exclusion areas. Access to Mystery Cave would be by permit only, June through October. These restrictions would protect Mystery Cave from potential degradation and damage from surface or mineral development, and provide protections through controlled surface use that would minimize or mitigation surface disturbances. However, overall restrictions of mineral development would have minor effect as there is little potential for deposits which could be developed due to previous tectonic activity.

4.2.15.6.3 Impacts from Recreation

Management actions in Alternative C include restrictions that would enhance the protection of Cave and Karst resources. These include designating most of the known Cave and karsts within SRMAs, and managing these exclusively for their primitive recreational opportunities and

experiences (Closed to OHV use). Periodic safety accessibility and condition assessments would be mandated as well as increased routine monitoring. This is the same as Alternative B.

4.2.15.7 Alternative D (Preferred Alternative)

4.2.15.7.1 Impacts from Wildlife Resources

Wildlife resources would be protected from most human impacts. Cave use for scientific research would be extremely limited but management emphasis for wildlife concerns is increased. However, based on past activity there would be less than one visit to the cave annually.

4.2.15.7.2 Impacts from Energy and Mineral Resources

Surface disturbing or disruptive activities within ¼ mile of cave entrances may be allowed if the activity benefits resource values with an approved mitigation plan. There would be No Surface Occupancy for oil and gas leasing, exploration and/or surface development within ¼ mile of the entrance to Mystery Cave. Other cave and karst areas would be inventoried prior to oil and gas leasing, exploration, and/or development. Mystery Cave would be closed to mineral entry, and recommended for withdrawal from mineral entry. Access limitations and/or restrictions on use of Mystery Cave and/or other cave resources would be identified in a field office Cave Management Plan. Such restrictions could include seasonal closures, limits on group size, group leader qualifications, or equipment requirements. However, restrictions of oil and gas leasing, and surface disturbing activities would have little effect as there is little potential for deposits which could be developed due to previous tectonic activity. All known caves are located in areas where management prescriptions for other resource concerns (ACEC designations, Wild Horse management, etc.) restrict surface occupancy or surface disturbing activity. This is essentially the same as all other Alternatives, even though the program has different management prescriptions.

4.2.15.7.3 Impacts from Recreation

Management actions in Alternative D include restrictions that would enhance the protection of Cave and Karst resources. These include designating most of the known Cave and karsts within SRMAs, and managing these exclusively for their primitive recreational opportunities and experiences (Closed to OHV use). Periodic safety accessibility and condition assessments would be mandated as well as increased routine monitoring. This is the same as Alternatives B and C.

4.2.15.8 Cumulative Impacts

Cave and Karsts are managed as mandated by the Federal Cave Resources Protection Act as well as other Acts such as the Endangered Species Act. Management actions in the RMP are in conformance with these prescriptions and protect the unique, nonrenewable, and fragile biological, geological, hydrological, cultural, paleontological, scientific, and recreational values. The management actions would result in significant restrictions of casual use of Caves

and Karsts but also provide more directed and focused responses due to the mandate for development of a specific Cave and Karsts Management Plan.

4.3 Impacts to Resource Uses

4.3.1 Energy and Mineral Resources

4.3.1.1 Solid Minerals

Implementing management actions under the Alternatives may result in direct impacts that open, limit, or deny access to solid mineral (leasable, locatable, and salable) development in the decision area.

4.3.1.1.1 Solid Leasable Minerals

BLM consideration to future proposals for developing solid leasable minerals (coal, phosphate, sodium, potash, sulfur, oil shale, native asphalt, and solid and semi-solid bituminous rock) in the decision area would vary between the four proposed Alternatives. With the exception of coal, no exploration or development potential exists for the other leasable mineral commodities in the decision area.

Table 4-25 Total Acreage Recommended for Closure for Solid Leasable Mineral Development

Alternative A	29,466 acres
Alternative B*	211,485 acres
Alternative C	170,276 acres
Alternative D	200,539 acres

Note:
*Future coal leasing would not occur under this Alternative

As shown in Table 4-25, coal development could occur under Alternatives A, C, and D. However, under Alternative B, future coal leasing actions would be prohibited. Most of the areas closed to coal development in Alternatives A, C, and D occur in areas where the coal development potential is extremely low, or does not exist.

The coal leasing decisions made in the Billings Resource Area RMP (BLM, 1984) would be carried forward in this RMP and include areas identified as acceptable for further consideration for coal leasing (see Appendix M, Coal Resources). These lands are located in Carbon and Musselshell counties in areas that have coal development potential. As a result, these lands considered as acceptable for further consideration for coal leasing in the current RMP should be taken into consideration for the purpose of impact analysis in this document.

Coal leasing proposals would be evaluated on a case-by-case basis for their suitability through the reapplication of the unsuitability criteria, the full coal-screening process, or both. Surface

owner consultation would be conducted, if needed, during the site-specific planning for a lease application. Prior to issuing a coal lease, a project-specific environmental review document would be prepared to assess impacts and develop mitigation measures.

In 2008, Signal Peak Energy submitted an application to lease federally-owned coal reserves on five lease tracts located in Musselshell County. The lease tracts, totaling 2,679.76 acres, contain an estimated 61.4 million tons of in-place coal reserves in the Mammoth-Rehder coal bed. In 2011, the decision to lease the tracts competitively was made by the BLM.

Coal exploration licenses are required when conducting exploration to obtain data on federal coal. Exploratory coal drilling would be conducted in accordance with all applicable federal and state laws, policies, and regulations. The BLM would strive to observe all agreements, guidelines, and policies pertaining to resource enhancement and protection. Prior to issuing a coal exploration license, an environmental review document would be prepared to assess impacts and develop mitigation and reclamation measures.

Coal leasing and ownership would be affected by land management actions such as future mineral or surface exchanges. The BLM may exchange federal coal for private coal to protect alluvial valley floors or to preserve public resource or social values, or to carry out congressional directives.

Coal leasing may be deferred in producing oil and gas fields where coal development would interfere with oil and gas operations and the economic recovery of the existing oil and gas resource. An exception to this would occur where it can be shown that economic recovery of oil and gas has been or would be completed before coal mining operations would begin.

On coal leases where mining and reclamation plans have been approved, oil and gas drilling and production are authorized where such activities would not conflict with coal mining. If conflicts cannot be resolved, oil and gas drilling and production activities are deferred. Proposals are evaluated on a case-by-case basis, and coal mining and oil and gas operations are acceptable where conflicts can be avoided or mitigated.

All federal coal lands with mining claims are acceptable for coal development and for further consideration for leasing subject to valid existing rights. Recent BLM decisions have change some of the operational aspects of the coal program. A decision was made in the early 1990s to defer oil and gas leasing within existing mine permit boundaries unless the oil and gas lease falls within an area that has already been mined and reclaimed or is obviously not going to be affected by the coal mining activity. This eliminates a potential conflict between oil/gas and coal operations. Later in the 1990s, a stipulation was developed to mitigate these situations, and all oil and gas leases issued within the boundaries of existing coal leases have this stipulation applied

4.3.1.1.2 Fluid Minerals

Fluid Minerals Assumptions

All federal mineral leases would be subject to standard lease terms. BMPs listed in Appendix B would be applied to minimize impacts, provide reclamation guidance, and improve reclamation

success. BMPs would be used in conjunction with site specific analysis and subsequent stipulations.

Oil and gas exploration would occur as described in the reasonably foreseeable development scenario (RFD scenario) which predicts that as many as 80 conventional oil and gas wildcat wells or coalbed (exploratory wells drilled in an area with no existing production) might be drilled in the Billings Field Office decision area in the next 20 years. The RFD scenario further forecasts that an average of three to four Federal conventional and/or CBNG wells would be drilled per year totaling 60 to 80 wells over the life of the plan.

Anticipated surface disturbance is dependent upon the location to be drilled, the local topography, the likely product, and drilling depth. Table 4-26 is modified from the 1992 Miles City Oil and Gas EIS/RMP Amendment:

Table 4-26 Forecast Drilling Depths, and Initial Surface Disturbance by Basin

Location	Common Drilling Depth in Feet	Likely Product	Size of Drill Site in Acres	Access and Ancillary Facilities in Acres
Central Montana Uplift and Bull Mountain Basin CBNG	5,000	Oil with associated gas; CBNG	2	1½
Big Horn Basin conventional and CBNG	7,000	Oil with associated gas; Gas; CBNG	3	1½
Crazy Mountains Basin	8,000-10,000	Gas	4	1½

Anticipated surface disturbance is 28 acres per year (8 × 3½) in the Central Montana Uplift/Bull Mountain Basin (including Golden Valley, Musselshell and northern Yellowstone Counties); 36 acres per year (8 × 4½) in the Big Horn Basin (including Big Horn, Carbon, southern Stillwater and southern Yellowstone Counties); and 22 acres per year (4 × 5½) in the Crazy Mountains Basin (Sweet Grass and southern Wheatland Counties); for a total of 86 acres per year for calendar years 2010 through 2014.

Table 4-27 Forecast Drilling Activity and Surface: 2010 – 2014

Location	Size of Drill Site (acres)	Access and Ancillary Facilities (acres)	Number of Wells Drilled Per Year	Short Term Disturbance (acres)	Long Term Disturbance (acres)[1]
Central Montana Uplift and Bull Mountain Basin CBNG	2	1.5	8: 4 wildcat, 4 development	28	14
Big Horn Basin Conventional and CBNG	3	1.5	8: 4 wildcat, 4 development	36	18
Crazy Mountains Basin	4	1.5	4: 4 wildcat	22	5.5
			Total Annual Disturbance (acres)	86	37.5

Note:

1 75% success rate for development wells, 25% for exploratory wells with interim reclamation.

CBNG = Coalbed Natural Gas

Table 4-28 Forecast Drilling Activity and Surface: 2015 – 2030

Location	Size of Drill Site in Acres	Access and Ancillary Facilities in Acres	Number of Wells Drilled Per Year	Short Term Disturbance (acres)	Long Term Disturbance (acres)[1]
Central Montana Uplift and Bull Mountain Basin CBNG	2	1.5	8: 4 wildcat, 4 development	28	14
Big Horn Basin Conventional and CBNG	3	1.5	8: 4 wildcat, 4 development	36	18
Crazy Mountains Basin	4	1.5	8: 4 wildcat, 4 development	44	22
			Total Annual Disturbance (acres)	108	54

Note:
1 75% success rate for development wells, 25% for exploratory wells with interim reclamation.
CBNG = Coalbed Natural Gas

- Maximum 20-year total (life of plan):
  - 80 Wells
  - 2,158 Acres Surface Disturbance
  - 1,106.5 Acres Reclaimed
  - 1,051.5 Acres Long-term Disturbance

It is anticipated that wells would be drilled for coal bed natural gas in limited and scattered areas of known sub-bituminous coal resources located in Bighorn Basin and the Bull Mountains Basin. The BLM does not anticipate that Coalbed Natural Gas (CBNG) exploration and development in the Billings Field Office would have the same intensity as does the CBNG development in the Powder River Basin. Compared to the Powder River Basin, the coals in the above-described fields are thinner, higher rank (with likely higher adsorbed gas levels), and more deeply buried. Drilling and development likely would have a lower well density. There would likely be a single well per spacing unit (no thick, stacked coals), and groundwater within the coals would likely have higher salinities and would not be suitable for domestic or agricultural purposes.

It is considered likely that there would be further drilling for CBNG when the price of natural gas again increases. Development potential is unknown. Drilling and production of CBNG wells would be similar to conventional shallow gas wells, therefore the analysis assumptions for gas wells are also adequate to consider impacts from potential CBNG exploration and development activity. The well pad and access needs are estimated at 3½ acres per well.

None of the lands within the Wilderness Study Areas in the Field Office would be available for oil and gas leasing under any of the Alternatives unless later released from their status as Wilderness Study Areas.

Stipulation-specific acreages by Alternative in Tables: Table 4-31, Table 4-34, Table 4-37, and Table 4-40 are presented for individual stipulations without consideration of overlap with other, potentially more protective (more restrictive of oil and gas exploration/development) stipulations. For example, a major constraint such as No Surface Occupancy (NSO) is generally a more protective stipulation for a resource than a moderate constraint such as Timing Limitations. In the case of the stipulation-specific acreages in these tables for "moderate" constraint stipulations (Timing Limitations, Controlled Surface Use), these numbers do not consider the overlap of "major" constraint stipulations (NSO, or No Lease areas), and they therefore underestimate the resource protection that would actually be provided for the subject resources if exploration and development were to occur.

No federal geothermal leasing is likely to occur in the decision area. However, the decisions of the Record of Decision and Resource Management Plan Amendments for Geothermal Leasing in the Western United States would be adopted in this RMP allowing for potential future geothermal leasing in the FO.

4.3.1.2 Impacts Common to All Alternatives

4.3.1.2.1 Geothermal Resources

Geothermal resource leasing activity is not anticipated, so there would be no effects

Oil and Gas

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Some areas would be deemed unavailable for oil and gas leasing as a result of existing non-discretionary closures for Wilderness Study Areas. Others may be determined unavailable as a result of the discretionary decisions of this RMP. These lease stipulations and the availability of the federal mineral estate for fluid mineral leasing varies by Alternative.

No Surface Occupancy stipulations may decrease some lease values, increase operating costs, and to a lesser extent (given the RFD) require relocation of well sites and modification of field development. Leases issued with moderate constraints (Timing Limitation and Controlled Surface Use stipulations) may result in similar impacts, and delays in operations and uncertainty on the part of operators regarding restrictions. Alternatives A, C, and D range from 5 to 7 percent of BLM oil and gas unavailable for lease.

Conditions of approval would be applied to development activities on leases as needed. Conditions of Approval (COAs) are mitigation measures that implement restrictions in light of site-specific conditions. General guidance for conditions of approval and surface operating standards is found in the BLM and USFS brochure entitled "Surface Operating Standards for Oil and Gas Exploration and Development" (USDI, BLM 2007) and BLM Manual 9113 entitled "Roads." Their impacts cannot be quantified.

4.3.1.3 Alternative A

4.3.1.3.1 Fluid Minerals

Continuation of current management would result in the availability of approximately 633,582 acres for fluid mineral leasing across the entire decision area. Approximately 39,730 acres of BLM subsurface ownership would be unavailable (4.9 percent of the total BLM oil and gas estate; Table 4-29), including four WSAs:

Table 4-29 Alternative A – Areas Unavailable to Fluid Mineral Development

Big Horn Canyon Tack-On WSA	2,689
Burnt Timber Canyon WSA	3,516
Pryor Mountain WSA	15,590
Twin Coulee WSA	6,836
Other non-discretionary unavailable areas would include:	
Pompeys Pillar NM	51
Discretionary unavailable areas would include:	
Bridger Fossil Area ACEC	577
East Pryor ACEC	29,550
Four Dances ACEC	784
Meeteetse Spires ACEC	965
Petroglyph Canyon ACEC	240
PMWHR	24,595

The remainder of federal mineral estate lands would be available for leasing, subject to the stipulations specified in Chapter 2 or under Standard Lease Terms.

Table 4-30 displays areas affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations.

Table 4-30 Alternative A – Approximate Acres of Federal Mineral Estate Available or Unavailable for Oil and Gas Leasing[1]

Classification	Acres
Acres Unavailable for Oil and Gas Leasing	***39,730***
Non-Discretionary No Lease (unavailable)	28,682
Discretionary No Lease (unavailable)	11,048
Acres Available for Oil and Gas Leasing	***633,582***
Acres Available by Leasing Constraints	
No Surface Occupancy[2]	32,595

Timing Limitations[2]	308,116
Controlled Surface Use[2]	28,337
Standard Lease Terms[2]	264,534

Note:

1 673,311 Federal Fluid Mineral Ownership

2 Acreages by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations over-ride and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by Alternative in Table 4-31, Table 4-34, Table 4-37, and Table 4-40.

Table 4-31 Alternative A – Acres Affected by Oil and Gas Stipulations

Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
No Surface Occupancy (NSO)				
Wildlife				
Peregrine Falcon	NSO – 1 mile of peregrine falcon nesting sites.	0	1,469	1,469
Bald Eagle Nests & Habitat	NSO – within ½ mile of eagle nest sites that have been active within the past 7 years and within eagle nesting habitat in riparian areas.	0	247	247
Ferruginous Hawks	NSO – within ½ mile of ferruginous hawk nest sites that have been active within the past 2 years.	81	0	81
Mountain Plover	NSO – ¼ mile of active mountain plover nest sites.	808	774	1,582
Greater Sage-Grouse	NSO – ¼ mile of sage-grouse leks.	1,645	2,182	3,827
Sharp-Tailed Grouse Lek	NSO – ¼ mile of sharp-tailed grouse leks.	942	803	1,745
Bighorn Sheep Habitat	NSO – designated bighorn sheep range.	1,121	13,256	14,377
Fisheries	NSO – within ¼ mile of designated reservoirs with fisheries.	No Data	No Data	No Data
Vegetation, Wetlands, and Water Quality				
Hydr-Rip-FLPL	NSO – Riparian Areas /Wetlands/ Floodplains/Water Bodies/Streams	4,113	9,872	13,984
Cultural & Paleontological Resources				
Cultural Resources	NSO – The following sites include a small buffer zone for protection from oil and gas actions: • Steamboat Butte • Bruder Janich Site • Paul Duke Site • Demi-John Flat NR District • Young's Point • Bighorn Mouth North Cliffs Rock Art Site	40	4,807	4,847

Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
	• Gyp Springs Site • Hoskins Basin Archaeological District			
Recreation and Visitor Services	NSO - developed recreation areas and areas receiving high concentrated use (Special Recreation Management Areas (Sundance/ 4 Dance).	388	784	1,175
Special Designations and Other Resources				
Castle Butte	No Minerals	0	0	0
Pompeys Pillar ACEC (Excluding the NM)	No Minerals	0	0	0
Stark Site ACEC	NSO	240	0	240
Weatherman Draw ACEC	NSO (with no WEMs).	4,365	0	4,365
Controlled Surface Use (CSU)				
Potential BF Areas Prairie Dog Towns > 80 Acres	Oil and gas leasing, development, and exploration and geothermal operations would be allowed with a CSU. Prior to surface disturbance, potential black-footed ferret habitat (prairie dog colonies and complexes 80 acres or more in size and not designated as black-footed ferret reintroduction sites) would be examined to determine the absence or presence of black-footed ferrets. The findings of this examination could result in some restrictions to the operator's plans or could even preclude use and occupancy that would be in violation of the Endangered Species Act of 1973.	984	970	1,954
Black-tailed and White-tailed Prairie Dogs	Oil and gas leasing, development, and exploration and geothermal operations would be allowed with a CSU. Prior to surface disturbance, potential black-footed ferret habitat (prairie dog colonies and complexes 80 acres or more in size and containing 5 burrows per acre would be examined to determine the presence or absence of black-footed ferrets.	3,104	3,591	6,695
General T&E Species[3]	CSU[3]	0	0	0
General Cultural Resources Stipulation[3]	CSU[3]	0	0	0
Visual Resources				
VRM Class II	CSU - VRM Class II	5,047	6,449	11,496
Vegetation, Wetlands, and Water Quality				
Soils	CSU Slopes > 30%	23,931	61,818	86,749
Timing Limitations (TL)				
Raptor Nests (currently applies to	TL - March 1 to August 1 within ½ mile of raptor nest sites which have been active the past 2	5,569	7,089	12,658

Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
Burrowing Owl, Swainson's Hawk, Northern Goshawk – data may be updated for other sensitive species as they are identified)	years			
Greater Sage-Grouse	TL - March 1 to June 15 in sage-grouse nesting habitat within 2 miles of a lek.	104,653	97,731	202,384
Greater Sage-Grouse Winter Range	TL - Surface use is prohibited from December 1 to March 31 within crucial winter range for greater sage-grouse. Stipulation does not apply to the operation and maintenance of production facilities.	No Data	No Data	No Data
Sharp-tail Grouse Nesting Habitat	TL - March 1 to June 15 in sharp-tailed grouse nesting habitat within 2 miles of a lek.	39,798	14,303	54,101
Big Game Parturition	TL – April 1 to June 15 within established spring calving range for elk	0	5,379	5,379
Big Game Winter Range (Old Crucial)	TL – December 1 to March 31 within big game winter range (white-tailed deer, mule deer, elk, pronghorn antelope, moose, and bighorn sheep).	75,745	151,061	226,806

Note:

1 Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

2 Total values of "0" indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres in the future.

3 This stipulation would apply across the entire Decision Area, therefore, acreages were not calculated separately.

4.3.1.4 Alternative B

4.3.1.4.1 Fluid Minerals

Approximately 421,852 acres would be available for fluid mineral leasing under Alternative B. Approximately 302,713 acres of BLM-administered federal mineral estate lands would not be available for oil and gas leasing (34.3 percent of the total BLM oil and gas estate; Table 4-32) including four WSAs. Under Alternative B, oil and gas operators would experience additional costs associated with establishing unitization agreements and site specific reclamation bonds. BLM would also incur additional administrative costs associated with managing the required unit agreements and calculating full reclamation bond amounts as required when development occurs in sage-grouse PPAs. These costs are not expected to be substantial based upon the RFD for the BiFO.

Table 4-32 Alternative B – Areas Unavailable to Fluid Mineral Development

Classification	Acres
Big Horn Canyon Tack-On WSA	2,689
Burnt Timber Canyon WSA	3,516
Pryor Mountain WSA	15,590
Twin Coulee WSA	6,836
Other Non-Discretionary Unavailable Areas Would Include:	
Pompeys Pillar NM	51
Discretionary Unavailable Areas Would Include:	
Bridger Fossil Area ACEC	577
East Pryor ACEC	8,301
Four Dances ACEC	784
Grove Creek ACEC	8,251
Meeteetse Spires ACEC	965
Petroglyph Canyon ACEC	240
Pryor Foothills RNA ACEC	958
Weatherman Draw ACEC	4,986
PMWHR	24,595
WSR Eligible Segments	6,772
Greater Sage-Grouse PPAs	191,543
State WMAs, Parks, and Fishing Access Sites	5,903
Lands with Wilderness Characteristics	27,292
Cultural Resource Sites or Districts Managed as Unavailable Include:	
Steamboat Butte	800
Bruder-Janich Site	579
Paul Duke Site	40
Demi-John Flat NR District	1,925
Bighorn Mouth North Cliffs Rock Art Site	160
Gyp Springs Site	320
Hoskins Basin Archeological District	2,611

The remainder of federal mineral estate lands in the Planning Area would be available for leasing, subject to the stipulations specified in Chapter 2 or to Standard Lease Terms.

Table 4-33 Alternative B – Approximate Acres of Federal Mineral Estate Available or Unavailable for Oil and Gas Leasing[1]

Classification	Acres
Acres Unavailable for Oil and Gas Leasing	302,713
Non-Discretionary No Lease (unavailable)	28,682
Discretionary No Lease (unavailable)	274,031
Acres Available for Oil and Gas Leasing	421,852
Acres Available With Leasing Constraints	**Acres**
No Surface Occupancy[2]	28,110
Timing Limitations[2]	249,460
Controlled Surface Use[2]	76,556
Standard Lease Terms[2]	67,726

Note:

1 673,311 Federal Fluid Mineral Ownership

2 Acreages by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by Alternative in Table 4-31, Table 4-34, Table 4-37, and Table 4-40.

Table 4-34 Alternative B – Acres Affected by Oil and Gas Stipulations

Alternative B – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
No Surface Occupancy (NSO)				
Wildlife				
Prairie Dogs	NSO - In the absence of black-footed ferrets, oil and gas leasing, development would be prohibited within ½ mile of black-tailed or white-tailed prairie dog colonies, active within the past 10 years.	13,035	10,995	24,030
Mountain Plover	NSO – in mountain plover habitat within ½ mile of nest.	3,327	2,593	5,920
Peregrine Falcon	NSO – within 1 mile of peregrine falcon nesting sites.	0	1,469	1,469
Bald and Golden Eagle Nests & Habitat	NSO - within 1 mile of eagle nest sites which have been active in the past 7 years and within eagle nesting habitat in riparian areas.	0	1,748	1,748
Ferruginous Hawks	NSO - within ½ mile of ferruginous hawk nest	81	0	81

Alternative B – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
	sites which have been active within the past 2 years.			
Restoration Areas for Greater Sage Grouse (RAs)	NSO - within 0.6 miles of sage-grouse leks.	159	3,070	3,229
Greater Sage Grouse Habitat - General Habitat Areas (GHAs)	NSO - within 0.6 miles of sage grouse leks.	1,599	386	1,985
Bighorn Sheep Habitat	NSO - within the designated bighorn sheep range.	1,121	13,256	14,377
Raptor Nests (currently applies to Burrowing Owl, Swainson's Hawk, Northern Goshawk) (note: Sensitive Species designations can change)	NSO - within ½ mile of raptor nest sites which have been active in the past 7 years	5,569	7,089	12,658
Sharp-tail Grouse Leks	NSO – within sharp-tailed grouse nesting habitat within 2 miles of a lek.	39,798	14,304	54,100
Fisheries				
Fisheries	NSO - within ½ mile of streams with YCT conservation populations	90	3,115	3,205
	NSO - within ½ mile of streams with YCT suitable habitat	14,870	36,896	51,766
	NSO - within ½ mile of Blue Ribbon streams	960	4,276	5,236
	NSO - within ½ mile of Red Ribbon streams	2,767	2,271	5,038
	NSO - within ½ mile of designated reservoirs with fisheries	No Data	No Data	No Data
Vegetation, Wetlands, and Water Quality				
Hydr-Rip-FLPL	NSO – within ¼ mile of riparian areas, wetlands, water bodies, perennial streams, and floodplains of perennial streams.	19,016	37,296	56,312
Special status Plant Species	NSO – known special status plant sites.	No Data	No Data	No Data
Soils	NSO Slopes > 30%	23,931	61,818	86,749
Cultural & Paleontological Resources	NSO ½ mile Bridger Cut-Off Trail Meeteetse Trail	3,080	8,304	11,384
Recreation	NSO – SRMAs: Sundance Lodge Recreation Four Dances Natural Area ACEC/SRMA Shepherd Ah Nei Recreation SRMA	6,879	78,835	85,714

Alternative B – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
	Acton Recreation SRMA Bundy Island South Hills TMA Pryor Mountain TMA			
Special Designations ***Other Areas***				
Pompeys Pillar ACEC	NSO	0	432	432
Meeteetse Spires	NSO (if minerals acquired on acquired portion)	0	0	0
Stark Site ACEC	NSO	240	0	240
Weatherman Draw ACEC	NSO	4,587	38	4,625
National Historic Trails	NSO - within ½ mile of the L&C and NP NHTs.	2,970	6,277	9,247
Cave/Karst Areas	NSO – within ½ mile of identified cave/karst areas.	0	3,299	3,299
Controlled Surface Use (CSU)				
Potential BF Areas >80 Acres	Prior to surface disturbance, potential black-footed ferret habitat (prairie dog colonies and complexes 80 acres or more in size and not designated as black-footed ferret reintroduction sites) would be examined to determine the absence or presence of black-footed ferrets (CSU). The findings of this examination could result in some restrictions to the operator's plans or could even preclude use and occupancy that would be in violation of the Endangered Species Act of 1973. Oil and gas leasing, development, and exploration and geothermal operations would be allowed with the above CSU.	984	970	1,954
Greater Sage-Grouse RAs	CSU - Surface occupancy and use for oil and gas exploration and development would be subject to the following special operating constraints that would maintain greater sage-grouse habitat: for sections that are within 1 mile of a lek and that border existing leases with 3 or less wells per 640 acres would be allowed with an NSO. Activities that are within 1 mile of a lek and that border existing leases with 4 or more wells per 640 would be open for leasing with a CSU that would maintain sage grouse habitat.	15,857	38,650	54,507
Big Game Winter Range	CSU – Surface occupancy and use for oil and gas exploration and development would be subject to the following special operating constraints that would maintain big game winter range habitat (within FWP CAPS Score 1 and 2 areas):	300,915	455,714	756,629

Alternative B – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
	A plan to maintain winter range for big game would be prepared by the proponent and implemented upon approval by the authorized officer. Activities would be restricted to one surface disturbance per 640 acres of land, with a cumulative disturbance of no more than 5% of the habitat in			
General T&E Species Stipulation[3]	CSU[3]	0	0	0
Cultural & Paleontological Resources[3]				
General Cultural Resources Stipulation	CSU[3]	0	0	0
Visual Resources	CSU – VRM Class II – IV	159,849	195,365	355,214
Timing Limitations (TL)				
Greater Sage-Grouse RAs	TL – from March 1 to June 15 within sage-grouse nesting habitat within 4 miles of a lek.	13,968	34,762	48,730
Greater Sage Grouse General Habitat Areas	TL - March 1 to June 15 in sage grouse nesting habitat within 3 miles of a lek.	60,480	43,885	104,365
Greater Sage-Grouse Winter Range	TL – from December 1 to March 31 within designated winter range for greater sage-grouse (4 miles from lek).	206,763	174,775	381,518
Big Game Parturition	TL - from April 1 to July 1 within established big game parturition habitat.	0	5,379	5,379
Big Game Winter Range	TL – from December 1 - March 31, within delineated big game winter range (FWP CAPS SCORE 1 and 2 areas).	113,285	145,307	258,592

Note:

1 Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

2 Total values of "0" indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres in the future.

3 This stipulation would apply across the entire Decision Area, therefore, acreages were not calculated separately.

4.3.1.5 Alternative C

4.3.1.5.1 Fluid Minerals

Under Alternative C, 65,891 acres of the Decision Area would not be available for oil and gas leasing (5.2 percent of the total BLM oil and gas estate; Table 4-35) including four WSAs:

Table 4-35 Alternative C – Areas Unavailable to Fluid Mineral Development

Classification	Acres
Big Horn Canyon Tack-On	2,689
Burnt Timber Canyon	3,516
Pryor Mountain	15,590
Twin Coulee	6,836
Other non-discretionary unavailable areas would include:	
Pompeys Pillar NM	51
Discretionary unavailable areas would include:	
East Pryor ACEC	32,767
Four Dances ACEC	784
Meeteetse Spires ACEC (partial)	965
PMWHR	24,595
Lands with wilderness characteristics	3,379

Table 4-36 Alternative C - Approximate Acres of Federal Mineral Estate Available or Unavailable for Oil and Gas Leasing[1]

Classification	Acres
Acres Unavailable for Oil and Gas Leasing	***65,891***
Non-Discretionary No Lease (unavailable)	28,682
Discretionary No Lease (unavailable)	37,209
Acres Available for Oil and Gas Leasing	***610,151***
Acres Available with Leasing Constraints	
No Surface Occupancy[2]	64,135
Timing Limitations[2]	316,602
Controlled Surface Use[2]	102,682
Standard Lease Terms[2]	126,732

Note:

1 673,311 Federal Fluid Mineral Ownership

2 Acreages by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by Alternative in Table 4-31, Table 4-34, Table 4-37, and Table 4-40.

This includes the Wilderness Study Areas identified in Alternative B plus discretionary no lease areas. The remainder of federal mineral estate in the planning area (610,151 acres) would be available for leasing, subject to the stipulations specified in Chapter 2 or to Standard Lease Terms.

Table 4-37 displays acres affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations.

Table 4-37 Alternative C – Acres Affected by Oil and Gas Stipulations

Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
No Surface Occupancy (NSO)				
Wildlife				
Peregrine Falcon	NSO - ¼ mile of active peregrine falcon nesting sites.	0	383	383
Ferruginous Hawks	NSO - within 300 feet of ferruginous hawk nest.	0	0	0
Raptor Nests (currently applies to Burrowing Owl, Swainson's Hawk, Northern Goshawk) (note: SSS designations can change)	NSO - within ¼ mile of raptor nest sites which have been active in the past 7 years.	1,389	2,028	3,417
Bald and Golden Eagle Nests & Habitat	NSO - within ¼ mile of active eagle nest sites.	0	16	16
Greater Sage-Grouse Protection Priority Areas	NSO – within 0.6 mile of a lek	10,046	9,544	19,591
Greater Sage Grouse Restoration Priority Areas	NSO – within ¼ mile of a lek	159	3,070	3,229
Greater Sage-Grouse General Habitat Areas	NSO - within ¼ mile of sage grouse leks	172	40	212
Fisheries				
Fisheries	NSO - within ¼ mile of Blue Ribbon streams.	1,557	410	1,967
	NSO - within ¼ mile of YCT Conservation Populations.	11	1,347	1,358
	NSO - within ¼ mile of designated reservoirs with fisheries	0	0	0
Vegetation, Wetlands, and Water Quality				
Hydr-Rip-FLPL	NSO – within riparian areas, wetlands, water bodies, perennial streams, and floodplains of perennial streams.	4,211	4,995	9,206
Cultural & Paleontological Resources	NSO - on the following sites, districts, or areas: • Steamboat Butte • Bruder-Janich Site • Paul Duke Site • Demi-John Flat NR District • Bighorn Mouth North Cliffs Rock Art	40	4,395	4,435

Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
	• Gyp Springs Site • Hoskins Basin Archaeological District			
Special Designations and Other Resources				
Pompeys Pillar ACEC (Excluding the NM)	NSO (no current minerals)	0	0	0
Bridger Fossil Area ACEC	NSO	577	0	577
Grove Creek ACEC	NSO - Conditions of Approval for existing leases	0	5,677	5,677
Petroglyph Canyon ACEC	NSO	0	239	239
Pryor Foothills Research Natural Area (RNA) ACEC	NSO - known plant sites.	0	7,401	7,401
Stark Site ACEC	NSO	240	0	240
Weatherman Draw ACEC	NSO	10,331	1,946	12,277
National Historic Trails	NSO – within ½ mile of the Lewis and Clark NHT and the Nez Perce NHT	1,272	537	1,809
Wild and Scenic River	NSO – within ¼ mile of eligible segments	0	3,024	3,024
Controlled Surface Use (CSU)				
Wildlife				
Prairie Dogs	CSU - mitigation plan would be required to maintain suitable habitat.	1,323	1,033	2,358
Potential BF Areas >80 Acres	CSU - Oil and gas leasing, development, and exploration and geothermal operations would be allowed with a CSU stipulation. Prior to surface disturbance, potential black-footed ferret habitat (prairie dog colonies and complexes 80 acres or more in size and not designated as black-footed ferret reintroduction sites) would be examined to determine the absence or presence of black-footed ferrets. The findings of this examination could result in some restrictions to the operator's plans or could even preclude use and occupancy that would be in violation of the Endangered Species Act of 1973.	984	970	1,954
Mountain Plover	CSU - within mountain plover habitat within ¼ mile of the nest.	808	774	1,582
Greater Sage-Grouse PPA	CSU – within Greater Sage-Grouse Protection Priority Areas	26,250	37,059	63,309
Greater Sage-Grouse RA	CSU – within Greater Sage-Grouse Restoration Areas	20,484	30,982	51,466
Big Game Parturition	CSU - within big game parturition habitat.	0	5,379	5,379
Bighorn Sheep Habitat	CSU – within bighorn sheep habitat	1,121	13,256	14,377
Sharp-tailed Grouse Leks	CSU - within sharp-tailed grouse lek sites and nesting habitats	1,291	454	1,745

Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
Designated State Wildlife Management Areas, Designated Fishing Access Sites and Designated State Parks	CSU – within designated state wildlife management areas, state fishing access sites and state parks.	1,920	3,983	5,903
General T&E Species[3]	CSU[3]	No Data	No Data	No Data
Recreation	CSU - SRMAs	10,265	117,819	128,084
Cultural Resources	CSU ¼ mile Bridger Cut-Off Trail Meeteetse Trail	0	972	972
General Cultural Resources Stipulation[3]	CSU[3]	No Data	No Data	No Data
Visual Resources	CSU - VRM Class II	5,046	6,449	11,495
Vegetation, Wetlands, and Water Quality				
Special Status Plant Species	CSU[3] – inventory required prior to oil and gas leasing, exploration and/or development surface disturbing activities.	No Data	No Data	No Data
Soils	CSU Slopes > 30%	23,931	61,818	86,749
Special Designations and Other Resources				
Pryor Foothills Research Natural Area (RNA) ACEC	CSU - Inventory for SSS plants prior to surface disturbing activities.	0	7,401	7,401
Cave and Karst	CSU – cave and karst areas	2,037	25,922	27,959
National Historic Trails	CSU – within ½ mile of the Lewis and Clark NHT and Nez Perce NHT.	2,970	6,277	9,247
Timing Limitation (TL)				
Greater Sage Grouse PPA - Nesting Habitat	TL - March 1 to June 15 in greater sage-grouse nesting habitat within 2 miles of a lek in Greater Sage-Grouse PPAs	70,345	47,885	118,230
Greater Sage Grouse RA Nesting Habitat	TL - March 1 to June 15 in greater sage-grouse nesting habitat within 2 miles of a lek in Greater Sage-Grouse RAs	5,458	18,300	23,758
Greater Sage Grouse General Habitat Areas Nesting Habitat	TL – March 1 to June 15 in sage-grouse nesting habitat within 2 miles of a lek.	29,934	18,459	47,393
Big Game Winter Range	TL - December 1 - March 31	75,745	151,061	226,806
Greater Sage-Grouse Winter Range	TL – December 1 to March 1 within designated winter range for greater sage-grouse lek (2 miles from lek).	107,451	86,531	193,982
Sharp Tailed Grouse Nesting Zone	TL - March 1 to June 15 within sharp-tailed grouse nesting habitat within ½ mile of a lek.	4,508	1,300	5,808

Note:

1 Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area. 2Total values of "0" indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres.

2 Total values of "0" indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres in the future.

3 This stipulation would apply across the entire Decision Area; therefore, acreages were not calculated separately.

4.3.1.6 Alternative D (Preferred Alternative)

4.3.1.6.1 Leasable Minerals

Under Alternative D approximately 606,096 acres would be available for fluid mineral leasing. A total of 72,915 acres of federal mineral estate lands would not be available for oil and gas leasing (approximately 7 percent of the total BLM oil and gas estate) including the Wilderness Study Areas.

Table 4-38 Alternative D – Areas Unavailable to Fluid Mineral Development

Classification	Acres
Big Horn Canyon Tack-On	2,689
Burnt Timber Canyon	3,516
Pryor Mountain	15,590
Twin Coulee	6,836
Other Non-Discretionary Unavailable Areas Would Include:	
Pompeys Pillar NM	51
Discretionary Unavailable Areas Would Include:	
Bridger Fossil Area ACEC	
East Pryor ACEC	11,122
Four Dances ACEC	784
Petroglyph Canyon ACEC	240
Meeteetse Spires ACEC (partial)	965
Weatherman Draw ACEC (partial)	4,986
PMWHR	24,595
Lands with wilderness characteristics	13,653

Table 4-39 Alternative D – Approximate Acres of Federal Mineral Estate Available or Unavailable for Oil and Gas Leasing[1]

Classification	Acres
Acres Unavailable for Oil and Gas Leasing	72,915
Non-Discretionary No Lease (unavailable)	28,682
Discretionary No Lease (unavailable)	44,233

Acres Available for Oil and Gas Leasing	606,096
Acres Available With Leasing Constraints	**Acres**
No Surface Occupancy[2]	263,185
Timing Limitations[2]	315,317
Controlled Surface Use[2]	21,436
Standard Lease Terms[2]	6,158

Note:

1 673,311 Federal Fluid Mineral Ownership

2 Acreages by stipulation subcategory were calculated such that the subcategories add up to the total available acres for leasing based on the following general concepts where multiple stipulations overlapped: No Surface Occupancy stipulations override and are more restrictive than Timing Limitations, Controlled Surface Use, and Standard Lease Terms. Timing Limitation stipulations override and are more restrictive than Controlled Surface Use and Standard Lease Terms. Controlled Surface Use stipulations override and are more restrictive than Standard Lease Terms. Non-overlapping individual stipulation-specific acreages are displayed by Alternative in Table 4-31, Table 4-34, Table 4-37, and Table 4-40.

The remainder of mineral estate in the decision area would be available for leasing, subject to the stipulations specified in Chapter 2 or to Standard Lease Terms.

Effects would be similar to Alternative A with respect to overall acres of BLM administered land available for leasing and not available for leasing (compare Table 4-31, Table 4-34, Table 4-37, and Table 4-40). However, Alternative D would apply stipulations to different acres. For example, there are fewer acres of land under No Surface Occupancy and Controlled Surface Use stipulations and a much larger number of acres under Timing Limitations and Standard Lease Terms stipulations under Alternative A, than Alternative D (Table 4-31, Table 4-34, Table 4-37, and Table 4-40). As a result Alternative D includes more area with No Surface Occupancy and would be more stringent in the application of stipulations for leasing of essentially the same amount of land as Alternative A.

Table 4-40 displays acres affected by no surface occupancy, timing limitations, and controlled surface use oil and gas stipulations under Alternative D.

Table 4-40 Alternative D – Acres Affected by Oil and Gas Stipulations

Alternative D – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
No Surface Occupancy (NSO)				
Wildlife				
Prairie Dogs	NSO - In the absence of black-footed ferrets, oil and gas leasing, development and exploration operations would be prohibited within ¼ mile of black-tailed or white-tailed prairie dog colonies, active within the past 10 years	6,554	5,436	11,980
Peregrine Falcon	NSO - 1 mile of peregrine falcon nesting sites.	0	1,469	1,469
Bald and Golden Eagle Nests & Habitat	NSO - within ½ mile of active and alternate eagle nests (for territories occupied within the last five years), unless the activity complies with Montana bald eagle management	0	247	247

Alternative D – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
	guidelines.			
Ferruginous Hawks	NSO - within ½ mile of ferruginous hawk nest sites which have been active within the past 7 years.	81	0	81
Greater Sage-Grouse Protection Priority Areas - PPAs	NSO – within Greater Sage-Grouse PPAs	107,134	66,121	173,256
Greater Sage Grouse Restoration Areas - RAs	NSO – within 0.6 mile of sage-grouse leks.	5,458	18,300	23,758
Greater Sage Grouse General Habitat Areas - GHAs	NSO - within 0.6 miles of sage-grouse leks	1,599	386	1,985
Sharp-tail Grouse Leks	NSO - 1/4 mile of sharp-tailed grouse leks	1,360	394	1,754
Bighorn Sheep Habitat	NSO - designated bighorn sheep range	1,121	13,256	14,377
Mountain Plover	NSO – ¼ mile of mountain plover nests	808	774	1,582
State Parks, WMAs, Fishing Access sites	NSO	1,920	3,983	5903
Fisheries	NSO - within ¼ mile of designated fishing reservoirs.	No Data	No Data	No Data
	NSO - within ½ mile of YCT conservation populations.	90	3,115	3,205
	NSO - within ½ mile of Blue Ribbon streams	960	4,276	5,236
Recreation	NSO – SRMAs: • Sundance Lodge Recreation SRMA • Four Dances Natural Area ACEC and SRMA • Shepherd Ah Nei Recreation SRMA • Acton Recreation SRMA • Yellowstone River SRMA (1/2 mile corridor)	10,265	86,748	97,013
Cultural & Paleontological Resources	NSO - on the following sites, districts, or areas: • Steamboat Butte • Bruder-Janich Site • Paul Duke Site • Demi-John Flat NR District • Bighorn Mouth North Cliffs Rock Art • Gyp Springs Site • Hoskins Basin Archaeological District	40	4,395	4,435
Vegetation, Wetlands, and Water Quality				
Hydr-Rip-FLPL	NSO – within 300 feet of riparian areas, wetlands, water bodies, perennial streams, and floodplains of perennial streams.	6,190	9,463	15,653
Special Designations and Other Resource				

Alternative D – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
Pompeys Pillar ACEC (Excluding the NM)	NSO	0	0	0
Castle Butte ACEC	NSO	0	0	0
Grove Creek ACEC	NSO	0	5,053	5,053
Pryor Foothills Research Natural Area (RNA) ACEC	NSO - ¼ mile buffer from known plant sites.	0	2,606	2,606
Stark Site ACEC	NSO	240	0	240
Weatherman Draw ACEC	NSO (on 7,291 acres; remainder of acreage (4,986 NL)	9,970	1,946	11,916
Wild & Scenic Rivers	NSO - within ½ mile of WSR- eligible and suitable segments.	42	6,217	6,259
National Historic Trails	NSO - within ½ mile of the L&C and NP NHTs.	2,970	6,277	9,247
Designated State Wildlife Management Areas, Fishing Access Sites and state Parks	NSO – within designated state wildlife management areas, designated state fishing access sites and designated state parks.	1,920	3,983	5,903
Controlled Surface Use (CSU)				
Wildlife				
Prairie Dogs	CSU - mitigation plan would be required to maintain suitable habitat.	13,035	10,995	24,030
Potential BF Areas >80 Acres	CSU - Prior to surface disturbance, potential black-footed ferret habitat (prairie dog colonies and complexes 80 acres or more in size and not designated as black-footed ferret reintroduction sites) would be examined to determine the absence or presence of black-footed ferrets. The findings of this examination could result in some restrictions to the operator's plans or could even preclude use and occupancy that would be in violation of the Endangered Species Act of 1973.	984	970	1,954
Greater Sage Grouse Restoration Areas (RAs)	CSU - within RAs to maintain greater sage-grouse habitat.	15,857	38,650	54,507
Big Game Winter Range	CSU – within big game winter range habitat (CAPS Score 2 areas).	117,906	148,913	266,819
Big Game Winter Range	CSU – within big game winter range habitat (CAPS Score 1 areas).	113,284	145,298	258,582
General T&E Species Stipulation	CSU[3]	No Data	No Data	No Data
Cultural & Paleontological Resources				
Cultural Resources	CSU - within ¼ mile of the following historic trails with	3,080	7,473	10,553

Alternative D – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	**Stipulation**	**Development Potential**		**Total Acres Stipulated[1]**
		Moderate	**Low**	
	stipulations: • Bridger Cut-Off Trail • Meeteetse Trail			
General Cultural Resources Stipulation	CSU[3]	No Data	No Data	No Data
Recreation	CSU - SRMAs: • Asparagus Point • Pryor Mountain TMA • Horse thief TMA • South Hills TMA	9,788	77,494	87,282
Visual Resources	CSU - VRM Class II – IV	159,849	195,365	355,214
Vegetation, Wetlands, and Water Quality				
Special Status Plant Species	CSU[3] - required prior to oil and gas leasing, exploration and/or development surface disturbing activities.	No Data	No Data	No Data
Soils	CSU - Slopes > 30%	23,931	61,818	86,749
Cave & Karst	CSU – within identified Cave and Karst Areas	2,037	25,543	25,580
Trails, Rivers, & Special Designations				
Pryor Foothills Research Natural Area (RNA) ACEC	CSU - Inventory prior to surface disturbing activities	0	2,606	2,606
Timing Limitation (TL)				
Wildlife				
Mountain Plover	TL - April 1 through July 31 within 1/4 mile of nest	808	774	1,582
Greater Sage Grouse Restoration Areas (RAs)	TL – March 1 to June 15 in sage grouse nesting habitat within 3 miles of a lek.	10,314	32,540	42,854
Greater Sage Grouse General Habitat Areas (GHAs)	TL - March 1 to June 15 in sage grouse nesting habitat within 3 miles of a lek.	60,480	43,885	104,365
Greater Sage-Grouse Winter Range	TL – December 1 to March 1 within designated sage-grouse winter range (3 miles of a lek).	167,614	136,773	304,387
Big Game Parturition	TL - April 1 to July 1 within established big game parturition habitat	0	5,379	5,379
Big Game Winter Range	TL - December 1 to March 31 within big game winter range habitat (CAPS SCORE 2 areas).	113,283	145,307	258,592
Raptor Nests (currently applies to Burrowing Owl, Swainson's Hawk,	TL - March 1 to August 1 within ½ mile of raptor nest sites which have been active the past 7 years.	5,569	7,089	12,658

Alternative D – Acres Affected by Oil and Gas Stipulations				
Type of Stipulation	Stipulation	Development Potential		Total Acres Stipulated[1]
		Moderate	Low	
Northern Goshawk) (note: SSS designations can change)				
Sharp-tailed Grouse Nesting Zone	TL - March 1 to June 15 in sharp-tailed grouse nesting habitat within 2 miles of a lek.	39,798	14,303	54,101

Note:

1 Total acres affected by each stipulation are based on individual, independent, stipulation-specific GIS mapping and have not been overlapped with any other stipulations. Figures are provided here to display which stipulations for which resources are relatively dominant in the Decision Area.

2 Total values of "0" indicate that there are currently no known sites or acres associated with this particular resource. Stipulation would apply to any newly detected sites or acres.

3 This stipulation would apply across the entire decision area, therefore, acreages were not calculated separately.

4.3.1.6.2 Locatable Minerals

Implementation of the Alternatives would result in some public lands being opened or withdrawn from locatable mineral entry under the mining laws. Such actions could affect the ability of potential mining claimants and/or exploration and mining companies to explore and develop locatable minerals in the planning area. Management actions that restrict access are long term in nature and the withdrawals are for 20-year periods from the operation of the mining laws, subject to valid existing rights. In these instances, only valid, existing mining claims can be developed. Subject to such valid existing rights, exploration, staking of new mining claims, development, or mining on withdrawn federal mineral estate is prohibited. Mining claimants or operators must submit a plan of operations if they propose operations that would exceed casual use on withdrawn lands, regardless of the size of the acreage proposed for surface disturbance. Before approving plans of operation in withdrawn areas, the BLM must first determine the validity of the preexisting mining claim. In the event a withdrawal is completed, Alternative B would allow for buy-outs if the validity exam determines that the minerals are present in sufficient quantities to be mined.

Subject to valid existing rights, restrictions on exploration and development of locatable minerals would result in adverse impacts when areas are withdrawn from locatable mineral entry, or with the application of other resource restrictions that limit or prohibit mineral activity. The intensity of impacts varies by Alternative and whether there are existing locatable minerals activities in an area proposed for withdrawal. The more acreage withdrawn, the more adverse impacts to exploration and development of locatable mineral resources would occur. Withdrawals would result in more impacts where withdrawals apply to locatable mineral areas with known development potential.

Under the existing Billings Resource Area RMP (BLM, 1984), the entire decision area is open to locatable mineral entry except for 1,855 acres which are currently withdrawn. BLM consideration to future proposals to develop locatable minerals in the decision area would vary

between Alternatives. The total acreage recommended for withdrawal for locatable mineral development is as follows:

- Alternative A 39,700 acres
- Alternative B 270,977 acres
- Alternative C 36,955 acres
- Alternative D 54,761 acres

As shown above, areas recommended for withdrawal from locatable mineral entry in the decision area range from 36,955 acres (Alternative C) to 270,977 acres (Alternative B). In cases involving valid mining claims, exploration for locatable minerals would occur under all Alternatives.

With the exception of bentonite, the development potential for other locatable minerals in the decision area is low. Commercially important bentonite deposits in the decision area are located in southern Carbon County and occur in the Mowry and Thermopolis formations. Current and future bentonite surface mining operations would not be affected under any of the Alternatives because the mining claims are valid, existing rights and the areas recommended for withdrawal do not coincide with areas having development potential.

Standard management practices would occur across all Alternatives in the public land administration of locatable minerals in the decision area. The BLM would coordinate with Montana Department of Environmental Quality (MDEQ) during the review, approval, inspection and reclamation of locatable minerals mining operations. An annual compliance inspection on each active notice would be conducted annually. The requirements of all state and federal laws would be met in the management of mining operations. Additionally, BMPs listed in Appendix B would be applied to minimize impacts, provide reclamation guidance, and improve reclamation success. BMPs would be used in conjunction with site specific analysis and subsequent stipulations.

Administration of locatable minerals on public lands in the planning area would continue and adhere to the following guidelines:

- Restrictions to resource uses apply throughout the life of the RMP, but can be changed by amending the RMP
- The surface management regulations at 43 CFR 3809 apply to all surface-disturbing activities for locatable minerals
- Lands not withdrawn from mineral entry would be available for locatable mineral entry, exploration, and development as per the regulations at 43 CFR 3800 and 3810
- The BLM must approve a plan of operations that meets all applicable statutory and regulatory requirements and would not cause unnecessary or undue degradation as per 43 CFR3809

- Regardless of the level of operations to be conducted (casual use, notice level, or operations under a plan of operations), a locatable mineral operator must prevent adverse impacts to threatened or endangered species and their habitat that may be affected by operations
- Locatable mineral operators may not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archeological site, structure, building, or object on federal lands
- Notice level operations do not require approval from the BLM (i.e., there is no "federal action") but are bound by statutory requirements, including ESA

4.3.1.6.3 Mineral Materials

Implementing management actions under the alternatives may result in direct impacts that open, limit or deny access to the disposition of mineral materials from public lands in the planning area. Adverse impacts to mineral materials disposal can result from management actions that restrict or limit disposals of mineral materials, or that place specific stipulations or mitigation requirements on development activity. Beneficial impacts to mineral materials disposal can result from management actions that encourage disposal or opens areas to disposal.

Indirect impacts result from actions that place or remove restrictions, or place additional requirements on the exploration and development activities for mineral materials. For example, actions taken to preserve greater sage-grouse habitat could either prevent or constrain the exploration and development of mineral materials.

Short-term impacts may include such seasonal restrictions to accessing mineral material resources to protect greater sage-grouse, or delays caused by requiring the completion of resource surveys (such as cultural resources) before commencing mining operations. Long-term impacts may include transferring federal mineral estate, including the mineral materials therein, to private ownership, thereby potentially removing the resource from public access. BMPs listed in Appendix B would be applied to minimize impacts, provide reclamation guidance, and improve reclamation success. BMPs would be used in conjunction with site specific analysis and subsequent stipulations.

Under the existing Billings Resource Area RMP (BLM, 1984), the entire decision area is open for the development of mineral materials except for 43,618 acres which are currently closed to disposal. The following areas are closed to mineral material disposals:

- Bridger Fossil Area ACEC
- Big Horn Tack-On WSA
- East Pryor ACEC
- Burnt Timber Canyon WSA
- Four Dances ACEC
- Pryor Mountain WSA

- Pompeys Pillar NM
- Twin Coulee WSA
- Stark Site ACEC
- Weatherman Draw ACEC

BLM consideration to future proposals to dispose mineral materials in the decision area would vary between alternatives. The total acreage recommended for closure to mineral material disposal is as follows:

- Alternative A 44,583 acres
- Alternative B 343,745 acres
- Alternative C 251,927 acres
- Alternative D 272,122 acres

As shown above, areas recommended for closure to mineral materials disposal in the decision area range from 44,583 acres (Alternative A) to 343,745 acres (Alternative B). Although there is a wide variance between Alternatives, the plan would provide land-use opportunities for the development of mineral materials. It would provide economic benefits and meet local infrastructure needs while protecting or minimizing adverse impacts to other resources and their uses.

The potential for the occurrence of mineral materials is high across the planning area. Mineral materials in the decision area consist of sand, gravel, building and decorative stone and fill dirt (borrow). Most of the current sand and gravel mining operations in the planning area occur on private lands containing alluvial gravel deposits. Building and decorative stone is abundant throughout the planning area. Decorative stone is primarily a commercial type commonly referred to as “moss rock,” which is a lichen-covered sandstone.

In most cases, the demand for mineral materials during the planning period would be directly proportional to the rate of other resource development in a given area. New disposals could be requested to be established in closer proximity to development areas, since generally, mineral materials are of low unit value compared to the cost to transport them from source to market. Sand and gravel deposits, which are likely to be developed, appear to be in sufficient quantity and quality to sustain moderate to large increases in local and regional demand.

New mineral material disposal sites in areas open to mineral material disposal would be subject to site-specific analysis, prior to approval. The BLM has discretionary authority to permit mineral materials disposal. It may approve or disapprove such sales or permits, on a case-by-case basis within the decision area.

Mineral material sites would have approved mining and reclamation plans and an environmental analysis would be conducted prior to disposal. Mineral materials would be sold at fair market value to the public, but would be free to state, county or other local governments when used for public projects.

4.3.2 Forestry and Wood Products

See analysis in Section 4.2.6.1 (page 4-106)

4.3.3 Lands and Realty

The following discussion highlights the primary differences between Alternatives and their anticipated impacts on the lands and realty program. Included in this lands and realty analysis section are: land-tenure adjustments and access (e.g., sales, exchanges, donations, purchases, acquisitions); rights-of-way (ROWs), leases, and permits; and withdrawals. This section focuses on how other resources potentially impact the lands and realty program by limiting or preventing realty actions.

The lands and realty program responds to requests for land use authorizations (ROWs, leases, permits), as well as land ownership adjustments (land tenure) from outside entities or other programs. The program adapts according to changing land management and resource needs and issues. As such, lands and realty program actions generally result in beneficial impacts within the BiFO with regard to multiple use objectives. In addition, the presence of other resources could prevent lands and realty actions from being carried out and, thus, they are considered adverse impacts on the lands and realty program.

This analysis addresses how the implementation of management actions may modify the location, size or design of a given proposal such as for a ROW or 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. For example, mitigating measures to protect resource values required for a ROW substantially increases processing costs and timeframes required to complete the transaction and temporarily delays the transaction. 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 impacts on those resources. Generally, there are no indirect impacts to the lands and realty program.

4.3.3.1 Methods and Assumptions

The analysis was based on the following assumptions.

- The BLM would continue to process land tenure adjustments.
- Lands would be acquired when access or recreation opportunities and/or protection of resources would be improved (and meets acquisition criteria).
- Tracts recommended for disposal in the 1984 RMP ROD have been re-analyzed in light of changing use patterns and resource protection priorities.
- Disposal of small, isolated parcels of public land would decrease the cost of public land administration in the BiFO and enhance efficient management of remaining public lands.

- The disposal of small, isolated parcels would decrease conflicts between public land users and private landowners.
- Lands and interests in lands could be acquired from willing landowners by purchase, exchange, donation, or reciprocal ROW.
- Non-federal land, interests in land (including access and conservation easements), and water rights would be considered for acquisition when they are within administratively designated areas or contain important resources (e.g., WSAs, ACECs, critical habitat, lands supporting listed species, riparian-wetland areas).
- The demand for communication sites and ROW corridors would increase within the life of this plan.
- ROW holders may maintain their use and access consistent with the terms of the ROW grant, leases and permits.

4.3.3.2 Environmental Consequences

Impacts to land tenure, ROWs/Leases/Permits, and withdrawals are discussed in this section. Impacts to land and realty would likely result from actions proposed under the following resource programs:

- Soils
- Water
- Vegetation
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Cultural Resources
- Paleontological Resources
- Visual Resources
- Wildfire Ecology & Management
- Lands with Wilderness Characteristics
- Cave and Karst Resources
- Energy and Mineral Resources
- Lands and Realty
- Recreation and Visitor Services
- Trails and Travel Management
- Renewable Energy
- Transportation and Facilities
- Special Designations

Other programs were determined to have little or no impact on lands and realty.

4.3.3.3 Impacts Common to All Alternatives

4.3.3.3.1 Impacts from Air, Soil and Water Resources

Management actions to protect soil, air and water quality could affect land use authorizations such as rights-of-way, leases, and permits, as well as BLM actions to obtain legal and physical access to public lands. Proposals for facilities and actions that would degrade these resources would have to be mitigated, sited in acceptable Alternative locations, or in more extreme cases, denied altogether. Applicants for such proposals could encounter time delays and greater costs in terms of project development.

4.3.3.3.2 Impacts from 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. In addition, mitigation measures applicable to ROW authorizations that would minimize the introduction or spread of noxious weeds or invasive species would substantially increase processing costs and timeframes required to complete the transaction, or, in some cases, could require re-routing the ROW.

4.3.3.3.3 Impacts from Wildlife Habitat, Fisheries and SSS (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. Retaining important blocks of hiding, security, and thermal cover for big game would limit land disposals or exchanges in these areas. However, in cases where land ownership adjustments are proposed in areas where wildlife or fisheries habitat could be adversely affected, the proposal may need to be restructured or eliminated from consideration. Implementation of Suggested Practices for Raptor Protection on Power Lines (APLIC, 1996) and BMPs established in the Final Programmatic EIS and ROD (December 2005) on Wind Energy Development on BLM Administered Lands in the Western United States would require mitigation for wildlife impacts on new rights-of-way development. These types of actions could increase processing costs and time for both the federal and non-federal parties.

Under all Alternatives, acquiring lands from willing sellers to consolidate the land ownership pattern would result in long-term beneficial impacts to wildlife and special status species habitat by increasing the land base and enhancing the BLM's ability to effectively manage resources and resources uses (e.g., wildlife habitat, riparian/wetland areas, special designations, and cultural/heritage and paleontological resources). Consolidating BLM-administered public lands also results in long-term beneficial impacts to habitat by increasing land base, reducing the number of easements needed, and helping reduce conflicts from encroachment or subdivision of private land.

4.3.3.3.4 Impacts from 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 re-routing 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 time for both the federal and non-federal parties. Under all Alternatives, acquiring lands from willing sellers to consolidate the land ownership pattern would result in long-term beneficial impacts to cultural resources by increasing the land base and enhancing the BLM's ability to effectively manage and protect cultural resources.

4.3.3.3.5 Impacts from 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. Under all Alternatives, acquiring lands from willing sellers to consolidate the land ownership pattern would result in long-term beneficial impacts to paleontological resources by increasing the land base and enhancing the BLM's ability to effectively manage and protect these resources.

4.3.3.3.6 Impacts from Visual Resources

Visual resource management under all Alternatives would affect land use authorizations such as ROWs, leases and permits. Facilities would need to meet objectives for the particular VRM class in which a project was proposed. This could result in mitigation, relocation or elimination of certain facilities resulting in additional time and costs in project development.

4.3.3.3.7 Impacts from Fire Ecology and Management

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 a slight possibility of losing control of prescribed fire and damaging above-ground facilities under ROW, lease or permit. .

4.3.3.3.8 Impacts from Cave and Karst Resources

Managing Mystery Cave, being managed as consistent with non-impairment criteria, could restrict placement and displace facilities to less desirable locations or areas with more restrictions on accessibility or construction.

4.3.3.3.9 Impacts from Energy and Mineral Resources

The management of leasable, salable, and locatable minerals under all Alternatives may result in requests for rights-of-way for utilities and access.

4.3.3.3.10 Impacts from Lands and Realty (including Land Tenure Adjustment and Access; Rights-of-Way, Leases and Permits; and Withdrawals)

Consideration of land ownership adjustments based on the three adjustment categories, through site-specific analysis, would allow for flexibility in managing public lands to achieve improved management efficiencies and enhance other programs. Actions such as exchanges, sales and purchase would adjust the relatively fragmented public land pattern to better manage public lands over the long-term. Consolidation of public land holdings could facilitate access to public lands and reduce the number of access easements needed. Consolidation could also lead to a reduction in encroachment issues on public lands from adjacent property owners as a result of fewer private inholdings within the planning area. In addition, acquiring state and private lands from willing sellers to consolidate the land ownership pattern would result in long-term beneficial impacts to the lands and realty program by increasing the land base and enhancing the BLM's ability to effectively manage resources and resources uses (e.g., wildlife habitat, riparian/wetland areas, special designations, and cultural/heritage and paleontological resources).

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 new withdrawals under all Alternatives would also ensure that such actions encumbered 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 would include monitoring the project after the 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. Follow-up includes monitoring, in accordance with existing right-of-way policies and regulations which require compliance checks on an as needed basis 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 somehow. Locating new right-of-way facilities within or adjacent to existing rights-of-way would minimize the number of acres designated for new right-of-way developments, as well as possibly restrict placement of new facilities. As more rights-of-way are authorized, the monitoring workload increases. The intensity of monitoring or compliance can vary substantially, depending on site-specific conditions and restrictions. For example, minor category rights-of-way with minimal impacts and resource issues, a single compliance inspection is often adequate. Other major category or complex rights-of-way in areas of higher resource concerns and/or restrictions would require a greater intensity of compliance inspections during both the construction and the reclamation phases.

New withdrawal proposals would be limited to the minimum area required for the intended use, would require strong justification, and would be initiated only where applicable Alternative prescriptions, such as the use of rights-of-way, leases, permits, or cooperative agreements, are inadequate to protect the resource values. Existing withdrawals would be renewed, in accordance with existing policies.

Under all Alternatives, a 5.2-mile long, 3,500 feet wide multi-modal corridor in Carbon County would continue to be a designated corridor. Co-locating ROWs could ease the process for construction and maintenance, but existence of ROW corridors could limit options on design or more preferable locations. A primary factor in the timely review and approval of land authorizations for a major energy facility is the effort involved in selecting a suitable route for the facility while minimizing the environmental impacts created by its construction, operation, and continued maintenance. If a project proponent uses the designated corridor as the proposed route, then the proponent would only be required to do on-the-ground environmental studies to determine if the route is suitable for the construction of the project. This simplifies the permitting process and can save considerable time as well as costs.

The following areas would be managed as ROW avoidance areas under all Alternatives: Asparagus Point, Steamboat Butte, Red Dome, Red Valley, Portion of Acton, Portion of Shepherd Ah-Nei, Bad Canyon, East and Red Pryor Mountains, Hoskins Basin Archeological District, Demi-John Flat Archeological District, and Beartooth Mountain Front (2 mile strip bordering the eastern boundary of the Custer National Forest). Facility siting in these areas could have additional design and siting requirements and associated costs on new ROWs or amended or renewed ROWs at existing sites. Such requirements may restrict placement and could possibly limit future access. There would also be an increased potential for requests for new or amended and renewed ROWs at existing sites to be denied in these areas.

4.3.3.3.11 Impacts from Recreation and Visitor Services

Recreation management actions, including designation of SRMAs and ERMAs, could result in land ownership adjustments or easement acquisitions in order to improve access to public lands for recreation opportunities. Proposed facilities, such as power lines, may need to be mitigated to minimize the impacts to recreational setting and experiences, which could result in an increase in processing costs and time for both the federal and non-federal parties.

4.3.3.3.12 Impacts from Renewable Energy

Any renewable energy development proposed for BLM-administered land could result in requests for site, utility, and access rights-of-way. Wind energy projects would be managed in accordance with the BMPs identified in the Final Programmatic EIS and ROD (December 2005) on Wind Energy Development on BLM Administered Lands in the Western United States.

4.3.3.3.13 Impacts from 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. Upon completion, roads used for commercial and administrative access would be reclaimed, unless the route provides benefits for public access, which would be determined through subsequent analysis.

4.3.3.3.14 Impacts from 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 power lines may need to be mitigated (e.g., burial of the line) or rerouted in order to protect these trail values. Land ownership adjustments such as sales or exchanges would be restructured or eliminated from consideration in order to avoid disposing of BLM lands containing important resource values. Those areas identified as special designations, including: National Historic Trails, Pompeys Pillar National Monument, ACECs, Wild and Scenic Rivers and lands with wilderness characteristics, would not be designated for disposal. Management of any BLM lands that would be designated as ACECs would impose stipulations and restrictions on the use of these areas for land use authorizations and would preclude realty-related disposals of these lands. The Meeteetse Spires and Petroglyph Canyon ACECs would be ROW exclusion areas under all Alternatives, prohibiting ROWs, leases, and permits in these areas.

BLM Manual 6330 (Management of BLM Wilderness Study Areas), directs Agency management of WSAs until Congress acts on designation. If Congress designates the areas as wilderness, they would be managed according to the Wilderness Act of 1964, as amended, Public Law 88-577 (16USC 1131-1136). If Congress releases them from wilderness consideration, the areas would be managed as prescribed under the existing RMP management direction.

Management activities for resources and programs within the PMWHR would be designed in a manner to minimize impacts or limit the ability to protect wild horses and their habitat. Stipulations and restrictions may limit placement of facilities to less desirable locations or areas with more restrictions on accessibility or construction.

4.3.3.4 Alternative A

4.3.3.4.1 Impacts from Soils

Under this Alternative, wheeled or tracked equipment operation on sustained slopes greater than 30 percent would be prohibited. This restriction would preclude land use authorizations on slopes greater than 30 percent, which would be approximately 33,908 acres of BLM-administered lands in the planning area. This would require projects in these areas to be relocated to Alternative locations. However, this impact would be anticipated to be minor because of the improbability of building facilities on steep slopes.

4.3.3.4.2 Impacts from Vegetation

Under this Alternative, surface disturbing activities would be limited on slopes greater than 35 percent, which would prohibit proposed land use authorizations in these areas and require projects to be relocated to outside these areas. However, this impact would be anticipated to be minor because of the improbability of building facilities on steep slopes.

There would be minimal impacts to land tenure, ROW, leases, permits, and withdrawals from riparian and wetlands actions under this Alternative. Proposed management actions would conform to mitigation guidelines and reclamation practices to minimize short-term and long-term surface disturbance.

4.3.3.4.3 Impacts from Wildlife Habitat and Special Status Species

Current management would not require specific seasonal or spatial restrictions for ROWs, leases and permits, land use authorizations would continue to be available for ROWs, leases, and permits to be permitted on a case-by-case basis, and would include BMPs. Management actions would conform to mitigation guidelines identified for wildlife and special status species, including BMPs to site facilities to minimize impacts to habitat, guidelines for overhead power lines/structures, etc., which would require additional time to process permits, and possible requiring additional monitoring over the term of the project. Existing oil and gas lease stipulations for greater sage-grouse habitat would restrict noise levels from production facilities to 50 decibels, as well as restrict use of heavy equipment exceeding 50 decibels within 2 miles of a lek from 4 to 8 AM and 7 to 10 PM from April 1 to June 30. These stipulations could restrict facility placement and require facilities exceeding these standards to be relocated to outside these areas.

4.3.3.4.4 Impacts from Fisheries Habitat and Special Status Species

Management actions would conform to mitigation guidelines identified for fisheries and special status species habitat. There are no impacts to land tenure, ROW, leases, permits, and withdrawals, from fisheries habitat and special status species actions under this Alternative.

4.3.3.4.5 Impacts from Paleontological Resources

Applying lease stipulations and lease terms to mitigate impacts to paleontological resources on a case-by-case basis could preclude land use authorizations or increase design and siting requirements and associated costs.

4.3.3.4.6 Impacts from Visual Resources

Current management identifies Visual Resource Inventory (VRI) classifications, absent Visual Resource Management (VRM) for a majority of the decision area. Under this Alternative, land authorizations would be prohibited on 29,843 acres classified as VRM Class I. Land authorizations proposed on the 12,472 acres (3 percent of the BiFO decision area) managed as VRM Class II areas would be redesigned, relocated, or otherwise restricted because of the requirements to preserve or retain the existing character of the landscape.

Managing for VRM Classes III and IV would allow the greatest flexibility for ROWs and other land use authorizations. VRM Classes III and IV allow more changes to the landscape and are less restrictive of ground-disturbing activities. Under this Alternative, 391,068 acres would be managed as VRM Class III, and 816 acres would be managed as VRM Class IV. Thus, the majority of the BiFO decision area (90 percent) would be available for siting ROWs.

4.3.3.4.7 Impacts from Lands with wilderness characteristics

Under this Alternative, 1,925 acres located adjacent to the Pryor Mountain and Big Horn Tack-On WSAs would be managed as ROW exclusion areas, which would preclude ROWs, leases, and permits in these areas.

4.3.3.4.8 Impacts from Cave and Karst Areas

Land use authorizations would continue to be permitted on a case-by-case basis, and would be designed to minimize impacts in and around cave entrances to minimize impacts to special status bat species and cave resources.

4.3.3.4.9 Impacts from Lands and Realty

Withdrawn lands are closed from operation of all or some of the public land laws and/or mineral laws, or are dedicated lands to a specific public purpose. The following areas, totaling 1,855 acres, are currently closed and withdrawn from mineral entry: Britton Springs Administrative Site, Crooked Creek Natural Area, Four Dances ACEC, Petroglyph Canyon ACEC, Pompeys Pillar NM, and Weatherman Draw ACEC. Approximately 37,700 acres (lands with wilderness characteristics, Meeteetse Spires ACEC, East Pryor ACEC, Big Horn Tack-On WSA (including Mystery Cave), Burnt Timber Canyon WSA, Pryor Mountain WSA, and Twin Coulee WSA) are closed and recommended for withdrawal from mineral entry.

Under this Alternative, 7,529 acres identified as available for FLPMA Section 203 sale (disposal) in the existing land use plans would continue to be available pending site-specific environmental analysis. Another 2,088 acres were identified for further study. These sales would improve the manageability of the public land estate by disposing of parcels isolated or difficult to manage and would provide opportunities for community expansion. Conversely, grazing land, open space, wildlife habitat, and land available for other public land uses would be lost. Under current management, approximately 26,616 acres would be managed for retention. These lands would include all ACECs, WSAs, National Register-eligible archeological and historic sites, and lands acquired through the Land Water Conservation Fund. Lands managed for retention would not be transferred from BLM management for the life of the plan. Under the existing RMP, BLM lands are available for state grants, agricultural entries, and Indian allotments on a case-by-case basis. Applications for Recreation and Public Purposes (R&PP) transfers and airport grants would also be considered on a case-by-case basis.

Rights-of-Way would not be allowed on 44,014 acres, which would be designated as exclusion areas. Designating 24,203 acres as avoidance areas for ROWs could impose design and siting requirements and associated costs on new ROWs or amended or renewed ROWs at existing sites.

Approximately 365,884 acres would be available for ROW development (including power lines, pipelines, and communication sites), which would accommodate desired placement of facilities, accommodate access and efficient energy supply (by allowing pipelines, transmission lines, and wind and solar projects), and minimize additional costs.

4.3.3.4.10 Impacts from Trails and Travel Management

The primary impacts to lands and realty programs and uses from general public motorized access to BLM-administered public lands are vandalism of authorized facilities, trespass, interruptions in energy or water transmissions, etc. Specifically, the availability of motorized access to authorized facilities and/or private, state or other land ownerships is addressed when assessing impacts to lands and realty-related users. Planning decisions that involve changes to the available number and overall miles of BLM-administered roads open for public and/or administrative use and the number of acres of routes proposed for closure would affect these users to varying degrees. Inasmuch as the use of motor vehicles on public routes constitutes the primary means of access to public lands for both authorized users and other land owners, the supply and spatial extent of travel access networks for motor vehicles is an important factor in assessing potential impacts to their operations or property rights by the route designations in the Travel Management Areas (TMA).

In analyzing the potential effects of route designations on authorized uses and private and state inholdings, differences between each action Alternative's set of route designations and the no action, current management route designations are analyzed and expressed primarily in terms of 'absolute percent change' versus a more familiar method of expressing 'relative percent change'. As a comparative example, in relative terms, an Alternative that proposes to close 562 routes (Appendix O) out of the total 877 routes that exist where only 89 routes out of 877 routes are closed under No Action represents a 631 percent increase in the number of routes closed in Alternative X relative to the No Action Alternative. In absolute terms, however, the

89 closed routes in the No Action Alternative represent 10 percent of the current total network while under Alternative X, the 562 closed routes represent 64 percent of the potential network, resulting in 54 percent more routes closed in Alternative X than in the No Action Alternative. Specialists determined to use the 'absolute percent change', primarily because a) the route 'population', or total number of routes under consideration for designation is constant for all Alternatives for each query and b) specialists believe the results better depict the 'shifting' of designations within Alternatives using the same route inventory.

Routes accessing authorized use sites/areas: Authorized facilities or uses on public lands, such as electric transmission lines, water pipelines, communication sites, etc., are typically accessed by motorized vehicle along existing routes. Total closure of routes that access these facilities could have a detrimental effect on the ability of the authorized user to access facilities for maintenance or other related activities essential to the authorized use.

With regard to the 159 routes that are associated with authorized uses under the No Action Alternative, 143 routes (259 miles) or about 90 percent would be open to all motorized uses or open with restrictions. Additionally, 4 routes (7 miles) or 3 percent of routes associated with facilities would be limited to administrative use only (which generally includes authorized users) and 12 routes (18 miles) or 8 percent would be closed. Although Alternative A carries forward 12 routes designated as closed, 8 percent of routes associated are with facilities. The direct, long-term effect of these closed routes on the ability of authorized users to access facilities or use sites would be negligible, due to the continued availability of over 9 out of every 10 existing BLM routes for these activities. Authorized users would have the continued availability to access these areas through non-motorized means.

Routes accessing private, state inholdings within larger blocks of public lands: Private and State land inholdings that are within larger blocks of public lands are typically accessed by motorized vehicle along existing routes. Total closure of routes to lands could have a detrimental effect on the ability of the land owners to access them.

With regard to the 149 routes that are associated with accessing private and state inholdings within larger blocks of public lands in the TMAs, under the No Action Alternative, 144 routes or about 97 percent would continue to be managed as open/open with restrictions or limited to administrative use only. Although Alternative A carries forward 5 route closures (existing management), over 3 percent of routes associated with inholdings, the direct, long-term effect of these closed routes on the ability to access private or state lands would be negligible to minor, due to the continued availability of almost 10 out of every 10 existing BLM routes for these activities.

4.3.3.4.11 Impacts from Special Designations

Areas of Critical Environmental Concern (ACECs)

Land tenure adjustments on 37,896 acres within the Bridger Fossil Area, East Pryor, Meeteetse Spires, Petroglyph Canyon, Pompeys Pillar (the 29 acre Historic Zone), Stark Site, Weatherman Draw ACECs, Castle Butte, Four Dances, and Pompeys Pillar (Historic-developed and General Management Zones) ACECs would focus on acquisition of non-federal

land within the ACECs. Over time, this would lead to a consolidated land pattern within these special designations, a benefit to other resource programs. Land tenure adjustments would be made on a case-by-case basis.

Approximately 36,525 acres associated with the Bridger Fossil Area, East Pryor, Meeteetse Spires, Petroglyph Canyon, Pompeys Pillar (the 29 acre Historic Zone), Stark Site, and Weatherman Draw ACECs would all be managed as ROW exclusion areas. Proposed land use authorizations would be prohibited and displaced to other areas. Due to the amount of area affected, impacts to lands and realty should be moderate. Approximately 1,371 acres associated with the Castle Butte, Four Dances, and Pompeys Pillar (Historic-developed and General Management Zones) ACECs would be managed as ROW avoidance areas. In these areas, proposed land use authorizations would be considered; however, associated costs and design and siting requirements due to mitigation may delay, restrict, or preclude land use authorizations.

Wilderness Study Areas

Approximately 28,631 acres of WSAs would continue to be managed as ROW exclusion areas. Proposed land use authorizations would not be processed and displaced to other locations in the decision area.

National Historic Trails

The L&CNHT and NPNHT would be managed as ROW avoidance areas. Proposed land use authorizations, ROWs, permits, and leases in these National Historic Trail sections would potentially be relocated to other locations in the decision area.

Pryor Mountain Wild Horse Range

The wild horse range would be managed as a ROW exclusion area. Proposed land use authorizations would be prohibited and displaced to other areas, thereby impacting lands authorizations for ROWs and identifying Alternative locations.

4.3.3.5 Alternative B

4.3.3.5.1 Impacts from Soils

Impacts under this Alternative would be the same as Alternative A, with the addition that soil disturbing activities would be prohibited in areas where erosion would not be controlled or mitigated, precluding land use authorizations in these areas.

4.3.3.5.2 Impacts from Water

This Alternative would include a limit to BLM-authorized activities that contribute to deteriorating watersheds and/or excessive erosion, and prohibit surface disturbing activities within riparian areas, wetlands, designated 100-year floodplains, and on water bodies and streams. Therefore, these actions would prohibit proposed land use authorizations in these areas and require projects to be relocated to outside these areas.

4.3.3.5.3 Impacts from Vegetation

Forest and Woodlands

This Alternative would place an emphasis on retention and acquisition of forested lands, with consideration to the value of the forest type, habitat diversity and potential for carbon sequestration. This would result in a more consolidated land pattern within these communities and retention of these resource values in federal ownership. Impacts to ROWs, leases, and permits would be the same as those described under Alternative A, except wheeled and tracked vehicle operations would be prohibited on sustained slopes greater than 30 percent.

Riparian and Wetlands

Under this Alternative, surface disturbing activities would be prohibited within riparian areas and wetlands, designated 100-year floodplains and on water bodies and streams, except to benefit watershed health. Furthermore, BLM-authorized activities that lead to degradation in riparian areas not rated as PFC or FAR-UP would be prohibited. In these areas, proposed land use authorizations would be prohibited and displaced to other areas.

4.3.3.5.4 Impacts from Wildlife Habitat and Special Status Species

Under this Alternative, there would be increased stipulations for protection of wildlife habitat areas and special status species. Mitigation of surface disturbing and disruptive activities would be managed consistent with fluid minerals stipulations within areas of important wildlife habitat, including big game crucial winter range, designated bighorn sheep range, greater sage-grouse habitat, etc. Furthermore, surface disturbing and disruptive activities would not be allowed within 1 mile of bald eagle nest sites which have been active in the last seven years, peregrine falcon nests, ½ mile of ferruginous hawk nests between March 1 and July 1 that have been active in the past two years, and within ½ mile of raptor nest sites which have been active in the past two years and mountain plover nests. Stipulations in place for sharp-tailed grouse include prohibiting surface disturbing and disruptive activities within 2 miles of a lek (54,100 acres). The Protection Priority Area (PPAs) for greater sage-grouse would be established under this Alternative and these areas would be managed as exclusion areas for ROWs, except for valid existing rights. This would require prohibiting new ROWs in these areas, and require these types of authorizations to be relocated elsewhere in the decision area. The Restoration Areas (RAs) for greater sage-grouse would be managed as avoidance areas for ROWs, increasing the cost and design requirements for new ROWs and possible precluding authorization. Mitigation and BMPs within greater sage-grouse habitat would restrict noise levels from production facilities to 49 decibels at ¼ mile from the perimeter of the lek, as well as restrict temporary noise (including installation, maintenance, and one-time use) to 49 decibels within 2 miles of the perimeter of a lek from 10 AM to 4 PM and between April 1 to June 30. Above ground power lines would also not be authorized within 6.2 miles of a lek, winter occurrence points, and in sage-grouse winter concentration areas. Additionally, above-ground power lines would not be authorized, unless it was technologically unfeasible to bury the power line. Impacts resulting from these conditions would result in increased costs and design and siting requirements, which may delay or prohibit land use authorizations. This Alternative would have an increased effect on ROWs, leases, and permits resulting in moderate

to high impacts from the increased cost and time involved in land use authorizations, as well as the preclusion of land use authorizations.

4.3.3.5.5 Impacts from Fisheries Habitat and Special Status Species

Under this Alternative, surface disturbing activities would be prohibited within riparian areas and wetlands, designated 100-year floodplains and on water bodies and streams, except to benefit watershed health. In these areas, proposed land use authorizations would be prohibited and displaced to other areas, thereby, increasing the cost and time required in land use authorizations, and potentially preclude land use authorizations in these areas.

4.3.3.5.6 Impacts from Paleontological Resources

Impacts would be the same as those described under Alternative A, with the exception that assessment and mitigation would be required as needed in areas with significant fossils.

4.3.3.5.7 Impacts from Visual Resources

Impacts anticipated under this Alternative would be similar to those described under Alternative A, except that fewer acres would be designated as VRM Class III (388,643 acres), more acres would be designated as VRM Class II (15,688), and no acreage would fall under VRM Class IV. This Alternative would be slightly more restrictive than Alternative A on where ROWs could be sited and would be likely to affect associated costs to the ROW/permit applicant, and most likely to delay or restrict availability of communications service in some areas.

4.3.3.5.8 Impacts from lands with wilderness characteristics

Approximately 27,292 acres would be managed for wilderness characteristics under this Alternative. These areas would be ROW exclusion areas, and proposed land use authorizations would be prohibited and displaced to other areas.

4.3.3.5.9 Impacts from Cave and Karst Areas

All cave and karst areas would be managed as ROW exclusion areas. Additionally, no surface disturbing activities would take place within ½ mile of cave entrances. Therefore, proposed land use authorizations would be prohibited and displaced to other areas.

4.3.3.5.10 Impacts from Lands & Realty (including Land Tenure Adjustment and Access; Rights-of-Way, leases and permits; and Withdrawals)

Under this Alternative, the least amount of acreage (compared to the other Alternatives) would be managed for Category I Retention (68,300 acres), the most acreage would be managed for Category II Retention/Limited Ownership (365,790 acres), and the least acreage managed for Category III Disposal (50 acres). Applications would be considered for R&PP leases/patents and airport grants, only on lands designated for disposal. This would restrict the number of R&PP leases/patents and grants to only 50 acres, which would require proponents to seek other opportunities, outside of BLM-administered lands. The BLM managed lands would not be available for state grants, agricultural entries, or Indian allotments.

Impacts to ROWs, leases, and permits would be similar to those listed under Alternative A, except under Alternative B, 211,384 acres of BLM-administered lands would be designated for ROW exclusion, and 185,607 acres of BLM-administered lands would be designated for ROW avoidance. This would allow 36,275 acres available for ROW development subject to standard mitigation. This would restrict the amount of acres available for land use authorizations, if not preclude facilities and authorizations, on BLM-administered lands, as well as increase the time and cost to process authorizations to meet mitigation requirements in the ROW avoidance areas. This Alternative is the most restrictive to placement of facilities authorized under ROWs, leases, and permits. Under this Alternative, applicants would be encouraged to locate electrical transmission lines 69 kV and greater, and pipelines ten inches and greater within designated corridors. Increased design and siting costs may preclude land use authorization, and the limited number of designated corridors within the decision area limits the ability to locate and site these facilities.

Alternative B includes the most acres of any Alternative to be recommended for withdrawal (a total of 270,977 acres of federal minerals). The following areas, totaling 1,855 acres, are currently closed and recommended to continue to be withdrawn from mineral entry: Britton Springs Administrative Site, Crooked Creek Natural Area, Four Dances Natural Area and ACEC, Petroglyph Canyon ACEC, Pompeys Pillar NM and ACEC, and Weatherman Draw ACEC. The following areas, totaling 269,122 acres of federal minerals, would be recommended for withdrawal from mineral entry: Bridger Fossil Area ACEC, East Pryor ACEC, Grove Creek ACEC, Meeteetse Spires ACEC, Pryor Foothills RNA/ACEC, Stark Site ACEC, and Weatherman Draw ACEC, WSAs, greater sage grouse PPAs, lands with wilderness characteristics, and cave and karst areas.

4.3.3.5.11 Impacts from Travel Management

With regard to the 159 routes that are associated with BLM-authorized uses under Alternative B, 29 routes (155 miles) or about 18 percent would be open to all motorized uses or open with restrictions (72 percent fewer than in Alternative A). Additionally, 60 routes (78 miles) or 38 percent of routes associated with facilities (35 percent more than in Alternative A) would be limited to administrative use only (which generally includes authorized users) and 70 routes (51 miles) or 44 percent would be closed (37 percent more than in Alternative A). Because Alternative B would close 70 routes or 44 percent of routes associated with authorized uses, the direct, long-term effect of these closed routes on the ability of authorized users to access facilities would be moderate, in part, due to the availability of over 5 out of every 10 existing BLM routes for these activities. While non-motorized access to these areas would continue to be available, limiting motorized access could impact authorized uses to maintain and/or monitor site facilities, as there would be constraints on the type of access to the area(s) and limiting the ability to bring in equipment, etc., if necessary.

Of the 149 routes that are associated with accessing private and state inholdings within the larger blocks of public lands in the TMAs, under Alternative B, 68 routes or about 46 percent would continue to be managed as open/open with restrictions or limited to administrative use only (51 percent fewer than in Alternative A). Because Alternative B would close 81 routes, or over 54 percent of routes associated with facilities, the direct, long-term effect of these closed

routes on the ability to access (motorized travel) private or state lands would be moderate to major, due to the availability of over 4 out of every 10 existing BLM routes for these activities.

4.3.3.5.12 Impacts from Special Designations

Areas of Critical Environmental Concern

This Alternative adds three new ACECs: Grove Creek, Pryor Foothills Research Natural Area, and Greater Sage-Grouse Habitat Area, which restrict land use authorizations (refer to the impact section above in lands/realty) as these areas would be managed as ROW exclusion areas under this Alternative. All ACECs would be managed as Category I Retention and would be retained in BLM management for the life of the plan, limiting disposals in these areas, and also placing priority acquisition adjacent to these areas which could enhance the values and benefits of these areas.

Wilderness Study Areas

Impacts would be the same as those described under Alternative A. If Big Horn Tack-On, Burnt Timber Canyon and Pryor Mountain WSAs were released from wilderness consideration, they would be managed as ACECs and ROW exclusion areas, prohibiting ROW authorizations.

National Historic Trails

The Lewis and Clark National Historic Trail and the Nez Pierce National Historic Trail would both be managed as ROW avoidance areas. Under this Alternative, mitigation of surface disturbing activities within ½ mile of the Lewis and Clark or Nez Pierce Historic Trails would protect these features. However, these actions would require land use authorizations to be subject to design and siting requirements, associated costs, and restrictions on placement.

Pryor Mountain Wild Horse Range

Under this Alternative, land within the PMWHR would not be designated for disposal. This would keep the area under public ownership and management, and limit land tenure adjustments.

4.3.3.6 Alternative C

4.3.3.6.1 Impacts from Soils

Surface disturbing activities would be allowed in areas where erosion would be controlled or mitigated with a BLM approved design plan, which would be less restrictive than Alternative B. Furthermore, surface disturbing activities would be prohibited on soils with sustained slopes greater than 45 percent, precluding ROW authorizations. However, this impact would be anticipated to be minor because of the improbability of building facilities on steep slopes.

4.3.3.6.2 Impacts from Water

Impacts under this Alternative would be the same as under Alternative A, with the exception that mitigation of surface disturbing activities would be required at the project level within

riparian areas, wetlands, designated 100-year floodplains, and on water bodies and streams. This would impose greater design and siting requirements than Alternative A, but would be less restrictive than Alternative B.

4.3.3.6.3 Impacts from Vegetation

Forest and Woodlands

This Alternative would place an emphasis on disposal of isolated forested lands where appropriate land/resource values are considered. This would result in a more consolidated land pattern and less administrative costs in managing scattered parcels. Impacts to ROWs, leases, and permits would be the same as those described under Alternative A, except wheeled and tracked vehicle operations would be prohibited on sustained slopes greater than 45 percent.

Riparian and Wetlands

Under this Alternative, surface disturbing activities would be allowed with mitigation within riparian areas and wetlands, designated 100-year floodplains and on water bodies and streams. This would impose greater design and siting requirements than Alternative A, but would be less restrictive than Alternative B. Furthermore, in riparian areas not rated as PFC or FAR-UP, BLM-authorized activities would be restricted or limited. In these areas, proposed land use authorizations would be allowed, but associated costs, design and siting requirements associated may delay or restrict land use authorizations.

4.3.3.6.4 Impacts from Wildlife Habitat and Special Status Species

Under this Alternative, there would be fewer stipulations for protection of wildlife habitat areas and special status species. For example, surface disturbing and disruptive activities would be allowed, with mitigation, within big game crucial winter range and within designated bighorn sheep range, although specialized design features to maintain habitat and mitigation would be required, and within established big game parturition habitat. Furthermore, surface disturbing and disruptive activities would be restricted and/or mitigated within ¼ mile of peregrine falcon nests, bald eagle nest sites from February 1 to August 15; 300 feet of ferruginous hawk nests if the activities would cause nest abandonment; ¼ mile of raptor nest sites which have been active in the past two years; and within ¼ mile of mountain plover nests. Mitigation and BMPs would be in place for sharp-tailed grouse and greater-sage grouse, as well as other species, to minimize impacts to important wildlife habitat areas. The greater sage-grouse Protection Priority Areas (154,140 acres of BLM-administered lands) and Restoration Areas (45,555 acres of BLM-administered lands) and General Habitat Areas (78,575 acres of BLM-administered lands) would be managed as avoidance areas for ROWs. Under this allocation, there would be considerable restrictions to land use authorization ROWs. Utilities and similar facilities would be located adjacent to other facilities where practical and when habitat functionality can be maintained.

These avoidance measures and mitigations would increase the cost and design requirements for new ROWs and facilities and potentially preclude authorizations in these areas. Other mitigation guidelines, which include noise stipulations for greater sage-grouse habitat that would restrict noise levels where cumulative noise exceeds to 49 decibels at the lek, and

temporary noise (including long-term operations and activities) exceeding a cumulative total of 49 decibels at the lek would be allowed where the cumulative noise total already exceeds 49 decibels at the lek.

These project level mitigation requirements would result in increased time and cost for land use authorizations and increased monitoring of the program to ensure compliance. Above-ground power lines, within 2 miles of a lek and winter occurrence points, and in sage-grouse winter concentration areas would be buried unless it would be technologically infeasible to bury the power lines. Additionally, above-ground power lines would be authorized in a manner that ensures habitat is maintained. Impacts resulting from these conditions would result in increased costs and design and siting requirements, which may delay or prohibit land use authorizations. Overall, this Alternative would have moderate impacts on lands and realty resulting in from the increased cost and time involved in land use authorizations, as well as the preclusion of land use authorizations.

4.3.3.6.5 Impacts from Fisheries Habitat and Special Status Species

Under this Alternative, surface disturbing activities would be allowed with mitigation within riparian areas and wetlands, designated 100-year floodplains and on water bodies and streams with an approved mitigation plan. This would impose greater design and siting requirements than Alternative A, but would be less restrictive than Alternative B.

4.3.3.6.6 Impacts from Paleontological Resources

Impacts would be the same as described under Alternative A, with the exception that damage to significant fossils would be prevented through lease notices, stipulations, and other requirements. This could impose additional facility siting and design requirements, which could increase project costs.

4.3.3.6.7 Impacts from Visual Resources

Impacts under this Alternative would be similar to those described under Alternative A, except that fewer acres would be designated as VRM Class III (387,616 acres), more acres would be designated as VRM Class II (20,498 acres), and no acreage would fall under VRM Class IV. This Alternative would be the most restrictive on land use authorizations and siting, and would be likely to increase project costs and possibly delay or restrict facility placement in some areas.

4.3.3.6.8 Impacts from Lands with Wilderness Characteristics

Impacts under this Alternative would be similar to those described under Alternative B, except these lands would be managed as VRM Class II, and less acreage (3,379 acres) under this Alternative would be managed for wilderness characteristics.

4.3.3.6.9 Impacts from Cave and Karst

All cave and karst areas would be managed as ROW avoidance areas, which is less restrictive than Alternative B. However, associated costs, design and siting requirements associated with

mitigation could delay or restrict land use authorizations. There would be no surface use restrictions.

4.3.3.6.10 Impacts from Lands & Realty (including Land Tenure Adjustment and Access; Rights-of-Way, leases and permits; and Withdrawals)

This Alternative would manage the most acreage for Category I Retention (108,184 acres), the least acreage for Category II Retention/Limited Ownership (321,255 acres), and the most acreage for Category III Disposal (4,223 acres). Applications would be considered for R&PP leases/patents and airport grants on lands designated Disposal and Retention/Limited Land Ownership Adjustment (Category II and III), approximately 325,974 acres. This provides flexibility and adaptability in managing these actions and adjustments to accommodate requests. State grants, agricultural entries, or Indian allotments would be available on 325,974 acres of Category II and III BLM managed lands.

Impacts to ROWs, leases, and permits would be similar to those listed under Alternative A, except under Alternative C, 39,491 acres would be designated for ROW exclusion. There would be 349,358 acres designated for ROW avoidance. This Alternative is the least restrictive to land use authorizations, allowing flexibility and adaptability for managing and addressing requests for land use authorizations, permits and ROWs. Under this Alternative, the Silver Tip Road would be designated a ROW corridor, one mile from the center line of Silver Tip Road, providing an additional corridor for ROW placement. In addition, applicants would be encouraged, but not required to use designated corridors, which would provide more flexibility in project siting and managing project cost.

Impacts to withdrawals would be the same as those described under Alternative B, except Grove Creek ACEC, East Pryor ACEC, Stark Site ACEC, and Twin Coulee WSA would not be recommended for withdrawal from mineral entry. Approximately 36,955 acres would be recommended for withdrawal under this Alternative.

4.3.3.6.11 Impacts from Travel Management

With regard to the 159 routes that are associated with authorized uses under Alternative C, 142 routes (271 miles) or about 89 percent would be open to all motorized uses or open with restrictions (0.6 percent fewer than in Alternative A). Additionally, 16 routes (13 miles) or 10 percent of routes associated with facilities (8 percent more than in Alternative A) would be limited to administrative use only (which generally includes authorized users) and 1 route (0.7 miles) or 0.6 percent would be closed (7 percent fewer than in Alternative A). Because Alternative C would close only 1 route to motorized use (or 0.6 percent) of routes associated with authorized uses, the direct, long-term effect of these closed routes on the ability of authorized users to access facilities, using motorized travel modes, would be negligible, in part, due to the availability of almost 10 out of every 10 existing BLM routes for these activities. There would be no impacts to authorized users under this Alternative, as access to existing facilities would not be impacted through closures.

Of the 149 routes that are associated with accessing private and state inholdings within the larger blocks of public lands in the TMAs, under Alternative C, 147 routes or about 99 percent

would continue to be managed as open/open with restrictions or limited to administrative use only (2 percent more than in Alternative A). Because Alternative C would close 2 routes to motorized use (or 1 percent) of routes associated with facilities, the direct, long-term effect of these closed routes on the ability to access private or state lands would be negligible, due to the availability of over 9 out of every 10 existing BLM routes for these activities.

4.3.3.6.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Impacts to lands and realty from ACECs, would be the same as those described under Alternative B, except the total acres of land designated as ACECs increases to 67,079 acres, the most of any Alternative. The Meeteetse Spires, Petroglyph Canyon, Pompeys Pillar (Zone A and B, 83 acres), and Weatherman Draw (original ACEC and acquisition) ACECs would all be managed as ROW exclusion areas in order to prevent irreparable damage to relevant and important values. Proposed land use authorizations would be prohibited and displaced to other areas. Due to the large amount of acres affected, impacts to lands and realty would be moderate. Approximately 59,597 acres associated with the Bridger Fossil Area, Castle Butte, East Pryor, Four Dances, Grove Creek, Pryor Foothills RNA, Stark Site, Weatherman Draw (expansion area), and Pompeys Pillar (Zone C) ACECs would be managed as ROW avoidance areas. The ROWs in Pompeys Pillar ACEC would be restricted to a 500 foot wide path along Highway 312. In avoidance areas, proposed land use authorizations may be re-located, or even prohibited and associated costs and design and siting requirements associated with mitigation may delay, restrict, or preclude land use authorizations.

Wilderness Study Areas

Impacts would be the same as those described under Alternative A. If the Big Horn Tack-On, Burnt Timber Canyon, and Pryor Mountain WSAs were released from Wilderness consideration, they would be managed as ACECs and ROW avoidance areas. This would result in increased cost and time to authorize a ROW, potentially precluding authorization.

National Historic Trails

Impacts would be the same as those described under Alternative B, except that surface disturbing activities would be subject to mitigation guidelines. Land use authorizations would be subject to design and siting requirements, associated costs, and restrictions on placement.

Pryor Mountain Wild Horse Range

Under this Alternative the wild horse range would be managed as an avoidance area, except for valid existing rights. Proposed land use authorizations would be subject to design and siting requirements, associated costs, and restrictions on placement.

4.3.3.7 Alternative D (Preferred Alternative)

4.3.3.7.1 Impacts from Soils

Impacts under this Alternative would be the same as Alternative C, except surface disturbing activities would be authorized on slopes greater than 30 percent where impacts could be mitigated to acceptable levels. This Alternative provides the most flexibility in design and siting of ROWs, leases, and permits.

4.3.3.7.2 Impacts from Water

Impacts under this Alternative would be the same as under Alternative C, except BLM-authorized activities that contribute to deteriorating watershed conditions or excessive erosion would be restricted or limited. This could result in increased cost and time to authorize ROWs, permits, and leases, potentially precluding authorization.

4.3.3.7.3 Impacts from Vegetation

Forest and Woodlands

Impacts to land tenure would be the same as those described under Alternative B. Impacts to ROWs, leases, and permits would be the same as those described under Alternative A, except wheeled and tracked vehicle operations would be prohibited on sustained slopes greater than 35 percent.

Riparian and Wetlands

Impacts under this Alternative from riparian and wetlands actions would be the same as Alternative C.

4.3.3.7.4 Impacts from Wildlife Habitat and Special Status Species

Under this Alternative, the impacts would be similar to Alternative C in that mitigation of surface disturbing and disruptive activities would be required at the project level, consistent with fluid minerals stipulations, for the protection of wildlife habitat areas and special status species. For example, surface disturbing and disruptive activities related to land use authorizations would be allowed, with mitigation, within bighorn sheep habitat, big game crucial winter range, within a ½ mile of active ferruginous hawk nests (that have been active with the past 2 years), and within 1 mile of active peregrine falcon nests. In addition, surface disturbing and disruptive activities would be allowed at the project level with appropriate mitigation from March 1 to August 1 within ½ mile of raptor nest sites which have been active the past 2 years, within ½ mile of active bald eagle nest sites from Feb 1 to August 15, and within ½ mile of mountain plover nests from April 10 to July 10. Other mitigation of uses in place for sharp-tailed grouse would be the same as under Alternative B. Greater sage-grouse PPAs, RAs and general habitat would be managed as avoidance areas for ROWs.

Under this Alternative, utilities and similar facilities would be located adjacent to other facilities where practical and when habitat functionality can be maintained, possibly increasing the cost and design requirements for new ROWs and facilities and potentially precluding

authorization. Mitigation of surface disturbing or disruptive activities, including ROWs, within PPAs, RAs and general sage-grouse habitat would be the same as under Alternative C. Above ground power lines within three miles of a lek and within greater sage-grouse winter range would be buried, unless sited in a way to maintain suitable habitat. If burying the power line is not feasible, above-ground power lines would be authorized in a manner that ensures habitat is maintained.

Impacts resulting from these conditions would result in increased costs and design and siting requirements, which may delay or prohibit land use authorizations. This Alternative would have moderate to high impacts on lands and realty from the increased cost and time involved in land use authorizations, as well as the preclusion of land use authorizations.

4.3.3.7.5 Impacts from Fisheries Habitat and Special Status Species

Impacts from fisheries habitat and special status species would be the same as Alternative B.

4.3.3.7.6 Impacts from Paleontological Resources

Impacts would be the same as those described under Alternative A, with the exception that for all surface disturbing activities occurring within PFYC Class 3 or higher, a stipulation would be included on the permitting document. This could impose additional facility siting and design requirements, which could increase project costs.

4.3.3.7.7 Impacts from Visual Resources

Impacts under this Alternative would be similar to those described under Alternative A, except that slightly more acres would be designated as VRM Class III (391,645 acres), and more acres would be designated as VRM Class II (13,648). This would result in impacts to land use authorizations as additional mitigation in more areas (VRM III) would be required and would also result in increased permit processing time and schedules, siting and design of facilities. No acreage would fall under VRM Class IV in this Alternative.

4.3.3.7.8 Impacts from Lands with Wilderness Characteristics

Impacts under this Alternative would be similar to those described under Alternative B, except 13,653 acres would be managed to maintain wilderness character. This would result in additional facility siting and design requirements, or potentially preclude authorizations and increase costs and time associated with land use authorizations and permits.

4.3.3.7.9 Impacts from Cave and Karst Areas

Impacts would be the same as Alternative C, except surface disturbing activities within ¼ mile of cave entrances may be allowed if the activity benefits the desired outcome of this resource.

4.3.3.7.10 Impacts from Lands & Realty (including Land Tenure Adjustments and Access; Rights-of-Way, Leases, and Permits; and Withdrawals)

Under this Alternative, 80,060 acres would be managed for Category I Retention, 353,796 acres would be managed for Category II Retention/Limited Ownership. There would be 170

acres of BLM-administered lands managed for Category III - Disposal. Applications would be considered for R&PP leases/patents and airport grants only on lands designated Disposal and Retention/Limited Land Ownership Adjustment (Category II and III) (approximately 354,098 acres). State grants, agricultural entries, or Indian allotments would be available on 170 acres of Category III BLM managed lands. This would provide the most flexibility in managing land tenure adjustments. Impacts to ROWs, leases, and permits would be similar to those listed under Alternative A, except under Alternative D, 48,258 acres of BLM-administered lands would be designated for ROW exclusion and 349,358 acres would be designated for ROW avoidance, with approximately 36,224 acres of BLM-administered lands available for land use authorizations, permits, and ROWs, subject to standard mitigation.

Impacts would be the same as Alternative C for utility corridors, except that the Silver Tip Road corridor would be one half mile from the centerline of Silver Tip Road.

Approximately 54,761 acres would be recommended for withdrawal from mineral entry under this Alternative. The impacts to withdrawals would be the same as those described under Alternative B, except East Pryor ACEC, Grove Creek ACEC, Stark Site ACEC, Twin Coulee WSA, greater sage grouse PPAs, and cave and karst areas would not be recommended for withdrawal from mineral entry.

4.3.3.7.11 Impacts from Travel Management

The 159 routes that are associated with authorized uses under Alternative D, 80 routes (220 miles) or about 50 percent would be open to all motorized uses or open with restrictions (40 percent fewer than in Alternative A). Additionally, 74 routes (62 miles) or 47 percent of routes associated with facilities (44 percent more than in Alternative A) would be limited to administrative use only (which generally includes authorized users) and 5 routes (2 miles) or 0.8 percent would be closed (4 percent fewer than in Alternative A). Because Alternative D would close 5 routes to motorized uses (or 3 percent of routes associated with authorized uses), the direct, long-term effect of these closed routes on the ability of authorized users to access facilities would be negligible to minor, in part, due to the availability of over 9 out of every 10 existing BLM routes for these activities. Of the 149 routes that are associated with access to private and state inholdings within the larger blocks of public lands in the TMAs, under Alternative D, 135 routes or about 91 percent would continue to be managed as open/open with restrictions or limited to administrative use only (6 percent fewer than in Alternative A). Because Alternative D would close 14 routes to motorized means (or over 9 percent of routes associated with facilities), the direct, long-term effect of these closed routes to access private or state lands would be minor (specific to those private land owners and/or other permitted users), due to the availability of over 9 out of every 10 existing BLM routes for these activities.

4.3.3.7.12 Impacts from Special Designations

Areas of Critical Environmental Concern

Impacts to lands and realty would be the same as those described under Alternative B, except the total acres of land designated increases to 38,786 acres. Bridger Fossil Area, Meeteetse Spires, Petroglyph Canyon, Pompeys Pillar (Zone A and B, 83 acres), and Weatherman Draw

(original ACEC and acquisition) ACECs would all be managed as ROW exclusion areas in order to prevent irreparable damage to relevant and important values. This Alternative would preclude ROW development on approximately 8,059 acres, 28,466 acres less than Alternative A. Proposed land use authorizations would be prohibited and displaced to other areas. Due to the large amount of acres affected, impacts to lands and realty should be moderate. Approximately 59,597 acres associated with the Castle Butte, East Pryor, Four Dances, Grove Creek, Pryor Foothills RNA, Stark Site, Weatherman Draw (expansion area), and Pompeys Pillar (Zone C) ACECs would be managed as ROW avoidance areas. ROWs in Pompeys Pillar ACEC would be restricted to a 500 foot wide path along Highway 312.

Proposed land use authorizations would be allowed; however, associated costs and design and siting requirements associated with mitigation may delay, restrict, or preclude land use authorizations.

Wilderness Study Areas

Impacts would be the same as those described under Alternative B.

National Historic Trails

Impacts would be the same as those described under Alternative C.

Pryor Mountain Wild Horse Range

Impacts to land tenure would be the same as described under Alternative B. Impacts to ROWs, leases, and permits would be the same as those described under Alternative C.

4.3.3.8 Cumulative Impacts

The cumulative impact analysis area for lands and realty include the BiFO and major ROW corridors that intersect its boundaries. The number of land use authorizations, particularly ROWs and permits, is a function of demand for these uses. Additional future development of adjacent federal, state, and private lands would likely result in additional requests for and approval of land use authorizations for facilities such as roads, utilities, and communication sites.

Restrictions on ROWs and utilities near the BiFO could result from areas protected as open space. This could result in increased concentration of ROWs for utilities on public lands within the BiFO. Sales or exchanges of state lands could result in extensive changes to surface management within the BiFO. If the BLM acquired non-federal lands, the demand for both major utilities and smaller-scale distribution utilities could decrease over time, because the potential for development of those lands (and the associated need for utilities) would decrease. In contrast, the BLM likely would need to issue increased ROWs to new areas if state lands were sold to private parties for future development.

The designation of ROW avoidance and exclusion areas on BLM lands, along with similar restrictions on ROW development on adjacent lands, would have a cumulative impact of reducing overall routing options for ROW facilities such as utilities and roads. Restrictions on ROWs in the decision area, combined with restrictions from other management plans in the

decision area, would have an incremental effect by limiting the location of the ROW. Alternatives B and D have the most avoidance and exclusion areas; and the fewest ROW avoidance and exclusion areas identified in Alternative A.

4.3.3.9 Irreversible and Irretrievable Commitments of Resources

Lands and realty policies may lead to irretrievable commitments of resources. This includes disposals of land that results in removal of that land from the private property tax base and loss of public use for other purposes, including recreational use and enjoyment of public lands. This also includes subsequent development and acquisition of land that results in removal of that land from the private property tax base.

4.3.3.10 Unavoidable Adverse Impacts

Numerous land use restrictions, imposed throughout the BiFO to protect sensitive resources and other important values, by their nature, impact the ability of operators, individuals, and groups who use the public lands to do so without limitations. Although attempts are made to minimize these impacts by limiting the level of protection necessary to accomplish management objectives while also meeting demands for land use authorizations, and through providing Alternative use areas for impacted activities; some adverse impacts to such users would be unavoidable to address the need to protect identified habitat types and mitigate visual impacts.

4.3.4 Livestock Grazing

This section describes potential impacts to livestock grazing resulting 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.

4.3.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Livestock grazing leases and permits would be adjusted as appropriate to ensure wildlife habitat requirements are taken into account in accordance with the Billings Field Office RMP.
- During review of grazing leases and permits, appropriate management tools and guidelines for grazing management options would be considered and prescribed as necessary to improve the condition of riparian and wetland areas.
- No net change in AUMs is expected in the decision area.

- Surface disturbances increase the likelihood for the introduction and spread of Invasive Non-Native Species, which degrade rangeland health and impact wildlife and livestock forage quality and quantity.
- To varying degrees, areas of concentrated wildlife and livestock use exist in most allotments (i.e., riparian and wetland areas, salting areas, fence corridors, etc.). Range improvements and managed livestock grazing methods disperse livestock and minimize livestock concentrations.
- Managing wildlife and special status plants can affect livestock grazing allocations.
- Managing for other resource uses can affect livestock grazing allocations and management.
- Over the last 50 years, rangeland health has improved across the decision area due to improved grazing management practices.

For the purpose of this analysis, short-term impacts to livestock grazing include activities that change the AUM allocation or rangeland health within 5 years of when the activity occurs. Long-term impacts are those remaining or occurring after 5 years. For example, the two-season grazing deferment following fire would be a short-term impact; a long-term beneficial impact to livestock grazing also may occur if the result is an increase in the quality or quantity of forage.

Direct impacts to livestock grazing from RMP Alternatives are anticipated from actions that change AUM allocations or in any way restrict, prohibit, or allow additional livestock grazing on an area. For example, the BLM policy requirement for deferring two growing seasons of grazing following prescribed fire and wildfire is considered a direct adverse impact to livestock grazing because it prohibits grazing.

Indirect impacts to livestock grazing are anticipated from actions that change rangeland health and productivity or that change livestock grazing management on BLM-administered public lands within the planning area (e.g., change in grazing seasons).

Impact analysis and conclusions are based on interdisciplinary team knowledge of resources within the planning area, review of existing literature, 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.

4.3.4.2 Environmental Consequences

Impacts to livestock grazing would likely result from actions proposed under the following resource management programs:

- Soil Resources and Water Resources

- Vegetation
- Wildlife and Fisheries Habitat and Special Status Species
- Fire Ecology and Management
- Cultural / Paleontological / Historic Resources
- Energy and Mineral Development
- Lands and Realty
- Livestock Grazing
- Recreation
- Travel Management
- Special Designations

Other programs were determined to have little or no impact on livestock grazing.

4.3.4.3 Impacts Common to All Alternatives

The types of impacts projected to occur to livestock grazing management because of each Alternative are similar and include changes in AUM allocations and rangeland health. The factors causing these impacts primarily include surface-disturbing activities, restrictions protecting resource values, fire and fuels management, invasive species and noxious weeds, and proactive management actions. Changes in AUM allocations and rangeland health, and the associated causative factors of these changes, are described below as impacts common to all Alternatives. How the intensity of these impacts varies by Alternative is described under individual Alternatives.

Under all Alternatives, changes in AUM allocations within the decision area may occur for several reasons, but are expected to be limited to specific allotments and to be relatively small changes compared to the total AUM allocations for the decision area. In many cases, a change in AUM allocations reflects a change in management of livestock within an allotment, or a change in management of another resource that affects livestock.

Livestock grazing continues to occur within the majority of the decision area under all Alternatives. In addition, current allotment categories (M, C, and I) are maintained under all Alternatives. The Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997) would be applied, regardless of Alternative. Vegetation treatment projects designed to benefit rangeland health also are anticipated to occur under all Alternatives. Over the life of the plan, it is estimated that to achieve or maintain the desired future condition (DFC) for rangelands, mechanical and chemical treatment and prescribed fire need to occur in the decision area.

4.3.4.3.1 Impacts from Soil

The use of standards for rangeland health would be utilized to assess soil and site stability, including compaction and erosion. Furthermore, surface disturbing activities would require plans for reclamation. These plans would reflect the project complexity, reclamation potential for the site, and other environment concerns. In the event of Wildfire the use for Emergency

Stabilization and Rehabilitation (ES&R) standards would be followed consistent with BLM policy. These requirements would ensure soils and vegetative communities would remain healthy, and prevent the deterioration of livestock quantity, and quality, which could lead to a reduction of federally available forage.

4.3.4.3.2 Impacts from Water

Implementation of the Guidelines for Grazing Management to restore and improve riparian areas may require adjustments in grazing management (i.e. adjusting numbers, rest, deferment, or maintaining existing livestock exclosures along streams, wetlands, and riparian areas in order to meet Proper Functioning Condition goals and the Montana Standards for Rangeland Health) that would affect livestock operations. The actions would be implemented on an individual allotment basis and be based on inventory and monitoring studies. Under all Alternatives, the BiFO would be in compliance with BLM-MOU-MT923-1030; Memorandum of Understanding Regarding Water Quality Management on Bureau of Land Management Lands in Montana, Between the Montana Department of Environmental Quality and the United States Department of Interior Bureau of Land Management

4.3.4.3.3 Impacts from Vegetation

The analysis of Alternatives is based on existing conditions and considers that over the last 40 to 50 years, an improvement in range conditions has occurred (see Livestock Grazing in Chapter 3). 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. To various degrees, improvements in range conditions generally are anticipated to continue under all Alternatives based on vegetation treatment, range-improvement projects, and development of guidelines for areas determined as not meeting rangeland health standards. Invasive species and noxious weeds are one factor that may adversely impact the improving trend.

Grazing allotments throughout the decision area are managed to meet the standards for rangeland health, including PFC in riparian areas. The focus of management is to improve Category I allotments and maintain category M and C allotments. Approximately 10 percent of public land acreage in the planning area is evaluated annually to determine whether it meets standards for healthy rangelands.

Various treatments have been proposed in all Alternatives analyzed. Vegetative treatments would have both short and long-term impacts to livestock grazing. The degree of impact to livestock grazing from these treatments would depend on the size and intensity of the treatment. Short-term impacts to livestock grazing from vegetative treatments could be from the removal and possibly temporary closure of all or portions of grazing allotments during and following the treatment. Once the area has been successfully reclaimed vegetative treatments could have long-term beneficial impacts to livestock grazing such as increased forage, and improved quality of forage.

4.3.4.3.4 Impacts from Wildlife and Fisheries Habitat and Special Status Species

Management for plant and wildlife species designated as threatened or endangered under the ESA or designated as special status species by the BLM can affect livestock grazing in allotments where these special status species occur. Specifically, restrictions on the type, location, or period that grazing or range improvement activities are allowed could limit livestock management options in allotments where special status species occur. For example, surface use restrictions could affect development or placement of range improvement projects and potentially affect the ability of the BLM or a grazing operator's ability to implement grazing management practices. In addition, special status species management can increase costs to livestock grazing operations by requiring additional surveys and design changes to projects.

Although the white-tailed prairie dog is not listed as threatened or endangered, it is a BLM-special status species and an important food source to raptors. Like the white tail-prairie dog, the black-tailed prairie dog is not listed as threatened or endangered, but is a BLM-special status species and is also an important food source to raptors. Both provide habitat for the burrowing owl and the black-footed ferret. Black-tailed prairie dog towns are typically devoid of forage, and other native vegetation. As these towns increase in size, the AUMs available to livestock decrease.

Special status plant species are known to or may occur in the planning area. Special considerations for the management of these plant species as they are discovered, or if critical habitat is designated, also could impact livestock grazing. To prevent trampling by livestock, water developments and placement of salt, mineral, or forage supplements for livestock are not allowed in areas inhabited by special status species or other sensitive areas under all Alternatives; however, the size of the buffers vary by Alternative. Any sort of buffer may restrict the placing and (or) timing of constructing range-improvement projects and, therefore, adversely impact livestock grazing by limiting management flexibility.

4.3.4.3.5 Impacts from Cultural, Paleontological, and Historical Resources

Cultural resources can restrict the location and design of rangeland improvement projects and, consequently, grazing systems. Avoidance of cultural resource sites that are eligible for or listed on the NRHP would be common to all Alternatives. Limitations on activities located adjacent to historic sites, and activities impacting the historic landscape, may limit the BLM's ability to construct rangeland improvement projects in an allotment that are aimed at better management of livestock. In addition, cultural and paleontological resource management can delay construction of range-improvement projects by requiring additional surveys and design changes in projects to avoid important cultural sites and paleontological localities.

4.3.4.3.6 Impacts from Fire Ecology and Management

Fire can have both beneficial and adverse impacts on livestock grazing management. In the short term, fire burns forage that livestock depend on and can damage facilities such as fences, pipelines, water developments, and corrals. This damage can have a substantial adverse economic impact on grazing operations by requiring leasing of additional pasture, feeding

livestock for longer periods, building or repairing fences, and reducing herd size. Wildfire emergency stabilization and rehabilitation efforts would be followed consistent with BLM policy. BLM policy requires deferment of livestock grazing following prescribed fire or wildfire for a minimum of two growing seasons. However, the total length of deferment beyond two growing seasons depends on the severity of the fire and the types of restrictions placed on grazing use on public land. In the long term, fire may improve the quality and quantity of forage, thereby improving flexibility in managing livestock. Both prescribed and wildfires can increase the extent of invasive species and noxious weeds. The extent that fire degrades rangeland health through propagation of invasive species and noxious weeds typically depends on the invasive species and noxious weed seed vector, 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.

4.3.4.3.7 Impacts from Energy and Minerals Resources

Given that livestock grazing occurs across most of the BiFO, and given that the potential for development is low, the loss of forage in these areas would result in negligible impacts to livestock grazing. However, mineral development activities would also increase the potential for livestock harassment and livestock loss from vehicle collisions. Additionally, the improvement of roads associated with mineral development could facilitate livestock management operations by improving access to remote locations within allotments.

4.3.4.3.8 Impacts from Lands and Realty

Land disposal could occur throughout the decision area. All lands identified for consideration for disposal are isolated and generally surrounded by private land. The majority of land disposed likely would continue to be grazed under different (e.g., private) ownership; however, grazing fees would no longer be collected by the BLM for these areas. Frequently, land disposal is 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 decision area cannot be predicted due to the differences in forage production among sites.

Subdividing base property for recreation or housing developments is a recent activity that could potentially impact the BLM's ability to effectively manage adjacent public lands for grazing. Subdividing would primarily impact individual grazing allotments and could result in breaking allotments into smaller units, reducing AUMs or in canceling the grazing lease/permit entirely. In addition to structures, subdivisions generally result in more vegetation removal and surface disturbance for roads, fences, power lines, and other facilities—all of which can fragment habitat and increase the opportunity for spread of invasive species and noxious weeds. The long-term impact could result in the degradation of rangeland health. Subdivisions increase management costs and oversight for the both the permittees and the BLM as recreational and incidental uses add to conflicts.

4.3.4.3.9 Impacts from Livestock Grazing

Under all Alternatives, based on assumptions state earlier in this chapter, throughout the decision area, the development, maintenance, and installation of wells would disturb 2.4 acres, water pipeline installation would disturb 23 miles and reservoir maintenance would disturb 2.4 acres. Adverse impacts associated with these improvement projects generally are considered short term, as vegetation typically is reclaimed within two to three growing seasons. While adverse impacts associated with the construction of these facilities are short term, the long-term impacts of these actions are designed to be beneficial.

Due to the scattered land pattern in the decision area, the Billings Field Office generally issues few trailing permits. Livestock are typically trucked or driven along county roads. Additionally, operators typically neighbor the allotments for which they are authorized to graze and can directly turn livestock on to their allotments directly from their private pastures. In recent years, one trailing permit has been issued annually. This permit is for trailing cattle and horses across the PMWHR. The route for this trailing authorization crosses approximately 0.5 miles of BLM managed public land. This permit is issued for one day in the spring and one day in the fall. Trailing of livestock across public lands is not expected to increase over the life of the plan. Due to the limited number of trailing permits issued, impacts are minimal.

4.3.4.3.10 Impacts from Recreation and Trails and Travel Management

The primary impacts to livestock grazing and rangeland management from general public motorized access to public lands are vandalism of facilities, intentional and/or unintentional harassment of livestock, inadvertent disruptions of livestock management operations (i.e., leaving gates open), and impacts to soils and vegetation. Specifically, the availability of motorized access to rangeland facilities and/or monitoring sites comes into play when assessing impacts to livestock grazing operations and rangeland management responsibilities. Planning decisions that involve changes to the available number and overall miles of roads open for public and/or administrative use and the number of acres of routes proposed for closure would affect these operations and responsibilities to varying degrees. Inasmuch as the use of motor vehicles on public routes constitutes the primary means of access to public lands for both permitted livestock operators and administrative personnel in order to perform required tasks, the supply and spatial extent of travel access networks for motor vehicles is an important factor in assessing potential impacts to livestock grazing and rangeland management by the route designations in the Travel Management Areas (TMA).

4.3.4.4 Alternative A

4.3.4.4.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.3.4.4.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.3.4.4.3 Impacts from Vegetation

Forest and Woodlands

Impacts would be the same as impacts common to all Alternatives.

Rangelands

Impacts would be the same as impacts common to all Alternatives. Under this Alternative the use of prescribed fire would be used to treat approximately 6,418 acres over the life of this plan. In the event of prescribed fire, grazing deferment would be implemented on burned areas for at least 2 growing season, consistent with BLM policy. This would lead to a temporary loss of forage for specific operators; however this could potentially result in an increase in the amount and quality of forage. Additionally 160 acres of crested wheatgrass would be hayed or mechanically treated. Dependent on the project goals and objectives this could result in a temporary loss of forage on treatment sites, thought it could lead to an increase of forage in the long term.

Riparian and Wetland

Impacts would be the same as impacts common to all Alternatives.

Invasive Species and Noxious Weeds

Impacts would be the same as impacts common to all Alternatives. Under this Alternative 366-5,548 acres would be treated annually. These treatments would be intended to control the spread of undesirable species into native communities which could potentially reduce the quantity and quality of forage available to livestock. The treatment of these species would include a variety of treatment techniques, including the use of domestic sheep or goats. In these cases the treatment of invasive species and noxious weeds would create a forage source for livestock. Overall the treatment of invasive species and noxious weeds would be compatible with livestock grazing, and there would be limited reductions of livestock grazing opportunities. The greatest impact to livestock grazing from the treatment of these species would be a long-term benefit, by controlling these species from expanding on to neighboring rangelands.

Special Status Species

Impacts to livestock grazing from the management of special status species would be limited. Under Alternative A. on site examinations and evaluations would be conducted prior to surface disturbing activities taking place. If special status species were present in the project area this could limit the ability to install projects which could improve livestock management. Additionally, Domestic sheep are not allowed in the Grove Creek allotment # 05225 (Grove Creek ACEC) due the presence of the BLM special status plant species Shoshonea (*Shoshonea pulvinata*). The small isolated population is located in steep rock outcrops, inaccessible to cattle, but possibly accessible by domestic sheep or goats. Conversion from cattle to sheep would not be allowed under any of the Alternatives on this allotment.

4.3.4.4.4 Impacts from Wildlife and Fisheries Habitat and Special Status Species

Management and restoration of native wildlife habitat in their historic ranges (sage grouse PPAs and RAs) could have negligible to minor short- and long-term impacts on livestock operations by creating conflict with space, forage use, and water. However, the two activities have mutual goals. Water developments designed to provide new water sources for wildlife would in some situations increase water availability for livestock, (and vice-versa) promoting improved distribution of both livestock and wildlife.

Reintroductions, transplants, augmentation, and reestablishment of certain wildlife species (e.g., introducing bighorn sheep in domestic sheep range) could eliminate use of domestic sheep in those areas (including biological weed control agents). Converting cattle permits to sheep permits in occupied bighorn sheep habitat (which is located in the southern portion of the BiFO in the Pryor Mountains) would not be allowed. Under Alternative A, this would affect a 9 mile buffer zone surrounding occupied habitat on two grazing allotments (Gyp Springs #04105 and Bluewash #4155) for a total of 31, 317 acres available for livestock grazing, and 2,524 AUMs.

4.3.4.4.5 Impacts from Cultural, Paleontological, and Historical Resources

Activities associated with the management of cultural resources would affect relatively small, localized areas and would not have measurable effects on livestock forage. Mitigating adverse impacts to cultural resources and allowing for preservation and interpretation of such resources could include excavation of known sites, resulting in soil disturbances and forage removal. Restrictions on surface-disturbing activities near cultural sites and paleontological localities could prevent the removal of forage in these areas, and it could also result in the modification or relocation of range improvements.

4.3.4.4.6 Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative A 6,280 acres could be treated over the life of the plan using prescribed fire. This is the fewest of all Alternatives. All other Alternatives propose to treat 21,700 acres over the life of this plan.

4.3.4.4.7 Impacts from Energy and Minerals Resources

Impacts would be the same as impacts common to all Alternatives.

4.3.4.4.8 Impacts from Lands and Realty

The loss of public land through land disposals (e.g., Section 203 land sales, exchanges, R&PP patents) could reduce the forage available for livestock use on some allotments. Under Alternative A, 7,529 acres would be identified for sale. At 10 acres per AUM, this could result in the loss of approximately 746 AUMs, which is less than 1.4 percent of the total AUMs available within the BiFO. Acquired lands within a grazing allotment would be added to the allotment, but these lands would likely also involve only a small amount of AUMs. Retaining lands in federal ownership (e.g., habitat for listed and candidate species, eligible WSR segments, ACECs) would continue to provide rangelands for livestock in these areas (except

where identified as unavailable for grazing). Very small allotments generally represent the potential disposal parcels; management costs would be reduced because small allotments are expensive to administer.

Construction activities related to the development of land use authorizations (e.g., ROWs, permits, leases, easements) would remove a small amount of vegetation over the short term and would increase the potential for the introduction and proliferation of noxious weeds and invasive species, thereby causing a loss of livestock forage and associated AUMs.

4.3.4.4.9 Impacts from Livestock Grazing

Under Alternative A, the decision area would be open to livestock grazing except at Sundance Lodge Recreation Area (387 acres) and Four Dances Natural Area (784 acres).

Disease transmission from privately owned livestock entering public lands could affect the operation of a BLM grazing allotment if the diseased livestock are ordered quarantined on the public land. Post quarantine re-entry times as ordered, could close an allotment for an indefinite period of time. This would cause a loss of grazing revenue to the BLM and could adversely affect the grazing permittee and adjacent allotment permittees.

4.3.4.4.10 Impacts from Recreation and Visitor Services

Recreation activities would continue to directly impact livestock grazing operations through human disturbance, including animal displacement, livestock respiratory problems caused by airborne dust, animal displacement and harassment, and the injury or death of animals caused by vehicle collisions.

Cross-country recreational OHV use could damage and remove forage resources and increase dust levels in high-use areas, thereby causing dust to coat forage and subsequently lowering forage palatability. Vandalism to range projects and leaving gates open would also have an impact on livestock grazing operations. These impacts would likely increase over the life of the plan because of the increasing level of visitation in the BiFO.

Overall impacts from recreation (2 SRMAs – 1,171 acres) on livestock grazing would be the least under Alternative A and would be less intense compared to the other Alternatives, which would expand recreational opportunities and place restrictions on types of uses (including motorized access).

4.3.4.4.11 Impacts from Travel Management

Routes accessing rangeland facilities: Rangeland improvements or facilities for livestock grazing operations, such as fences, gates, wells, windmills, cattleguards, corrals, pipelines, ponds, springs, and tanks, are typically accessed by motorized vehicle along existing routes. Total closure of routes that access these facilities could have a detrimental effect on the ability of the permitted commercial livestock grazing operator to access facilities for gathering, branding, providing water or other related activities essential to the operator's business.

With regard to the 580 routes that are associated with livestock grazing facilities under the No Action Alternative, 493 routes (691 miles) or about 85 percent would be open to all motorized uses or open with restrictions. Additionally, 37 routes (45 miles) or 6 percent of routes associated with facilities would be limited to administrative use only (which generally includes grazing operators) and 50 routes (68 miles) or 9 percent would be closed. Although Alternative A carries forward 50 route closures, 9 percent of routes associated with facilities, the direct, long-term effect of these closed routes on the ability of operators to access livestock grazing facilities would be negligible, due to the continued availability of over 9 out of every 10 existing BLM routes for these activities.

Routes closed with reclamation: Routes that are proposed for closure would either be allowed to reclaim vegetative cover naturally over time or would receive some degree of mechanical reclamation following closure. In either case, the route acreage returned to a more natural condition would potentially change forage availability in pastures associated with such routes.

Under the No Action Alternative, no routes would be slated for active, mechanical reclamation. However, 81 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 120 acres.

4.3.4.4.12 Impacts from Special Designations

National Monuments

Under Alternative A, the Pompeys Pillar National Monument (and ACEC) is not authorized for livestock grazing because grazing preference was never established at the site. However, under the provisions of the ACEC designation, grazing could be authorized for the control of invasive species and noxious weeds. Impacts to the livestock grazing program would be minimal; however impacts to the control of noxious would be enhanced since grazing represents an additional control tool. Range improvements are allowed provided they do not impair or conflict with the ACEC values.

Areas of Critical Environmental Concern

Alternative A continues the designation of nine ACECs. Two of these ACECs (East Pryor and Four Dances Natural Area) are unavailable for livestock grazing. The feasibility of grazing these areas is questionable, given that East Pryor ACEC is within the Pryor Mountain Horse Range and as such, was withdrawn from livestock grazing when it was designated in 1968. The Four Dances Natural Area ACEC is not well suited for livestock grazing due to its high degree of recreational foot traffic and recreational facilities. Sheep grazing is not allowed within the Meeteetse Spires ACECs for reasons stated above under the Special Status Species section. Management of the other six ACECs would have no impact on livestock grazing because livestock grazing was not identified as a threat to any relevant or important values, therefore no special management prescriptions that affect grazing operations would be implemented.

4.3.4.5 Alternative B

4.3.4.5.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.3.4.5.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.3.4.5.3 Impacts from Vegetation

Forest and Woodlands

Impacts would be the same as impacts common to all Alternatives.

Rangelands

Under Alternative B, 15 percent (22,414 acres) of crested wheatgrass acreage would be converted to native sagebrush/ grassland over the life of the plan. Preferred treatment areas would be areas that are not currently being used in a grazing system to provide early spring grazing and reduce grazing pressure from other areas within a grazing allotment.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives.

Invasive Species and Noxious Weeds

Impacts would be the same as Alternative A. Under this Alternative 200-800 acres would be treated annually.

Special Status Species

Impacts would be the same as Alternative A.

4.3.4.5.4 Impacts from Wildlife and Fisheries Habitat and Special Status Species

Under Alternative B, the types of impacts experienced as a result of SSS (plants and wildlife) management would be similar to those described under Alternative A. However, Alternative B would include additional grazing permit/lease strategies to avoid or reduce fragmentation of habitat. All these actions would maintain forage cover and reduce forage loss, thus maintaining AUMs for livestock. Impacts associated with the management of Bighorn Sheep would be similar to Alternative A, except that the buffer zone for domestic sheep grazing would increase to 14.3 miles surrounding occupied wild sheep habitat.

Under Alternative B, the development of springs would not be authorized in riparian areas and wetlands. This could reduce the potential to improve livestock grazing practices which would improve livestock distribution, therefore potentially restricting opportunities to improve rangeland health

4.3.4.5.5 Impacts from Cultural, Paleontological, and Historical Resources

Impacts would be the same as those described under Alternative A

4.3.4.5.6 Impacts from Fire Ecology and Management

Impacts would be the same as impacts common to all Alternatives. Under Alternative B 21,700 acres could be treated over the life of the plan using prescribed fire. This is 15,420 acres more than Alternative A.

4.3.4.5.7 Impacts from Energy and Mineral Resources

Impacts would be the same as impacts common to all Alternatives.

4.3.4.5.8 Impacts from Lands and Realty

Under Alternative B, 50 acres in Category III – Disposal (land ownership adjustments, including sale) have been identified for conveyance. The effects to livestock grazing from disposals, ROWs, permits and leases under this Alternative would be negligible.

4.3.4.5.9 Impacts from Livestock Grazing

Impacts would be the same as those described under Alternative A except under Alternative B, the following areas would be closed to livestock grazing; Sundance Lodge Recreation Area (387 acres), Four Dances Natural Area (784 acres), Pompeys Pillar ACEC (432 acres), Bundy Island (78 acres), Pryor Mountain Wild Horse Range (28,387 acres), Asparagus Point (26 acres), Twin Coulee WSA (6,756 acres), and Meeteetse Spires (1,523 acres).

4.3.4.5.10 Impacts from Recreation

Impacts would be the same as those described under Alternative A, but would include additional SRMAs (total of 6 SRMAs – 90,783 acres). Impacts from recreation under Alternative B would include more acres than Alternative A, but would designate fewer acres than Alternatives C and D.

4.3.4.5.11 Impacts from Travel Management

Routes accessing rangeland facilities: With regard to the 580 routes that are associated with livestock grazing facilities under Alternative B, 83 routes (338 miles) or about 14 percent would be open to all motorized uses or open with restrictions (71 percent fewer than in Alternative A). Additionally, 181 routes (214 miles) or 31 percent of routes associated with facilities (25 percent more than in Alternative A) would be limited to administrative use only (which generally includes grazing operators) and 316 routes (252 miles) or 55 percent would be closed (46 percent more than in Alternative A).

Because Alternative B would close 316 routes or 55 percent of routes associated with facilities, the direct, long-term effect of these closed routes on the ability of operators to access livestock grazing facilities would be major, in part, due to the availability of over 4 out of every 10 existing BLM routes for these activities. Under Alternative B, no routes would be slated for active, mechanical reclamation (same as Alternative A). However, 458 existing BLM routes

would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 404 acres, 285 more acres than Alternative A.

4.3.4.5.12 Impacts from Special Designations

National Monuments

Under Alternative B grazing would not be allowed for any reason, and therefore, range improvements would not be necessary for the orderly administration of livestock grazing

Areas of Critical Environmental Concern

Impacts to livestock grazing would be the same as under Alternative A with the exception that under this Alternative, range improvements would only be allowed in the East Pryor ACEC and at Four Dances Natural Area ACEC

4.3.4.6 Alternative C

4.3.4.6.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.3.4.6.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.3.4.6.3 Impacts from Vegetation

Forest and Woodlands

Impacts would be the same as impacts common to all Alternatives.

Rangelands

Under Alternative C, 5 percent (7,500 acres) of crested wheatgrass acreage would be converted to native sagebrush/ grassland over the life of the plan. Preferred treatment areas would be areas that are not currently being used in a grazing system to provide early spring grazing and reduce grazing pressure from other areas within a grazing allotment. Additionally other treatments may occur within sage brush stands to achieve age class diversity within the stand. Treatment methods would vary.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives.

Invasive Species and Noxious Weeds

Impacts would be the same as Alternative A. Under this Alternative 1,500-3,000 acres would be treated annually.

Special Status Species

Impacts would be the same as Alternative A

4.3.4.6.4 Impacts from Wildlife and Fisheries Habitat and Special Status Species

Under Alternative C, the types of impacts experienced as a result of SSS (plants and wildlife) management would be similar to those described under Alternative A. However, Alternative C would not include additional grazing permit/lease strategies to avoid or reduce fragmentation of habitat. Impacts associated with the management of Bighorn Sheep would be similar to Alternative B, except that the buffer zone for domestic sheep grazing would decrease to 12.4 miles surrounding occupied wild sheep habitat.

Under Alternative C. Spring developments would be authorized and developed to maintain the integrity and function of associated riparian areas and wetlands. The use of these developments would improve livestock management and distribution

4.3.4.6.5 Impacts from Cultural, Paleontological, and Historical Resources

Impacts would be the same as those described under Alternative A.

4.3.4.6.6 Impacts from Fire Ecology and Management

Impacts would be the same Alternative B.

4.3.4.6.7 Impacts from Energy and Mineral Resources

Impacts would be the same as impacts common to all Alternatives.

4.3.4.6.8 Impacts from Lands and Realty

Under Alternative C, 4,223 acres in Category III – Disposal (land ownership adjustments, including sale) have been identified for conveyance. The effects to livestock grazing from disposals, ROWs, permits and leases under this Alternative would constitute a net loss of 472 AUMs, or 0.75 percent of the total AUMs in the Decision area.

4.3.4.6.9 Impacts from Livestock Grazing

Impacts would be the same as those described under Alternative A except under Alternative C the following areas would be open to livestock grazing only as a management tool for the treatment of noxious weeds or as a prescription to meet specific vegetation or other resource management goals; Sundance Lodge Recreation Area (387 acres), Four Dances Natural Area ACEC (784 acres), Pompeys Pillar ACEC (432 acres), Bundy Island (78 acres), Asparagus Point (26 acres), Twin Coulee WSA (6,756 acres), and Meeteetse Spires ACEC (558 acres).

4.3.4.6.10 Impacts from Recreation

Impacts would be similar to those described under Alternative B, although more lands (147,181 acres) would be established as SRMAs to manage recreational use and to mitigate impacts caused by this use. Under Alternative C, more area would be managed for motorized use; management of the two Travel Management Areas (TMAs) identified the “Recreation” section

(82,584 acres, and under Alternative B of this section) and an additional 9 TMAs (152,980 acres) would be managed for motorized use would emphasize this type of recreational opportunity available in the BiFO and consequently would increase the potential for livestock displacement, harassment, or injury. However, implementing surface use restrictions within all or portions of the SRMAs and TMAs would help to reduce the degree of impact from recreational and other uses.

4.3.4.6.11 Impacts from Travel Management

Routes accessing rangeland facilities: With regard to the 580 routes that are associated with livestock grazing facilities under Alternative C, 490 routes (735 miles) or about 84 percent would be open to all motorized uses or open with restrictions (0.5 percent fewer than in Alternative A). Additionally, 76 routes (64 miles) or 13 percent of routes associated with facilities (7 percent more than in Alternative A) would be limited to administrative use only (which generally includes grazing operators) and 14 routes (4 miles) or 2 percent would be closed (6 percent fewer than in Alternative A). Because Alternative C would close 14 routes or 2 percent of routes associated with facilities, the direct, long-term effect of these closed routes on the ability of operators to access livestock grazing facilities would be negligible, in part, due to the availability of over 9 out of every 10 existing BLM routes for these activities.

Routes closed with reclamation: Under Alternative C, no routes would be slated for active, mechanical reclamation (same as Alternative A). However, 18 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 6 acres, 63 fewer acres than Alternative A.

4.3.4.6.12 Impacts from Special Designations

National Monuments

Impacts under Alternative C would be the same as under Alternative A, however range improvements would be allowed provided they do not impair the NM/NHL values.

Areas of Critical Environmental Concern

Impacts under Alternative C would be the same as under Alternative A, however range improvements would be allowed provided they do not impair the ACEC values.

4.3.4.7 Alternative D (Preferred Alternative)

4.3.4.7.1 Impacts from Soil

Impacts would be the same as impacts common to all Alternatives.

4.3.4.7.2 Impacts from Water

Impacts would be the same as impacts common to all Alternatives.

4.3.4.7.3 Impacts from Vegetation

Forest and Woodlands

Impacts would be the same as impacts common to all Alternatives.

Rangelands

Impacts would be the same as Alternative C; however, 8 percent (12,000 acres) of crested wheatgrass acreage would be converted to native sagebrush/ grassland over the life of the plan.

Riparian and Wetlands

Impacts would be the same as impacts common to all Alternatives.

Invasive Species and Noxious Weeds

Impacts would be the same as Alternative A. Under this Alternative 400-2,000 acres would be treated annually.

Special Status Species

Impacts would be the same as Alternative A

4.3.4.7.4 Impacts from Special Status Species and Fish and Wildlife

Impacts would be the similar to impacts under Alternative C, however the buffer distance restricting sheep or goat grazing from bighorn sheep habitat would increase from 12.4 miles to 16 miles, with corresponding impacts to livestock grazing.

4.3.4.7.5 Impacts from Cultural, Paleontological, and Historical Resources

Impacts would be the same as those described under Alternative A

4.3.4.7.6 Impacts from Energy and Mineral Resources

Impacts would be the same as impacts common to all Alternatives.

4.3.4.7.7 Impacts from Lands and Realty

Under Alternative D, 170 acres would of Class III disposal acres would constitute a net loss of 32 AUMs, or .05 percent to the total AUMs in the decision area.

4.3.4.7.8 Impacts from Livestock Grazing

Impacts would be the same as those described under Alternative C

4.3.4.7.9 Impacts from Recreation

Impacts would be similar to those described under Alternative C, although fewer lands (81,227 acres) would be established as SRMAs to manage recreational use and to mitigate impacts caused by this use. Under Alternative D, more area would be managed for motorized use than under Alternative A or B; management of the two Travel Management Areas (TMAs)

identified the "Recreation" section (82,584 acres, and under Alternative B of this section) and an additional 4 TMAs (48,738 acres) would be managed for motorized use would emphasize this type of recreational opportunity available in the BiFO and consequently would increase the potential for livestock displacement, harassment, or injury. However, implementing surface use restrictions within all or portions of the SRMAs and TMAs would help to reduce the degree of impact from recreational and other uses.

4.3.4.7.10 Impacts from Travel Management

Routes accessing rangeland facilities: With regard to the 580 routes that are associated with livestock grazing facilities under Alternative D, 241 routes (531 miles) or about 42 percent would be open to all motorized uses or open with restrictions (43 percent fewer than in Alternative A). Additionally, 312 routes (237 miles) or 54 percent of routes associated with facilities (47 percent more than in Alternative A) would be limited to administrative use only (which generally includes grazing operators) and 27 routes (35 miles) or 5 percent would be closed (4 percent fewer than in Alternative A). Because Alternative D would close 27 routes or 5 percent of routes associated with facilities, the direct, long-term effect of these closed routes on the ability of operators to access livestock grazing facilities would be negligible, in part, due to the availability of over 9 out of every 10 existing BLM routes for these activities.

Routes closed with reclamation: Under Alternative D, no routes would be slated for active, mechanical reclamation (same as Alternative A). However, 66 existing BLM routes would be closed and natural reclamation would be allowed to occur. The footprint (actual area of surface disturbance) of these routes would be approximately 73 acres, 47 fewer acres than Alternative A.

4.3.4.7.11 Impacts from Special Designations

National Monuments

Impacts would be the same as those described under Alternative C

Areas of Critical Environmental Concern

Impacts would be the same as those described under Alternative C

4.3.4.8 Cumulative Impacts

The area of analysis for cumulative impacts on livestock grazing is defined as the BiFO area boundary and the livestock operations that include public land grazing permits within the area administered by the BiFO.

Alternative A would maintain the status quo for allotment categorization (I: Improve, M: Maintain and C: Custodial). Under this alternative, allotments with high priority resource issues are categorized as I and receive the highest priority for improvement (mainly staff, planning and funding) and monitoring. As I allotments improve to a level where they are meeting the standards for rangeland health (or making significant progress towards meeting the standards) the category can be lowered to the M category so that staff and funding can be put towards

other allotments that require improvement. Category C allotments are typically small (less than 320 acres), isolated and unfenced parcels with little or no management potential (other than season of use), and are managed under the custodial oversight of the grazing permittee. There are currently 35 I category allotments, 111 M category allotments and 253 C category allotments.

Impacts under this alternative would be minimal to staff and funding. The flexibility to change categorization based on improving resource conditions is maximized.

Alternative B re-categorizes all allotments within the PPA boundaries to the I category. Under this alternative, all allotments within the boundary of the PPA would receive priority for protection, maintenance, improvement and monitoring. Impacts to staff and funding levels with creation of the newly re-categorized allotments would be low to moderate and dependent on existing resource conditions and the degree of departure from the standards for rangeland health, if any. Existing I allotments outside PPAs would continue to be treated the same as under Alternative A.

Impacts under Alternative C are the same as Alternative A for both monitoring and allotment categorization

Alternative D is essentially the same as Alternative B, with the exception that Alternative D includes the continued priority for monitoring of existing allotment management plans that are currently in place.

4.3.4.8.1 Past and Present Actions

Since European settlement began in the late 1800s, livestock grazing practices have changed dramatically. Initial livestock use of the area was completely unregulated and occurred on a first come, first served basis. The natural fire regime was intact, and additional fires were set by both Native American residents and European settlers, resulting in much larger areas of land dominated by native bunch grasses. There were few invasive plant species and meadow systems along riparian corridors were broad and productive. There were no fences, and virtually all of the lands were available for livestock use. As a result, the area was used by extremely large numbers of domestic sheep and cattle, and grazing management practices were relatively inexpensive.

Within a short time of initial settlement however, livestock grazing conditions began to change. The most productive lands were homesteaded, fenced, and placed in crop production. Repeated overgrazing of the uplands resulted in reduced natural fire events, and shrub and juniper dominated communities began to replace the grasslands. Livestock grazing and the construction of roads/trails along riparian corridors has resulted in stream downcutting and dewatering of meadows. These factors, coupled with fire suppression and the extreme drought of the 1930s resulted in a reduction of the forage available for livestock grazing. The increasing competition for available grazing lands made livestock management much more difficult and undependable.

The Taylor Grazing Act in 1934 allocated grazing lands to individuals that controlled adjacent base properties, which increased the dependability of public land livestock grazing. Montana

Grazing District 4 (M-4) was the fourth such district created under the act in the western United States. The adjudication period (Missouri River Basin Studies) in the 1960s reduced the number of livestock that were permitted to use the public lands, and the reductions resulted in increased livestock forage production. Water developments and seedings further increased the forage available for livestock.

In the 1970s and 1980s, allotment management plans were developed. The management methods these plans implemented further improved livestock forage conditions. However, they also increased the time and costs of maintaining livestock grazing on public lands.

4.3.4.8.2 Reasonably Foreseeable Actions

Since the 1960s, the restrictions being placed on livestock grazing have increased dramatically to accommodate other consumptive and non-consumptive uses of the public lands. The importance of managing the lands administered by the BiFO for healthy ecosystems, unstructured recreational experiences, wildlife habitat, special status plant and animal species habitat, and archaeological resources has increased, and is expected to increase into the foreseeable future. Livestock management to meet the objectives of these resources is becoming more tightly controlled, particularly in “special habitat” areas, such as in riparian areas and corridors, grassland, and shrubland communities. The cumulative impact on livestock grazing of meeting these objectives is increased cost to the livestock operations, either in a reduction in the amount of forage that livestock are allowed to harvest, or in an increase in operation costs due to additional herding and/or infrastructure to manage livestock while they are on public lands.

4.3.4.9 Irreversible and Irretrievable Commitment of Resources

None

4.3.4.10 Unavoidable Adverse Impacts

Actions needed to restore land health, particularly prescribed fire and special habitat management, would have short and long-term unavoidable impacts to livestock grazing. Treated areas would need to be rested from livestock grazing until vegetation is well established and can withstand livestock grazing. Some special habitat areas would need to be excluded from livestock grazing for extended periods of time. To meet land health and other resource objectives, livestock grazing management would need to be more tightly controlled in terms of season of use, duration of use, and periods of rest between uses, which could increase the costs to livestock operations grazing on public lands.

Activities that directly disrupt or impact the soil surface (such as mining and facility construction, compaction by grazing animals and vehicles, exposure of soil surfaces to wind and water erosion, and accelerated erosion of meadow soils along riparian corridors) reduce the long-term productivity of vegetation in the disturbed areas.

Activities, such as excessive or inappropriate livestock grazing, compaction of heavy clay soils by grazing animals and vehicles, heavy grazing that reduces fine fuels and ladder fuels, and

aggressive wildfire suppression contribute to the type conversion of native vegetation communities to non-native species, particularly annual grasses (cheatgrass), or to invasive native species. These type conversions also impact the long-term productivity of vegetation in the decision area. Reduction in the productivity of vegetation adversely impacts the long-term productivity for livestock as well.

4.3.5 Recreation and Visitor Services

This section presents potential impacts on recreation resources, opportunities, and experiences from management actions for other resource programs. Recreation uses within the decision area include backpacking, recreational OHV use, hiking, camping, sightseeing/viewing nature, hunting, fishing, mountain biking, rock climbing, and horseback riding. Impacts could occur through potential changes to visitor preferences (activities, experiences, and benefits), recreation setting conditions (physical, social, administrative), recreation management (resources, signing, facilities), recreation marketing (visitor services, information, interpretation and environmental education), recreation inventory and monitoring, and recreation administration (permits, fees, visitor limits and regulations). These recreation features are interrelated and connected to access. For example, changes in recreation settings would result in corresponding changes in the opportunities to achieve desired recreation experiences and associated benefits. These opportunities and benefits are influenced by access.

Recreational experiences and the potential attainment of a variety of beneficial outcomes are vulnerable to any management action that would alter the settings and opportunities in a particular area. Recreation settings are based on a variety of attributes, such as remoteness, the amount of human modification in the natural environment, evidence of other users, restrictions and controls, and the level of motorized vehicle use. Management actions that greatly alter such features within a particular portion of the decision area could affect the capacity of that landscape to support appropriate recreation opportunities and beneficial outcomes.

4.3.5.1 Methods and Assumptions

The analysis is based on the following assumptions:

- Principal positive indirect long-term impacts to recreational users would generally derive from resource protection measures. In the long term, resource-based recreational opportunities such as hiking, fishing, birding and hunting could be enhanced because habitat quality would be maintained or improved.
- The incidence of resource damage and conflicts between recreationists involved in motorized and non-motorized activities would increase with increasing use of public lands. This follows a local, regional and national trend.
- The existing transportation network would be sufficient to meet the demand of recreational OHV opportunities.
- The implementation of travel management planning conducted as part of this plan would affect use patterns in some parts of the decision area.

- The implementation of travel management planning would provide a basis for resolving existing conflicts between recreationists involved in motorized and non-motorized activities, and would minimize new conflicts.
- There would be sufficient opportunities to meet the demand for non-motorized recreation (e.g., hiking, mountain biking, equestrian).
- Demands for all types of recreation experiences would increase—particularly demands for semi-primitive motorized, semi-primitive non-motorized, and primitive recreation.
- Principal adverse direct impacts to recreational users from management would be in the form of activity restrictions. These would stem from prohibition of occupancy, use, and surface-disturbing activities. Surface disturbing uses such as OHV operation or certain non-motorized activities may be temporarily, seasonally, or permanently curtailed as a result of identified emergent conditions or excessive resource damage. Management actions to achieve desired outcomes may temporarily interrupt recreational activities through closures for rehabilitation/rest cycles.
- The recovered costs associated with the issuance of Special Recreation Permits (SRPs) may include mitigation costs. Applications for SRPs may be delayed or denied and activities may be relocated when environmental analysis identifies unacceptable levels of change to resources or other activities that would result from permitted recreational activities.
- Demand for Special Recreation Permits (SRP) would increase during the life of the plan.

4.3.5.2 Environmental Consequences

Impacts to recreation would likely result from actions proposed under the following resource programs:

- Air Resources
- Vegetation Resources
- Wildlife habitat and Special Status Species
- Fish and Wildlife and Special Status Species
- Wild Horses and Burros
- Cultural Resources
- Paleontological Resources
- Visual Resources
- Wildfire Ecology and Management
- Wilderness Characteristics
- Cave and Karsts Resources

- Minerals and Energy
- Lands and Realty
- Livestock Grazing
- Forestry and Woodland Resources
- Recreation
- Travel Management
- Renewable Energy
- Special Designations

Other programs were determined to have little or no impact on recreation.

4.3.5.3 Impacts Common to All Alternatives

4.3.5.3.1 Impacts from Air

None of the counties or communities in BiFO is currently a nonattainment area for fugitive dust. The only likely impact to recreational use associated with protection of air quality standards is to organized OHV events such as the annual Elk Basin Motorcycle Race sponsored by the Billings Motorcycle Club under a Special Use Permit in Carbon County. The race is typically run in June before soil moisture is low enough to result in significant fugitive dust. If Carbon County becomes a nonattainment area or area of concern for $PM_{2.5}$ or PM_{10} fugitive dust, then the permit would be amended to include mitigation measures, or changes in scheduling to ensure that the event did not result in significant fugitive dust emissions. Reasonably foreseeable effects are negligible.

4.3.5.3.2 Impacts from Cultural and Heritage Resources

The indirect effect of managing use to protect cultural and heritage property would be to protect recreational experiences derived from viewing undisturbed sites, or life-long learning opportunities in the study of other cultures.

4.3.5.3.3 Impacts from Paleontological Resources

The indirect effect of managing use to protect paleontological resources would be to protect recreational experiences derived from viewing undisturbed sites, or life-long learning opportunities in the study of the history of life on Earth.

4.3.5.3.4 Impacts from Cave and Karsts

Regardless of the Alternative BLM is charged with addressing White Nose Syndrome in Bat populations which takes precedence and the potential consequences include the closure or limitation of cave access to recreationists in order to reduce or eliminate impacts from recreational caving possibly transmitting White Nose Syndrome to bats and diminishing the populations.

4.3.5.3.5 Impacts from Lands and Realty

When private lands would be proposed for acquisition, exchange or sale they would be considered for their potential recreational opportunities and experiences, and any impacts from actions that might potentially impact these resources would be analyzed in NEPA on a case-by-case basis.

The BiFO is available for other land use authorizations (such as film permits, leases, and easements) if the use associated with this authorization is compatible with other decisions throughout the RMP. Activities authorized under a permit, lease, or easement must be in conformance with the recreational management directions developed in the RMP and any Activity level plans. It is difficult to speculate where these activities might occur in the future and what the proposed activity would entail. If the proposal is for a minimally impactful activity, it is likely that no impacts to recreational opportunities would occur from that activity. If, however, the proposed activity involves ground disturbance, takes extended time periods, has on site facilities, even if temporary, and has much use of motorized vehicles, then recreational opportunities and experiences would likely be affected by altering the Recreational Setting Characteristics.

4.3.5.3.6 Impacts from Recreation

Management decisions for the issuance of SRPs provides direction regarding the types of permits that would be issued, areas where some types of permits would not be appropriate and thresholds for organized group permits. These decisions would allow for a variety of SRPs to be issued while providing greater resource protection. Processing would also be streamlined by having management plan criteria to compare to applications. The benefits to applicants would be minor to moderate depending on the complexity of their proposal.

Given substantial increases in workload as permit applications increase, the current case-by-case authorization is inefficient. This process may eventually preclude some recreation providers from making available certain recreation opportunities. This could lead to minor-to-moderate impacts, which could increase as demand for SRPs increase.

Intensive management of more SRMAs will either affect SRPs positively or negatively in number based on monitoring. Outfitting and guiding could be reduced in these areas for overall experience of the casual visitor over commercial gains from Outfitter and guides and their clients. On the other hand, Outfitter and guide opportunities may increase if the appropriate resource protection measures are enacted and effective marketing strategies are developed, especially during preparation of SRMA implementation level plans.

4.3.5.3.7 Impacts from Special Designations

Wilderness Study Areas

Under all Alternatives, Wilderness Study Areas would be managed according to the BLM Manual 6330. The BLM is statutorily required (FLPMA Section 603) to manage these areas to protect their suitability for congressional designation to the National Wilderness Preservation System, unless and until Congress either designates an area as wilderness or releases it from

further consideration. The BiFO manages these areas for their naturalness, opportunity for solitude and primitive recreation, and provides users a unique recreational setting, opportunity, and experience. In the BiFO, the Pryor Mountains WSA units provide a significant level of opportunity, while the Twin Coulee unit receives much less. There would be no change in any Alternative.

4.3.5.4 Alternative A

4.3.5.4.1 Impacts from Soil

Current management strategies and polices which would enhance watershed stabilization and improve recreational opportunities includes: Implementation of Rangeland Health Standards and BMPs to mitigate effects of grazing on soils/watersheds, Controlled surface use, (CSU) and limitations on timber harvest activities. Implementation actions are on a case-by-case basis and not systematic. Current impacts to recreation are minor office wide but can be higher in specific locations such as Shepherd Ah-Nei and South Hills Recreation Areas due to the higher level of surface disturbance potential.

4.3.5.4.2 Impacts from Vegetation

Depending on the type, scope, and intensity, vegetation treatments could directly impact recreation settings and the associated visitor experiences as well as the possible realization of specific benefits. Impacts in treated areas could range from negligible to moderate. The duration of the impacts would be dependent on the type of treatment being applied as well as the acreage and success of treatments. In the long term, managing vegetation resources to achieve Standards for Rangeland Health and desired vegetation conditions, including the control of noxious weeds, invasive species, and insects, would improve the condition of the landscape and enhance recreation experiences and settings. Vegetation treatments would also indirectly improve wildlife-related recreation opportunities as a result of improved wildlife habitat. There are no federally threatened or endangered plant species in the decision area. Necessary mitigation, such as timing and avoidance, would be implemented to protect listed and sensitive plant species. If adequate mitigation could not be applied to the proposal, it would be relocated or denied.

4.3.5.4.3 Impacts from Wildlife Habitat and Special Status Species

All federal actions would be subject to the requirements of the Endangered Species Act of 1973, as amended. For recreation resources, this would include such things as facility construction, issuance of Special Recreation Permits, or trailhead improvements. Any action potentially affecting any listed threatened or endangered species would require the appropriate level of Section 7 consultation with U.S. Fish and Wildlife Service (USFWS). Necessary mitigation, such as timing and avoidance, would be implemented to protect listed plant and animal species. If adequate mitigation could not be applied to the proposal, it would be relocated or denied.

4.3.5.4.4 Impacts from Fisheries Habitat and Special Status Species

Under this Alternative, improving wildlife habitat would help maintain or improve fish and wildlife populations, which would be beneficial for recreation opportunities such as wildlife viewing, hunting, and fishing. Depending on the scope and intensity of habitat improvement efforts, impacts to recreational opportunities could result in short-term impacts resultant from short-term surface disturbances or temporary restrictions to areas. However, long-term impacts to improve habitat would generally improve recreational opportunities. Modification of physical recreational settings could have impacts that range from negligible to moderate.

Impacts from management activities in riparian areas, specifically buffer zones along streams, would be the same as discussed for this Alternative in Impacts from Water.

4.3.5.4.5 Impacts from Wild Horses and Burros

BiFO manages wild horses and the PMWHR to ensure a thriving natural ecological balance. In this Alternative BLM would manage wild horses on approximately 24,595 acres of BLM-administered lands (37,494 acres all ownerships). Viewing of wild horses is one of the most important and popular recreational activities in BiFO. In this Alternative, there are currently no horse management activities that might adversely affect recreational activities, other than short-term and localized closures associated with roundups. However, this action itself could also be considered a unique recreational and viewing opportunity by some.

4.3.5.4.6 Impacts from Visual Resources

Under this Alternative, VRM classes would not be established, and visual considerations would be done on a case-by case basis without management objectives found in the VRM manual, but still considering the landscape sensitivity. Any new facilities, new types of commercial activities, or other surface-disturbing activities would be analyzed on a case-by-case basis and would be required to meet visual program considerations or be relocated.

Under this Alternative, 29,843 acres of the lands within the BiFO would continue to be managed to meet VRM Class I objectives, which by policy are consistent with VRI Class A. These are the WSAs. The character of the landscape would be maintained in these areas and enhance the recreation experience, especially for those users seeking a more undeveloped setting. Since these lands are all within the WSAs and managed under the IMP, some projects could still be allowed that could result in localized impacts to the landscape and thus the recreation experience, which would range from negligible to minor, depending on the type of project.

Managing 12,427 acres of the BiFO as VRI Class B would allow changes to the landscape. While specific impacts would depend on the type and location of projects, they would range from minor to moderate. Class B areas should still support a wide variety of recreational opportunities and experiences. The remaining area, 391, 068 acres of the BiFO would continue to be managed as VRI Class B and C, which could allow for moderate to major modification of the landscape. The Class B and C lands would allow for development of recreation facilities, if necessary, and would continue to support and possibly enhance motorized recreation opportunities such as driving for pleasure, vehicle-supported camping, and OHV riding. The

non-motorized recreation experience could be diminished in areas in which the surface is disturbed and the landscape altered. Impacts would be long term, and depending on what projects are proposed, could range from minor to major.

4.3.5.4.7 Impacts from Fire Ecology and Management

Depending on the type, scope, and intensity, wildland fire treatments could directly impact recreation settings and the associated visitor experiences as well as the possible realization of specific benefits. Impacts in treated areas could range from negligible to moderate. The duration of the impacts would be dependent on the type of treatment being applied as well as the acreage and success of ESR treatments. In the long term, managing vegetation resources for using fire ecological practices to achieve Standards for Rangeland Health and desired vegetation conditions, including the control of noxious weeds, invasive species, and insects, would improve the condition of the landscape and enhance recreation experiences and settings. Treatments would also indirectly improve wildlife-related recreation opportunities as a result of improved wildlife habitat.

Areas where wildfire management for resource benefit including, but not limited to, forestry, wildlife, range, vegetation, and watershed; (2) the reduction of hazardous fuels; and (3) the introduction of fire into fire-adapted ecosystems would occur indirectly benefit recreational experiences and opportunities by improving these resources since they serve to attract recreational users. There may be a short-term adverse impact from temporary closures or perceived esthetics. In this Alternative, without a concise strategy, the effects would be localized and occur on an irregular schedule; as a result some actions may occur at inconvenient times and at locations which might benefit the fire ecology program but not necessarily the recreation program.

4.3.5.4.8 Impacts from Wilderness Characteristics

No actions to maintain wilderness characteristics on lands outside of WSAs are proposed under this Alternative, resulting in no impacts to recreation. The existing condition of the land acquired and “managed as WSAs” according the existing ROD would continue to receive the protective measures.

4.3.5.4.9 Impacts from Cave and Karsts

Management actions to achieve cave resource protection may temporarily or permanently affect recreational activities through closures or restrictions. Actions would be on a case-by-case basis and mostly reactive in nature since there would be no specific management decision framework for caves other than general policy guidelines.

4.3.5.4.10 Impacts from Energy and Mineral Resources

Recreation settings, opportunities, and experiences could be impacted during all phases of minerals development. Minerals related exploration, development, access road and infrastructure construction would create surface disturbances, noise and light pollution. These impacts would be greatest if development occurred in semi-primitive to primitive areas with natural appearing landscapes. Concentrations of wells or other mineral infrastructure could also

result in localized changes to the recreational opportunities and experiences available in that area.

Adherence to BMPs outlined in mining laws, plans of operation, pertinent restrictions, standard terms and conditions, etc., would help minimize such impacts. Closing 39,730 acres to fluids mineral leasing, allowing fluid mineral leasing with no surface occupancy on 32,595 acres, withdrawing 39,700 acres from mineral entry, and closing 44,583 acres to mineral material disposal would eliminate risks to recreation settings from minerals management and development within those areas.

The potential for development varies within different portions of the decision area. However, development potential is low in the southern portions of the decision area where the majority of the primitive to semi-primitive, natural appearing landscapes occur and where development would be most likely to impact recreation settings and experiences. Overall impacts to recreation would be minor.

4.3.5.4.11 Impacts from Forestry and Woodland Products

Approximately 9,500 acres of forested land would be protected from cutting, except where needed for other resource values. Protective areas include Pryor Mountain WSA, Bighorn Tack-On WSA, Burnt Timber WSA, Bad Canyon, Young's Point, Asparagus Point, Shepherd Ah-Nei and Acton. These areas are significant recreational areas so they would have negligible impacts from forestry operations. The remaining areas would be open. Principal adverse direct impacts to recreational users from fuels treatment generated forest product sales would be in the form of temporary restrictions on activities during cutting, skidding, and slash disposal operations, and disturbances generated by purchasers accessing areas to remove products. Operations may require the construction of temporary access roads, and subsequent reclamation of roads deemed no longer needed, temporarily affecting access.

Recreation experiences could be diminished in areas where the forest treatments are on-going and the landscape is altered. A total of 18 acres per year are proposed under Alternative A. Impacts would be primarily short term, and depending on where the projects are proposed to be located, could result in temporary impacts to users.

4.3.5.4.12 Impacts from Lands and Realty

Land tenure decisions currently include criteria regarding the disposal and acquisition of lands with high-value recreation opportunities. These decisions could enhance the recreation opportunities and management of areas when high-value recreation and access are considered. Other considerations are the same as the common to all Alternatives.

4.3.5.4.13 Impacts from Livestock Grazing

Principle adverse direct impacts from grazing operations on recreational users are primarily esthetic. Areas where livestock congregate around water development, riparian areas, shaded areas, or mineral supplement stations experience increased trampling, forage consumption, fugitive dust, and accumulations of manure with attendant increase in manure-feeding fly populations and odors. Where exclusions of cattle from riparian areas are implemented to meet

rangeland health standards, the quality of recreational experiences would increase and potential conflicts could be minimized.

In this Alternative, some specific recreational areas are closed to grazing, in these areas other resources such as wild horse viewing opportunities on the PMWHR and the wildlife viewing opportunities at Sundance or the historical considerations at the Pompeys Pillar NM take precedence, and these recreational opportunities are enhanced.

4.3.5.4.14 Impacts from Recreation and Visitor Services

Limiting or controlling recreation activities to support the Standards for Public Land Health and Guidelines for Recreation Management for BLM Lands in Montana and to protect resources could result in some localized closures or limitations on public use. The impacts would be dependent on the extent of the closures/limitations necessary, but they would be expected to be negligible to minor. Continuing to manage a large portion of the BiFO as non-designated public lands for recreation would allow a variety of recreational opportunities in a less structured setting. No new SRMAs would be established under this Alternative. Sundance and Four Dances SRMAs would continue to be managed.

Under Alternative A, 1,171 acres would be managed under two SRMAs. Management objectives through the development of activity plans would provide visitors higher quality recreation opportunities through the more focused and effective management of the desired settings, activities, and experience opportunities appropriate for each SRMA Four Dances SRMA/ACEC and Sundance Lodge SRMA would focus on non- motorized recreation opportunities and provide a variety of dispersed recreational experiences.

Impacts to recreation settings would range from negligible to moderate as these SRMAs would maintain the experiences and opportunities currently occurring in these areas. The remainder of the lands would be managed as an extensive recreation management area which would continue to support a variety of recreational opportunities in a less structured setting. However, with 431,981 acres (98 percent) of the area receiving no specific management direction for recreation opportunities, there would continue to be conflicts between user groups seeking varied experiences which may be viewed as incompatible. These impacts could range from minor to moderate and would continue to increase as recreation uses grow and change.

Under this Alternative, emphasis would be placed on maintaining a non-structured setting, without being subject to change as recreation uses change. Special management objectives to maintain the desired recreational opportunities and settings for specific areas would not be realized. In the long term, moderate impacts could result as visitation increases and new recreation activities develop. Potential user conflicts and degradation of the resource settings due to overuse are possible. SRPs would continue to be issued on a case-by-case basis with no management plan direction for issuance of commercial, competitive, organized group, and vending permits.

4.3.5.4.15 Impacts from Trails and Travel Management

Conflicts between motorized and non-motorized users and the potential for resource degradation would continue to increase which could result in a long-term moderate impact to recreation settings and opportunities. Recreation settings would be maintained and protected within the 101,027 acres designated as limited for OHV use and the 877 miles of routes open to motorized use in the TMAs would provide access. Those routes that are limited for OHV use would maintain and protect the semi-primitive to primitive setting in those areas.

No restrictions would be placed on motorized use off of designated routes for parking/staging and access to campsites, except within WSAs. There are also no decisions for the use of motorized vehicles for retrieval of game kills. This would continue to enhance some motorized activities, but could result in long-term minor to major impacts to resources and recreation settings.

4.3.5.4.16 Impacts from Renewable Energy

The BiFO currently has 47,496 acres closed to renewable (wind) energy development; the remainder of the BiFO would be available to wind energy projects and all requests would be addressed at the project level. If wind or solar energy were developed in the lands managed by the BiFO, it could adversely affect the recreation setting. Introducing large wind structures and solar arrays would be noticeable. Depending on the setting and opportunities in the area, this type of development could displace some recreational visitors long-term. Development, access road and infrastructure construction would create surface disturbances, noise and light pollution. These impacts would be greatest if development occurred in semi-primitive to primitive areas with natural appearing landscapes. Concentrations of wind turbines, solar arrays, power lines, substations and other infrastructure could also result in localized changes to the recreational opportunities and experiences available in that area. The impact would range from minor to major, depending on the extent of development and the location. Adherence to BMPs, pertinent restrictions, standard terms and conditions, etc., would help minimize such impacts.

4.3.5.4.17 Impacts from Special designations

Areas of Critical Environmental Concern

Continuing the present management of the existing ACECs would maintain the primitive and semi primitive non-motorized recreational opportunities in those areas.

Wild and Scenic Rivers

Management of the seven eligible Wild and Scenic River segments (14.08 miles) would protect their outstandingly remarkable values, free-flowing nature and tentative classification and would maintain the recreation settings along those segments:

- Bad Canyon (4.5 miles)
- Bear Canyon (1.62 miles)
- Crooked Creek (upper) (1.59 miles)

- Crooked Creek (lower) (1.56 miles)
- Gyp Springs (0.46 miles)
- Piney Creek (0.16 miles)
- Yellowstone River/Pompeys Pillar (4.19 miles)

This Alternative decision would support and enhance the semi-primitive and primitive recreation opportunities of the WSRs. Portions of Crooked Creek "Wild" and "Scenic" overlap with WSAs which provide similar protection of recreation settings. Overall the impact from this decision would be minor to negligible.

4.3.5.5 Alternative B

4.3.5.5.1 Impacts from Soil

Authorizations for permitted activities would not be allowed in areas where erosion would not be effectively controlled or mitigated and surface disturbing activities would not be allowed on fragile, steep slopes over 30 percent. This might reduce the number of permitted activities or require an increased level of design and mitigation planning if allowed. Casual recreation use could also be adversely affected.

4.3.5.5.2 Impacts from Vegetation

Depending on the type, scope, and intensity, vegetation treatments could directly impact recreation settings and the associated visitor experiences as well as the possible realization of specific benefits. Impacts in treated areas could range from negligible to moderate. The duration of the impacts would be dependent on the type of treatment being applied as well as the acreage and success of treatments. In the long term, managing vegetation resources to achieve Standards for Rangeland Health and desired vegetation conditions, including the control of noxious weeds, invasive species, and insects, would improve the condition of the landscape and enhance recreation experiences and settings. Vegetation treatments would also indirectly improve wildlife-related recreation opportunities as a result of improved wildlife habitat. In this Alternative, restrictions on recreational activities would be placed on surface disturbing activities within ½ mile of riparian areas and wetlands, designated 100 year flood plains and on water bodies and streams, except those activities that are not in conflict with the desired outcomes for this resource. The actual impact would be minor due to the sitting and types of current and anticipated recreational activities.

4.3.5.5.3 Impacts from Wildlife Habitat and Special Status Species

Proposed management for special status species and raptor habitats would result in species-specific buffers, and seasonal, temporal and spatial restrictions.

4.3.5.5.4 Impacts from Fisheries Habitat and Special Status Species

Improving wildlife habitat would help maintain or improve fish and wildlife populations which would be beneficial for recreation opportunities such as wildlife viewing, hunting and fishing. In this Alternative, there are the greatest number of fisheries habitats actively managed for

protection and the greatest potential impacts to the recreation program. Depending on the scope and intensity of habitat improvement efforts, impacts to recreational opportunities could be mixed. Modification of physical recreational settings could have impacts similar to those described in the Impacts to Vegetation section. Impacts could range from negligible to moderate.

4.3.5.5.5 Impacts from Wild Horses and Burros

In this Alternative, the BiFO would manage wild horses only within the boundaries of the original Secretarial Orders from 1968 and 1969 (23,204 acres of BLM administered land and 31,153 acres of all ownerships). Principal adverse direct impacts to recreational users from protection of wild horses would be in the form of activity restrictions. Vehicular access to the upper elevations during crucial foaling season (March 1 – June 30) may be restricted to protect habitat from undue degradation from vehicular travel on saturated roads and prevent disturbance or disruption of herd behavior which may endanger new foals. The indirect effect of managing to foster healthy and productive horse populations would be to enhance recreational experiences derived from observation of animals on the range. Although the range area may be smaller than other Alternatives, the opportunity for viewing horses should still be the same.

4.3.5.5.6 Impacts from Visual Resources

Managing 29,823 acres of the BiFO as VRM Class I would allow for only minor changes to the landscape. While specific impacts would depend on the type and location of projects, they would be minor. VRM Class II areas should still support a wide variety of recreational opportunities and experiences while also protecting those opportunities from actions which could detract from the recreational experiences. The remaining area, 388,643 acres of the BiFO, would be managed as VRM Class III, which could allow for major modification of the landscape. VRM Class III status would allow for development of recreation facilities, if necessary, and would continue to support and possibly enhance motorized recreation opportunities such as driving for pleasure, vehicle-supported camping, and OHV riding. The non-motorized recreation experience could be diminished in areas in which the surface is disturbed and the landscape altered substantially. Impacts would be long term, and depending on what projects are proposed, could range from minor to major.

4.3.5.5.7 Impacts from Fire Ecology and Management

Areas where wildfire management for resource benefit including, but not limited to, forestry, wildlife, range, vegetation, and watershed; (2) the reduction of hazardous fuels; and (3) the introduction of fire into fire-adapted ecosystems would occur indirectly benefit recreational experiences and opportunities by improving these resources since they serve to attract recreational users. There may be a short-term adverse impact from temporary closures or perceived esthetics. The effects would be localized to no more than approximately 7,400 acres of the BiFO each year.

4.3.5.5.8 Impacts from Wilderness Characteristics

In this Alternative, 27,292 acres would be managed for their wilderness characteristics. Since these areas are adjacent to WSAs and are already closed to motorized use, recreational use patterns, numbers, and seasons of use would not be altered and there would be no impacts. As well, the BLM prescribes NEPA consideration of any project level actions being proposed.

4.3.5.5.9 Impacts from Cave and Karsts

This Alternative has the most protective Cave and karsts measures, and would thus have the most beneficial for recreation opportunities and experiences.

A direct impact on the recreation program is that recreational use of Mystery Cave would be prohibited, adversely impacting a small but dedicated user group. There are no similar recreational caving opportunities in the Billings Field Office area administered by the BLM. An indirect impact on recreational uses is that while there are no recreational caving experiences available in the Billings Field Office, it is reasonable to assume that cavers interested in obtaining some caving experience would increase use of other caves where access is not controlled.

4.3.5.5.10 Impacts from Energy and Mineral Resources

The impacts would be similar to those described under Alternative A. Areas closed or withdrawn for minerals are more in this Alternative: 302,713 acres closed to oil and gas leasing; 270,122 acres withdrawn from mineral entry; and 343,745 acres closed to salable mineral disposal. Overall, impacts to recreation would still be minor.

Impacts from other programs on Minerals and Energy in this Alternative could have indirect impacts on the recreation program by establishing restrictive management prescriptions on oil and gas projects and surface disturbing actions. These would reduce the potential for development of resources and with their absence, enable a higher level of protection, and increased recreational experiences and opportunities for viewing associated wildlife and cave features in an unaltered state.

4.3.5.5.11 Impacts from Forestry and Woodland Products

Impacts would be the same as described in Alternative A. However in this Alternative, additional land parcels are also closed as they designated as SRMAs or ACECs for other resource purposes. As with Alternative A, Some WSAs and ACECs which have protective measures overlap large recreational activities areas and have minimal impact from potential forestry operations regardless. The total area potentially affected is approximately 6 percent more forested acres having recreational activities than Alternative A.

4.3.5.5.12 Impacts from Lands and Realty

The impacts would be the same as described for Alternative A and Common to All Alternatives.

4.3.5.5.13 Impacts from Livestock Grazing

Principle adverse direct impacts from grazing operations on recreational users are esthetic. Areas where livestock congregate around water development, riparian areas, shaded areas, or mineral supplement stations experience increased trampling, forage consumption, fugitive dust, and accumulations of manure with attendant increase in manure-feeding fly populations and odors. Where exclusions of cattle from riparian areas are implemented to meet rangeland health standards the quality of recreational experiences would increase.

In this Alternative, some specific recreational areas are closed to grazing. In these areas other resources such as wild horse viewing opportunities on the PMWHR and the wildlife viewing opportunities at Sundance or the historical considerations at the Pompeys Pillar NM take precedence and these recreational opportunities are enhanced. This Alternative has the same consequences for the recreation program as Alterative A. However, the lack of selected grazing on some these high use recreational areas also could have an adverse impact to the recreation program by removing a management tool for control of invasive species.

4.3.5.5.14 Impacts from Recreation and Visitor Services

Impacts under this Alternative would be similar to impacts common to All Alternatives in regards to decisions supporting rangeland health and protecting resources.

Impacts under this Alternative would be similar to Alternative A. Under this Alternative, 90,783 acres would be managed under seven SRMAs. New SRMAs would be established for the Shepherd Ah-Nei Recreation Area, Acton Recreation Area, Bundy Island, South Hills and Pryor Mountains. These areas currently do require focused Recreation management direction and the development and implementation of activity level plans is recognized as needed.

Management of the Yellowstone River Corridor, Mill Creek/Bundy Island, Horse thief, 17 mile, and Asparagus Point as ERMAs would not provide specific direction to maintain and enhance the semi-primitive motorized and primitive recreation settings in those areas. This Alternative would result in minor to moderate impacts and could result in increased conflict by displacing some users whose activities may no longer be consistent with the types of SRMAs proposed. The issuance of SRPs would not be affected by the change of management emphasis between Alternatives.

4.3.5.5.15 Impacts from Trails and Travel Management

Vehicle travel would be limited to designated roads and trails on 282,285 acres and limited to existing roads and trails on 145,303 acres of BLM public lands in the BiFO. These decisions would result in minor to moderate impacts to recreational opportunities that are dependent on access, dispersed camping, and game retrieval by potentially limiting these opportunities. However, main access routes are not affected, so semi-primitive motorized access impacts are generally minor, and offset by improved semi-primitive and primitive recreational opportunities of other types. The main difference between this and other Alternatives is that the South Hills Area would be closed to cross country OHV use, which would eliminate recreational activities of this type anywhere in the BiFO. Users have no other public lands in the vicinity and while there are private lands available, they charge a fee.

4.3.5.5.16 Impacts from Renewable Energy

The impacts would be the same as described in Alternative A, see above.

4.3.5.5.17 Impacts from Special Designations

Areas of Critical Environmental Concern

Continuation of the existing ACECs and the establishment of new or portions of new ACECs in the East Pryor Mountains ACEC, Grove Creek ACEC, Pryor Foothills ACEC, the Weatherman Draw ACEC and the Greater Sage-Grouse Habitat Area ACEC, would incorporate several new management prescriptions (such as VRM Class II designation in a portion of the Weatherman Draw ACEC) the which would benefit recreational opportunities and experiences by protecting the resources which attract the use. There would be no adverse impacts.

Wild and Scenic Rivers

Impacts would be the same as those described under Alternative A, although they were not managed as suitable in Alternative A, and are in this Alternative, both Alternatives have specific management prescriptions which protect their resource values.

Management of the 7 eligible Wild and Scenic River segments (14.08 miles) as suitable would protect their outstandingly remarkable values, free-flowing nature and tentative classification and would maintain the recreation settings along those segments:

- Bad Canyon (4.5 miles)
- Bear Canyon (1.62 miles)
- Crooked Creek (upper; 1.59 miles)
- Crooked Creek (lower; 1.56 miles)
- Gyp Springs (0.46 miles)
- Piney Creek (0.16 miles)
- Yellowstone River/Pompeys Pillar (4.19 miles)

Pryor Mountains Wild Horse Range

Decisions made to support the Pryor Mountains Wild Horse Range enhance the recreational opportunities and experiences and could serve to increase the recreational numbers.

4.3.5.6 Alternative C

4.3.5.6.1 Impacts from Soil

Authorizations for permitted activities would not be allowed in areas where erosion would not be effectively controlled or mitigated and surface disturbing activities would not be allowed on fragile, steep slopes over 45 percent. This might reduce the number of permitted activities or require an increased level of design and mitigation planning if allowed. Casual recreation use could also be adversely affected. The actual use patterns and places where this type of action could occur are very localized and the affects, overall, would be minor.

4.3.5.6.2 Impacts from Vegetation

Depending on the type, scope, and intensity, vegetation treatments could directly impact recreation settings and the associated visitor experiences as well as the possible realization of specific benefits. Impacts in treated areas could range from negligible to moderate. The duration of the impacts would be dependent on the type of treatment being applied as well as the acreage and success of treatments. In the long term, managing vegetation resources to achieve Standards for Rangeland Health and desired vegetation conditions, including the control of noxious weeds, invasive species, and insects, would improve the condition of the landscape and enhance recreation experiences and settings. Vegetation treatments would also indirectly improve wildlife-related recreation opportunities as a result of improved wildlife habitat. In this Alternative, restrictions on recreational activities would be placed on surface disturbing activities within ½ mile of riparian areas and wetlands, designated 100 year flood plains and on water bodies and streams, except those activities that are not in conflict with the desired outcomes for this resource. The actual impact would be minor due to the sitting and types of current and anticipated recreational activities.

4.3.5.6.3 Impacts from Wildlife Habitat and Special Status Species

Closing and reclaiming roads to avoid or reduce habitat fragmentation could have a minor to moderate effect on recreational opportunities (e.g. reducing access while improving semi-primitive to primitive opportunities). The level of impact would depend on the number of roads closed and/or the amount of recreation use the road receives. Proposed management for special status species and raptor habitat would result in species-specific buffers, and seasonal, temporal and spatial restrictions for recreational users.

4.3.5.6.4 Impacts from Fisheries Habitat and Special Status Species

Improving wildlife habitat would help maintain or improve fish and wildlife populations which would be beneficial to recreational opportunities such as wildlife viewing, hunting and fishing. Depending on the scope and intensity of habitat improvement efforts, impacts to recreational opportunities could be mixed. Modification of physical recreational settings could have impacts similar to those described in the Impacts Sections in Alternative B and C, with more emphasis placed on Alternative B than Alternative C. Still, impacts could range from negligible to moderate due to use patterns, trends, access, and landscape.

4.3.5.6.5 Impacts from Wild Horses and Burros

BIFO manages wild horses and the PMWHR to ensure a thriving natural ecological balance. In this Alternative BLM would manage wild horses on approximately 28,622 acres of BLM-administered lands (44,855 acres all ownerships). Viewing of wild horses is one of the most important and popular recreational activities in BIFO. In this Alternative, there are no horse program management activities which might adversely affect recreational activities. The increase in size of the range does not necessarily mean that there would be any increase in recreational opportunities for horse viewing.

4.3.5.6.6 Impacts from Visual Resources

The variation of the Alternatives in the designation of VRM Class I, II, and III is relatively small (approximately 5,000 acres total) and only accounts for changes in special management areas and their specific emphasis which recognizes their visual sensitivities.

Designating the majority of the BiFO as VRM Class III lands could result in large areas of moderate to major modifications in the existing character of the landscape, which could alter the recreation settings. In this Alternative, the largest percentage of acreage that is proposed as VRM Class III is found in VRI Class C, and more of the Class B VRI lands are found in VRM Class II and VRM Class I, instead of VRM Class III, with more Class B lands found in VRM Class I. The VRM restrictions by acreage would be more severe in this Alternative, but also protect the visual resources for recreational considerations better than other Alternatives.

Managing 26,040 acres of the BiFO as VRM Class I would allow for only minor changes to the landscape. While specific impacts would depend on the type and location of projects, they would be minor. VRM Class II areas should still support a wide variety of recreational opportunities and experiences while also protecting those opportunities from actions which could detract from the recreational experiences. The remaining area, 387,616 acres of the BiFO, would be managed as VRM Class III, which could allow for major modification of the landscape. VRM Class III status would allow for development of recreation facilities, if necessary, and would continue to support and possibly enhance motorized recreation opportunities such as driving for pleasure, vehicle-supported camping, and OHV riding. The non-motorized recreation experience could be diminished in areas in which the surface is disturbed and the landscape altered substantially. Impacts would be long term, and depending on what projects are proposed, could range from minor to major.

4.3.5.6.7 Impacts from Fire Ecology and Management

Areas where wildfire management (natural ignitions) for resource benefit including, but not limited to, forestry, wildlife, range, vegetation, and watershed; (2) the reduction of hazardous fuels; and (3) the introduction of fire into fire-adapted ecosystems would occur indirectly benefit recreational experiences and opportunities by improving these resources since they serve to attract recreational users. There may be a short-term adverse impact from temporary closures or perceived esthetics. The effects would be localized to no more than 2,170 acres of the BiFO each year. This is less of an impact to recreational users since the highest priorities are in urban interface areas

4.3.5.6.8 Impacts from Wilderness Characteristics

Impacts from wilderness characteristics on the recreation program depend on the individual land parcels considered for management, the goals considered and the specific management prescriptions. In this Alternative, the Big Horn Unit Tract 2, Pryor Mountains Unit Tract 1, Burnt Timber Unit Tract 1, Meeteetse Spires unit and the Bad Canyon Unit are all already being managed for primitive non-motorized recreation opportunities and experiences and due to access and other resource concerns, and would continue to be so regardless of Alternative. There are no designated routes in these parcels, other than a vehicle route in the Meeteetse

Spires Unit, which provides administrative access to a BLM facility and has been closed to public use since acquisition and several primitive vehicle routes which are naturally rehabbing. The impacts would be negligible.

4.3.5.6.9 Impacts from Cave and Karsts

Impacts from the Cave and karsts program would have direct impacts on the recreation program by allowing potential oil and gas and mineral development with surface disturbance, although with mitigation measures. While these do not guarantee development, the potential still exists for impacts. Recreational users, especially cave users, could be displaced by activity and opportunities for recreational experiences and opportunities could be adversely impacted if cave resources are developed for other uses.

4.3.5.6.10 Impacts from Energy and Mineral Resources

The impacts would be similar to those described under Alternative A and B. Areas closed or withdrawn for minerals are slightly l3ss in this Alternative: 65,891 acres closed to oil and gas leasing, 36,955 acres withdrawn from mineral entry, and 251,927 acres closed to salable mineral disposal. Overall, impacts to recreation would still be minor but somewhat different due to potential operating areas and techniques allowable. Appropriate mitigation measures would be available on a case-by case basis through NEPA to further reduce the scope of impacts. Overall, measures under the Energy and Mineral program in this Alternative would probably have the greatest impact on the Recreation program.

4.3.5.6.11 Impacts from Forestry and Woodland Products

Essentially the impacts are the same as described in Alternatives A and B. However in this Alternative, additional land parcels are also closed as they designated as SRMAs or ACECs for other resource purposes. As with Alternative A, Some WSAs and ACECs which have protective measures overlap large recreational activities areas and have minimal impact from potential forestry operations regardless. The total area potentially affected is approximately 11 percent more forested acres having recreational activities than Alternative A and19 percent more than Alterative B. Alternative C could have theoretically the largest impact on recreational opportunities but slope restrictions would potentially reduce the actual occurrence.

4.3.5.6.12 Impacts from Lands and Realty

Same as Common to All Alternatives

4.3.5.6.13 Impacts from Livestock Grazing

Selected areas not open under Alternatives A and B could be open to livestock grazing on a temporary basis for the treatment of noxious weeds, or as a prescription treatment (targeted grazing) to meet site specific vegetation or other resource management goals: The total acres available for targeted prescription grazing treatments are 9,021 acres. The recreational activities occurring in these areas would benefit from a more natural appearing condition. With the exception of the PMWHR, the remainder of the BiFO would be open to grazing to meet rangeland health standards, which would also serve to improve the recreational settings.

4.3.5.6.14 Impacts from Recreation and Visitor Services

Impacts under Alternative C would be similar to Alternative B with the exception that the number, acreage and locations of the proposed SRMAs change somewhat. SRMA acreage is much larger under any other Alternative. Under Alternative C, 147181 acres (34 percent of the BiFO) would be managed under 11 SRMAs. South Hills SRMA and a portion of the Shepherd Ah-Nei SRMA would focus on motorized recreation opportunities and provide a variety of riding experiences (e.g. hill climbs, trail riding). The Sundance Lodge, Four Dances, a portion of the Shepherd Ah-Nei, 17 mile, Asparagus Point, Mill Creek/Bundy and Acton SRMAs would focus on dispersed recreation opportunities with an urban interface emphasis. The Pryor Mountains, more remote than the other areas and also receiving a different user group, would focus on its own niche. The Yellowstone River Corridor SRMA also has its own niche and is based on water related activities. These SRMAs would maintain the experiences and opportunities currently occurring in these areas which range from semi-primitive motorized to primitive.

The remainder of the lands, 288,495 acres (66 percent of the BiFO) would be managed as a non-designated area which would continue to support a variety of recreational opportunities in a non-structured setting. While it provides areas to reduce user conflicts, the remaining areas outside of the SRMAs receive no management direction and could have user conflicts. The issuance of SRPs would not be affected by the change of management emphasis between Alternatives.

4.3.5.6.15 Impacts from Trails and Travel Management

The impacts would be the same as under Alternative B with the exception that the recreational opportunity for cross country OHV use at the South Hills is continued.

4.3.5.6.16 Impacts from Renewable Energy

The impacts would be the same as under Alternative A, above

4.3.5.6.17 Impacts from Special Designations

ACECs

In this Alternative a total of 11 ACECs are designated, covering 67,079 acres. This action would generally benefit recreational opportunities and experience by establishing protective measures for important resources for further appreciation, although some restrictions would be in place which could make access and some types of use more difficult.

Wild and Scenic Rivers

No eligible river segments would be managed as suitable for inclusion in the National Wild and Scenic River System under Alternative A. However, 3.16 of the 14.08 miles of eligible WSR segments are within WSAs that would continue to be managed under the IMP, providing protection of the recreation settings. The majority of the eligible Crooked Creek river segments and all of the eligible Bad Canyon segments would receive management protection from the proposed vehicle restrictions, retaining the semi-primitive to primitive recreation settings in

those areas. Overall, the potential for impacts to recreation under this Alternative would be negligible.

Pryor Mountains Wild Horse Range

Decisions made to support the Pryor Mountains Wild Horse Range enhance the recreational opportunities and experiences and could serve to increase the recreational numbers.

4.3.5.7 Alternative D (Preferred Alternative)

4.3.5.7.1 Impacts from Soil

Authorizations for permitted activities would not be allowed in areas where erosion would not be effectively controlled or mitigated and surface disturbing activities would not be allowed on fragile, steep slopes over 35 percent. This might reduce the number of permitted activities or require an increased level of design and mitigation planning if allowed. Casual recreation use could also be adversely affected.

4.3.5.7.2 Impacts from Water

Decisions proposed for water quality and the protection of groundwater would also benefit recreational uses by maintaining the quality and quantity of public water sources and natural springs. Maintaining a 300 feet buffer zone of no surface disturbance around riparian areas would restrict motorized camping in these small areas. General recreation visitors would also be displaced where fencing is constructed to maintain these buffer zones. However, in most cases there are adequate opportunities for camping away from natural water sources. The impacts from potential displacement would range from negligible to minor due to current recreation al use patterns and the on-ground terrain and access. In the long term, recreational opportunities such as birding and hunting could be enhanced because habitat within the buffer zone and water quality would be improved.

4.3.5.7.3 Impacts from Vegetation

Depending on the type, scope, and intensity, vegetation treatments could directly impact recreation settings and the associated visitor experiences as well as the possible realization of specific benefits. Impacts in treated areas could range from negligible to moderate. The duration of the impacts would be dependent on the type of treatment being applied as well as the acreage and success of treatments. In the long term, managing vegetation resources to achieve Fundamentals of Rangeland Health and desired vegetation conditions, including the control of noxious weeds, invasive species, and insects, would improve the condition of the landscape and enhance recreation experiences and settings. Vegetation treatments would also indirectly improve wildlife-related recreation opportunities as a result of improved wildlife habitat. In this Alternative, restrictions on recreational activities would be placed on surface disturbing activities within ¼ mile of riparian areas and wetlands, designated 100 year flood plains and on water bodies and streams, except those activities that are not in conflict with the desired outcomes for this resource. The actual impact would be minor due to the sitting and types of current and anticipated recreational activities.

4.3.5.7.4 Impacts from Wildlife Habitat and SS Species

Closing and reclaiming roads to avoid or reduce habitat fragmentation could have a minor to moderate effect on recreational opportunities (e.g. reducing access while improving semi-primitive to primitive opportunities). The level of impact would depend on the number of roads closed and/or the amount of recreation use the road receives. Proposed management for special status species and raptor habitat would result in species-specific buffers, and seasonal, temporal and spatial restrictions for recreational users.

4.3.5.7.5 Impacts from Fisheries Habitat and SS Species

Improving wildlife habitat would help maintain or improve fish and wildlife populations which would be beneficial for recreation opportunities such as wildlife viewing, hunting and fishing. Depending on the scope and intensity of habitat improvement efforts, impacts to recreational opportunities could be mixed. Modification of physical recreational settings could have impacts similar to those described in the impacts Sections in Alternative B and C, with more emphasis placed on Alternative B than Alternative C. Still, impacts could range from negligible to moderate due to use patterns, trends, access, and landscape.

4.3.5.7.6 Impacts from Wild Horses and Burros

Principal adverse direct impacts to recreational users from protection of wild horses would be in the form of activity restrictions. Vehicular access to the upper elevations during crucial foaling season (April 15 – June 15) may be restricted to protect habitat from undue degradation from vehicular travel on saturated roads and prevent disturbance or disruption of herd behavior which may endanger new foals. The indirect effect of managing to foster healthy and productive horse populations would be to enhance recreational experiences derived from observation of animals on the range. In this Alternative there are approximately 27,094 acres of BLM-administered lands (39,944 acres all surface ownerships) in direct horse management.

4.3.5.7.7 Impacts from Visual Resources

The variation of the Alternatives in the designation of VRM Class I, II, and III is relatively small (approximately 5,000 acres total) and only accounts for changes in special management areas and their specific emphasis which recognizes their visual sensitivities. Designating the majority of the BiFO as VRM Class III lands could result in large areas of moderate to major modifications in the existing character of the landscape, which could alter the recreation settings.

In this Alternative, the largest percentage of acreage that is proposed as VRM Class III is found in VRI Class C, and more of the Class B VRI lands are found in VRM Class II and VRM Class I, instead of VRM Class III. This Alternative thus protects the sensitive landscape, and the recreational opportunity, with moderate and major restrictions (VRM Class I and II), while providing for the most acreage available for moderate development (VRM Class III).

Managing 28,861 acres of the BiFO as VRM Class I would allow for only minor changes to the landscape. While specific impacts would depend on the type and location of projects, they would be minor. VRM Class II areas (13,648 acres) should still support a wide variety of

recreational opportunities and experiences while also protecting those opportunities from actions which could detract from the recreational experiences. The remaining area, 391,645 acres of the BiFO, would be managed as VRM Class III, which could allow for major modification of the landscape. VRM Class III status would allow for development of recreation facilities, if necessary, and would continue to support and possibly enhance motorized recreation opportunities such as driving for pleasure, vehicle-supported camping, and OHV riding. The non-motorized recreation experience could be diminished in areas in which the surface is disturbed and the landscape altered substantially. Impacts would be long term, and depending on what projects are proposed, could range from minor to major.

4.3.5.7.8 Impacts from Wildland Fire Ecology and Management

Areas where wildland fire management (natural ignitions) for resource benefit including, but not limited to, forestry, wildlife, range, vegetation, and watershed; (2) the reduction of hazardous fuels; and (3) the introduction of fire into fire-adapted ecosystems would occur indirectly benefit recreational experiences and opportunities by improving these resources since they serve to attract recreational users. There may be a short-term adverse impact from temporary closures or perceived esthetics. The effects would be localized to no more than 5 percent of the BiFO each year.

4.3.5.7.9 Impacts from Wilderness Characteristics

Impacts from wilderness characteristics on the recreation program depend on the individual land parcels considered for management, the goals considered and the specific management prescriptions. In this Alternative, the Big Horn Unit Tract 2, Pryor Mountains Unit Tract 1, Burnt Timber Unit Tract 1, Meeteetse Spires unit and the Bad Canyon Unit are all already being managed for primitive non-motorized recreation opportunities and experiences and due to access and other resource concerns, and would continue to be so regardless of Alternative. There are very few designated routes in these parcels, other than a vehicle route in the Meeteetse Spires Unit, which provides administrative access to a BLM facility and has been closed to public use since acquisition and several primitive vehicle routes in this and other units which are naturally rehabbing. Main access to general areas would not be affected, while the current recreational patterns, seasons of use, and use numbers would not be changed. The adverse impacts would be negligible. The positive impacts of self-reliance, challenging experiences, and healthy activities may be enhanced.

4.3.5.7.10 Impacts from Cave and Karsts

Impacts from the Cave and karsts program would have both indirect and direct impacts on the recreation program by allowing potential oil and gas and mineral development with surface disturbance, although with mitigation measures. Surface disturbing activities could be allowed if they benefit the Cave and karst program, which would also benefit the recreational program. While these do not guarantee development or surface disturbance, the potential still exists for impacts. Recreational users, especially cave users, could be displaced by activity and opportunities for recreational experiences and opportunities could be adversely impacted if cave resources are developed.

4.3.5.7.11 Impacts from Energy and Mineral Resources

The impacts would be similar to those described under Alternative A and C. Areas closed or withdrawn for minerals are slightly more in this Alternative: 72,915 acres closed to oil and gas leasing, 54,761 acres withdrawn from mineral entry, and 272,122 acres closed to salable mineral disposal. Overall, impacts to recreation would still be minor but somewhat different due to potential operating areas and techniques allowable. Appropriate mitigation measures would be available on a case-by case basis through NEPA to further reduce the scope of impacts. Overall, measures under the Energy and Mineral program in this Alternative would have some impact on the Recreation program, mostly in the dispersed recreational activities and less used ERMAs and NDPL areas.

4.3.5.7.12 Impacts from Forestry and Woodland Products

Essentially the impacts are the same as described in the other Alternatives. In this Alternative, additional land parcels are also closed as they designated as SRMAs or ACECs for other resource purposes. Some WSAs and ACECs which have protective measures overlap large recreational activities areas and have minimal impact from potential forestry operations regardless. The total area potentially affected is approximately the same forested acres having recreational activities as Alternative A and19 percent less than Alterative B. Alternative D also have restricted measures (mitigation measures, slope restrictions, surface disturbances, etc) that benefit recreational opportunities.

4.3.5.7.13 Impacts from Lands and Realty

Same as Common to All Alternative

4.3.5.7.14 Impacts from Livestock Grazing

Selected areas not open under Alternatives A and B could be open to livestock grazing on a temporary basis for the treatment of noxious weeds, or as a prescription treatment (targeted grazing) to meet site specific vegetation or other resource management goals: The total acres available for targeted prescription grazing treatments are 9,021 acres. The recreational activities occurring in these areas would benefit from a more natural appearing condition. With the exception of the PMWHR, the remainder of the BiFO would be open to grazing to meet rangeland health standards, which would also serve to improve the recreational settings. This is the same impacts from grazing as Alternative C

4.3.5.7.15 Impacts from Recreation and Visitor Services

Impacts would be similar to Alternative B, other than acreage, number and locations are slightly different. In this Alternative 110,862 acres in 9 SRMAs are established, with two specific ERMAs as well.

The management intent for the 17 Mile area and the Mill Creek Area, both of which receive dispersed recreational use, would have no structured management direction other than provided for under general BLM recreational strategies. The current management direction for 17 mile

and Mills Creek would essentially continue unchanged from the current condition with minimal management provided. It is not anticipated that user numbers would increase and the areas would not be marketed. The SRMAs are discussed in other Alternatives.

These decisions would result in minor to moderate impacts to recreational opportunities that are dependent on access, dispersed camping, and game retrieval by potentially limiting these opportunities.

4.3.5.7.16 Impacts from Trails and Travel Management

The impacts would essentially be the same as Alternative C.

4.3.5.7.17 Impacts from Renewable Energy

Impacts would be the same as Alternative A, above.

4.3.5.7.18 Impacts from Special Designations

ACECs

In this Alternative a total of 11 ACECs are designated, covering 38,786 acres. This action would generally benefit recreational opportunities and experience by establishing protective measures for important resources for further appreciation, although some restrictions would be in place which could make recreational access and some types of use more difficult. This Alternative has less area than in Alternative C, but the overlapping designations of ACEC/SRMA/WSA still cover some of the most popular recreational areas.

Wild and Scenic Rivers

The impacts from WSR decisions would be similar to those discussed under Alternative C. Under this Alternative, only the two Crooked Creek segments (3.16 miles) would be recommended and managed for suitability as a WSR. Some other eligible segments would still receive protective management from overlapping vehicle management decisions. Overall, impacts would be negligible.

Pryor Mountains Wild Horse Range

Decisions made to support the Pryor Mountains Wild Horse Range enhance the recreational opportunities and experiences and could serve to increase the recreational numbers.

4.3.5.8 Cumulative Impacts

Various past, present, and reasonably foreseeable future BLM actions have affected and would continue to affect recreational opportunities within the decision area, including mineral development, wildfire suppression and fuels treatments, OHV travel, utility corridor development, grazing and recreational activities in riparian areas, and management within existing SRMAs and the ERMA. The increase in vehicle-based recreation and urban development and associated population growth all contribute to increased demand for recreational opportunities in the region. As a result, the decision area could experience

increased recreational visitors over the life of the plan, which could degrade certain recreational settings, resulting in diminished recreational opportunities and experiences, or increase user conflicts associated with dispersed unconfined recreational opportunities. Similarly, increasing development or utilities within or near the BiFO could degrade certain recreational settings. The increase in recreational activities is minimally a result of BLM actions. There would be a minor incremental impact to recreational opportunities and experiences from the Proposed RMP management actions. The issuance of SRPs would not be affected by the change of management emphasis between Alternatives.

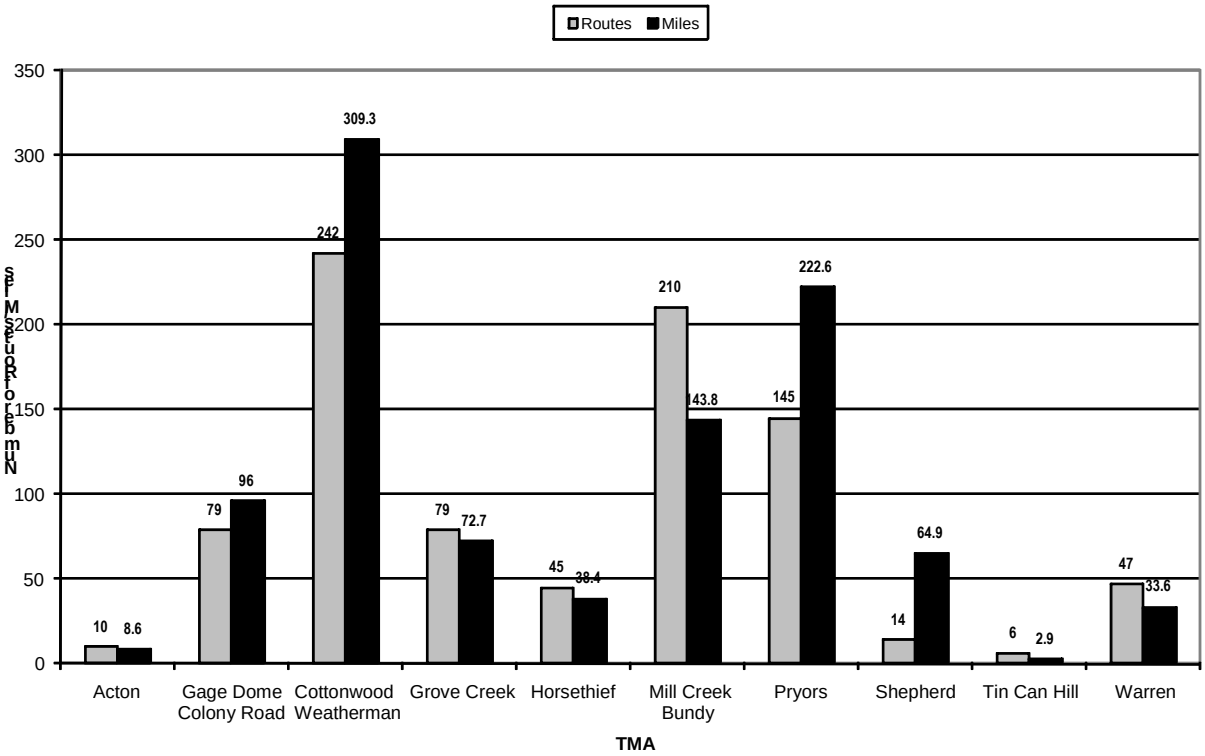
4.3.6 Trails and Travel Management

This section describes potential impacts on travel management resulting from the implementation of management actions for other resource programs. Impacts on resources and resource uses resulting from implementation of the travel management program are discussed in those particular resource sections of this chapter.

For a complete discussion of the process, methodology, decisions, consequences and maps of the Travel Management Areas (TMAs), for the Travel Management Plan section of the Billings Field Office RMP please see Appendix O.

The travel management program provides for ingress, egress, and access in the BiFO. The transportation network consists of roads and trails, mostly unpaved, that provide access into and across the BiFO which are located within eleven Travel Management Areas (TMAs) identified in Chapter 2 of this document (See Figure 4-2 below) for summary of existing routes and mileages by TMA; note that South Hills TMA is not shown as no specific route designations were developed because an area-wide travel designations are being addressed in the range of Alternatives).

Figure 4-2 Summary of Route/Miles by TMA



Various individuals rely on this network to access livestock operations, mining properties, utility and communication facilities, range and wildlife developments, wildfire prevention/management and suppression, recreation sites as well as the public lands in general for a myriad of recreational activities, and intermingled private and state owned lands.

Management decisions that involve changes to miles of roads open for public or administrative use, number of acres open to off-road travel, or specific travel restrictions (vehicle size, seasonal restrictions, etc.) would affect access into and across the BiFO. The following discussion of the effects on transportation and access focuses on management actions that restrict or facilitate travel management opportunities. Impacts on opportunities for OHV use is addressed in the impact analysis in Appendix O and only summarized in this chapter by Alternative.

This analysis describes the degree of access and the extent of usable transportation systems within the BiFO and its effects on both motorized and mechanized travel. This includes decisions that would limit the degree of travel opportunities and the ability to access certain portions of the decision area.

The majority of motorized access issues are related to OHV use; this form of transportation provides a major source of travel opportunities. Mechanized travel involves primarily mountain bikes, but could also include other forms of non-motorized vehicles.

4.3.6.1 Methods and Assumptions

Baseline route inventories were completed for the TMAs within the BiFO. The Route Evaluation Process© (REP) was then used to determine potential designation status (e.g., designated as open, limited in use, or completely closed) for existing routes under each of the Alternatives except Alternative A, which represents existing management decisions regarding route designations.

BLM resource specialists at the BiFO used their expertise in applying a route evaluation process (REP©) by developing various route network options, evaluating designation criteria required in 43 CFR 8342.1, and documenting the various resources and resource uses that might be affected by the future implementation from any of the network options (see Appendix O for a description of the travel planning process). Combined, these staff members possess an extensive knowledge of travel management and access issues within the Decision area, and applied their professional knowledge and expertise in the process.

The analysis was based on the following assumptions:

- The transportation network, as defined by Alternative, would remain in place throughout the life of this RMP. The process also provides for individual changes to specific routes in case of changing conditions without the need for Plan Amendments.
- The BLM would evaluate RS-2477 assertions under a separate process and criteria than this planning process.
- Travel through the TMAs is expected to increase due to the increased demand for open space and commercial recreation opportunities on public lands, as well as periodic up trends in energy exploration and development, including renewable energy production.
- Planning decisions that involve changes to the available number and overall miles of roads open for public or administrative use, the number of acres open or closed to off-road travel, road improvement or maintenance activities, or specific travel restrictions (e.g., speed limits, seasonal restrictions; etc.) would affect opportunities for various types of travelers to access and cross the planning area.
- Impacts to travel management, as defined above (e.g., via state-maintained highways and BLM Maintained system roads) would be anticipated primarily from differing route designations by Alternative and through the implementation of management actions that consolidate public land through purchases, exchanges, and disposal of isolated tracts.

4.3.6.2 Environmental Consequences

Impacts to travel management would likely result from actions proposed under the following resource programs:

- Wildlife habitat and Special Status Species
- Non-WSA Lands with Wilderness Characteristics
- Lands and Realty
- Recreation
- Travel Management
- Renewable energy
- Special Designations

Other programs were determined to have little or no impact on travel management.

4.3.6.3 Impacts Common to All Alternatives

4.3.6.3.1 Impacts from Wildlife Habitat and Special Status Species

Setting as a priority, management actions in all Alternatives for sagebrush, native grasslands, seasonal or crucial wildlife ranges, special status species habitat, cottonwood galleries and riparian/wetland could see restrictions or elimination of use on some routes. However, generally there are alternate routes which still provide access. These decisions could serve to lower the potential for wildlife habitat fragmentation and may increase the opportunity for wildlife and scenic recreational touring. Extensive limitations are not anticipated in any Alternative. Therefore the overall impact to travel management would be minor to negligible. Alternative B has slightly different management prescriptions (No oil and gas lease in high use recreation areas, largest no surface occupancy in critical wildlife habitat areas, prohibitions of activity near wildlife nesting habitats, leks, prairie dog colonies, etc.) that might affect future road network developments the most, and has the most restrictive road densities prescriptions (.0.5 mile/square mile, for the current road network. Alternative C has the least restricted road management objectives (open road densities are 1.5 mi/mi2) and with a goal of a road density of 1 mi/mi2 Alternative D has the most balanced objective of resource and activity. For a complete list of wildlife restrictions by Alternative, see Chapter 4, Wildlife section.

Management strategies to avoid or reduce habitat fragmentation would include such practices as reclaiming redundant roads, reclaiming roads no longer serving intended purpose and reducing road densities. There could be some effects on travel management depending on the number of roads reclaimed and the existing uses of those roads, but extensive limitations are not anticipated. Overall impacts to travel management and access would be negligible

4.3.6.3.2 Impacts from Travel Management

There are 149352.6 deferred acres are to be planned later, and in the interim these acres would be limited to existing roads and trails. This would not result in the overall inability of BLM to provide public access or resource damage while the plans are yet to be completed.

4.3.6.3.3 Impacts from Special Designations

Areas of Critical Environmental Concern

In All Alternatives the designation of ACECs with their specific management objectives would preserve and protect the resources while possibly restricting access if those resources are found to be at risk from activities. This could lead to road and trail closures. However, this is a management tool regardless of designation; ACECs just make this action a priority. The largest area of ACEC designations is in Alternative B, with 12 areas totaling 181,079 acres and the least is in Alternative A, with 9 units and 37,896 acres. The impact on travel management is overall minor in scope.

4.3.6.4 Alternative A

4.3.6.4.1 Impacts from Wildlife Habitat and Special Status Species

No special management is proposed in Alternative A to protect special status species. However, current policy and practices call for the protection of threatened and endangered species habitat by mitigating disturbances and prohibiting activities that destroy, adversely modify, or fragment critical habitat.

4.3.6.4.2 Impacts from Lands with Wilderness Characteristics

No actions to maintain wilderness character on those lands outside of WSAs, other than the existing parcels identified in the existing RMP and Travel Plan decisions are proposed under this Alternative, so no impacts to travel management would occur. Currently there are several small parcels adjacent to the WSAs, totaling 1925 acres, which are being managed for their wilderness character. They are closed to motorized use for other resource (Wild Horse) concerns.

4.3.6.4.3 Impacts from Lands and Realty

The disposal of lands currently identified in the Billings RMP would reduce the overall amount of BLM lands available to the public for access. Due to the relatively small acreage involved and that most parcels are isolated and lack public access, impacts would be minor to negligible, with a notable exception of some lands proposed for disposal in the South Hills area, which is a popular OHV use area. This could be offset by priority acquisitions through exchange in the Shepherd Ah-Nei OHV Area. Alternative A has the largest acreage, followed by Alternative C. All Action Alternatives (B, C, and D) have substantially larger ROW avoidance and exclusion areas than currently (Alternative A) but these decisions have a negligible impact on travel.

4.3.6.4.4 Impacts from Recreation and Visitor Services

No recreation management decisions are proposed in Alternative A that would affect travel management. The entire BiFO (with the exception of the small areas of Four Dances Recreation Area and Sundance Recreation Area, which are managed as SRMA/ACEC and SRMA) is identified and managed essentially as an ERMA. Management of recreation in ERMAs is restricted to minimal actions only, with no special prescriptions identified that

would limit or control recreational activities, including OHV use. Management of much of the BiFO public lands does not emphasize recreation in this Alternative. The BLM has had to place a significant management emphasis in a number of areas on a purely reactive basis, including Shepherd Ah-Nei, Asparagus Point, South Hills, 17 Mile and the Pryor Mountains. Management in this Alternative is not in conformance with BLM guidelines and may not be sustainable in some cases.

4.3.6.4.5 Impacts from Trails and Travel Management

Of the 427,588 acres of BLM public lands in the BiFO, vehicle travel would be limited to existing roads and trails on 326,561 acres. On about 101,027 acres, site-specific travel planning has been completed and motorized travel would be limited to designated routes in the following Travel Management Areas (TMAs): Shepherd Ah-Nei (4,680 acres), Acton (3,697 acres), Horsethief (11,423 acres) and the Pryors (81,227 acres).

Under Alternative A, the South Hills OHV area would continue to be designated as open to motorized cross-country travel, limited to motorcycle use only (1,097 acres open) with a 260 acre closed area to provide a buffer to residential areas adjacent to the area.

In this Alternative, the areas designated as ‘limited to existing roads and trails’ would continue to be difficult to enforce as unauthorized route creation and proliferation by users makes the ‘existing network’ ever-changing. In those areas where motorized travel is limited to existing roads and trails, impacts to various resources, including soil, water, fragile cultural or paleontological sites and wildlife habitat would continue in those areas outside of the existing TMAs (where route designations have been made under previous decisions).

Generally, limiting motorized travel in a majority of the decision area to existing roads and trails is not always compatible with the other resource uses or resource values associated with certain areas. Addressing site specific travel planning decisions better addresses localized conditions, resource features on-going/historic uses and recreational trend information.

4.3.6.4.6 Impacts from Renewable Energy

The development of wind and/or solar energy could adversely affect access and travel management if access were restricted into those areas or through voluntary displacement if significant development took place. Exploration and development would be considered on a case-by-case basis. Impacts would be site-specific.

4.3.6.4.7 Impacts from Special Designations

Areas of Critical Environmental Concern

The four existing ACECs would continue to be managed for the protection of their relevant and important values. These areas are and would continue to be closed to OHV use, which would not provide any additional opportunities for this type of use. Closures for the protection of resources could occur if warranted and would positively impact ACEC resources.

Wilderness Study Areas

In this Alternative, the use of motorized vehicles would be not allowed within the WSAs. Development of new routes would not be authorized within these areas. Previously inventoried routes within WSAs would not be available for use. This is a continuation of the existing condition and would have no new impacts.

Wild and Scenic Rivers

The14.08 miles of eligible river segments would be managed to protect their outstandingly remarkable values, free-flowing nature and tentative classification. Current management decisions are in place to restrict access in some of these areas, including the Crooked Creek segments and the Bad Canyon Segment. Motorized use within all segments would be according to existing OHV designations. Therefore, the overall impact to access and travel management would be negligible.

4.3.6.5 Alternative B

4.3.6.5.1 Impacts from Lands with Wilderness Characteristics

Lands with wilderness characteristics would be managed as VRM Class I, however in this Alternative, there is little impact to travel designations as the actual number of routes located in the units impacted is low. This Alternative does have the largest impact of all Alternatives, however, as it actively manages all lands with wilderness characteristics, including the Meeteetse Tract 6 parcel, which has the most routes and the highest density of routes, within it.

4.3.6.5.2 Impacts from Lands and Realty

Please see Common to All Alternative

4.3.6.5.3 Impacts from Recreation and Visitor Services

Generally, in this Alternative, recreation management decisions are compatible with travel management decisions. 6 SRMAs covering 90,873 acres and 6 ERMAs covering 22,069 acres are established which utilize the transportation network while providing appropriate resource protections.

Other measures, such as certain areas with NSO for oil and gas projects, mitigation measures for surface disturbing activities, and construction of non-motorized trails which are intended to enhance the recreational opportunities and experiences of users may alter use of specific routes but overall the impacts would be minor.

4.3.6.5.4 Impacts from Travel Management

Under Alternative B, vehicle travel would be limited to designated roads and trails on 282,285 acres and limited to existing roads and trails on 145,303 acres of BLM public lands in the BiFO. Under Alternative B, an additional 181,258 acres (or a 36 percent increase) (compared to Alternative A) would be limited to designated motorized routes in the decision area.

Additionally, under Alternative B, South Hills (1,357 acres) would be designated as closed to all motorized modes of travel. This would result in a significant, direct, long-term impact to motorized users (motorcycle only) resulting from the area closure of the South Hills OHV area.

4.3.6.5.5 Impacts from Renewable Energy

Impacts would be the same as Alternative A

4.3.6.5.6 Impacts from Special Designations

Areas of Critical Environmental Concern

Impacts would be the same as impacts common to all Alternatives.

Wilderness Study Areas

Same impacts as Alternative A.

Wild and Scenic Rivers

The 14.08 miles of eligible river segments would be managed to protect their outstandingly remarkable values, free-flowing nature and tentative classification and recommended as suitable for potential W&SR designation. Current management decisions are in place to restrict access in some of these areas, including the Crooked Creek segments and the Bad Canyon Segment. Motorized use within all segments would be according to existing OHV designations. Therefore, the overall impact to access and travel management would be minor. The impacts would be the same as Alternative A, but of a lesser scale.

4.3.6.6 Alternative C

4.3.6.6.1 Impacts from Lands with Wilderness Characteristics

In this Alternative the impacts are negligible. The Bad Canyon Unit, the Meeteetse Spires Tract 7, and the Big Horn Tack-On and Pryor Mountain Tracts have existing route designations in place which have restricted routes to public use or which are not accessible for motorized vehicles. The Burnt Timber Unit Tract 1 has one vehicle route in it, which is not open in this Alternative for other resource concerns.

4.3.6.6.2 Impacts from Lands and Realty

Please see Common to All Alternative.

4.3.6.6.3 Impacts from Recreation and Visitor Services

In this Alternative, 11 SRMAs are established totaling 147,181 acres. Vehicle route designations in these areas are consistent and compatible with recreation goals and objectives. No areas are managed as ERMAs. This means that in this Alternative a large area would be managed intensively for recreation, utilizing the route network for access. The remainder of the FO (286,973 acres) has only minimal recreation management and negligible impacts.

4.3.6.6.4 Impacts from Trails and Travel Management

Under Alternative C, vehicle travel would be limited to designated roads and trails on 282,285 acres and limited to existing roads and trails on 145,303 acres of BLM public lands in the planning area. This would the same as Alternative B. Under Alternative C, within the South Hills OHV Area, 1,296 acres as open to motorized vehicle use (limited to motorcycle use only), and would identify a 61 acre closure area to motorized use (all uses) in the South Hills OHV Area to provide a buffer to adjacent residential areas. This would be an increase of 199 acres for an open area designation from Alternative A. Generally, under Alternative C, more routes would be designated as open all forms of motorized travel than in Alternative B, and fewer than Alternative A, Alternative C Route Designations for All TMAs (compared to Alternative A).

4.3.6.6.5 Impacts from Renewable Energy

Impacts would be the same as Alternative A

4.3.6.6.6 Impacts from Special Designations

Areas of Critical Environmental Concern

Impacts would be the same as impacts common to all Alternatives.

Wilderness Study Areas

Same impacts as Alternative A

Wild and Scenic Rivers

The14.08 miles of eligible river segments would be managed to protect their outstandingly remarkable values, free-flowing nature and tentative classification. Current management decisions are in place to restrict access in some of these areas, including the Crooked Creek segments and the Bad Canyon Segment. Motorized use within all segments would be according to existing OHV designations. Therefore, the overall impact to access and travel management would be minor. The impacts would be the same as Alternative A, but of a lesser scale.

4.3.6.7 Alternative D (Preferred Alternative)

4.3.6.7.1 Impacts from Lands with Wilderness Characteristics

In this Alternative the only change in areas designated from Alterative B is that the Meeteetse Tract 6 and Bad Canyon Units are managed for their wilderness characteristics. Regardless, the Bad Canyon area is still closed to vehicle use as there is no public access, so there is no change in impacts from other Alternatives, and the Meeteetse Unit Tract 6 parcel has the same travel management decisions as Alternative B. There are no impacts from the management or not management of the lands with Wilderness Characteristics.

4.3.6.7.2 Impacts from Lands and Realty

See Common to All Alternatives.

4.3.6.7.3 Impacts from Recreation and Visitor Services

The impacts would essentially be the same as Alternative C but with a slightly different emphasis and impact; there are less lands included in the SRMAs than in Alternative C with more intensive management requirements and considerations, more lands in SRMAs than in Alternative B. Management decisions regarding the issuance of SRPs, trap lines, landing of aircraft, and monitoring would not affect travel management decisions. Development of Implementation-level plans may result in slightly altered actual usages of the travel network but the overall impacts would not be major. This Alternative is the most restrictive for White Nose Bat protection.

4.3.6.7.4 Impacts from Trails and Travel Management

Under Alternative D, vehicle travel would be limited to designated roads and trails on 282,285 acres of BLM public lands and limited to existing roads and trails on 145,303 acres of BLM lands in the planning area. This would be the same as Alternatives B and C. Additionally; 982 acres would be designated as open to motorized vehicle use (limited to motorcycle use only). Within the South Hills OHV Area under Alternative D, 982 acres would be designated as open to motorized vehicle use (limited to motorcycle use only), and 375 acres would be closed to provide for a buffer area to adjacent residential areas. This would be a decrease of 115 acres of an open designation, as compared to Alternative A.

4.3.6.7.5 Impacts from Renewable Energy

Impacts would be the same as Alternative A

4.3.6.7.6 Impacts from Special Designations

Areas of Critical Environmental Concern

Impacts would be the same as impacts common to all Alternatives.

Wilderness Study Areas

Same impacts as Alternative A

Wild and Scenic Rivers

The 3.15 miles of suitable river segments would be managed to protect their outstandingly remarkable values, free-flowing nature and tentative classification. Management decisions would be in place to restrict access in some of these areas, including the Crooked Creek segments and the Bad Canyon Segment, in the SRMA or Lands with Wilderness Character sections. Motorized use within all segments would be according to OHV designations. Therefore, the overall impact to access and travel management would be negligible.

4.3.6.8 Cumulative Impacts

The cumulative impact analysis boundary includes the planning area and immediately adjacent segments of state and local road networks including portions of Gallatin and Custer National

Forests, Big Horn Canyon NRA, several Fish and Wildlife Refuges, Montana FWP lands, the Butte, Lewiston, Miles City and Cody BLM Field Offices, and regional State Trust Lands.

Past, present, and reasonably foreseeable future non-federal actions have affected, and would continue to affect, travel management within the planning area. These actions, which include urban development patterns, the continuing growth of vehicle-based recreation, planned road and highway projects, and population growth, are expected to increase demand and construction of transportation routes near the BiFO. Areas protected from development have guided in the past, and would continue to guide, the location and development of many highways and roads near and within the BiFO. In contrast, the Proposed RMP and Alternatives B, C, and D management actions restrict travel within the BiFO mostly to designated routes and very few, if any, additional routes would be developed. As a result, there could be increased concentrations of vehicles within certain areas of the BiFO, that is, restricting the miles of roads open for motorized travel would be expected to increase vehicle concentrations more in the BiFO than in surrounding areas that do not impose travel restrictions.

Management actions that restrict OHV use would limit the degree of travel opportunities and the ability to access certain portions of the decision area. The Proposed RMP management actions for closing 99 percent of the decision area to cross-country OHV travel in combination with similar management actions of adjacent field offices and agencies would incrementally reduce opportunities for cross-country OHV travel. Other Proposed RMP management actions that could affect travel management would include the construction of routes for fire and fuels management to reduce the risks of wildfire, vegetation treatments to control invasive species, new minerals exploration and development routes, managing for increasing recreational demand and visitation, and other changes in travel management. For the travel routes deferred until after the RMP, (those outside of the TMAs on 149352.6 acres) deferring decisions would not result in the overall inability of BLM to provide public access or control resource damage while the plans are yet to be completed. All travel management in the deferred areas in the interim would be limited to existing roads and trails. However, these incremental actions would likely be minor to the overall cumulative effect for a number of reasons, some of which are identified above.

4.3.7 Renewable Energy

Given the presence and potential of renewable energy sources in the planning area described in Chapter 3, it is projected that wind energy testing and/or generation facilities would be the primary renewable energy development that may occur in the planning area, and thus the focus of this analysis is on wind development. Assumptions and impacts for geothermal energy are addressed in the Energy and Mineral Resources section; biomass is addressed in the Forest and Woodland Products section.

This section describes potential impacts to wind development from implementing the Alternatives. Potential effects and implications related to the types of restrictions that would be applied and from the resulting proposed land use allocations quantified when possible.

4.3.7.1 Methods and Assumptions

While no commercial wind developments are presently on or immediately adjacent to BLM-administered public lands in the Billings planning area, for analysis purposes, development assumptions have been projected based on existing and proposed wind developments in both the planning area and across Montana (see Chapter 3 Affected Environment discussion), the land pattern in the planning area, and the wind energy potential of BLM-administered lands in the Billings Field Office (see Table 3-62 in Chapter 3). At the present time, transmission is a limiting factor in many areas of Montana. The lack of this infrastructure presents challenges in transportation of generation from resources in remote areas into the grid. Costs necessary to construct either new transmission or interconnects into existing facilities (where capacity is available) require a level of generation high enough to recoup facility investments.

Therefore, it is assumed that a small commercial wind energy development project comprised of 25 to 35 2.5 megawatt turbines, generating about 62.5 to 87.5 megawatts could occur in the decision area. While current turbines are generally 1.5 to 2 MW in size, it is expected that turbines would continue to increase in size and height given advances in engineering research and design, and thus a 2.5 megawatt turbine assumption was used. No assumptions were made as to the specific location of the wind energy facilities except that development could occur throughout the decision area where not restricted.

Wind testing and monitoring facilities are temporary in nature, and generally occur with little surface disturbance and limited impacts. However, wind energy developments are long-term commitments once approved, may cover broad areas of a landscape depending on size and turbine siting, and may require substantial disturbance during the construction phase.

Centralized staging areas are often established to orchestrate construction and store supplies and equipment. Each turbine location, once sited, requires concrete foundation work and a +"laydown" area where turbine assembly would occur. Turbines are connected with buried connector lines which eventually terminate at a collector substation, where power is stepped up to a compatible voltage to be tied into the power grid. These lines are usually placed alongside the road system. Occasionally, terrain considerations or geotechnical studies necessitate above ground or aerial collector systems. Fencing around turbines is normally not required; substations are generally fenced. A building for operations and maintenance is also a standard component of a wind energy development.

Appropriate access to the area is critical. A road width of 40' is usually required in order to accommodate the large trailers and crane equipment necessary to transport and erect the turbines. Upon completion of construction, roads can generally be reclaimed to a narrower width for operations and maintenance of the wind facility.

While wind energy facilities are expected to be long-term uses of the landscape where they are constructed, proper reclamation of disturbance occurring from construction activities can reduce the footprint of the facilities. For analysis purposes, it is assumed an estimated 2 acres per turbine would be disturbed during construction (70 acres short term); an estimated 1 acre would be disturbed for the life of the project (35 acres long term). In addition, only 2 percent to 5 percent of the total land approved under wind energy authorizations is actually occupied by

the turbine foundations and access roads. The remaining land is compatible with rural land use, such as farming and ranching. Based on the high end of the projected development range, a 1,400-acre, 35-turbine wind farm located entirely on BLM-administered land would result in long-term direct disturbance of 70 acres, with short-term disturbance estimated at 35 acres.

The analysis is also based on the following assumptions:

- Wind energy is the most likely type of renewable energy to be developed in the planning area, though changes in technology may render utilization of other renewable energy resources more viable than at present.
- Wind energy development would likely occur in areas open to development more than in renewable energy avoidance areas.
- With advances in technology, lands in lower classed wind areas may become more attractive for development.
- Mapping of renewable energy potential (wind power classifications) is based on a broad-scale national mapping exercise at 50 meters. Site-specific testing and monitoring may indicate areas with higher (or lower) wind energy potential than previously identified, and newer mapping at 80 meters may result in increased acreage of high potential given stronger "better" winds at increased heights.
- Management objectives for other resources and resource uses and programs may limit the location and development of wind energy infrastructure.

4.3.7.2 Environmental Consequences

Impacts to wind energy would likely result from actions/restrictions proposed under the following resource programs:

- Wild Horse and Burro Management
- Wildlife Habitat and Special Status Species
- Cultural and Heritage Resources
- Renewable Energy
- Lands and Realty
- Special Designations
- Visual Resource Management

Other programs were determined to have little or no impact on renewable energy.

4.3.7.3 Impacts Common to All Alternatives

Management actions that encourage or facilitate wind development would provide opportunities for increased generation of renewable energy, which would serve to meet goals set out in the Energy Policy Act of 2005. Adverse impacts would result from application of

management actions that constrain wind or other renewable energy development, especially if the constraints result in reducing the generation potential to a degree where the development becomes economically infeasible.

Designation of lands as exclusion areas would result in direct adverse impacts to wind development and the economic and social benefits that could be realized. However, the majority of lands closed to development in the various Alternatives do not lie in areas of high wind potential.

Managing areas as avoidance areas for renewable energy ROWs, especially in high wind potential areas, could limit opportunities for renewable energy development in the decision area by increasing costs and processing time if applications were submitted. Restrictions on facility placement, limited access, required inventories, increased administrative costs, and installation of facilities in less-than-optimum sites could all result if applications were entertained in designated avoidance areas. Placement or operation of turbines to avoid resources of concern or mitigate impacts (such as increasing cut-in speeds, shutdown during migration periods, etc.) could result less-than-optimum generation. In some instances, an area that is not closed to wind could become uneconomical to develop due to the cost of implementing mitigation measures and the decrease in generation potential.

Designation of lands as VRM Class II and III would impose standards that may be difficult for wind developers to meet, especially in Class II, and result in abandonment or denial of a proposal. The absence of VRM Class IV lands in the BiFO limits options to identify lands for better opportunity for development. Unless advances in technologies are perfected and approved that allow wind developments without lighting as currently required by FAA, visual intrusion would occur at night as well, even if VRM objectives could be met with siting to reduce feature dominance.

Exclusion of portions of the decision area, and in some instances, mitigation in avoidance areas and/or special design features or restrictions have the potential to affect proposals on non-BLM administered lands if facilities or development is contingent on public land availability and authorization. The areas that lie outside of the exclusion and avoidance areas would provide the best opportunity for generation of renewable energy to meet agency goals. Meeting these goals would potentially assist in reducing reliance on other energy sources and in turn, reduce emissions from other generating sources.

Disposal or exchange of any lands exhibiting high wind development potential, or lands adjacent to private developments would reduce the land base available in the public sector, but may continue to provide renewable energy opportunities with fewer constraints if new owners were amenable to development.

Table 2-1 summarizes the acres by Alternative that would be open, excluded, or managed as avoidance areas, providing the degree of impact from each Alternative due to the management actions proposed. Impacts from management actions that apply to renewable energy development are similar across all Alternatives. Discussion under each Alternative highlights the percent of lands affected by allocations resulting from resource restrictions and how that impact is distributed across wind potential on BLM land.

4.3.7.4 Alternative A

Managing 47,496 acres as renewable energy exclusion areas (closed) would remove 11 percent of BLM-administered land in the planning area from wind development, of which 12,372 acres are high and 16,350 acres are moderate development potential. Table 4-41 shows the impact allocations in this Alternative have on the availability of land for wind energy development.

Table 4-41 Impact by Percent/Acres on Wind Potential Development in Alternative A

Development Potential	Open (83%) 361,514 acres	Avoidance (6%) 25,144 acres	Closed (11%) 47,496 acres	Total Acres
Acres in High	50,135	1,040	12,372	63,547
Acres in Moderate	132,040	7,677	6,350	146,067
Acres in Low	178,916	15,055	26,271	220,242
Wyoming Acreage	423	1,372	2,503	4,298

Opportunity for development is provided to the greatest degree by this Alternative, especially on the 50,135 acres of high potential land that would be managed as open (see Map 153) as long as resource issues could be resolved and important values protected with BMPs and standard stipulations.

4.3.7.5 Alternative B

Managing 345,491 acres as renewable energy exclusion areas (closed) would remove 80 percent of BLM-administered land in the planning area from wind development, of which 53,537 acres are high and 111,742 acres are moderate in development potential. Table 4-42 shows the impact of allocations in this Alternative on the availability of land for wind energy development.

Table 4-42 Impact by Percent/Acres on Wind Potential Development in Alternative B

Development Potential	Open (0%) 0 acres	Avoidance (20%) 85,461	Closed (80%) 345,491 acres	Total Acres
Acres in High	0	10,690	53,537	64,227
Acres in Moderate	0	34,202	111,742	145,944
Acres in Low	0	40,513	179,530	220,043
Wyoming Acreage	0	56	4,242	4,298

Maximizing restrictions under this Alternative would remove the greatest number of acres exhibiting high wind resources of any Alternative, severely impacting opportunities for

development. This would be the most restrictive of any of the Alternatives for wind development with no areas considered "open" (see Map 154). However, exclusion of renewable energy development from Lands with Wilderness Characteristics would affect only low potential wind areas. Should technologies be developed in the future to take advantage of winds in lower potential areas, as well as to better mitigate impacts, this Alternative would have detrimental long-term impacts on industry and renewable energy development in the BiFO.

4.3.7.6 Alternative C

Managing 82,019 acres as renewable energy exclusion areas (closed) would remove 19 percent of BLM-administered land in the planning area from wind development, of which 19,960 acres are high and 15,358 acres are moderate in development potential. Table 4-43 shows the impact of allocations in this Alternative on the availability of land for wind energy development.

Table 4-43 Impact by Percent/Acres on Wind Potential Development in Alternative C

Development Potential	Open (5%) 21,349 acres	Avoidance (75%) 326,722 acres	Closed (19%) 82,019 acres	Total Acres
Acres in High	757	42,830	19,960	63,547
Acres in Moderate	10,750	119,570	15,358	145,678
Acres in Low	9,842	163,846	46,421	220,109
Wyoming Acreage	0	476	3,822	4,298

Application of special design features, timing limitations, and other restrictions would increase costs and processing time, and in some instances, result in applications being withdrawn by industry as described under Impacts from Management Common to All Alternatives. Allowing wind energy development in the Pryor Foothills ACEC and in Greater Sage-Grouse PPAs and RAs if sage-grouse habitat suitability would be maintained would potentially increase the amount of acreage available for wind development in comparison to Alternative B, where development in sage grouse areas is excluded. Managing VRM Class III as open rather than as avoidance areas could result in additional development flexibility, though VRM objectives must still be met.

4.3.7.7 Alternative D (Preferred Alternative)

Managing 78,088 acres as renewable energy exclusion areas (closed) would remove 18 percent of BLM-administered land in the planning area from wind development, of which 17,392 acres are high in development potential. Table 4-44 shows the impact of allocations in this Alternative on the availability of land for wind energy development.

Table 4-44 Impact by Percent/Acres on Wind Potential Development in Alternative D

Development Potential	Open (5%) 20,937 acres	Avoidance (76%) 331,088 acres	Closed (18%) 78,088 acres	Total Acres
Acres in High	751	45,406	17,392	63,549
Acres in Moderate	10,595	122,101	12,978	145,674
Acres in Low	9,591	163,105	47,411	220,107
Wyoming Acreage	0	476	3,822	4,298

Impacts are similar to Alternative C, though different timing limitation and distances would be applied for some resources. Areas such as the Pryor Foothills ACEC and slopes over 30 percent would be managed for avoidance rather than exclusion, which provides additional flexibility for development on about 2,500 additional high wind potential acres. Under Alternative D, the 20,937 acres of open BLM-administered land, including 751 acres with High wind potential and 10,595 acres with Moderate wind potential would provide opportunities similar to Alternative C for generation of renewable energy to meet agency goals and potentially assist in reducing reliance on other energy sources and in turn, reduce emissions from other generating sources.

4.3.7.8 Cumulative Impacts

The Cumulative Impact Analysis Area for renewable energy is the BiFO. Currently, no wind energy projects are planned on BLM managed lands within the BiFO, though interest has existed in the past. Increased residential and commercial development in the planning area combined with the emphasis on wind energy may place a greater demand on the need for wind development in the planning area. Restrictions on wind development in the planning area, combined with restrictions from other local or state governments and/or management plans could reduce generation potential by modifying optimum facility and turbine siting and possibly increasing construction costs. Potential regulation of wind developments by non-federal entities in the future (i.e. establishment of design features or mitigation measures or impact fees by local governments when reviewing wind development applications on private lands, etc.) could result in increased interest in BLM-administered land should development requirements become similar to those currently applied by BLM.

4.3.7.9 Irreversible and Irretrievable Commitments of Resources

Wind facilities represent substantial infrastructure investment and are considered long-term uses of a landscape, likely to remain as long as wind resources continue to provide generation. As a result, renewable energy development authorizations could permanently alter natural and cultural resources and uses of lands where authorized, and lead to an irretrievable conversion of lands to facility development for the life of the project.

4.3.7.10 Unavoidable Adverse Impacts

Exclusion of wind energy development from specific areas, and the measures and/or restrictions imposed on developments in order to reduce, minimize or eliminate impacts to a number of resources, including but not limited to special status species, wildlife, scenic values, and cultural resources, would limit the ability of the BLM to provide opportunities for the production of wind energy from public land in the BiFO.

The land use restrictions required to meet legal requirements and protect sensitive resources and other important values would adversely impact the ability of operators, individuals, and groups to fully develop high potential wind resources in the BiFO.

4.3.8 Transportation and Facilities

The Billings Field Office has five developed administrative sites for BiFO staff to store equipment, supplies, and to prepare to work on field oriented tasks. These are: The Billings Fire Dispatch Center, the Pompeys Pillar Administrative Site, Britton Administrative Site, The Four Dances Administrative Site and the Sundance Administration Site For further description of these sites, please see Chapter 3.

Efficient field operations conducted by BLM staff on BLM lands are crucial for the use and stewardship of those lands. Maintained administrative facilities provide appropriate and timely operations for most resource management programs in the planning area.

Generally, as costs increase, fewer facilities would be maintained each year and more would be deferred. The actual number of facilities maintained each year would be based on annual budgets. Under all Alternatives, the BiFO would emphasize maintaining the majority of BLM facilities at maintenance intensities that may not provide year-round access but are intended to keep the facility usable when needed, both for public and BLM staff. This is sufficient to meet the goals and objectives across all Alternatives. The BLM does not remove snow, but some facilities identified above have access routes plowed by county road maintenance, utility companies, or private entities if the roads also provide access to utilities, homes, or private buildings.

Under all Alternatives, facility maintenance intensities would be consistent with the defined goals and objectives for the care and maintenance of BLM facilities based on identified management objectives in the land-use plan (e.g., recreation setting character conditions and visual resource management). This would ensure the facilities continue to meet those area-specific resource conditions and goals and minimize resource conflicts. Overall, the facilities are designed to help BLM staff achieve RMP goals and objectives (for all resources and resource uses) and to provide for appropriate public and administrative access.

4.3.8.1 Methods and Assumptions

The facility impact analysis is based on the following assumptions:

- BLM "Condition Assessment Site Exam" audit provides guidance for appropriate "standards of care" to facilities within the BLM decision area. Facilities are carried as assets within the Facility Asset Management System (FAMS). These would be identified by number and specific maintenance schedules and activities would be considered at the project level.
- The BLM would coordinate with other local state and local agencies in the development, maintenance, and management of BLM facilities as appropriate on lands in the decision area.
- Facility costs would increase through the life of the RMP as facilities experience aging and wear from use.
- Most resource programs have needs for additional facilities of one kind or another.
- Facilities for administrative purposes at all sites would be maintained and upgraded as needed to achieve management objectives for safety, resource protection, and quality recreational experiences. Facilities found to not meet agency needs or which are contributing to resource impacts would considered for redesign, relocation, closure, or decommission to minimize adverse impacts or conserve funding.
- Facilities would be inspected on an established schedule in accordance with the Bureau's Condition Assessment guidance.
- New facilities determined to be necessary for permanent, short- or long-term use as part of the Agency mission would be constructed subject to NEPA and approved engineering standards.
- Consideration would be given to use demands, location, safety, funding, and resource constraints when determining the type of facility necessary.
- BLM administrative site buildings and facilities would be maintained within the Bureau standards to reduce deferred maintenance costs, meet public health and safety requirements; and to provide universal accessibility as appropriate. These activities would be coordinated with other federal, state, and local government agencies, private landowners, and the general public as needed.
- To protect public investments and facilities from incompatible disturbance, conveyance, or activities, the following prescriptions would be applied to developed administrative sites at the Four Dances, Sundance, Pompeys Pillar and Britton locations:
    - BLM would seek to withdraw the sites from mining location

- The areas would be closed to mineral materials and fuelwood sales
- Category 3 (NSO) stipulations would be applied to the areas for fluid mineral leasing.

4.3.8.2 Environmental Consequences

Impacts to Transportation Facilities and Maintenance would likely result from actions proposed under the following resource programs:

All programs were determined to have little or no impact on Travel Facilities and Maintenance. NEPA analysis in a case-by-case basis adequately addresses and resolves resource concerns. Funding levels are the determining factor in projects.

4.3.8.3 Impacts Common to All

4.3.8.3.1 Impacts from Transportation Facilities and Access:

The impact of these decisions on other programs is negligible due to the small size of the areas and that the existing area has already been closed when the sites were established. Continuation of the operation and maintenance of BLM facilities would create safer conditions for the public and provide for administrative uses.

4.3.8.4 Cumulative Impacts

Cumulatively, actual on ground transportation facilities and access would not change through any of the proposals in the RMP. Administratively, however, the BiFO would have better information and management database allowing for better, informed decisions.

4.4 Special Designations

4.4.1 Pompeys Pillar National Monument and ACEC

4.4.1.1 Impacts Common to All Alternatives

Under all Alternatives, Pompeys Pillar ACEC (432 acres) would continue to be managed to protect the historical, cultural, and biological values, including its outstanding viewsheds and unique resources of the area. Emphasis on providing opportunities for interpretation, education and enjoyment of the area would continue. The ACEC would be available for oil and gas leasing, subject to a No Surface Occupancy (NSO) stipulation. The 432 acres within the ACEC have low mineral development potential; therefore, while the NSO stipulation protects the values of concern within the ACEC, there would be minimal adverse impacts to oil and gas leasing. Pompeys Pillar National Monument (51 acres) which is included in a portion of the ACEC, would be managed to protect the historical and cultural objects for which is was

nominated, and would be withdrawn from all forms of entry, location, selection, sale or disposition, subject to valid existing rights.

The National Historic Landmark (NHL 6 acres) which includes the rock feature itself, would be managed as a VRM Class II to protect the values associated with the landform. The remainder of the ACEC would be managed as VRM Class III. This would allow for interpretive and educational programming, facilities and access to and within the site, while ensuring the visual quality and visual obtrusions are minimized or mitigated to protect the scenic values of the area.

4.4.1.2 Alternative A

Pompeys Pillar ACEC is delineated into three management zones: Historic (Natural) Zone – 29 acres; Historic (Developed) Zone – 54 acres; and a General management Zone – 349 acres. Management according to these zones provides protection to the resources, however, is limiting on the type and amount of facilities needed to serve recreational and interpretive use needs, as well as ensure public health and safety considerations. Negative impacts from relocating existing facilities to meet the objectives of the various management zones would result in surface disturbing activities that would adverse impact cultural and historic resources on the site. Under Alternative A, there are no restrictions or limitations on plant collecting, which negatively impacts the features and values associated with the ACEC, generates unintended adverse impacts from actual collection by trampling of native vegetation, as well as encourages other users to travel off-trail and disturb cultural or historic artifacts.

Alternative A currently has no restrictions to other surfacing disturbing activities associated with energy and renewable energy, including solid leaseable minerals, mineral material sales, commercial wind energy development, and solar or geothermal development. The surface disturbance associates with these types of uses would adverse impact the cultural and historic artifacts associated with the site, negative impact the visual and scenic quality of the area and adverse impact the visitors' experience to the site. There would be permanent loss of artifacts resultant from mineral development and the surface disturbance footprint associated with commercial wind or solar energy development.

A ROW exclusion area (29 acres) and a ROW avoidance area (403 acres) would minimize surface disturbing impacts as well as the impacts from visual intrusions, resultant from land use authorizations, including ROWs, except for those necessary to serve the site facilities.

Alternative A has no restrictions on cremains scattering. This activity would impact Native American religious values, and would result in impacts from surface disturbance and inadvertent impacts to cultural or historic artifacts when accessing sites off of the main trail areas. Other permitted activities, including special recreation permits, would be allowed.

4.4.1.3 Alternative B

Under Alternative B, the delineation of management zones would be modified to better address the current and on-going needs of the site. In Zone A (25 acres), the management objective

would provide visitor access to Clark's signature and other historic inscriptions/rock art, and enhance the visitors' experience through providing landscapes that appear similar to the natural setting Clark viewed in 1806. In Zone B (58 acres), the management objective would provide for a setting where most facilities would be placed and would be designed to enhance visitor experiences and services. Zone C (349 acres) would be managed to improve and/or maintain wildlife habitat, enhance recreational opportunities, visitor services, and wildlife viewing. Priority may be given to visitor service needs, including facility development, as needed. Management according to these zones would continue to provide protection to the values of concern, as well as meet the management needs for recreational and interpretive uses, as well as ensure public health and safety considerations. Existing facilities in Zone A could remain, which would eliminate adverse impacts from the surface disturbance actions required to relocate existing facilities. Visitor experiences would be better met by leaving these facilities in tact to address interpretive opportunities as well as address visitor health and safety needs.

Under Alternative B, the ROW exclusion area (83 acres) would include more lands (approximately 54 acres) adjacent near the landform, riparian area, and the national monument boundary. This would provide more protection to the values of concern, minimize surface disturbance to cultural and historic artifacts, and protect visual and scenic quality. The expanded ROW exclusion area would also enhance visitor experiences by minimizing human-created distractions in and around the Zones A and B. The ROW avoidance area (349 acres) would include all of Zone C and would continue minimize surface disturbing impacts as well as the impacts from visual intrusions, resultant from land use authorizations, including ROWs, except for those necessary to serve the site facilities. This would better align the ROW actions with the objectives of the management zones to enhance the overall objective of the site.

Alternative B would not allow plant collection. This would protect the resource values, retain the vegetative features of the area, and prevent soil disturbance resultant from actual collection caused by trampling of native vegetation. Not allowing plant collection would avoid the potential for visitors/users to travel off the trail system which could inadvertently impact cultural or historic artifacts. Not allowing plant collection would negatively impact visitor experiences or opportunities for those wanting to collective native vegetation or plants observed and documented in the journals of the Lewis and Clark Expedition.

Animal trapping and use of traplines would only be allowed in Zone C, by authorization only (and authorized for administrative purposes in Zones A and B). This would protect the safety of visitors and their pets in the heavier use areas of Zones A and B. Hunting would be allowed in Zone C only (349 acres). This would provide for the safety of the public in the heavy concentrated use areas of the site.

Alternative B would restrict energy and renewable energy actions, including solid leaseable minerals, mineral material sales, commercial wind solar or geothermal energy development. Geophysical exploration would also not be allowed in Alternative B. These closures and restrictions would protect cultural and historic artifacts and the associated negative impact to visual and scenic quality. These restrictions would impact mineral and renewable energy development (432 acres) by limiting the availability for development of the energy resources.

Cremains scattering would not be authorized in Alternative B. This action would protect the Native American religious values, and prevent surface disturbance and inadvertent impacts to cultural or historic artifacts when access sites off of the main trail areas. Livestock grazing would not be allowed in Alternative B. Prohibiting livestock grazing limits this use as a management tool to address weeds issues or other vegetation prescriptions that could benefit from livestock grazing as a management tool. Other permitted activities, including special recreation permits, would be allowed subject to project level review and analysis and mitigation to protect resource values.

4.4.1.4 Alternative C

Impacts would be the same as Alternative B, except that plant collection would be authorized in Zone C (349 acres), which would accommodate certain users/groups while protect the fragile surface and native vegetation in Zones A and B. In addition, Alternative C would allow livestock grazing on a temporary basis as a management tool to treat noxious weeds and as a prescription to meet site-specific vegetation or resource management objectives. This would enhance vegetation management at the site, minimize the potential spread of noxious weeds, and allow for adaptive management to reach vegetation resource objectives. Overall, the site would be managed to protect the relevant and important values and provide for enhanced visitor experiences and interpretive opportunities.

4.4.1.5 Alternative D (Preferred Alternative)

The effects would be the same as Alternative C.

4.4.2 Areas of Critical Environmental Concern

This section describes impacts related to the 11 existing, existing with proposed expansion, and new proposed ACECs in the planning area (see Table 4-45). The BLM manages ACECs to provide special management for relevant and important values, resources, natural systems, and natural hazards (herein referred to as values of concern). As part of the planning process, the BLM Billings FO specialists considered the relevant and importance criteria. Refer to Appendix E for a complete description of the process, the ACECs considered, and the identified values for each ACEC being carried forward.

The impacts discussion of ACECs considers both the impacts of management in these special designations to other resources and resource uses and the impacts of management to the protection of the values of concern for which the BLM proposes that designation. Most of the values of concern are also resources with management independent of ACEC designation; this non-ACEC management is further discussed and analyzed by Alternative in the relevant sections of this Chapter. For example, this section describes impacts to paleontological values of concern in the Bridger Fossil Area ACEC, but the Paleontological Resources section in this chapter describes the overall impacts to paleontology from management under the range of Alternatives. Additionally, the restrictions identified to protect the values of concern by Alternative that are restrictions or allocations, are also analyzed in those corresponding sections. For example, a ROW exclusion or avoidance area (by acreage by Alternative) is also

analyzed in aggregate in the Lands and Realty section of this chapter, as impacts to that program.

4.4.2.1 Methods and Assumptions

The impact analysis in this section focuses on high-level comparisons of potential adverse and beneficial impacts among the Alternatives. The introduction to Chapter 4 identifies the overall assumptions used in this impact analysis. Assumptions related to other resources and resource uses discussed in this section apply to the analysis of the ACECs. In addition, the size (acres) of the ACEC, as well as the identified management actions by Alternative to protect the values of concern vary among Alternatives. In Alternative B, where overall management within the decision area emphasizes protection of resources, the ACEC acreage and/or management is generally prescriptive as the overall management direction provides protection for those values. Conversely, in Alternative C, which emphasizes commercial and economic development of resources, the ACECs typically are larger in size and are more prescriptive within those areas, to protect those identified values associated with the ACEC.

Table 4-45 Existing and Proposed ACECs by Alternative

Area	Alternative			
	A	B	C	D
Existing ACECs				
Pompeys Pillar ACEC	432 acres			
Bridger Fossil Area ACEC	577 acres			
Castle Butte ACEC	184 acres			
East Pryor ACEC	29,550 acres	8,301 acres	32,767 acres	11,122 acres
Four Dances Natural Area ACEC	784 acres			
Meeteetse Spires ACEC	965 acres	1,523 acres	2,173 acres	1,523 acres
Petroglyph Canyon ACEC	240 acres			
Stark Site ACEC	799 acres			
Weatherman Draw ACEC	4,365 acres	4,986 acres	12,277 acres	
Proposed ACECs				
Grove Creek ACEC	0	8,251 acres	9,445 acres	Same as B
Pryor Foothills Research Natural Area ACEC	0	958 acres	7,401 acres	2,606 acres
Greater Sage-Grouse Habitat ACEC	0	154,140 acres	0	0
Total ACEC Acreage by Alternative	**37,896 acres**	**181,175 acres**	**67,079 acres**	**38,786 acres**

4.4.2.2 Analysis of Alternatives – Summary of Impacts

Alternative A would retain 37,896 acres as ACECs (9 ACECs), Alternative B would retain 9 ACECs and designate 3 new ACECs for a total of 12 ACECs (181,175 acres) and Alternatives C and D would retain 9 ACECs and designate 2 new ACECs, with acreages varying by Alternative, based on the adequate levels of management protections needed to protect the relevant and important values. Alternative B would designate the most acreage for ACECs (181,175 acres). Alternative D would balance management prescriptions and ACEC designations (38,786 acres) with the level of protections needed to protect the values of concern, in consideration of other planning area-wide emphasis on the balance between resources and resource uses.

In all Alternatives, ACEC management generally restricts mineral development, ROWs, and other land use authorizations are generally restricted to protect the resource values. ACECs also identify by Alternative the type of restriction or constraint for oil and gas (major or moderate constraints), ROW avoidance or exclusion area, and in all cases, wind energy development would be closed to protect the important values associated with cultural, historic artifacts or paleontological values and scenic viewsheds. Other surface disturbing activities and permitted uses would be considered at the project level to assess impacts and any required restrictions or mitigation to avoid adverse impacts to the relevant and important values.

4.4.2.3 Impacts Common to all Alternatives

Although the values of concern vary by area and ACEC, the effects of key management (i.e., ROWs, VRM, mineral development, etc.) on these values and other resource uses would have some similarities. This section analyzes the impacts to relevant ACEC values from management actions from other programs. Impacts to other programs, based on restrictions or constraints, are also analyzed in those corresponding program areas in this chapter. In addition, the analysis in this section is limited to impacts to only those values of concern that meet the relevance and importance criteria. Impacts to other values in the ACEC are not analyzed unless they contribute to the need for special management. The following paragraphs describe the general effects of key management.

Generally, management prescriptions for the protection for air quality, geology, soil, water, and non-WSA lands with wilderness character would benefit ACECs by preventing the degradation of those resources in ACECs. This beneficial impact to ACECs would be secondary to other benefits, such as limiting mineral development. Non-ACEC management actions to protect air quality, soil, water and vegetation through limiting surface-disturbing activities vary by Alternative by the number of acres protected by slope steepness, riparian-wetland buffer sizes, and the protections applied to those buffers, would result in beneficial impacts to ACEC values.

In general, surface-disturbing activities such as mineral development, realty actions or other activities, reduce the quality of habitat by causing fragmentation, removal of vegetation, and create surface disturbance that would adverse impact cultural, historical and paleontological values associated with the ACECs. Often, surface disturbance and/or developments also create a moderate to strong contrast with the characteristic landscape for visual resources or historical

setting of the ACECs. Therefore, surface-disturbing activities, regardless of the cause, generally result in adverse impacts to ACEC values. In the analysis that follows, the adverse impacts of surface disturbance would not be discussed repetitively; additional information regarding the adverse impacts to wildlife, special status plants, historic and visual resources are found in those respective sections.

The impact of the sale of forest products is not expected to vary by Alternative over the planning period because there is no foreseeable market for substantial quantities of timber. Any specific future proposed projects would require implementation-level analysis to determine extent, scope, and impacts to the values of concern.

Impacts to ACEC values from management actions for cultural resources would be generally the same under all Alternatives because of the requirements of the NHPA and as well as for paleontological resources. Cultural and paleontological resource management could result in limited surface disturbance and loss of vegetation if excavation is necessary.

Restrictions on the exploration for or development of mineral resources in the area designated as an ACEC would generally result in beneficial impacts to values of concern in the ACECs. However, there would be adverse impacts to minerals in that withdrawing or closing an area designated as an ACEC to mineral or oil and gas development, removes the potential to develop that resource. An NSO, CSU, or TLS restrictions and limitations, or restrictions on surface-disturbing activities in ACECs can limit potential development, increase timeframes and costs, and may decrease the feasibility of economic recovery of mineral resources. Within an area designated as an ACEC, the BLM would require a plan of operations for all locatable mineral exploration (except casual use) and development, including disturbances of five acres of less (43 CFR 3809). The BLM would not automatically require a plan of operations absent such a designation. In parts of the ACECs with low development or potential, the adverse impacts of such restrictions and stipulations generally would be lower because the resource is either not present in commercial quantities or is uneconomical to mine. The requirement for a plan of operations could make the mining operation more costly or more time consuming, which would be adverse impacts to the claimant; however, these are not considered adverse impacts to the locatable mineral resource, since recovery would not be precluded.

Closing an area to mineral development or applying other restrictions or mitigation minerals development generally results in beneficial impacts to scenic quality, vegetation, soils, wildlife habitat, cultural resources, and other values of concern in ACECs by protecting the identified important and relevant resources from disturbance.

All of the ACECs have management prescriptions for major ROWs, such as large pipelines, transmission lines, and also includes restrictions to wind energy developments. Restrictions, limitations, or required mitigation for other land use authorizations generally result in beneficial impacts to the values of concern in the ACECs by protecting these resources from disturbance or mitigating adverse impacts to an acceptable level. In all Alternatives, no land disposals within the ACECs would be authorized, and acquisition would be considered a priority to enhance and further protect those ACEC values. Impacts to land use authorizations and ROWs within ACECs generally affects the lands program and the values of concern for the

ACEC. Managing an area with more ROW restrictions, such as ROW avoidance areas, generally would require additional mitigation, application of BMPs, or other design considerations that would result in adverse impacts to ROWs in the form of additional expense and delay of project development.

Under all Alternatives, management that restricts travel in ACECs would benefit values of concern for the ACEC by closing or limited routes that may damage resources, and by reducing the number of available roads. In those ACECs where motorized travel is limited to existing roads and trails, resource values of concern would continue to be protected. Where resource damage or impacts begin to occur, travel management to address motorized or non-motorized route designations would be addressed in the future. Where mechanized travel would be limited or restricted, generally the resource values in those areas would also be protected. Generally, restrictions to motorized travel would result in adverse impacts to access and motorized OHV users. Managing an area as limited to designated roads and trails, for example, would limit the roads and trails available for motorized use and may adversely affect the ability to access certain areas and limit the recreational opportunities and experiences for those who prefer travel by motorized modes. Any resource use that results in authorized or unauthorized road or trail development (e.g., oil and gas development or user-pioneered trails), can have a direct impact on paleontological resources, cultural sites, and other resource values because the road or trail may physically pass through or over these resources and damage or destroy them. In addition, an indirect impact from road and trail development may occur when the road provides access to a previously remote and/or inaccessible location. People who gain access may inadvertently damage fragile resources or disrupt wildlife during important life stages.

Managing an area with more restrictive VRM classifications (Classes I and II) would result in adverse impacts to BLM-authorized actions that create surface disturbance or otherwise contrast with the visual setting and attract the attention of the viewer. Adverse impacts to these BLM-authorized actions in areas with restrictive VRM classifications would result from changes to the size, scope, location, required mitigation, or BMPs for the actions. Managing an area with more restrictive VRM classifications would generally result in beneficial impacts to the important and relevant resources in an ACEC by requiring additional design consideration and mitigation in the area which would reduce the potential for facilities or development that could adversely affect important and relevant resources. Conversely, managing areas with less restrictive VRM classifications (Classes III and IV) would generally result in adverse impacts to values of concern, especially if the values of concern in an ACEC are associated with scenic quality.

Livestock grazing management, varies by Alternative, but would be authorized in all ACECs except Four Dances Natural Area. Impacts to ACEC values from management actions associated with surface disturbance associated with range improvements for cultural resources would be generally the same under all Alternatives because of the requirements of the NHPA as well as for paleontological resources. Cultural and paleontological resource management could result in limited surface disturbance and loss of vegetation if excavation is necessary.

Under all Alternatives, the use of heavy equipment in fire suppression activities would be restricted in areas of sensitive resources. This includes ACECs. Therefore, adverse impacts to

ACEC values from the use of heavy equipment would not vary by Alternative and are not further analyzed in this section. Whether or not the tactics used for suppression of wildfire is utilized varies by Alternative. Suppression could result in adverse impacts to visual resources, cultural and paleontological values, at least in the short term, if resources were damaged by fire suppression efforts. Conversely, full suppression would result in short-term beneficial impacts by preventing fire damage to vegetation and critical cultural resource values. However, on a long-term basis, suppression tactics could lead to fuels buildup and increase the risk of landscape-level fires, with substantial adverse impacts to ACEC values and scenic quality.

4.4.2.4 Bridger Fossil Area ACEC

4.4.2.4.1 Impacts Common

Under all Alternatives, Bridger Fossil Area ACEC (577 acres) would continue to be managed to protect the paleontological values of the area. The values for which the Bridger Fossil Area National Natural Landmark (NNL) was designated would also be maintained. Emphasis on providing opportunities for interpretation, education, and enjoyment of the area would continue. Under all Alternatives, the ACEC would not be available for fuel wood cutting/wood product sales and use of explosives for geophysical exploration for oil and gas would be prohibited. This would protect the paleontological values of the ACEC by preventing surface and sub-surface disruption to known fossil resources.

4.4.2.4.2 Alternative A

Under Alternative A, Bridger Fossil Area would be managed as a ROW exclusion area which would prohibit many surface disturbing activities associated with land authorizations. Additionally, oil and gas exploration and development in the ACEC would be closed (No Lease) and mineral material sales are not allowed. These restrictions would benefit the paleontological values of concern for the ACEC by reducing the potential for destruction or degradation of paleontological resources and values. However, under Alternative A, there are no specific restrictions associated with other energy development, including mining solid leasable minerals, locatable minerals. Requests for these types of mineral uses would be considered at the project level and could result in the degradation of paleontological resources as well as diminish the scenic values associated with the area.

The Bridger Fossil Area ACEC would continue to be managed as a VRM Class IV area. This visual management class is the least restrictive, and would impact the visual and scenic quality of the area, thereby, diminishing the public's experience, particularly during interpretive or educational programs offered at the site.

Travel management would continue to be limited to existing roads and trails. This restriction would protect surface resources from off-road or cross-country travel (also refer to Appendix O for more detailed impact analysis from travel management by Alternative).

Generally, under Alternative A, restrictions to other activities or uses with potentially surfacing disturbing impacts are not limited, and are managed in accordance with other program guidelines and management actions, including plant collecting, target shooting,

noxious/invasive weed treatments, range improvements, and permitted activities (e.g., special recreation permits). These activities, if not managed or monitored to ensure the ACEC values are protected, could result in unintended adverse impacts to paleontological resources.

4.4.2.4.3 Alternative B

Alternative B would provide for more protective and restrictive management actions, which would provide greater protection for all potentially surface-disturbing uses and activities, thereby preventing degradation of the paleontological values of the area.

The Bridger Fossil Area ACEC would continue to be managed as a ROW Exclusion area, closed to oil and gas leasing and development, and no lands within the ACEC would be available for disposal. Travel management would be limited to designated routes, which primarily include access only to BLM-authorized administrative uses (also refer to Appendix O for more detailed impact analysis from travel management by Alternative).

The VRM Class would be managed as VRM III, which would be beneficial for the visual and scenic qualities associated with the area. Plant collections, range improvements, animal trapping/traplines, and target shooting would not be allowed, and the ACEC would be closed to solid leasable minerals, renewable energy and geophysical exploration. Fire management activities would be allowed with no heavy equipment. Collectively, these restrictions to surface use and activities would provide the most protection to the paleontological resource values associated with the area by preventing degradation or removal of the surface which adversely impacts paleontological values. Additionally, not allowing other use permits, (e.g., special recreation permits or other management activities) would restrict permitted activities to protect resource values. However, these restrictions would also eliminate the opportunities for interpretation, education, and enjoyment of the area by various user groups, including schools and universities for study/research purposes.

4.4.2.4.4 Alternative C

Under Alternative C, the impacts would be similar to Alternative B with the following exceptions.

The ACEC would be managed as a ROW Avoidance area and rights-of-way would be granted only if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. The ACEC would also allow oil and gas development with no surface occupancy (and no available waivers, exceptions or modifications associated with the stipulation). This would provide adequate protection to the paleontological values associated with the area, while accommodating uses that would not result in degradation of resource values.

Other uses and activities, including range improvements, special recreation permits, weed treatments and target shooting could be allowed if the activity does not conflict with the ACEC resource values. This would enhance vegetation management at the site, minimize the potential spread of noxious weeds, and allow for adaptive management to reach other resource objectives. Overall, the site would be managed to protect the relevant and important values and

provide for enhanced visitor experiences and interpretive opportunities. The land use allocations and restrictions under Alternative C protect the paleontological values, while also providing flexibility in the management of other resources.

4.4.2.4.5 Alternative D (Preferred Alternative)

The effects would be the same as Alternative C.

4.4.2.5 Castle Butte ACEC

4.4.2.5.1 Impacts Common

Under all Alternatives, Castle Butte ACEC (184 acres) would continue to be managed to protect the unique cultural values of the area. Castle Butte would be managed as a VRM Class III area which would generally have beneficial impacts to the values associated with the ACEC through additional design consideration and mitigation requirements. Livestock grazing would be allowed in all Alternatives and would be managed to protect the important values associated with the ACEC, as needed, through the terms and conditions of the permit. This would allow for flexibility to protect the cultural values. Generally, geophysical exploration for oil and gas and fuelwood cutting/wood product sales would be restricted to minimize surface disturbance which would result in deterioration of cultural sites.

4.4.2.5.2 Alternative A

Under Alternative A, Castle Butte ACEC would be managed as a ROW avoidance area. This would restrict most surface disturbing activities associated with land authorizations; however, rights-of-way may be granted if there is minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. Impacts to surface disturbance would be minimized and protect the ACEC values. Travel management would continue to be limited to existing roads and trails. This restriction would protect surface resources from off-road or cross-country travel (also refer to Appendix O for more detailed impact analysis from travel management by Alternative).

Conditional fire suppression would be allowed in the ACEC, however there are no restrictions on the use of heavy equipment or foam/retardant on Castle Butte. These actions would result in adverse impacts to the sensitive resource values resulting from the chemicals from the retardant deteriorating features associated with the butte itself, as well as impacts from the surface disturbance from heavy equipment. Generally, under Alternative A, restrictions to other activities or uses with potentially surfacing disturbing impacts are not limited, and are managed in accordance with other program guidelines and management actions, including plant collecting, target shooting, noxious/invasive weed treatments, range improvements, and permitted activities (e.g., special recreation permits). These activities would result in unintended adverse impacts to the ACEC resources and values f not managed or monitored to ensure the values are protected.

4.4.2.5.3 Alternative B

Alternative B would provide for more protective and restrictive management actions in the Castle Butte ACEC, which would provide greater protection for all potentially surface-disturbing uses and activities, thereby preventing degradation of the unique values associated with the area.

Under Alternative B, Castle Butte ACEC would be managed as a ROW Exclusion area and would be closed to commercial wind energy development. This would eliminate surface use and disturbances associated with land use authorization actions and wind development. This would result in beneficial impacts to the values associated with the ACEC by prohibiting most surface disturbance. No lands within the ACEC would be available for disposal, and travel management would be limited to designated routes, which primarily include access only to BLM-authorized administrative uses (also refer to Appendix O for more detailed impact analysis from travel management by Alternative).

Restrictions to other uses and surface disturbing activities, including plant collection, geophysical exploration, range improvements, animal trapping/traplines and target shooting would not be allowed. Fire management tactics would be allowed with no heavy equipment or use of foam or retardant. Collectively, these restrictions to surface use and activities would provide the most protection to the resource values associated with the ACEC by preventing degradation of the surface which adversely impacts ACEC resource values. Restrictions to special recreation permits would benefit the ACEC resource values; however, these restrictions would also eliminate the opportunities for interpretation, education and enjoyment of the area by various user groups.

4.4.2.5.4 Alternative C

Under Alternative C, the impacts would be similar to Alternative B with the following exceptions. The ACEC would be managed as a ROW Avoidance area and rights-of-way would be granted only if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. This would provide protection to the unique cultural values associated with the area, while accommodating uses that would not result in degradation of those values. Other uses and activities, including range improvements, special recreation permits, and plant collection could be allowed if the activity does not conflict with the ACEC resource values. This would enhance vegetation management at the site, minimize the potential spread of noxious weeds, and allow for adaptive management to reach other resource objectives. Overall, the site would be managed to protect the relevant and important values and provide for enhanced visitor experiences and interpretive opportunities. The land use allocations and restrictions under Alternative C protect the unique ACEC values, while also providing flexibility in the management of other resources.

4.4.2.5.5 Alternative D (Preferred Alternative)

The effects would be the same as Alternative C.

4.4.2.6 East Pryor ACEC

4.4.2.6.1 Impacts Common

Under all Alternatives, the East Pryor ACEC would continue to be managed to protect wildlife and wild horse habitat, historical/cultural resources, special status plant species, and paleontological values. The values for which the Crooked Creek Natural Area and the Crooked Creek National Natural Landmark were designated would be maintained. Management and size of the ACEC area would vary by Alternative, and is analyzed below by Alternative. Wild horses would be managed only within the PMWHR (refer to Section 4.2.9).

Travel management would continue to be limited to designated roads and trails, however, the specific route designations vary by Alternative, but the designations generally protect surface resources from off-road or cross-country travel, as the route evaluation process identified and considered specific existing resource conditions and features as the designations were identified by Alternative (also refer to Appendix O for more detailed impact analysis from travel management by Alternative). Travel limited to designated routes would also minimize route proliferation, fragmentation and limit route densities in those areas where resource values are related to important wildlife habitat.

Under all Alternatives, the ACEC would be managed as VRM Class II which would generally have beneficial impacts to the values associated with the ACEC through additional design consideration and mitigation requirements. The ACEC would be closed to oil and gas leasing and development, and closed to geophysical exploration (for oil and gas). These restrictions would protect the values of concern in the ACEC by reducing their potential for destruction or degradation resulting from the surface disturbance and disruptive activity.

4.4.2.6.2 Impacts Common to Action Alternatives (Alternatives B through D)

Under all action Alternatives, BLM public lands within the East Pryor ACEC would not be subject to land tenure adjustments through disposal of BLM lands. This would benefit the ACEC by retaining BLM public lands and ensuring management and protection of the values of concern. The BLM road maintenance would be limited to the designated roadway/route; and only that necessary to ensure public safety and serviceability of the road. This would minimize soil loss and impacts to vegetation, as well as prevent additional surface disturbance and degradation of resources along these designated linear travel corridors and assist in retaining the visual qualities of the area. To varying degrees, plant collecting would be allowed under all action Alternatives, with restrictions on the commercial collection of plants and permit requirements for the collection of special status plant species. These restrictions would have beneficial impacts to special status plants in this ACEC by protecting the plant resources, minimizing disturbance to and adjacent to these areas.

The action Alternatives would close the ACEC to commercial wind energy developments and the use of explosives for geophysical exploration for oil and gas. These restrictions would minimize surface disturbing activities and would benefit the ACEC values by protecting the surface resources, including special status plant species, cultural and historic values, and wildlife and wild horse habitat. In the case of wind development, closing the area would protect

the ACEC values from both short-term and long-term impacts resulting from wind farm developments, including surface disturbance (from the wind turbine footprint), adverse impacts to scenic quality and viewsheds in the area, and impacts from fragmentation of the landscape.

The action Alternatives would allow range improvements, invasive and noxious weed treatments, and fuels management within the ACEC if there would be minimal or no conflict with identified ACEC resource values of concern and potential impacts could be mitigated at the project level. This would benefit the resource values by allowing treatments to prevent the spread of noxious weeds and utilizing appropriate grazing practices or range improvements to meet or improve vegetation conditions. Special recreation or other use permits would be allowed, with restrictions to protect ACEC values. This would benefit the ACEC by allowing the uses with restrictions or constraints to prevent resource disturbance/damage, while at the same time, allowing for the use and enjoyment of the area for interpretation, education and exploration by various user groups and individuals, universities and other study/research purposes.

4.4.2.6.3 Alternative A

General management of the resources under Alternative A would result in beneficial impacts to ACEC values by minimizing surface disturbance. Under Alternative A, East Pryor ACEC (29,550 acres) would continue to be managed as a ROW exclusion area, which would prohibit many surface disturbing activities associated with land authorizations. The ACEC would continue to be closed to locatable minerals and recommended for withdrawal; and mineral material sales and permits would not be allowed. These restrictions would benefit the values of concern for the ACEC by reducing or minimizing surface destruction or degradation. Generally, under Alternative A, restrictions to other activities or uses with potentially surfacing disturbing impacts are not limited, and are managed in accordance with other program guidelines and management actions, including solid leasable minerals, plant collecting, target shooting, noxious/invasive weed treatments, range improvements, and permitted activities (e.g., special recreation permits). These activities, if not managed or monitored to ensure the ACEC values are protected, could result in unintended adverse impacts to ACEC resource values.

4.4.2.6.4 Alternative B

Generally, management actions for Alternative B, across all resources and resource uses is more protective; therefore, the areas with the most critical ACEC values that would need additional protection, beyond the measures identified across all programs for Alternative B, would be less than under Alternative A. Under Alternative B, 8,301 acres would be designated as the East Pryor ACEC. In addition to the restrictions identified under Impacts Common to All Alternatives and Impacts Common to the Action Alternatives, under Alternative B, the East Pryor ACEC would continue to be managed an a ROW exclusion area, and closed to oil and gas leasing and development. The ACEC would continue to be closed to locatable minerals and recommended for withdrawal; and mineral material sales and permits would not be allowed. Additionally, solid leasable mineral development would be closed.

These management actions are more restrictive than other Alternatives, which would benefit the ACEC values and provide greater protection from all potentially surface-disturbing uses and activities

Wildfire management (natural ignitions) would be managed for resource benefit, with appropriate fire management for human-caused fires. This would benefit the natural processes of the resource values and vegetative conditions, while still allowing for management flexibility in managing human-caused fires. Additionally, under Alternative B, animal trapping/trap lines and target shooting would not be allowed. This would ensure protection of resource values, ensure the safety of casual visitors to the area and minimize the potential for inadvertent damage to the cultural and historic resource values. Collectively, these restrictions to surface use and activities would provide the most protection to the ACEC resource values associated with the area by preventing degradation or removal of the surface which adversely impacts the identified ACEC values.

4.4.2.6.5 Alternative C

Under Alternative C, a total of 32,767 acres would be designated as the East Pryor ACEC. Generally, under Alternative C, there are fewer management restrictions and constraints identified across all resources and resource uses, therefore, the additional acreage reflects those areas that have been found to include ACEC resource values of concern that would require additional protection or management restrictions under this Alternative.

The impacts under Alternative C would be similar to Alternative B with the following exceptions. The ACEC would be managed as a ROW Avoidance area; rights-of-way would be granted only if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. The ACEC would be open to locatable and solid mineral leasing and development. While project level impacts would be identified and mitigated, there would be adverse impacts to the resource values resulting from the surface destruction and disturbance associated with these activities. Target shooting would be allowed within the ACEC, which could result in adverse impacts to resource values, increase the potential for dumping or trash, and create user conflicts. Appropriate management protection strategies would be used for fire suppression activities. Generally this would benefit the ACEC values; however, not managing the ACEC area for wildfire management for resource benefit (natural ignitions) could impact the natural, ecological benefits of fire.

4.4.2.6.6 Alternative D (Preferred Alternative)

Under Alternative D, the East Pryor ACEC would designate a total of 11,122 acres to protect the resource values of concern. Alternative D would designate fewer acres than in Alternative B, and more acres than in Alternative A (but with more restrictive management actions than Alternative A).

The effects would be the same as Alternative B, except the ACEC would be managed as a ROW avoidance area, whereby, rights-of-way would be granted only if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. While project level impacts could result in short-term surface disturbance, long-term

adverse impacts to the resource values would be avoided or mitigated at the project scale; therefore the impacts to the ACEC values would be minimized.

4.4.2.7 Four Dances ACEC

4.4.2.7.1 Impacts Common

Under all Alternatives, Four Dances ACEC (784 acres) would continue to be managed to protect significant historic, cultural and scenic values, wildlife, and for the natural hazards of the cliffs. The adverse effects to the ACEC values from surface disturbance would be avoided or minimized which would benefit the resource values associated with the ACEC. Restrictions and management constraints for right-of-way (avoidance), oil and gas (closed to leasing) and mineral leasing (closed and recommended for withdrawal) would have beneficial impacts to the resource values by reducing the potential for destruction or degradation resulting from the surface disturbance and disruptive activity.

Under all Alternatives, the ACEC would be managed as VRM Class III which would have beneficial impacts to the values associated with the ACEC through additional design consideration and mitigation requirements. Impacts from fire suppression would be minimized with restrictions on the use of heavy equipment and retardant. Livestock grazing, authorized if the activity is consistent with the ACEC objectives, would improve vegetative conditions, and would not result in negative impacts or loss of surface resources. However, buffalo grazing would not be permitted, to avoid conflicts with the cultural resources. Minimizing the spread of invasive and noxious weeds would benefit the site and restrictions on the application and treatment type would avoid negative impacts to the sensitive resource concerns.

4.4.2.7.2 Alternative A

General management of the resources under Alternative A would result in beneficial impacts to ACEC values by minimizing surface disturbance. Under Alternative A, Four Dances ACEC would restrict OHV motorized use, including bicycles, to administrative or authorized uses. This would benefit the ACEC values by minimizing the potential for motorized cross country travel, and avoiding impacts resulting from bicycle travel which would result in untended damage to resource values of concern associated with the ACEC. These travel restrictions would benefit the values of concern for the ACEC by reducing or minimizing surface destruction or degradation.

Adverse impacts resulting from the short and long-term surface disturbance from the construction and operation of wind turbines at the site would have adverse impacts to the resource values of concern, as well as degrade the scenic qualities and viewshed at the site.

4.4.2.7.3 Alternative B

Generally, the impacts from Alternative B would benefit the ACEC values and provide more protection to the unique resources of the area. Under Alternative B, Four Dances ACEC would be closed to commercial wind energy which would eliminate any short or long-term surface disturbance or impacts to the scenic viewshed at the site. Additionally, Alternative B identifies

more restrictions or management constraints to other uses and activities which would result in greater protection of the resource values, including closing the area to animal trapping/trap lines, range improvements, and plant collecting. These restrictions would provide more protection and minimize surface disturbance. However, there would be limitations on the educational and/or interpretive opportunities or other events at the site by not allowing special recreation permits. Not allowing range improvements would have a negative impact on ACEC values by limiting opportunities to enhance vegetation resources or range improvements that would otherwise protect (by excluding livestock) cultural resources.

Collectively, these restrictions to surface use and activities would provide the most protection to the ACEC resource values associated with the area by preventing degradation or removal of the surface which adversely impacts the identified ACEC values. However, there would be negative impacts to visitor experiences from limiting educational and interpretive opportunities at the site.

4.4.2.7.4 Alternative C

The impacts under Alternative C would be similar to Alternative B, with the following exceptions. Range improvements, plant collecting, special recreation permits and other permitted activities would be allowed at the project level if the activity would not result in negative impacts to or conflicts with the ACEC values. This would provide protection for the resources at the site and generally benefit the ACEC, while at the same time allowing for projects or activities that would improve or enhance the ACEC values of concern. The ACEC would continue to be closed to motorized travel, except for administrative use, however, mechanized (bicycle) travel would be considered at the project level. Restrictions to motorized travel would continue to protect surface resources, however, mechanized travel would be addressed during subsequent project level planning.

4.4.2.7.5 Alternative D (Preferred Alternative)

Impacts would be the same as Alternative C.

4.4.2.8 Grove Creek ACEC

4.4.2.8.1 Impacts Common to Action Alternatives (Alternatives B through D)

Under all action Alternatives (Alternatives B-D), Grove Creek ACEC would be designated an ACEC and managed to protect the significant archaeological and traditional cultural values and special status plants. BLM public lands within the Grove Creek ACEC would not be subject to land tenure adjustments through disposal of BLM lands, which would benefit the ACEC by retaining BLM public lands and ensuring management and protection of the values of concern.

Impacts from motorized travel would be minimized and would benefit the ACEC resource values of concern by limiting motorized travel to designated roads and trails and protecting the special status species (plant) habitat by limiting disturbance or trampling from vehicles. Specific route designations vary by Alternative, but the designations generally protect surface resources from off-road or cross-country travel. Limiting motorized travel to designated routes

would also minimize route proliferation, fragmentation and limit route densities in those areas where resource values are related to important wildlife habitat (refer to Appendix O – for more detailed impact analysis from travel management by Alternative). BLM road maintenance would be limited to the designated roadway/route; and only that necessary to ensure public safety and serviceability of the road. This would minimize soil loss and impacts to vegetation, as well as prevent additional surface disturbance and degradation of resources along these designated linear travel corridors and would retain the visual qualities of the area.

The visual and scenic quality within the ACEC would continue to be managed as VRM Class III. This would result in beneficial impacts to the values associated with the ACEC, as design consideration and mitigation requirements could be applied to protect the scenic values. Impacts from fire suppression and fuels management would be minimized, as these activities would be allowed, with constraints, to protect the resource values associated with the ACEC. No heavy equipment use would be authorized in the ACEC which would avoid adverse impacts to the special status plant species known to occur in the area.

Livestock grazing and noxious weed treatments and other permitted uses would be allowed if the activities would not conflict with the ACEC values. Managing the area for appropriate mix of uses would benefit the resource values by allowing treatment to prevent the spread of noxious weeds and utilizing appropriate grazing practices to meet or improve vegetation conditions.

4.4.2.8.2 Alternative A

Alternative A does not designate Grove Creek as an ACEC; the BLM would manage the area in accordance with multiple use principles consistent with other resource objectives. Few management restrictions or constraints are identified under current management which would potentially have adverse impacts to special status plant species and cultural resource values associated with the ACEC, resulting from surface disturbing activities. Travel management would be limited to existing roads and trails; and travel designations would not be addressed to minimize fragmentation, route redundancy and/or other specific route designations that would minimize adverse impacts to resource values.

No restrictions would be applied to energy development; the ACEC would be open to energy exploration and development and subject only to standard terms and conditions. These activities would result in surface disturbance and would have a negative, adverse impact on the resource values, negatively impact scenic viewsheds and negatively impact habitat from surface destruction or disturbance to special status plants. Both short-term and long-term adverse impacts, from wind farm developments (commercial wind development), would include surface disturbance (from the wind turbine footprint), and adverse impacts to scenic quality and viewsheds in the area, as well as adverse impacts from fragmentation of the landscape.

4.4.2.8.3 Alternative B

Generally, management actions for Alternative B, would result in the greatest level of protection to the ACEC resource values of concern. Under Alternative B, 8,251 acres would be designated as an ACEC. In addition to the impacts described under Impacts Common to the

Action Alternatives, Alternative B would provide additional management restrictions and constraints to development that would provide the greatest level of protection. Under Alternative B, the ACEC would be managed as a ROW exclusion area, and the ACEC would be closed to oil and gas exploration and development, and closed and recommended for withdrawal from mineral entry. These management actions are more restrictive than other Alternatives, which would benefit the ACEC values and provide greater protection from all potentially surface-disturbing uses and activities. Collectively, these restrictions to surface use and activities would minimize impacts to the ACEC resource values by preventing degradation or removal of the surface which adversely impacts the identified ACEC values and negatively impacts the special status plant species.

4.4.2.8.4 Alternative C

Under Alternative C, 9,445 acres would be designated as the Grove Creek ACEC. Generally, under Alternative C, there are fewer management restrictions proposed across all resources and resource uses, therefore, the additional acreage reflects those areas that have been found to include ACEC resource values of concern that would require additional protection or management restrictions under this Alternative.

Under Alternative C, the impacts would be similar to Alternative B with the following exceptions. The ACEC would be managed as a ROW avoidance area, which would result in short-term impacts resulting from surface disturbance and/or disruptive activities; however, the activities would only be authorized if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. Under Alternative C, special recreation permits and other permitted activities would be allowed at the project level. This would generally benefit the ACEC values by allowing flexibility in authorizing activities that would not conflict with ACEC values and potentially enhance site conditions to meet the ACEC objectives, including enhancing visitor recreational or interpretive experiences through special permits for events and/or activities.

The ACEC would be available to locatable and solid mineral leasing and development and mineral material sales. Managing the area as available for mineral development would result in adverse impacts if speculative claims were to be located in the area; however, the potential for mineral occurrence is low. While project level impacts would be identified and mitigated, there would be adverse impacts to the resource values resulting from the surface destruction and disturbance associated with these activities. Under Alternative C, oil and gas exploration and development would be allowed with a no surface occupancy stipulation. This would minimize or avoid surface disturbance impacts to the ACEC resource values of concern, however, activities associated with the development could result in negative impacts to wildlife, and visual and scenic qualities from ambient noise, traffic, lighting, and visual intrusions upon the landscape.

4.4.2.8.5 Alternative D (Preferred Alternative)

Under Alternative D, 8,251 acres would be designated as Grove Creek ACEC (the same as Alternative B). The impacts would be the same as Alternative C.

4.4.2.9 Meeteetse Spires ACEC

4.4.2.9.1 Impacts Common to All Alternatives

Under all Alternatives, Meeteetse Spires ACEC would be designated and managed to protect and enhance unique vegetation (rare plants) and conserve scenic values. The ACEC would benefit from restrictions placed on rights-of-way and energy development. The ACEC would be managed as a ROW exclusion area and closed to oil and gas leasing and development (no lease). Use of explosives for geophysical exploration would be prohibited, which would avoid surfacing disturbance and disruption to fragile resource values. The ACEC would also be closed to locatable minerals, and recommended for withdrawal.

The visual and scenic quality within the ACEC would continue to be managed as VRM Class II. This would result in beneficial impacts to the values associated with the ACEC, as design consideration and mitigation requirements would be applied to protect the scenic values. Fuel wood cutting would not be allowed in the ACEC which would protect the scenic values and wildlife habitat associated with the ACEC. Collectively, restricting these activities would provide the greatest benefit to the ACEC resource values by minimizing or avoiding surface disturbance to the resources, enhancing the scenic values of the area and visitor experiences by minimizing user conflicts. Noxious and invasive weed treatments would be allowed, and would include restrictions as to the type of application, to protect rare plants in the area. This would have a beneficial impact on the resource values by preventing or minimizing the spread of noxious weeds and protecting the rare plants and their habitat.

4.4.2.9.2 Impacts Common to Action Alternatives (Alternatives B through D)

Under all action Alternatives (Alternatives B-D), Meeteetse Spires ACEC would not be subject to land tenure adjustments through disposal of BLM public lands. This would benefit the ACEC values by retaining BLM ownership of lands and ensuring management and protection of the values of concern. Motorized travel would be limited to designated routes. While specific route designations vary by Alternative; the route designations protect surface resources from off-road or cross-country travel. In addition, limiting motorized travel to designated routes would minimize route proliferation, fragmentation and limit route densities in those areas where resource values are related to important wildlife habitat (refer to Appendix O for more detailed impact analysis from travel management by Alternative). Impacts from fire suppression and fuels management would be minimized, as these activities would be allowed, with constraints, to protect the resource values associated with the ACEC. No heavy equipment use would be authorized in the ACEC which would avoid adverse impacts to the special status plant species known to occur in the area. Under the action Alternatives, the ACEC would be closed to commercial wind energy development, thereby, avoiding adverse impacts on the resource values from surface disturbance and protecting the rare plant values and scenic qualities of the area.

4.4.2.9.3 Alternative A

Under Alternative A, 965 acres would be designated as an ACEC. Current management would not designate the newly acquired lands as an ACEC, and those lands would be managed in

accordance with the management direction under specific programs. Generally, fewer restrictions or constraints from surface disturbing activities are identified which would have adverse impacts to special status plant species and scenic values associated with the ACEC.

In addition to the impacts described under Impacts Common to All Alternatives, the ACEC would available for commercial wind energy development, which would result in both short- and long-term adverse impacts from surface disturbance associated with the development, potential loss of rare plants and their habitat, and adverse impacts to scenic quality and viewsheds.

Other uses, including special recreation permits, livestock grazing, range improvements, animal trapping and target shooting would be allowed at the project level. Managing the area for appropriate mix of uses would benefit the resource values by utilizing appropriate grazing practices to meet or improve vegetation conditions and other use enjoyment of the area. No restrictions would be applied to plant collecting under this Alternative, which would result in disturbance to plant communities and individuals, as well as inadvertent trampling resulting from the activity. Overall, impacts from Alternative would not provide adequate protection to the ACEC resource values of concern and result in short and long-term negative impacts to the special plant species and cultural values. Additionally, if not managed or monitored, many of these surface disturbing activities would result in unintended adverse impacts and deteriorate the resource values.

4.4.2.9.4 Alternative B

Under Alternative B, 1,523 acres would be designated as the Meeteetse Spires ACEC. In addition to the impacts discussed identified under Impacts Common and Impacts Common to the Action Alternatives, the Meeteetse Spires ACEC would benefit from restrictions placed on commercial wind energy development and mineral material sales. The ACEC would also be closed to mineral material sales and closed to commercial wind energy. Collectively, restricting these activities would provide the greatest benefit to the ACEC resource values by minimizing or avoiding surface disturbance to these resources, enhancing the scenic values of the area and visitor experiences by minimizing user conflicts.

Impacts from fire suppression activities would be minimized or avoided, as heavy equipment use would be prohibited in the ACEC, while allowing other appropriate suppression activities to respond to fires. This would benefit the resource values and vegetative conditions, while still allowing for management flexibility in managing human-caused fires. BLM road maintenance would not be allowed. This would minimize soil loss and impacts to vegetation, as well as prevent additional surface disturbance and degradation of resources along these designated linear travel corridors and would retain the visual qualities of the area. However, not allowing even minimal road maintenance would negatively public safety and serviceability of the road. Additionally, under Alternative B, livestock grazing, range improvements and special recreation permits and other permitted activities would not be authorized. Restricting these activities would protect ACEC values by minimizing or avoiding surface disturbance, however, the area would not benefit from an appropriate mix of uses and practices to meet resource objectives. Additionally, not allowing permitted activities or events, including education,

interpretive or research opportunities would result in adverse impacts to user groups and organizations by limiting the use and enjoyment of the area.

4.4.2.9.5 Alternative C

Under Alternative C, a total of 2,173 acres would be designated as the Meeteetse Spires ACEC. Generally, under Alternative C, fewer management restrictions and constraints are identified across all resources and resource uses; therefore, the additional acreage designated for the ACEC reflects those areas that have been found to include relevant and important values, and would require additional protection or management restrictions under this Alternative. The impacts under Alternative C would be similar to Alternative B with the following exceptions. BLM road maintenance would be limited to the designated roadway/route; and only that necessary to ensure public safety and serviceability of the road. This would minimize soil loss and impacts to vegetation, as well as prevent additional surface disturbance and degradation of resources along these designated linear travel corridors and would retain the visual qualities of the area. Mineral materials sales would only be allowed if impacts could be fully mitigated and there would be no conflicts with the ACEC values. There would be short-term adverse impacts resulting from the surface disturbance, but long-term negative impacts would be minimized through the appropriate reclamation and mitigation of the activity.

Other uses such as special recreation permits and other permitted uses, livestock grazing and range improvements would be allowed within the ACEC. These activities would result in short term, localized surface impacts and disturbances to the area. However, use of livestock grazing (except for sheep) and range improvements could improve vegetative conditions. The use of appropriate management protection strategies would be identified at the project scale to mitigate or minimize surface disturbances or disruptive activities. Impacts from these activities would not negatively impact the ACEC values. Additionally, allowing special recreation permits or other permitted uses, at the project level, would allow management flexibility and would benefit visitor experiences by enhancing uses and opportunities for the enjoyment of the area.

4.4.2.9.6 Alternative D (Preferred Alternative)

Under Alternative D, 1,523 acres would be designated as the Meeteetse Spires ACEC. The impacts would be the same as Alternative C, with the following exceptions. BLM road maintenance would not be allowed. This would minimize soil loss and impacts to vegetation, as well as prevent additional surface disturbance and degradation of resources along these designated linear travel corridors and would retain the visual qualities of the area. However, not allowing even minimal road maintenance would negatively public safety and serviceability of the road.

4.4.2.10 Petroglyph Canyon ACEC

4.4.2.10.1 Impacts Common

Under all Alternatives, Petroglyph Canyon ACEC (240 acres) would continue to be managed to protect the unique cultural values of the area. The ACEC would be managed as a ROW

Exclusion Area, closed oil and gas leasing and closed and withdrawn (recommended for withdrawal) from locatable minerals. These restrictions would benefit the values of concern for the ACEC by reducing the potential for destruction or degradation of resources and values of concern.

4.4.2.10.2 Impacts Common to Action Alternatives (Alternatives B through D)

In general, the management restrictions and constraints identified in Alternatives B-D would protect the unique values associated with the site by prohibiting or minimizing surface disturbance, thereby avoiding any adverse impacts to the cultural values. Travel management would be limited to designated roads and trails, which would protect surface resources and minimize soil loss and destruction of cultural resources by limiting motorized travel and other unauthorized motorized access into this area (also refer to Appendix O for more detailed impact analysis from travel management by Alternative). No heavy equipment use or retardant or foam would be used for fire suppression activities which would prevent harm and damage to the cultural features of the area. Noxious and invasive weed treatments would be allowed, with limitations, which would benefit the ACEC by limiting or eliminating invasive species into the area which could degrade the site. Prohibiting target shooting in the ACEC would protect the fragile resources and prevent damage to cultural sites and features, and minimize the potential for vandalism. Under the action Alternatives, the ACEC would be closed to commercial wind energy development, thereby, avoiding adverse impacts on the resource values from surface disturbance and protecting the resource values and scenic qualities of the area.

4.4.2.10.3 Alternative A

Under Alternative A, Petroglyph Canyon ACEC would be closed to oil and gas exploration and development. This would benefit the values of concern for the ACEC by reducing the potential for destruction or degradation of the unique resources associated with the site. However, under Alternative A, there are no specific restrictions associated with other energy development, including solid leasable minerals, mineral materials sales or commercial wind energy. Requests for these types of uses would be considered at the project level and could result in the degradation of resources as well as diminish the scenic values associated with the area.

Petroglyph Canyon would be managed as a VRM Class IV area, which provides for the fewest restrictions and management to preserve visual and scenic qualities. This VRM class designation would allow a degree of visual intrusion from proposed actions in the area, should they occur, and would negatively impact the values associated with the ACEC through objects that distract from the character and natural environment of the area. Plant collecting would not be allowed under Alternative A, which would benefit the ACEC values of concern by limiting the potential for inadvertent trampling of vegetative resources.

Generally, under Alternative A, restrictions to other activities or uses with potentially surfacing disturbing impacts are not limited, and are managed in accordance with other program guidelines and management actions, including plant collecting, target shooting, noxious/invasive weed treatments, range improvements, and permitted activities (e.g., special recreation permits). These activities, if not managed or monitored to ensure the ACEC values are protected, could result in unintended adverse impacts to cultural resources.

4.4.2.10.4 Alternative B

Alternative B would provide for more protective and restrictive management actions, which would provide greater protection for all potentially surface-disturbing uses and activities, thereby preventing degradation of the cultural values of the area.

The Petroglyph Canyon ACEC would continue to be closed to oil and gas leasing, but would also be closed to solid leasable mineral development, renewable energy development, and mineral materials sales and permits would not be allowed. Together, these restrictions and constraints to surface disturbance would benefit the ACEC by minimizing or eliminating the potential for direct or impacts to the sensitive resource values.

The VRM Class would be managed as VRM II, which would be beneficial for the visual and scenic qualities associated with the area, and limit the visual intrusion of objects, thereby enhancing the quality of the experience to those who visit the area. Under Alternative B, generally, other uses would not be allowed, including plant collections, range improvements, animal trapping/traplines, target shooting, special recreation permits and other permitted uses, would not be allowed, which would provide the greatest level of protection to the ACEC values by eliminating any surface disturbing and disruptive activities. However, restricting special recreation permits or other activities would also eliminate the opportunities for interpretation, education, and enjoyment of the area by various user groups, including schools and universities for study/research purposes.

4.4.2.10.5 Alternative C

The impacts to the unique resource values from Alternative C, would be minimized; however, the management is g generally less restrictive. Oil and gas leasing and development would be allowed with a no surface occupancy stipulation, but with no waivers, exceptions or modifications to the stipulation. This would benefit the ACEC by continuing to protect and prevent surface disturbance and disruptive activities. Solid leasable mineral development and mineral material sales would be allowed, but with management restrictions to protect degradation of the surface and only if mitigation would avoid impacts to the resource values. This would potentially result in adverse impacts to the resource values and diminish the visual quality of the site.

The VRM Class would be managed as VRM III, which would be beneficial for the visual and scenic qualities associated with the area, and limit the visual intrusion of objects, however, the impacts would be slightly greater than under Alternative B. Generally, other uses including range improvements, special recreation permits (and other permitted activities), and animal trapping, would be allowed if, upon project level review, the impacts could be avoided either through mitigation or avoiding the resource values.

Overall, the site would be managed to protect the relevant and important values and provide for enhanced visitor experiences and interpretive opportunities. The land use allocations and restrictions under Alternative C protect the ACEC values, while also providing flexibility in the management of other resources.

4.4.2.10.6 Alternative D (Preferred Alternative)

The effects would be the same as Alternative C, with the following exceptions. Under Alternative D, the VRM Class would be VRM Class II, therefore the impacts would be the same as Alternative B. The ACEC would be closed to oil and gas exploration, leasing and development and solid leasable minerals. Mineral material sales and animal trapping would not be allowed; therefore, the impacts would be the same as Alternative B.

4.4.2.11 Pryor Foothills Research Natural Area ACEC

4.4.2.11.1 Impacts Common to Action Alternatives (Alternatives B through D)

Under all action Alternatives (Alternatives B-D), Pryor Foothills Research Natural Area (RNA) ACEC would be designated and managed to protect the unique vegetation, including a large concentration of Bureau special status plant species and rare plant communities, and to protect significant historic and cultural values in the area. The BLM public lands within the Pryor Foothills RNA ACEC would not be subject to land tenure adjustments through disposal of BLM lands, which would benefit the ACEC by retaining BLM public lands and ensuring management and protection of the values of concern.

Impacts from motorized travel would continue to be limited to designated routes which would benefit the ACEC resource values by minimizing surface disturbance and avoiding the trampling of vegetation (plant) resources resultant from vehicular travel. Specific route designations vary by Alternative; the route designations protect surface resources from off-road or cross-country travel. Limiting motorized travel to designated routes would also minimize route proliferation, fragmentation and limit route densities in those areas where resource values are related to important wildlife habitat (refer to Appendix O for more detailed impact analysis from travel management by Alternative). BLM road maintenance would be limited to the designated roadway/route; and only that necessary to ensure public safety and serviceability of the road. This would minimize soil loss and impacts to vegetation, as well as prevent additional surface disturbance and degradation of resources along these designated linear travel corridors and would retain the visual qualities of the area.

The visual and scenic quality within the ACEC would continue to be managed as VRM Class III. This would result in beneficial impacts to the values associated with the ACEC, as design consideration and mitigation requirements could be applied to protect the scenic values. Impacts from fire suppression and fuels management would be minimized, as these activities would be allowed, with constraints, to protect the resource values associated with the ACEC. No heavy equipment use would be authorized in the ACEC which would avoid adverse impacts to the special status plant species known to occur in the area.

Livestock grazing, range improvements, and noxious weed treatments and target shooting would be allowed if the activities would not conflict with the ACEC values, based on project level review. Managing the area for appropriate mix of uses would benefit the resource values by allowing treatment to prevent the spread of noxious weeds and utilizing appropriate grazing practices to meet or improve vegetation conditions.

4.4.2.11.2 Alternative A

Alternative A does not designate Pryor Foothills as an RNA ACEC. The area would be managed in accordance with multiple use principles consistent with other resource objectives. Few management restrictions or constraints are identified under current management which would have adverse impacts to special status plant species and cultural resource values associated with the ACEC, resulting from surface disturbing and disruptive activities.

The ACEC would be open to energy exploration and development and subject only to standard terms and conditions. These activities would result in surface disturbance and would have a negative, adverse impact on the resource values, negatively impact scenic viewsheds and impact special status plant habitat and rare plant communities from surface destruction or disturbance associated with mineral development. Both short-term and long-term adverse impacts, from wind farm developments (commercial wind development), would include surface disturbance (from the wind turbine footprint), and adverse impacts to scenic quality and viewsheds in the area, as well as adverse impacts from fragmentation of the landscape. Collectively, long-term impacts and potential loss of plant species would result from the surface disturbance and increased activities associated with long-term operation and production of these activities.

No restrictions would be applied to plant collecting under this Alternative, which would result in disturbance to plant communities and individuals, as well as inadvertent trampling resulting from the activity. Overall, impacts from Alternative would not provide adequate protection to the ACEC resource values of concern and result in short and long-term negative impacts to the special plant species and cultural values. Additionally, if not managed or monitored, many of these surface disturbing activities would result in unintended adverse impacts and deteriorate the resource values.

4.4.2.11.3 Alternative B

Generally, management actions for Alternative B, across all resources and resource uses is more protective; therefore, the areas with the most critical ACEC values that would need additional protection, beyond the measures identified across all programs for Alternative B, would be less than under Alternative A. Under Alternative B, 958 acres would be designated as the Pryor Foothills RNA ACEC.

In addition to the restrictions identified under Impacts Common to the Action Alternatives, the Pryor Foothills RNA ACEC would benefit from restrictions placed on rights-of-way and energy development. The ACEC would be managed as a ROW exclusion area and closed to oil and gas leasing and development. The ACEC would also be closed to mineral development (and recommended for withdrawal). Mineral material sales and permits would not be allowed and the ACEC would be closed to commercial wind energy. Collectively, restricting these activities would provide the greatest benefit to the ACEC resource values by minimizing or avoiding surface disturbance to these resources, enhancing the scenic values of the area and visitor experiences by minimizing user conflicts.

Impacts from fire suppression activities would be minimized or avoided, as heavy equipment use would be prohibited in the ACEC, while allowing other appropriate suppression activities to respond to fires. This would benefit the resource values and vegetative conditions, while still allowing for management flexibility in managing human-caused fires. Additionally, under Alternative B, animal trapping/trap lines and target shooting would not be allowed. This would ensure protection of resource values, ensure the safety of casual visitors to the area and minimize the potential for inadvertent damage to the cultural and historic resource values. Collectively, these restrictions to surface use and activities would provide the most protection to the ACEC resource values associated with the area by preventing degradation or removal of the surface which adversely impacts the identified ACEC values. Other surface disturbing or disruptive activities would not be allowed, including plant collecting, target shooting, special recreation permits, and other permitted activities. These restrictions limit other events or activities that could result in increased use, vehicle traffic or result in inadvertent damage to vegetative resources and plants. However, there would be negative impacts to visitor experiences by limiting opportunities for organized educational or interpretive events.

4.4.2.11.4 Alternative C

Under Alternative C, a total of 7,401 acres would be designated as the Pryor Foothills RNA ACEC. Generally, under Alternative C, there are fewer management restrictions and constraints identified across all resources and resource uses, therefore, the additional acreage designated for the ACEC reflects those areas that have been found to include ACEC resource values of concern that would require additional protection or management restrictions under this Alternative.

The impacts under Alternative C would be similar to Alternative B with the following exceptions. The ACEC would be managed as a ROW avoidance area. Rights-of-way would be granted only if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. This would minimize the level of disturbance and protect those specific areas/sites with fragile resource concerns, while still allowing management flexibility to allow some use. Plant collecting would be allowed for scientific use or study. This would benefit the ACEC by enhancing research, monitoring or other data to aid in management of the plants.

The ACEC would be available for oil and gas exploration and development with a no surface occupancy stipulation (on known plant sites; with inventory required prior to surface disturbance). Additionally, mineral development (locatable, solid leasable and mineral material sales) would be available. During subsequent project level review, impacts would be identified and mitigated. Collectively, these actions would protect special status plant species at specific sites, however, surface impacts to the surrounding areas would result, including the potential for inadvertent trampling of vegetation or plants resultant from the activities.

Other uses such as target shooting, special recreation permits and other permitted uses would be allowed within the ACEC, which could result in short-term, localized surface impacts to the ACEC resource values, increase the potential for dumping or trash, and potentially generate user conflicts. Appropriate management protection strategies would be identified at the project scale to mitigate or minimize surface disturbances or disruptive activities. Generally these

activities, would not negatively impact the ACEC values, in addition, allowing these activities enhances management flexibility and provides opportunities for visitor use and enjoyment of the area.

4.4.2.11.5 Alternative D (Preferred Alternative)

Under Alternative D, the Pryor Foothills RNA ACEC would be 2,606 acres. The ACEC in this Alternative would provide management restrictions to protect the area with the greatest concentration of special status plants and cultural values of the area. The area outside the ACEC would be managed in accordance with multiple use principles consistent with other resource objectives, which provide some specific management actions for those resources (refer to special status plants and cultural resources sections). The impacts would be the same as Alternative B, with the following exceptions.

Under Alternative D, the Pryor Foothills RNA ACEC would be available for oil and gas exploration and development with a no surface occupancy stipulation with a ¼ mile buffer on known plant sites; an inventory required prior to surface disturbance. This would provide greater protection than Alternative C, by avoiding surface disturbance in and around those sites and prevent inadvertent trampling of plant resources, provide undisturbed areas surrounding individual plants, while allowing for mineral development to occur without disturbance to plant communities. Additionally, special recreation permits and other permitted activities could be allowed if the use or activity does not conflict with the ACEC values and all impacts could be mitigated at the project level. This would benefit the ACEC values by enhancing visitor experiences through organized events, allow for management flexibility in project level actions, while providing for protection of special plant species and cultural values. Generally, the impacts under Alternative D minimize adverse impacts, limit surface disturbance, while allowing management flexibility at the project level.

4.4.2.12 Stark Site ACEC

4.4.2.12.1 Impacts Common

Under all Alternatives, Stark Site ACEC (799 acres) would continue to protect the unique cultural values associated with the ACEC. Under all Alternatives, Stark Site ACEC would be managed as a VRM Class III which would be beneficial for the visual and scenic qualities associated with the ACEC by limiting or mitigation for visual intrusions. The ACEC would be available for oil and gas leasing, exploration and development with a no surface occupancy stipulation and fuelwood cutting/wood product sales would not be allowed. Collectively, these restrictions would benefit the values of concern for the ACEC by reducing the potential for destruction or degradation of the surface and, therefore, protecting the cultural resources.

4.4.2.12.2 Impacts Common to Action Alternatives (Alternatives B through D)

In general, the management restrictions and constraints identified in Alternatives B-D would protect the unique values associated with the site by prohibiting or minimizing surface disturbance (more than just restrictions to oil and gas development), thereby avoiding any adverse impacts to the cultural values. Motorized travel would be limited to designated roads

and trails, which would protect surface resources and minimize soil loss and destruction of cultural resources by limiting motorized travel and other unauthorized motorized access into this area (also refer to Appendix O for more detailed impact analysis from travel management by Alternative). No heavy equipment use or retardant or foam would be used for fire suppression activities which would prevent harm and damage to the cultural features of the area. Livestock grazing and noxious and invasive weed treatments would be allowed with limitations, which would benefit the ACEC by limiting the spread of invasive species into the area which could degrade the site. Under the action Alternatives, the ACEC would be closed to commercial wind energy development, thereby, avoiding adverse impacts on the resource values from surface disturbance which would protect the cultural values and scenic qualities of the area.

4.4.2.12.3 Alternative A

Under Alternative A, Stark Site ACEC would be open to locatable mineral development. Additionally, the ACEC would also be available for commercial wind energy development. Both short-term and long-term adverse impacts to the ACEC values would result from the surface disturbance and destruction associated with these activities. In addition, the visual quality of the area would be diminished from the mineral development activity and visual obtrusions from wind turbines. Alternative A would limit motorized travel to existing roads and trails. While the impacts associated with motorized use would be restricted to existing linear routes, allowing travel on those routes that are proximate to unique cultural sites could result in destruction or damage to the ACEC resource values.

Generally, under Alternative A, restrictions to other activities or uses (except for oil and gas development) with surfacing disturbing impacts are not limited, and are managed in accordance with other program guidelines and management actions. These activities, if not managed or monitored to ensure the ACEC values are protected, could result in unintended adverse impacts to cultural resources.

4.4.2.12.4 Alternative B

Alternative B would provide for more protective and restrictive management actions, which would provide greater protection for all potentially surface disturbing uses and activities, thereby preventing degradation of the cultural values of the area. In addition to the discussion of impacts presented in the Impacts Common to All Alternatives and Action Alternatives, the Stark Site ACEC would be closed to locatable mineral development and recommended for withdrawal from mineral entry. The ACEC would continue to be closed to mineral material sales, range improvements, animal trapping, and target shooting. Under Alternative B, special recreation permits and other permitted uses would not be authorized. Collectively, these restrictions and constraints to surface disturbance would benefit the ACEC by minimizing or eliminating the potential for direct or impacts to the sensitive resource values. However, some of these constraints would result in adverse impacts to visitor experiences, through decreased opportunities for organized educational, interpretive or research related events or activities, and limited management flexibility to use range improvements to improve vegetative conditions.

4.4.2.12.5 Alternative C

Management under Alternative C is generally less restrictive, but allows for adaptive management to address resource conditions, while at the same time, identify protective measures at the project level to avoid, minimize or mitigation impacts to cultural resource values. Under Alternative C, the ACEC would be managed as a ROW avoidance area, and locatable and solid leasable mineral development and mineral materials sales would be allowed, but with management restrictions or mitigation, to minimize degradation of the surface and avoid adverse impacts to cultural resource values. Additionally, these activities could diminish the visual quality of the site.

Generally, other uses including range improvements, special recreation permits (and other permitted activities), target shooting and animal trapping, would be allowed, if they do not conflict with the ACEC values. The impacts from these activities could result in short-term surface disturbance, however, mitigation identified at the project scale would be applied to avoid or minimize surface disturbance. This would benefit the ACEC by allowing for flexibility to manage for a variety of uses while minimizing impacts to sensitive cultural resources. Allowing special recreation permits would enhance visitor experiences by allowing interpretive, education or other activities or organized events at the site. Overall, the site would be managed to protect the relevant and important values and provide for enhanced visitor experiences and interpretive opportunities. The land use allocations and restrictions under Alternative C protect the ACEC values, while also providing flexibility in the management of other resources.

4.4.2.12.6 Alternative D (Preferred Alternative)

The effects from Alternative D would be the same as Alternative C, with the following exceptions. Under Alternative D, Stark Site ACEC would be closed to locatable mineral development and recommended for withdrawal from mineral entry, and the ACEC would be closed to mineral material sales. Target shooting in the ACEC would also be prohibited. These impacts would be the same as Alternative B.

4.4.2.13Weatherman Draw ACEC

4.4.2.13.1 Impacts Common

Under all Alternatives, Weatherman Draw ACEC would continue to be managed to protect the unique cultural values of the area. Motorized and mechanized travel would be limited in the ACEC which would minimize surface disturbances that result from increased vehicular traffic, disruption of soils and increased accessibility to the area. These restrictions would also protect surface resources from off-road or cross-country travel (also refer to Appendix O – for more detailed impact analysis from travel management by Alternative). Livestock grazing would be allowed under all Alternatives and would be managed to meet the defined resource objectives to protect the ACEC values. This would result in minor or negligible impacts to the ACEC resource values. Geophysical exploration for oil and gas would not be allowed in the Weatherman Draw, which would be beneficial to the ACEC by avoiding cultural resources.

4.4.2.13.2 Alternative A

Under Alternative A, 4,365 acres would be managed as Weatherman Draw ACEC. The area would be managed as a ROW exclusion area which would prohibit many surface disturbing activities associated with land authorizations. Mineral material sales or permits would not be authorized in the area. Additionally, oil and gas exploration and development in the ACEC would be available subject to a no surface occupancy stipulation (with no waivers, exceptions or modifications), and 600 acres within the ACEC would continue to be closed and withdrawn from mineral entry. These restrictions would benefit the values of concern for the ACEC by reducing the potential for destruction or degradation of the cultural resources. However, under Alternative A, there are no specific restrictions associated with other energy development, including solid leasable minerals, mineral materials and commercial wind energy developments. Requests for these types of mineral uses would be considered at the project level and could result in the degradation of the cultural resources as well as diminish the scenic values associated with the area.

The visual and scenic quality within the ACEC would continue to be managed as VRM Class II. This would result in beneficial impacts to the values associated with the ACEC, as design considerations and mitigation requirements would be applied to protect the scenic values and enhance the visitor's experience at the area.

Generally, under Alternative A, restrictions to other activities or uses with potentially surfacing disturbing impacts are not limited, and are managed in accordance with other program guidelines and management actions, including plant collecting, target shooting, noxious/invasive weed treatments, range improvements, and permitted activities (e.g., special recreation permits). These activities, if not managed or monitored to ensure the ACEC values are protected, could result in unintended adverse impacts to cultural resources.

4.4.2.13.3 Alternative B

Alternative B would provide for more protective and restrictive management actions, which would provide greater protection for all potentially surface-disturbing uses and activities and prevent degradation of the cultural values of the area. Under Alternative B, 4,986 acres would be designated as an ACEC, slightly more than in Alternative A. Weatherman Draw ACEC would continue to be managed as a ROW exclusion area, closed to oil and gas leasing and development, and closed to mineral material sales. Weatherman Draw ACEC would also continue to be managed as VRM Class II. These impacts would be the same as discussed in Alternative A. Under Alternative B, 4,386 acres would be closed and recommended for withdrawal from mineral entry and the ACEC would be closed to solid leasable minerals. This would result in more surface acreage protection from surface disturbances and provide more protection to cultural values than in Alternative A. Under this Alternative, the ACEC would be closed to commercial wind energy development. The effect to the ACEC would result in avoiding the surface disturbing activities that would result from the development (short-term and long-term) of the foot print associated with wind farms. This would benefit the ACEC values by protecting the surface resources, cultural and historic values, and avoid adverse impacts to scenic quality and viewsheds in the area, and impacts from fragmentation of the landscape.

Plant collections, range improvements, animal trapping/traplines and target shooting would not be allowed, and special recreation permits and other permitted activities would not be allowed in the ACEC. Fire management tactics would be allowed with no heavy equipment. Fuels treatments could be allowed if there would be a threat or loss of resources. Noxious weed or invasive species treatments would be allowed, with restrictions in the type of application to minimize or avoid conflicts with ACEC resource values. Collectively, these restrictions to surface use and activities would provide the most protection to the cultural resource values associated with the area by preventing degradation or removal of the surface which adversely impacts cultural values. However, restrictions to special recreation permits or other permitted uses would negatively impact visitor use by eliminating opportunities for interpretation, education, and enjoyment of the area by various user groups, including schools and universities for study/research purposes.

4.4.2.13.4 Alternative C

Under Alternative C, the Weatherman Draw ACEC boundary would be expanded to include a total of 12,277 acres. Based on the general management approach in Alternative C, more BLM-administered lands with the relevant and important values would require protective management, however, the management uses in this Alternative vary from Alternatives A and B. Under Alternative C, a portion of the ACEC (4,986 acres) would be managed as a ROW exclusion area (the same area as identified in Alternative B); and 7,291 acres would be managed as a ROW avoidance area. Within the avoidance area, impacts would be avoided or minimized at the project level by only authorizing rights-of-way if there would be minimal or no conflict with identified resource values and impacts to ACEC resource values can be fully mitigated. Similarly, the 4,986 acres would be managed as VRM Class II (same as Alternative B); and 7,291 acres would be managed as VRM III. This visual classification and management requirements would minimize visual obtrusions to the area and maintain the scenic qualities of the area which would benefit the visitors' experience and protect resource values.

The ACEC would be available to oil and gas leasing, subject to a no surface occupancy restriction, the impacts would be the same as Alternative A. Under Alternative C, 600 acres would continue to be closed and recommended for withdrawal from mineral entry and 11,677 acres would be available to locatable minerals. This would prevent disturbance to those areas with concentrated cultural resources and protect the resources from destruction. The ACEC would be available for solid leasable mineral development and mineral material sales. This would have a negative impact on the ACEC resource values and result in surface disturbance to those areas which would result in damage or destruction to sensitive cultural sites.

Other uses and activities, including range improvements, special recreation permits, and animal trapping could be allowed if the activity does not conflict with the ACEC resource values. This would benefit the ACEC and enhance vegetative conditions at the site, and allow for adaptive management to reach other resource objectives without negatively impacting the ACEC values. Overall, the site would be managed to protect the relevant and important values and provide for enhanced visitor experiences and interpretive opportunities by allowing special recreation permits. The land use allocations and restrictions under Alternative C protect the cultural values, while also providing flexibility in the management of other resources.

4.4.2.13.5 Alternative D

The effects would be the same as Alternative C with the following exceptions. Within the area of the ACEC with the most concentrated cultural resources/sites (4,986 acres), the area would be closed to oil and gas leasing and development; closed and recommended for withdrawal from mineral entry (impacts same as Alternative B). The remainder of the ACEC (7,291 acres) would be available to oil and gas leasing and development, subject to a no surface occupancy stipulation and available to mineral development with mitigation required at the project level (impacts same as Alternative C). This Alternative would have fewer negative impacts than Alternative C for those areas with the highest concentration of cultural value, and include more acres of cultural resource values than in Alternatives A and B, which overall, has beneficial impacts to the ACEC resource values.

4.4.2.14 Greater Sage-Grouse Habitat Area ACEC

4.4.2.14.1 Impacts under Alternative B

The Greater Sage-Grouse PPA area would be designated as an ACEC. The potential ACEC would be managed with the same protections as described and provided for in the Greater Sage-Grouse PPA areas which would result in the same impacts as described in that section (refer to Wildlife and Special Status Species section 4.2.7.4.4 for a description of direct, indirect, and cumulative impacts).

4.4.2.14.2 Impacts under Alternative C and D

The Greater Sage-Grouse PPA areas would not be designated as an ACEC. However, the area would be managed with the same protections as described and provided for in the Greater Sage-Grouse PPA areas which would result in the same impacts as described in that section (refer to Wildlife and Special Status Species sections 4.2.7.5.4 (Alternative C) and 4.2.7.6.4 (Alternative D) for a description of direct, indirect, and cumulative impacts).

4.4.2.15 Cumulative Impacts from ACECs

The cumulative impact analysis area for the ACECs is the proposed ACEC boundaries. Cumulative impacts from the implementation of other federal agency and non-federal resource decisions within and outside of the planning area on currently designated and proposed ACECs would be minimal, with the exception of mineral and travel management decisions. The nature of the relevant and important values associated with the existing and proposed ACECs tends to result in impacts that occur quickly but recover slowly, if at all, in the case of some visual impacts, and impacts on cultural or paleontological sites. As such, any impact could result in an incremental increase in the potential for irreparable damage to relevant and important values. However, the proposed management actions, by Alternative, including the proposed boundary areas and protective management associated with the ACECs would protect the relevant and important values, resources, processes, or systems in the proposed ACECs. The relevant and important values of the areas adjacent to the proposed ACEC boundaries would be protected through other resource management actions identified in the RMP, laws, rules and regulations.

4.4.3 Wilderness Study Areas (WSAs)

Pursuant to FLPMA and BLM policy, WSAs are managed according to the IMP to protect their suitability for wilderness designation until such time that Congress acts on the BLM's recommendations. This analysis does not analyze the impact of the IMP on other resources and resource uses, or on the wilderness characteristics of the WSAs; that analysis was conducted in the "Montana Statewide Wilderness Report" (BLM September 1991).

WSAs would be managed pursuant to the non-impairment standard, and as such, the BLM cannot allow activities to occur within WSAs that would impair their suitability for preservation as wilderness. Therefore, significant impacts on WSAs (e.g., impairment) would not occur under any of the Alternatives. Although impacts on natural resources within WSAs could occur from a variety of uses, they would be non-impairing and therefore would not result in long-term impacts to the wilderness characteristics of the WSAs.

There are four WSAs within the BiFO totaling 28,631 acres. All WSAs, except one (Twin Coulee WSA), are located in the Pryor Mountains near the Montana/Wyoming border. The Twin Coulee WSA is located in the northern area on the south slopes of the Snowy Mountains. The management of WSAs focuses on maintaining the wilderness characteristics of appearance of naturalness, outstanding opportunities for solitude and/or primitive, unconfined recreation. Size and management guidelines have already been established for these areas. Federal law and BLM policy require that WSAs be closed to oil and gas leasing. This management direction protects the wilderness characteristics of the WSAs and the BLM has no discretion to direct otherwise through planning. Thus, the RMP makes only two management decisions specific to WSAs, including:

- VRM class designations (BLM policy requires that WSAs be designated as VRM Class I)
- Designation of each WSA as either closed or limited to OHV use (the BiFO WSAs are closed in all Alternatives).

Management actions that could impact these characteristics include managing for the presence or absence of ways and trails, use of motorized vehicles along these ways, construction of fences and other range or wildlife improvements, management of native vegetation communities, land tenure adjustments, or other actions that result in surface disturbing activities. These and all other actions which may be proposed are covered under the IMP.

4.4.3.1 Methods and Assumptions

The analysis is based on the following assumptions:

- Managing WSAs according to the IMP would protect wilderness characteristics of WSAs in a manner that would not "impair the suitability of such areas for preservation as wilderness" (FLPMA Section 603(c)).

- Management actions that enhance biological or environmental characteristics would improve the wilderness quality and suitability of the WSAs.

4.4.3.2 Environmental Consequences

Impacts to WSAs could result from actions proposed under the following resource programs:

- Wildland Fire Ecology Management
- Lands and Realty
- Recreation
- Lands with Wilderness Characteristics

Other programs were determined to have little or no impact on WSAs.

4.4.3.3 Impacts Common to All Alternatives

4.4.3.3.1 Impacts from Wildland Fire Ecology Management

During and immediately after fire events, access to WSAs and enjoyment of opportunities for primitive recreation associated with them may be restricted or impaired. Full suppression of wildfires in these areas may be implemented to control fire size and severity, protecting these opportunities. Wildfire suppression activities could result in short-term impacts, including disturbance to soils, surfaces and groundwater, watershed functions, and vegetation conditions Impacts would be minimized by post-fire rehabilitation efforts. There would also be impacts to solitude due to presence of firefighters and equipment during fire events, but this would be short-term.

Appropriate management response within a WSA could limit the use of mechanical suppression activities or other techniques for reducing these impacts. Temporary disturbances may occur to resources and values; however these effects would be short-term while wilderness values are assessed on a long-term scale. Long-term impacts associated with the use of an appropriate management response to wildfire suppression, wildfire use and the planned actions of prescribed fire and non-fire fuel treatments on WSAs are the decreased risk of large severe wildfire events and the overall improved ecological health. With the removal of hazardous fuels, a trend towards increasing the preservation of naturalness and opportunities for primitive recreation would be in place. Since fire is a natural and necessary event in maintaining ecological health, a WSAs natural character would not only be protected, but also likely enhanced.

4.4.3.3.2 Impacts from Lands and Realty

Acquiring in-holdings within WSAs would improve their manageability and preclude non-conforming uses on what are currently non-Federal (state and private) lands. Lands within WSAs are not available for rights-of-way or disposal, precluding impacts to wilderness characteristics from these actions.

4.4.3.3.3 Impacts from Recreation

Visitors may have outstanding opportunities for solitude or primitive and unconfined recreation when the sights, sounds, and evidence of other people are rare or infrequent, where visitors can be isolated, alone or secluded from others, where the use of the area is by non-motorized, non-mechanical means, and where no or minimal developed recreation facilities are encountered. High concentrations of recreation users (large group sizes and/or frequent group encounters) would decrease outstanding opportunities for solitude in WSAs. Continued increases in non-motorized recreation users would reduce opportunities for solitude in those areas. Additionally, large numbers of recreationists in WSAs, especially in the traditional use areas associated with some of the WSAs, would increase the impact to campsites, decreasing the naturalness of WSAs in specific locations. An increasing use of campsites results in increased areas of compacted soils, reducing vegetation and creating unnatural openings in the vegetation. Human waste and trash also increases, especially when campsites are located in traditional use areas.

4.4.3.3.4 Impacts from Lands with Wilderness Characteristics

Management of lands identified as Lands with Wilderness Characteristics would include complementary actions to prevent surface disturbance and development on adjacent WSA lands. The potential impact to VRM, solitude and primitive recreation would be beneficial. Impacts would vary by alternative since the parcels change by alternative but the effect on WSAs would be the same. Alternative B would be the most beneficial to WSAs.

4.4.3.4 Alternative A

4.4.3.4.1 Impacts from Wildland Fire Ecology Management

Same as Common to All Alternative, above.

4.4.3.4.2 Impacts from Lands and Realty

Same as Common to All Alternatives, above.

4.4.3.4.3 Impacts from Recreation

In this Alternative, there is no SRMA designated for primitive recreational opportunities in the Pryor Mountains. Still the area is managed for its primitive recreational values with some emphasis on semi-primitive motorized opportunities. There are negligible impacts on the WSAs.

4.4.3.5 Alternative B

4.4.3.5.1 Impacts from Wildland Fire Ecology Management

Same as Common to All Alternative, above.

4.4.3.5.2 Impacts from Lands and Realty

Same as Common to All Alternative, above.

4.4.3.5.3 Impacts from Recreation

In this Alternative, an SRMA is established for recreational opportunities and experiences in the Pryor Mountains. Managing the lands that include and surround the WSAs for semi-primitive recreation would complement WSA management. However, management under the IMP is usually more restrictive than SRMA prescriptions, so no additional benefit to wilderness characteristics would result from SRMA management.

4.4.3.6 Alternative C

4.4.3.6.1 Impacts from Wildland Fire Ecology Management

Same as Common to All Alternative, above.

4.4.3.6.2 Impacts from Lands and Realty

Same as Common to All Alternative, above.

4.4.3.6.3 Impacts from Recreation

In this Alternative, an SRMA is established for recreational opportunities and experiences in the Pryor Mountains. The impacts are discussed in Alternative B

4.4.3.7 Alternative D (Preferred Alternative)

4.4.3.7.1 Impacts from Wildland Fire Ecology Management

Same as Common to All Alternative, above.

4.4.3.7.2 Impacts from Lands and Realty

Same as Common to All Alternative, above.

4.4.3.7.3 Impacts from Recreation

In this Alternative, an SRMA is established for recreational opportunities and experiences in the Pryor Mountains. The impacts are discussed in Alternative B and are similar.

4.4.3.8 Cumulative Impacts

Under the non-impairment standard of the IMP, the BLM is required to manage the WSAs so as not to preclude their possible designation by Congress as a Wilderness. Overall the effects of any of the Alternatives would not exceed this standard and there is no significant difference between the Alternatives.

4.4.4 Wild and Scenic Rivers

This section discusses impacts to Wild and Scenic Rivers (WSRs) that would occur from actions associated with the management of other resources. Analysis of impacts to WSRs is

limited to the river segment corridor which includes the view shed within one-quarter mile of each side of the rivers high water mark. In many cases the corridor would be limited to the canyon in which the river segment is located. The Wild and Scenic River Act includes three possible tentative classifications: "wild," "scenic," or "recreational." These classifications are based on the type and degree of human development associated with the river and the lands adjacent to the river corridor at the time of inventory. Tentative classification also dictates the types of activities and development allowed within the river corridor. "Wild" rivers are the most restrictive of the three classifications, and are associated with rivers free of impoundments, generally are inaccessible except by trail, contain shorelines and watersheds that are essentially primitive and have waters that are unpolluted. "Scenic" rivers are slightly less restrictive than "wild" rivers, accessibility to "scenic" rivers is generally easier and can include existing roads and trails; however, "scenic" rivers are generally free of impoundments, contain shorelines and watersheds that are largely primitive and undeveloped. "Recreational" rivers have the least restrictions placed on them and include rivers that are readily accessible by roads, trails, or railroads, may have some development along their shorelines and may have substantial evidence of human activity.

Outstandingly remarkable values and the criteria associated with each value are as follows:

- Scenic – Diversity of view, special features, seasonal variations, cultural modifications
- Fish – Habitat quality, diversity of species, values of species, abundance of fish, natural reproduction, size and vigor of fish, quality of experience, cultural and historical importance, recreational importance and access.
- Recreational – Length of season, diversity of use, flow, character of run, scenery and naturalness, access, level of use, associated opportunities, attraction, sites, and facilities.
- Wildlife – Habitat quality, diversity of species, abundance of species, natural reproduction, size, and vigor of species, quality of experience, cultural and historic importance, recreational importance, and access.
- Geologic – Feature abundance, diversity of features, and educational or scenic.
- Historic – Significance, site integrity, education and interpretation, listing and eligibility.
- Cultural – Significance, current uses, number of cultures, site integrity, educational and interpretation, listing and eligibility.
- Ecologic – Species diversity, ecological function, rare communities, and educational and scientific.

4.4.4.1 Methods and Assumptions

The analysis of impacts to WSRs includes an evaluation of where management actions may be inconsistent with the tentative classification given to all eligible or suitable segments as well as potential impacts to the outstandingly remarkable values of any eligible or suitable segment. Impacts to the tentative classification of the segments for each Alternative would be discussed first followed by impacts associated with the segment's outstandingly remarkable values. River segments determined to be eligible for further consideration in land use planning, along with their outstandingly remarkable values and tentative classification, are identified in Table 3-68. Details of the eligibility and classification process are included in the Appendix R.

4.4.4.2 Environmental Consequences

Impacts to the outstandingly remarkable values of the eligible wild and scenic rivers could result from actions proposed under the following resource management programs:

- Vegetation
- Cultural Resources
- Wildlife Habitat and Special Status Species
- Fisheries Habitat and Special Status Species
- Visual Resources
- Non-WSA Lands with Wilderness Characteristics
- Lands and Realty
- Livestock Grazing
- Recreation and Visitor Services
- Trails and Travel Management
- Special Designations

Other programs were determined to have little or no impact on wild and scenic rivers.

4.4.4.3 Impacts Common to All Alternatives

4.4.4.3.1 Impacts from Vegetation

Allowing for habitat restoration could result in evidence of human activity from surface disturbance along the 1.5 miles of segments tentatively classified as "wild", however, these impacts would be short-term in duration and would not likely result in a change to the tentative classifications. Also, these lands are within WSAs where the IMP prescriptions are paramount. Performing land treatments to reduce soil loss and maintain vegetation structure would impact WSRs by assisting in maintaining plant diversity and preserving the ecological condition of the segments. Management actions to maintain soil levels and vegetation cover, manage noxious weeds, and enhance wildlife habitat could have short-term impacts on wildlife, scenic, ecological and recreational outstandingly remarkable values by removing vegetation and increasing the potential for erosion and sedimentation, visual intrusions, and loss of habitat;

however, over the long term, such actions would likely increase age and species diversity of plant communities, which would improve or maintain these values.

4.4.4.3.2 Impacts from Cultural Resources

Management actions associated with cultural resources would be compatible with all 14.08 miles identified as eligible for suitability because allowable activities and the degree of development within the river corridors would not change and future activities would be minimized or prohibited. In some instances, if inventories and collection were to occur within river corridors, short-term impacts could result from associated surface disturbance, particularly segments with "wild" classifications; however, over the long term, these impacts would not likely affect tentative classification of the segment. Law and policy guiding cultural resources management would provide indirect protection to those segments that contain cultural or historic outstandingly remarkable values by placing restrictions on surface disturbance activities.

Additionally, indirect effects from these restrictions could also occur to segments containing scenic, recreational, fish, wildlife, and ecologic outstandingly remarkable values by providing additional protections within the management of these values. Allowing for inventories and collection within river corridors could potentially cause short-term impacts associated with surface disturbance activities; however, over the long term, these impacts from associated mitigation measures would be negligible and, in some instances, may provide additional values to segments, particularly if a significant cultural resource was found.

4.4.4.3.3 Impacts from Wildlife and Fish Habitat and Special Status Species

Management actions proposed in the all Alternatives section for wildlife would complement management emphasis under the eligible and suitable phases of the Wild and Scenic River program. The difference in river segments proposed for suitability or eligibility under each Alternative does not change any action and has no impact. Some wildlife decisions which vary by Alternative (raptor nests, Peregrine falcon management, etc.) could have an impact on Wild and Scenic Rivers if those river segments are located outside of areas with other overlapping management considerations which have similar management emphasis (for example, ACECs, WSAs, Pompeys Pillar National Monument, etc.). Legal and policy requirements for protecting special status species habitats would protect eligible river segments where the special status species are the outstandingly remarkable value.

4.4.4.3.4 Impacts from Lands and Realty

No proposed actions from lands and realty would impact the tentative classification or outstandingly remarkable values of the eligible segments identified under this Alternative because allowable lands and realty actions and the degree of development within the corridor would be minimized or prohibited due to the BLM's policy to manage eligible river segments to protect their free-flowing nature, outstandingly remarkable values, and tentative classification. Thus, these river segments would be managed as right-of way avoidance areas, which would provide additional protection to the outstandingly remarkable values of the

segments from eliminating any surface disturbance or visual intrusions associated with such development actions.

Because the BLM has no control over potential modifications to a river's shoreline or any other type of development on non-public lands, impacts could occur in these areas on adjacent private lands. Land tenure adjustments that would result in the acquisition of non-BLM lands within these river corridors would provide opportunities to better manage outstandingly remarkable values and to mitigate any efforts that could impact the segments' tentative classification or free-flowing nature.

4.4.4.3.5 Impacts from Livestock Grazing

Proposed decisions to manage livestock grazing could have minor and localized effects on some outstandingly remarkable values. Most river segments are inaccessible to cattle, and several river segments are closed to grazing. While livestock grazing would be allowed within other eligible river corridors, impacts to the outstandingly remarkable scenic and recreational values would be minimal since management of livestock grazing is subject to the Standards for Rangeland Health. However, there is a potential that certain types of potentially proposed rangeland improvements (e.g., fencing, water crossings) could be incompatible in some of the segments from visual intrusions to the natural character of the area.

4.4.4.4 Alternative A

4.4.4.4.1 Impacts from Visual Resources

Most of the eligible river segments would continue to be managed as VRI Class B or as VRM Class I. This requires that the existing character of the landscape be retained and allows only low level changes to the landscape. This would minimize, but not eliminate, impacts from surface disturbing activities to eligible wild and scenic rivers where scenery was identified as the outstandingly remarkable value. River segments within WSAs would receive VRM Class I protection regardless of VRI classification.

4.4.4.4.2 Impacts from Lands with Wilderness Characteristics

No actions to maintain wilderness characteristics on lands outside WSAs are proposed under this Alternative, resulting in no additional protection for wild and scenic river outstandingly remarkable values.

4.4.4.4.3 Impacts from Recreation

Under this Alternative, there are no lands within SRMAs which overlap WSR segments, therefore, SRMA management would have no impact on eligible river segments. All lands which include eligible river segments are managed as ERMA in this Alternative, with the exception of the Yellowstone River segment, which is adjacent to the Pompeys Pillar National Monument. The ERMAs receive minimal management emphasis, but have prescriptions in the existing RMP and in the IMP which generally serve to protect wild and scenic river resource values.

4.4.4.4.4 Impacts from Travel Management

Eligible river segments within WSAs would not be affected by motorized vehicle use, since all WSAs are closed. The Bad Canyon river segment also has no motorized access and would not be impacted.

4.4.4.4.5 Impacts from Special Designations

Areas of Critical Environmental Concern

Continued management of the Pryor Mountains ACEC and the Pompeys Pillar ACEC for their resources would protect the ecological outstandingly remarkable value of the Crooked Creek and Yellowstone River eligible river segments. Continued management of the other seven existing ACECs would have no impact on the other eligible river segments because no segments are located within those ACECs

Wilderness Study Areas

The Crooked Creek River segments, both below and above the fish barrier, are entirely within the Burnt Timber WSA. WSA management pursuant to the IMP would continue to have a beneficial impact on all outstandingly remarkable values within these segments by limiting development within these river corridors.

Wild and Scenic Rivers

Under this Alternative, seven segments, totaling 14.08 miles, have been identified as eligible for consideration for suitability and as dictated by policy would be managed to protect their free-flowing nature, outstandingly remarkable values, and tentative classification until such time as a suitability determination is made. One segment (1.5 miles) is tentatively classified as "wild," four segments (6.4 miles) are "recreational," and two segments (6.2 miles) are tentatively classified as "scenic."

National Historic Trails

In addition to being part of the Lewis and Clark National Historic Trail (NHT), a river segment (Yellowstone/Pompeys Pillar river segment) also includes the Pompeys Pillar National Monument. Management decisions are compatible with each program and have the same objectives and goals. There would be no adverse impacts.

4.4.4.5 Alternative B

4.4.4.5.1 Impacts from Cultural Resources

Management actions associated with cultural resources would be compatible with all 14.08 miles identified as eligible for suitability because allowable activities and the degree of development within the river corridors would not change and future activities would be minimized or prohibited. In some instances, if inventories and collection were to occur within river corridors, short-term impacts could result from associated surface disturbance, particularly segments with "wild" classifications; however, over the long term, these impacts would not

likely affect tentative classification of the segment. Law and policy guiding cultural resources management would provide indirect protection to those segments that contain cultural or historic outstandingly remarkable values by placing restrictions on surface disturbance activities.

Additionally, indirect effects from these restrictions could also occur to segments containing scenic, recreational, fish, wildlife, and ecologic outstandingly remarkable values by providing additional protections within the management of these values. Allowing for inventories and collection within river corridors could potentially cause short-term impacts associated with surface disturbance activities; however, over the long term, these impacts from associated mitigation measures would be negligible and, in some instances, may provide additional values to segments, particularly if a significant cultural resource was found.

4.4.4.5.2 Impacts from Lands with Wilderness Characteristics

The Bad Canyon Creek river segment is located within the Bad Canyon Lands with Wilderness Character Unit. Management for both would have compatible actions and would enhance resource values over the entire unit, including watershed lands outside the river corridor but within the Lands with Wilderness Characteristics.

4.4.4.5.3 Impacts from Recreation

Proposed decisions to identify SRMAs could impact outstandingly remarkable values. Under Alternative B, management direction for the proposed Pryor Mountains SRMA and the Bundy Island SRMA would complement the outstandingly remarkable values identified in the suitable Crooked Creek segments because of the emphasis on providing primitive and semi-primitive recreation opportunities.

4.4.4.5.4 Impacts from Travel Management

Motorized OHV use could impact outstandingly remarkable values. Within most of the suitable river corridors, OHVs would either be limited to designated routes or the areas are closed, reducing impacts relative to Alternative A.

4.4.4.5.5 Impacts from Special Designations

Wilderness Study Areas

The impacts would be the same as Alternative A for the Crooked Creek river segments.

Wild and Scenic Rivers

A suitability determination for all eligible river segments would be made under Alternative B and the outstandingly remarkable values of all suitable river segments would continue to be protected.

National Historic Trails

The impacts would be the same as Alternative A.

4.4.4.6 Alternative C

4.4.4.6.1 Impacts from Cultural Resources

The impacts would be the same as for Alternative B, however, with different units emphasized. None of the 14.08 river miles would be managed as eligible or suitable. Cultural resources would still receive protective measures from other management decisions so the impact would be negligible.

4.4.4.6.2 Impacts from Lands with Wilderness Characteristics

The Bad Canyon Creek river segment (not managed as suitable in this Alternative) is located within the Bad Canyon Lands with Wilderness Character Unit. Management for wilderness characteristics in this Alternative would still provide protective measures, would have compatible actions, and would enhance resource values over the entire unit, including watershed lands outside the river corridor but within the Lands with Wilderness Characteristics.

4.4.4.6.3 Impacts from Lands and Realty

Under Alternative C, none of the eligible river segments would be recommended as suitable or managed to protect their free-flowing nature, outstandingly remarkable values, and tentative classification. The eligible river segments would not be included in withdrawals or right-of-way avoidance areas, which could result in proposals for surface disturbing activities within some of the eligible river corridors such as development of rights-of-way or mining-related activities. These areas could be disposed of under a land tenure adjustment (removing land from management under Federal laws and regulations), and inholdings could be acquired (which would bring lands under Federal jurisdiction, subject to management under Federal laws and regulations).

There would continue to be protection from lands and realty actions for 3.1 of the 14.08 miles of eligible river miles that are located within WSAs. The potential for impacts to the remaining 10.98 miles would be dependent on future proposals. This Alternative would provide the least protection for the river segments, and as discussed above, could result in impacts to the outstandingly remarkable values from development of rights-of-way or other land use actions, as well as development of lands if disposed from public ownership.

4.4.4.6.4 Impacts from Recreation

Under Alternative C, management direction for the proposed Pryor Mountains SRMA would complement and still protect the outstandingly remarkable values identified in the Crooked Creek river segments because of the emphasis on providing primitive and semi-primitive recreation opportunities.

4.4.4.6.5 Impacts from Travel Management

Motorized OHV use could adversely impact outstandingly remarkable values although at a minimum level. Within most of the river corridors, OHVs would either continue to be limited

to designated routes or the areas are closed, reducing impacts relative to Alternative A and being similar to Alternatives B and D.

4.4.4.6.6 Impacts from Special Designations

Wilderness Study Areas

The impacts are described in the Wild and Scenic River section above for the Crooked Creek river segments. No other portions of WSAs overlay wild and scenic river segments.

Wild and Scenic Rivers

A no suitability determination for all eligible river segments would be made under Alternative C, but the outstandingly remarkable values of the Bad Canyon and Crooked Creek river segments would continue to be protected by some level of other management consideration: 3.15 miles of Crooked Creek are within WSAs and approximately 4.5 miles are managed with compatible decisions within the Bad Canyon Lands with Wilderness Characteristics unit. The remaining river segments (Bear Canyon, Gyp Springs, Piney Creek and Yellowstone River segments) are within lands proposed as ACECs and also receive some management protective measures from these designations.

National Historic Trails

The impacts would be the same as Alternative A.

4.4.4.7 Alternative D (Preferred Alternative)

4.4.4.7.1 Impacts from Cultural Resources

The impacts would be the same as for Alternative B, however, with different units emphasized. 3.15 river miles would be managed as suitable while the other segments would be released from eligibility. In the both the river segments which are released and the river segments found suitable cultural resources would still receive protective measures so the impact on wild and scenic rivers would be negligible.

4.4.4.7.2 Impacts from Lands with Wilderness Characteristics

The Bad Canyon Creek river segment and the Yellowstone River segment (not managed as suitable in this Alternative) is located within the Bad Canyon Lands with Wilderness Character Unit and a portion of the Islands Land with Wilderness Character Unit Management (Bundy island). Wilderness characteristics in this Alternative would still provide protective measures, would have compatible actions, and would enhance resource values over the entire river segments, including for Bad Canyon watershed lands outside the river corridor but within the Lands with Wilderness Characteristics. The other lands with wilderness units do not overlap wild and scenic river segments and are not affected.

4.4.4.7.3 Impacts from Lands and Realty

Under Alternative D, two of the eligible river segments would be recommended as suitable and managed to protect their free-flowing nature, outstandingly remarkable values, and tentative classification. With the exception of the Yellowstone River segment, the other river segments would not be included in withdrawals or right-of-way avoidance areas, which could result in proposals for surface disturbing activities within some of the eligible river corridors such as development of rights-of-way or mining-related activities. These areas could be disposed of under a land tenure adjustment (removing land from management under Federal laws and regulations), and in-holdings could be acquired (which would bring lands under Federal jurisdiction, subject to management under Federal laws and regulations).

4.4.4.7.4 Impacts from Recreation

Under Alternative D, management direction for the proposed Pryor Mountains SRMA would complement and still protect the outstandingly remarkable values identified in the Crooked Creek River segments managed as suitable because of the emphasis on providing primitive and semi-primitive recreation opportunities. Recreation management decisions establishing SRMAs on the Yellowstone River with specific prescriptions provide protection for the Yellowstone river segment which is not suitable. There would be no impacts to this segment. The ERMA designation for the reminding river segments would not adversely affect them since the intention is for dispersed recreation similar in nature to management concerns for eligibility and general recreation management actions would provide some protection measures for these river segments.

4.4.4.7.5 Impacts from Travel Management

OHV use could adversely impact outstandingly remarkable values although at a minimum level. Within most of the river corridors found not suitable, OHVs would still be limited to designated routes or the areas are closed, reducing impacts relative to Alternative A and being similar to Alternatives B and C.

4.4.4.7.6 Impacts from Special Designations

Wilderness Study Areas

The impacts are described in the Wild and Scenic River section, above for the Crooked Creek river segments. No other portions of WSAs overlay wild and scenic river segments.

Wild and Scenic Rivers

A suitability determination for the outstandingly remarkable values of the Bad Canyon and Crooked Creek river segments would continue to protect 3.15 miles of Crooked Creek. Even through not suitable, approximately 4.5 miles of the bad canyon river segment are managed with compatible decisions within the Bad Canyon Lands with Wilderness Characteristics unit. The remaining river segments (Bear canyon, Gyp Springs, Piney Creek and Yellowstone River segments) are within lands proposed as ACECs and also receive some management protective measures from these designations.

National Historic Trails

The impacts would be the same as Alternative A.

4.4.4.8 Cumulative Impacts from Wild and Scenic Rivers

The cumulative impact analysis area for WSRs is the proposed eligible and suitable segments. Cumulative impacts from the implementation of other federal agency and non-federal resource decisions within and outside of the planning area on WSR segments would be minimal. The nature of the outstandingly remarkable values associated with the WSR segments tend to result in short-term or temporary impacts. As such, the proposed management actions, by Alternative, including the proposed WSR segments and protective management associated with the WSR segments would protect the outstandingly remarkable values, resources, processes, or systems associated with the segments. The areas adjacent to the WSR segments would be protected through other resource management actions identified in the RMP, laws, rules and regulations.

4.4.5 Pryor Mountain Wild Horse Range

See section 4.2.9 for analysis (page 4-318)

4.4.6 National Historic Trails

The Lewis and Clark National Historic Trail (NHT) and the Nez Perce (Nee-me-poo or Nimi'ipuu) NHT are the only two NHTs in the Planning Area. A number of other, non-designated historic trails also pass through the Planning Area, including trails of importance to Native Americans, routes from the early historic period, such as the Bridger Trail and the Bozeman Trail, and roads and highways from the late 19th and early 20th Centuries. These other historic trails are addressed in the cultural and heritage section in this chapter. Map 175 illustrates the Lewis and Clark and Nez Perce NHTs.

Each National Trail, established by law, is assigned for administration to one or two Federal agencies by either the Secretary of the Interior or the Secretary of Agriculture, as designated by Congress. Subject to available funding, the administering agencies exercise trail-wide responsibilities under the Act for that specific trail. Such responsibilities include coordination among and between agencies and partner organizations in planning, marking, certification, resource preservation and protection, interpretation, cooperative / interagency agreements, and financial assistance to other cooperating government agencies, landowners, interest groups, and individuals.

Various government and private entities own or manage lands along each National Trail. Management responsibilities and emphasis often include inventorying of resources and mapping, planning and development of trail segments or sites, compliance, provision of appropriate public access, site interpretation, trail maintenance, marking, resource preservation and protection, view-shed protection, and management of visitor use.

4.4.6.1 Methods and Assumptions

This impact analysis for NHTs are managed and protected in accordance with the National Trails System Act, the NHPA, Existing Trail Management Plans, and BLM IM Washington Office-2009-215 (BLM 2009). Completion of the evaluation step of Section 106 compliance may be necessary before moving forward with an undertaking that impacts a trail. Additional methods and assumptions used in this impact analysis include the following:

- Activities occurring on private lands would not be affected by any BLM management prescriptions unless those activities involve federal assistance or require a federal license.
- Direct and indirect impacts can result from a variety of natural and human-caused actions, such as those that physically alter or damage all or part of the trail; improved access, which brings increased use to an area, altering characteristics of the surrounding environment that contribute to trail importance; the introduction of visual or audible elements out of character with the trail or that alter its historic setting; and neglect of the trail to the extent that it deteriorates or is destroyed.
- The BLM encourages opportunities to cooperate with private landowners to minimize or eliminate disturbance to NHTs.
- Recognizing that historic trails often comprise numerous routes rather than a single trace, protective zones or buffers have been incorporated into some management prescriptions.
- Certain projects, due to size or topography, could require consideration of visual intrusions into the setting beyond the foreground or middle ground zones to avoid or mitigate adverse effects as defined by the NHPA.
- Recreational or heritage tourism use of the NHTs would increase over time. Overuse of NHTs on BLM public lands would be controlled through permitting mechanisms and special use permits.
- The direction in the enabling legislation and supporting documentation would be better achieved through complementary allowable use decisions (e.g., constraints to oil and gas leasing and development).

4.4.6.2 Environmental Consequences

Principle impacts to the L&C and NP NHTs arise directly from development activities and intrusions into the viewshed that alter the environment that contributes to the trail's significance. The impacts among the Alternatives vary only slightly, as the overall desired outcome (goals and objectives) is to protect trail and resource values. Alternative A has few specific management actions beyond standard terms or stipulations, and includes a VRM Class III rating for the NHTs. Alternative B provides the greatest protection for these trails through the application of a No Surface Occupancy stipulation for oil and gas within ½ mile of the

NHTs as well as prohibit surface disturbing activities (other uses) within ½ mile of the NHTs. This would include land use authorizations, ROWs, or other projects that may create disturbance to the trail resources. Alternative C allows for all uses, including oil and gas development and exploration, subject to mitigation guidelines or controlled surface use restrictions. Alternative D provides similar protections as Alternative B, however, offers more adaptability and flexibility in determining if other surface disturbing activities would degrade or impact NHT values at the project level, including for example, riparian exclosures to meet Rangeland Health Standards and Guidelines, which would actually have beneficial impacts to the trail resources.

The NHTs are fragile, nonrenewable resources that provide a direct and tangible link to human history in the planning area. As resources on BLM public land under the jurisdiction of a federal agency, the BLM is responsible for their protection and interpretation, and must consider their value when making land use decisions. Adverse impacts to trail resources are primarily the result of direct impacts from actions that disturb the soil or alter characteristics of the surrounding environment that contribute to the trail's significance. This includes the introduction of visual elements out of character with the property, or other actions that alter the setting or result in neglect of the resource to the extent that it deteriorates or is destroyed. For example, surface-disturbing activities that impact trail ruts are considered adverse impacts because the trail segments are nonrenewable. In contrast, actions that result in data collection and preservation of NHTs can be considered beneficial impacts.

Beneficial impacts also include proactive trail management, such as the preservation of buffer zones. Indirect impacts to NHTs primarily result from project-related increases or decreases in activity in the planning area. For example, the construction of a recreational facility may increase visitor use, which would result in an indirect impact to previously undisturbed trail segments. Recreation in particular is a complex issue, because actions taken to preserve historic values can result in both beneficial and adverse impacts for the resource, and for heritage tourism and trail enthusiasts.

Construction in an area some distance from a trail also can result in erosion or deposition at a trail location. Because of the nonrenewable nature of NHTs, there is little distinction between short-term and long-term impacts. An exception to this would be visual impacts related to temporary construction or fire related impacts. For example, a change in vegetation resulting from fire or clearing would be a temporary impact, as long as it did not lead to erosion of the trail. Similarly, if construction activity temporarily intruded into the trail's viewshed, this would be a temporary impact, as long as the construction itself did not directly affect the trail or result in a condition that may lead to indirect impacts.

Impacts to the outstandingly remarkable values of the National Historic Trails could result from actions proposed under the following resource management programs:

- Cultural Resources
- Visual Resources
- Energy and Mineral Resources
- Lands and Realty

- Recreation
- Renewable Energy

Other programs were determined to have little or no impact on National Historic Trails.

4.4.6.3 Impacts Common to All Alternatives

4.4.6.3.1 Impacts from Visual Resources

Under all Alternatives, the NHTs would be somewhat protected through a VRM Class III management (VRI Class C in Alternative A – essentially the same as VRM Class III with NHT restrictions). This would help minimize changes that would result in degradation of resource values or opportunities for sharing the experience of the original users of the NHTs. The setting for the NHT segments would be maintained where setting is an aspect of trail integrity. Under all Alternatives, monitoring and inventory of the trail segments would be maintained to identify trends, use, and condition of the trail which would be used to identify protection management practices to curtail or minimizing further degradation of the trail values.

4.4.6.3.2 Impacts from Cultural Resources

For all federal undertakings that may impact NHTs, the BLM complies with NHPA Section 106 before implementing the undertaking. Section 106 compliance typically includes inventory, evaluation, and consultation with the SHPO. Identification and protection of the cultural and historical components of the Trail would enhance the Trail by providing knowledge, appreciation, and educational opportunities.

4.4.6.3.3 Impacts from Energy and Mineral Resources

Each proposed action and decision would still be required to address potential impacts to the trails due to the National Trails Act. In Alternative B, C and D, there are management prescriptions specific for the Trail management. Similar resource consideration is the renewable energy section, above, would also apply to potential mineral development.

4.4.6.3.4 Impacts from Lands and Realty

Each proposed action and decision would still be required to address potential impacts to the trails due to the National Trails Act. Typically, if management actions under the National Trails Act and existing management plans for the trails identify high value sites in private land ownership, realty actions could be initiated which would enhance the Trail system segments in the BiFO through acquisition or exchange. These impacts may change slightly by Alternative to accommodate suggested actions to acquire lands and /or easements within trail corridors.

4.4.6.3.5 Impacts from Recreation

Recreation in particular is a complex issue, because actions taken to preserve historic values can result in both beneficial and adverse impacts for the resource, and for heritage tourism and trail enthusiasts. In general, the historical resource which leads to the designation of the National Historic Trails serves as a major recreational attraction and could require additional

management through such actions as restrictions, and demands for increased infrastructure, such as at Pompeys Pillar National Monument. Additionally, most of the routes are highway routes and are not hiking trails, although they provide opportunities for hiking and other outdoor activities along their routes. The trails also pass through privately owned property and it is necessary to obtain permission to enter these areas from local landowners. Attempts are underway to continue to preserve right-of-ways to allow greater access for visitors. Since National Historic Trails are designated by an Act of Congress and have specific prescriptions and goals outlined in their individual Management Plan and the National Parks and Recreation Act of 1978 (Public Law 95-625) amending the National Trails System Act (Public Law 90-543), these decisions take precedence over local decisions and guide recreation management along the trail sections BiFO manages. The impacts are this minimal.

4.4.6.3.6 Impacts from Renewable Energy

Each proposed action and decision would still be required to address potential impacts in site-specific NEPA documents to the trails due to the National Trails Act. There is no difference in the Alternatives, although the distance for exclusion of projects does change with Alternative. Also, other management considerations (ACEC, SRMA, and National Monument, wildlife and riparian habitat) which overlap the trails may affect the potential for energy development with their similar prescriptions.

4.4.6.4 Alternative A

4.4.6.4.1 Impacts from Energy and Mineral Resources

In this Alternative, there is no specific direction, but each proposed action and decision would still be required to address potential impacts to the trails due to the National Trails Act. However under this Alternative a piecemeal approach may result in some adverse cumulative impacts from individual actions.

4.4.6.4.2 Impacts from Lands and Realty

In this Alternative, there is no specific direction, but each proposed action and decision would still be required to address potential impacts to the trails due to the National Trails Act. However under this Alternative a piecemeal approach may result in some adverse cumulative impacts

4.4.6.4.3 Impacts from Renewable Energy

In this Alternative, there is no specific direction, but each proposed action and decision would still be required to address potential impacts to the trails due to the National Trails Act. However under this Alternative a piecemeal approach may result in some adverse cumulative impacts

4.4.6.5 Alternative B

4.4.6.5.1 Impacts from Energy and Mineral Resources

Alternative B provides the most protection to the NHT segments in the planning area. Under Alternative, oil and gas exploration and development would be allowed with a NSO stipulation within ½ mile of the NHT segments. Other surface disturbing activities would also be restricted within ½ mile of NHT segments (9,247 acres). These restrictions would provide the protection to the resource values associated with the NHTs as well as have beneficial impacts on the visual and scenic qualities of the areas by creating ½ mile buffer zone. However, the restrictions to 'other surface disturbing activities' may have unintended negative, adverse impacts to the trail segments, should specific project-level actions be taken to improve site conditions, restore resource values, or restrict access to improve site conditions (i.e., exclosures to protect sites, etc.). This would impact the NHT values, impact visual and scenic quality by creating intrusions in the viewshed. Other surface disturbances would be allowed, but would be subject to standard mitigation and practices, which would provide some level of protection of the NHT values.

4.4.6.5.2 Impacts from Lands and Realty

The impacts would be the same as Alternative A and Common to All Alternative, above.

4.4.6.5.3 Impacts from Renewable Energy

Surface disturbing activities associated with renewable energy would also be restricted within ½ mile of NHT segments (9,247 acres). These restrictions would provide the protection to the resource values associated with the NHTs as well as have beneficial impacts on the visual and scenic qualities of the areas by creating ½ mile buffer zone (VRM Class III by itself provides for moderate impacts). However, the restrictions to 'other surface disturbing activities' including renewable energy projects may have unintended negative, adverse impacts to the trail segments, should specific project-level actions be taken to improve site conditions, restore resource values, or restrict access to improve site conditions (i.e., exclosures to protect sites, etc.). This would impact the NHT values, impact visual and scenic quality by creating intrusions in the viewshed. Other surface disturbances would be allowed, but would be subject to standard mitigation and practices, which would provide some level of protection of the NHT values.

4.4.6.6 Alternative C

4.4.6.6.1 Impacts from Energy and Mineral Resources

Alternative C provides the least protection to the NHT segments in the planning area. Under this Alternative, oil and gas exploration and development would be allowed with a controlled surface use stipulation within ½ mile of the NHT segments. The CSU would identify mitigation measures specifically designed to protect trail values. Other surface disturbing activities could be allowed, but would be subject to mitigation guidelines. This would allow for specific project-level actions that could improve site conditions, restore resource values, or restrict

access to improve site conditions (i.e., exclosures to protect sites, etc.). Oil and gas development and exploration, even subject to mitigation guidelines or controlled surface use restrictions would have an adverse impact.

4.4.6.6.2 Impacts from Lands and Realty

The impacts would be the same as Alternative A, B and Common to All Alternative, above.

4.4.6.6.3 Impacts from Renewable Energy

The potential impacts would be the same as the impacts from Energy and Mineral Resources section, above.

4.4.6.7 Alternative D (Preferred Alternative)

4.4.6.7.1 Impacts from Energy and Mineral Resources

Impacts to Alternative D would be similar to Alternative B, except that other surface disturbing activities may be allowed at the project level, but would be subject to mitigation guidelines and other measures to ensure adequate measures are in place to protect trail resources, but also allow for management flexibility to allow certain uses should they benefit the NHT segment values or other related resources

4.4.6.7.2 Impacts from Lands and Realty

The impacts would be the same as Alternative A, B, C and Common to All Alternatives.

4.4.6.7.3 Impacts from Renewable Energy

The potential impacts would be the same as the impacts from Energy and Mineral Resources section, above.

4.4.6.8 Cumulative Impacts

The proposed RMP would not alter the management emphasis of the designated National Historic Trail segments. Precedence is set for these sections under the Acts of Congress designating them and the RMP decisions would have to conform to them. In general terms there could be some actions which could alter the landscape, resources, qualities, values, and associated settings through which the designated trails pass but the activity-specific NEPA requirements ensure that the Trails and their historic remnants and artifacts would be considered and reasonable mitigation measures would be proposed. These impacts would be localized and minor in scale relative to the entire Historic Trail.

4.5 Social and Economic Conditions

4.5.1 Social Conditions

4.5.1.1 Methods and Assumptions

For the social effects analysis, information from scoping and other field office planning documents, 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. The potentially affected groups and individuals included ranchers/livestock grazing permittees, recreationists (motorized and non-motorized), groups and individuals who give a high priority to resource protection, groups and individuals who give a high priority to resource use, small communities, wild horse advocates, and American Indian Tribes. Based on the concerns and potential effects, a set of indicators related to resource activity changes (such as increases in the quality and/or quantity of recreation opportunities, road closures, increases in AUMs available for wildlife or livestock, etc.) 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 (grazing, minerals, economics, recreation, wildlife, etc.) 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 on public lands and are particularly concerned about resource protection while other ranchers do not recreate on public lands and are relatively more pro-development. Recreationists may engage in both motorized and non-motorized activities. Some individuals are concerned with resource development and resource protection. The social analysis would include the groups and individuals most likely to be affected by the plan.

The average age of the national and local populations would continue to increase and current population trends would continue.

The economic, cultural, recreation, livestock grazing, travel management and visual resource assumptions and effects sections include information that may be of interest to the reader interested in Social effects.

4.5.1.2 Impacts Common

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.

Oil and gas development could also affect rural areas positively by providing employment and income. Residents living in areas that have been experiencing ongoing population losses may support the increased employment and population related to oil and gas development. Their communities could also benefit from the additional revenues to counties due to this leasing and development. Jobs associated with energy development could provide economic benefits that would supplement ranching and other incomes and allow younger residents to remain in their communities near their families.

Under all Alternatives, access would be pursued if the opportunity arises which could enhance opportunities for some recreationists.

Under all Alternatives, current levels of forage available for livestock grazing would be maintained so there would be no social effects to local communities from changes in AUMs. However, there may be short-term localized or regional changes in AUMs due to fire, drought, insects, etc. These changes could cause short-term inconvenience and stress for the affected ranchers.

Under all Alternatives, administration of a permit or lease allows for driving off designated routes to administer the permit or lease, which could be perceived as unfair to recreationists who are not allowed to in these areas. The rules for driving off designated routes are described in the individual permit or lease.

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, conflicts between permittees and motorized recreationists would continue and may even escalate in the future if the increase in motorized users continues.

Individuals with disabilities could request a permit to travel off designated routes to retrieve game consistent with the Rehabilitation Act of 1973. Such access would be considered on a case by case basis by the appropriate manager considering land use plans and habitat concerns.

Individuals with disabilities could have opportunities off designated routes which are not granted to the general public, which could enhance their quality of life.

4.5.1.3 Tribal Issues – Tribal Treaty Rights

The BLM, as a governmental agency, would maintain a special government-to-government relationship with federally recognized Indian Tribes. Members of tribes on Reservations in Montana and adjacent states exercise their hunting, fishing, and gathering rights on federal lands outside the boundaries of their reservations, including BLM-administered lands within the Billings Field Office. These pursuits include fishing for resident game fish species, hunting large and small game, and gathering natural resources for subsistence and medicinal purposes. It is expected that over the life of the plan, the demand from American Indians to exercise their treaty rights on public lands will continue and potentially increase. Under all of the alternatives, BLM-administered lands in the Billings Field Office could be used in land exchanges to acquire lands in other parts of the Montana/Dakotas, outside of the historical culture areas of the affected Tribes. The net effect of such land tenure adjustments could be to limit or reduce the area within which tribal treaty rights could be exercised.

4.5.1.4 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.

4.5.1.5 Alternative A

Groups and individuals who give a high priority to resource use would support this Alternative because it allows oil and gas and other types of development to continue as it has in the past. Employment and income from all BLM resources and resource uses would increase from current levels by 16 percent and 11 percent respectively. BLM program revenues and payments to counties would be more than double mostly due to an increase in coal and oil and gas revenues. Those who give a high priority to resource use include many local residents and local elected officials who are concerned about economic development and its potential positive effects on the social environment of small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and special status plants, would not feel this Alternative offers adequate protection for wildlife and other resources because these resources would slowly continue to degrade under this Alternative. This could result in a decline in the quality of life for these groups and individuals.

Recreation management under Alternative A would continue as it has in the past. Opportunities for recreationists desiring motorized experiences would continue to be available. No game retrieval would be allowed; 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 or D. This Alternative would not offer the opportunity to deal with existing problems such as conflicts between users with preferences for different types of experiences, resource degradation, etc. at places like the South Hills, the Pryor Mountains, Acton, and the Mill Creek Bundy area.

Under Alternative A, noxious weeds and wildfire would be fought aggressively, which would be supported by the local populations. Based on past activities, more acreage of weeds would be treated and there would be fewer restrictions on wildfire suppression.

Under this Alternative, the Grove Creek and Pryor Foothills areas would not be designated as ACECs and Weatherman Draw ACEC would not be expanded. These areas would receive less protection than under the other Alternatives, which could lessen the ability of affected American Indians to practice their traditional land uses and religion in an unencumbered way.

4.5.1.6 Alternative B

Groups and individuals who give a high priority to resource use may not support this Alternative because it includes more restrictions on oil and gas and other types of development than any other Alternative. Employment and income from all BLM resources and resource uses would increase from current levels by 13 percent and 8 percent respectively, which is slightly less than under the other Alternatives. BLM program revenues and payments to counties would be more than double mostly due to an increase in coal revenues; however this increase would be the smallest of all the Alternatives. Those who give a high priority to resource use include many local residents and local elected officials who are concerned about economic development and its potential positive effects on the social environment of small communities. This alternative would offer the least amount of opportunity for jobs in resource industries to retain younger family members in the communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and special status plants, would feel these resources would be adequately protected under this Alternative because their habitat would not be disturbed. This could result in an increase in the quality of life for these groups and individuals.

Recreation management under Alternative B would enhance experiences for people who prefer non-motorized opportunities and decrease opportunities for those desiring a motorized experience. Non-motorized experiences would be enhanced due to less surface disturbance, enhanced fish and wildlife protection, less noise, etc. No game retrieval would be allowed; the needs expressed by some hunters who feel motorized game retrieval is important, particularly in an area with an aging hunter population, would not be addressed. This Alternative would offer the opportunity to deal with existing problems such as conflicts between users with preferences for different types of experiences, off road use, resource degradation, etc. but at the expense of motorized opportunities. Routes to major destinations would be maintained but Alternative routes to the same places may be closed. South Hills would be closed to motorcycle use because of safety, resource and noise issues. This type of single use area would not be replaced and may result in these users going to other areas where the activity is prohibited,

which could also affect others who prefer a non-motorized experience. This could occur in other places where multiple routes are closed through travel management plans under this Alternative and could cause use conflicts and resource degradation.

Under this Alternative, the Grove Creek and Pryor Foothills areas would be designated as ACECs. These areas, along with Weatherman Draw, would receive more protection here than under any other Alternative, which could enhance the ability of affected American Indians to practice their traditional land uses and religion in an unencumbered way free of non-natural sights and sounds.

Under Alternative B, noxious weeds and wildfire would be fought less aggressively than under the other Alternatives, which would not be supported by the local populations. There would be less acreage under a full wildfire suppression strategy and fewer acres of weeds treated. However, there would also be less potential for weeds to spread because of less surface disturbance. Advocates for wild horses would support the protection of native vegetation in this alternative, but may believe that motorized opportunities for horse viewing are inadequate.

4.5.1.7 Alternative C

Groups and individuals who give a high priority to resource use would support this Alternative because it offers the fewest restrictions on oil and gas and other types of development. Employment and income from all BLM resources and resource uses would increase from current levels by 16 percent and 11 percent respectively. BLM program revenues and payments to counties would be more than double mostly due to an increase in coal and oil and gas revenues. Those who give a high priority to resource use include many local residents and local elected officials who are concerned about economic development and its potential positive effects on the social environment of small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem and special status plants, would not feel this Alternative offers adequate protection for wildlife and other resources because these resources would slowly continue to degrade under this Alternative. This could result in less satisfaction with BLM management of resources and a decline in the quality of life for these groups and individuals.

Recreation management under Alternative C would enhance opportunities for those who prefer motorized experiences and decrease opportunities for those desiring non-motorized experiences. Off road game retrieval would be allowed which would 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, including some hunters, would be limited under this Alternative. There are a variety of problems associated with off-road game retrieval including spreading weeds, creating new roads, diminishing the 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.

This Alternative would not offer the opportunity to deal with existing problems such as conflicts between users with preferences for different types of experiences, resource

degradation, etc. at places like the South Hills, the Pryor Mountains and Acton. The Mill Creek Bundy Area would be managed as a SRMA which would help to address problems in that area.

Under Alternative C, noxious weeds and wildfire would be fought aggressively, which would be supported by the local populations. There would be more acreage under a full wildfire suppression strategy and more acres of weeds treated than under Alternatives A or B.

Under this Alternative, the Grove Creek and Pryor Foothills areas would be designated as ACECs. These areas, along with Weatherman Draw, would receive more protection here than under current conditions, which could enhance the ability of affected American Indians to practice their traditional land uses and religion in an unencumbered way.

4.5.1.8 Alternative D (Preferred Alternative)

Groups and individuals who give a high priority to resource use may support this Alternative because, although it includes some restrictions on oil and gas and other types of development, employment and local program revenues and payments to counties would be the same as for Alternatives A and C. Those who give a high priority to resource use include many local residents and local elected officials who are concerned about economic development and its potential positive effects on the social environment of small communities.

Groups and individuals who give a high priority to resource protection, including the protection of the prairie ecosystem, wildlife and special status plants, may feel these resources would be adequately protected under this Alternative because mitigation is in place to offset the effects of habitat disturbance. Depending on the individual, this could result in an increase or decrease in satisfaction with land management and the quality of life for these groups and individuals.

Recreation management under Alternative D would enhance experiences for people who prefer non-motorized opportunities while maintaining quality opportunities for those desiring a motorized experience, which could enhance the quality of life for both of these groups. Each travel management area was examined individually and the plan was based on current use and activities, area destinations, loop routes, resource issues, administrative and permitted needs as well as public use, user conflicts and issues. Issues in the Pryor Mountains, Acton, and Bundy-Mill Creek would be addressed under this Alternative. The South Hills motorcycle area would remain open but the safety and resource issues would remain. No motorized game retrieval would be allowed; the needs expressed by some hunters who feel motorized game retrieval is important, particularly in an area with an aging hunter population, would not be addressed. Under this alternative there would be more restrictions on wildfire and weed suppression, which would not be supported by local populations.

Under this Alternative, the Grove Creek and Pryor Foothills areas would be designated as ACECs. These areas, along with Weatherman Draw, would receive more protection here than under current conditions, which could enhance the ability of affected American Indians to practice their traditional land uses and religion in an unencumbered way.

4.5.1.9 Cumulative Impacts

Adoption of Alternative B could add to the concern of some residents about increasing federal government control and decreasing local control over the public lands. In addition, under this Alternative, in the northern part of the planning area, minerals development could be pushed onto private lands where less protection of the lands occurs. Fewer opportunities for motorized recreation would exist, which would add to the ongoing loss of these opportunities on state and other federal lands.

Adoption of Alternatives A or C would contribute to an increasing concern regarding wildlife and fisheries habitat, and special status species to individuals and groups who place a high priority on protecting these resources and/or recreating in a non-motorized environment. These Alternatives would not offer the opportunities resolve some of the issues that currently exist on public lands that are causing existing conflicts to continue or escalate.

Adoption of the preferred Alternative, Alternative D, offers a balance between resource use and resource protection which would meet many of the needs of the groups and individuals interested in public lands. Both motorized and non-motorized recreation use would be enhanced and many of the issues that current exist on these public lands would be addressed.

4.5.2 Economic Conditions

4.5.2.1 Methods, Assumptions, and Incomplete Information

4.5.2.1.1 General

- The analysis area for the economic analysis consists of the eight Montana counties that include lands managed by the Billings FO: Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland, and Yellowstone counties. It also includes two counties in Wyoming (Big Horn and Park) because of the economic activity associated with BLM land and mineral uses within the planning area.

- 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 (Version 3) input-output modeling system and IMPLAN 2010 datasets for the above mentioned counties.

- Unless otherwise stated, all income data are in 2010 dollars to be consistent with the 2010 IMPLAN dataset.

- 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 a 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 and proprietors' 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 sector. 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).

- 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 are not conducive to developing some opportunities, the impact on the local economy would be different than estimated herein.

- A number of assumptions were made to facilitate the analysis of the Alternative management actions. These assumptions set guidelines and provide reasonably foreseeable levels of development that would occur within the planning area over the analysis period (20 years). These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each Alternative and described in Chapter 2. Resource specialists projected annual resource outputs are based on the best available information and professional judgment. The purpose of the economic analysis is to compare the relative impacts of the resource management Alternatives and should not be viewed as absolute economic values.

4.5.2.1.2 Livestock Grazing

- 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 (42,429 AUMs), horses (342 AUMS), and sheep and goats (160 AUMs).

4.5.2.1.3 Minerals

- It is assumed that about 95 percent of federal minerals that have been nominated for oil and gas leasing but deferred from leasing pending completion of the RMP would be leased within one year of completing the RMP. Anticipated levels of leasing, development, and production by Alternative are provided in Table 4-46.

- It is assumed that approximately 15,955 acres of leasable federal minerals would continue to be held by production. Lease bonus bids would continue to average about $12.54 per acre (ONRR, 2011).

- Average 2009 price for oil and natural gas in Montana from the Independent Petroleum Association of America was updated to 2010 dollars for consistency with the 2010 IMPLAN data.
- The average annual federal coal leasing, production, tax, and royalty revenues related to BLM federal minerals are unknown at this time and would be determined based on whether the proposed Montana Federal Mineral Conveyance Act (HR 1158) passes in Congress. For analysis purposes, under all Alternatives, it is assumed that all federal coal is retained in federal ownership, and a coal lease sale covering 2,680 acres of federal coal are leased, an annual average of 2.8 million tons of federal coal are produced over the life of the lease, and price per ton of coal in Montana is $13.53 (Energy Information Administration, 2011).

Table 4-46 Average Annual Federal Oil and Gas Leasing, Rents, and Production by Alternative

Activity	Existing Level	Alternative			
		A	B	C	D
Existing Acres Leased	149,829	149,829	149,829	149,829	149,829
Additional Acres Leased upon RMP Completion	0	82,002	24,001	82,002	81,060
Total Acres Leased	149,829	231,831	173,830	231,831	230,889
Total Federal Lease and Rent Revenue	$402,157	$648,492	$474,257	$648,492	645,662
Distribution to State/Local Government	$157,485	$253,949	$185,719	$253,949	$252,841
Annual Oil Production (bbl)	277,662	429,628	322,140	429,628	427,882
Annual Gas Production (mcf)	143,099	221,418	166,022	221,418	220,518
Total Annual Federal O&G Royalties	$3,322,663	$5,141,169	$3,854,918	$5,141,169	5,120,279
Royalties Distributed to State/Local Government	$1,301,155	$2,013,282	$1,509,586	$2,013,282	$2,005,357
Total Federal Revenues	*$3,724,820*	*$5,789,661*	*$4,329,174*	*$5,789,661*	*$5,765,941*
Total State/Local Revenues	*$1,458,640*	*$2,267,231*	*$1,695,305*	*$2,267,231*	*$2,258,198*
Total Revenue Distributed to Counties	**$651,005**	**$1,011,888**	**$756,631**	**$1,011,888**	**$1,007,742**

- Anticipated level of bentonite production would continue to be about 264,000 tons per year for each Alternative. The price of bentonite would continue to be about $60 per ton. The Montana Bentonite Production Tax is $1.50 per ton and 77.95 percent of this tax is distributed to the county of production.
- Anticipated level of building stone production would continue to be about 100 tons per year for each Alternative. The price of building stone would continue to be about $750 per ton.

- Anticipated level of mineral materials (sand and gravel) production would continue to be about 6,500 cubic yards per year for each Alternative. The price of mineral materials would continue to be about $0.50/cubic yard.

4.5.2.1.4 Recreation

- Current recreation use levels and anticipated levels for all the Alternatives would be the same (261,000 visits).
- BLM Recreation Management Information System provides the 2010 levels of recreation use by activity for the Billings Field Office and Pompeys Pillar. These use levels are multiplied by the average consumer surplus value for the Intermountain area studies (as reported in chapter 3-economics Updated Outdoor Recreation Use Values on National Forests and Other Public Lands, John Loomis, 2005). The total of the consumer surplus is updated to 2011dollars to provide an estimated consumer surplus of $13.1 million
- Projected recreation expenditures are distributed among different categories of visitors based on the results of National Visitor Use Monitoring surveys conducted for the Custer National Forest. Recreation use on BLM lands within the planning area are estimated to be: nonlocal day use (14 percent, 37,046 visits), nonlocal overnight on BLM (4 percent, 11,332 visits), nonlocal overnight off BLM (7 percent, 16,997 visits), local day use (66 percent, 172,589 visits), local overnight on BLM (4 percent, 10,024 visits), local overnight off BLM (5 percent, 12,639).
- Average expenditure profiles for recreation users on below average spending forest (Stynes and White, 2005) are a reasonable proxy for average expenditure profiles for recreation users on BLM lands within the planning area.
- Recreation use fees collected from recreation use at BLM fee sites (Pompeys Pillar and Shepherd Ah Nei) would be the same for each Alternative ($47,300 per year).
- 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.
- 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 public lands. The report provides average net willingness to pay or consumer surplus for 30 recreation activities at the national level.

4.5.2.1.5 Timber

- All sawtimber harvested within the analysis area would be logged by logging contractors, not households.
- Annual saw timber harvest would average the following: Current Management and Alt. A (160 CCF), Alternative B (160 CCF), Alternative C (570 CCF), and Alternative D (285 CCF).
- The economic contribution of timber harvest associated with hazardous fuels treatments would be included in the BLM contributions section below because these treatments are either contracted out or done by BLM employees.
- Average prices are: sawtimber ($38/CCF), pulp wood ($1.00/ton), biomass ($0.01/ton), juniper ($0.05/lb.), fuelwood ($5.00/cord).
- The average annual amount of pulp wood (131 ccf), post and poles (2 ccf), biomass (960 ccf), fuelwood (1 ccf), and juniper (1,102 lbs) would be produced annually for all Alternatives.
- 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.

4.5.2.1.6 Lands/Realty

- Total annual rights-of-way rentals would average $21,642. It is assumed that annual rental revenues would remain about the same with all Alternatives. No new proposals for major power lines or roads/highways that would cross BLM lands are anticipated.
- Currently no renewable wind energy development exists on BLM public lands. However, because of the emphasis on renewable energy development and the high potential for wind energy development in the planning area, it is assumed that 25-35 turbines generating about 64.8 MW would be developed on BLM lands under all Alternatives.

4.5.2.1.7 BLM Contributions

- BLM would average 30 permanent and 8 other than permanent positions for all the Alternatives. The number of permanent and other than permanent BLM employees who would work on minerals and resource management would not vary by Alternative.
- BLM would spend an estimated $3.3 million for labor and $4.3million on operations annually for all Alternatives.

- Wildfire suppression costs are not provided by Alternative because it is not possible to predict the level of non-prescribed wildfire or associated costs that would occur under any of the Alternatives.
- An estimated average annual $224,000 would be provided to local governments and entities through community assistance agreements to reduce the risk of wildfire to communities.
- The amount of BLM labor and operations expenditures for weed treatments would be the same for all Alternatives. However, the number of acres treated and the treatment methods may vary among Alternatives.
- 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 decision making process.

4.5.2.1.8 Population and Households

- Currently there are 1.50 people for every job in the planning area (IMPLAN, 2010). The same ratio is applied to the change in total jobs from current levels to estimate total population effects.
- Within the local economy there are about 0.60 households per job (IMPLAN, 2010). This relationship is used to estimate the number of households with each Alternative.

4.5.2.2 Impacts Common to All Alternatives

The local economy is described in the Affected Environment portion of this document (Chapter 3). While the Alternatives have the potential to affect local businesses and individuals, the changes in BLM lands and minerals uses would not change enough to affect economic diversity (the number of economic sectors) or dependency (when the local economy is dominated by a limited number of industries). This is also the case with respect to economic stability, which is typically assessed in terms of seasonal unemployment, sporadic population changes, and fluctuating income growth rates.

The economic analysis assesses the anticipated change in jobs and income. Changes in natural amenities and quality of life may also be important indicators of economic impacts. While natural amenities and life quality do not directly generate income in the same sense as, for example, a sawmill or a tourist lodge, they do act to attract and keep residents, and may attract

new businesses. Open spaces, scenery, and protected lands contribute to healthy economies and lifestyles (Rasker, Alexander, venden Noort, and Carter, 2004).

Benefit transfer method was used to estimate 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 use on public lands would be $13.1 million for each Alternative.

4.5.2.2.1 Ecosystem Services

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.

The Alternatives involve different approaches to, and levels of, vegetation treatment and wildfire management. Fuels treatments should contribute to fuels conditions that would be less likely to have unplanned fire starts. This would reduce the threat to life and property. For example, fires generally burn hotter, flame length is higher, and fires in tree canopies are more likely in non-treated areas. It is not possible, however, to project the level of wildfire that would occur under any of the Alternatives.

4.5.2.2.2 Grazing Management

Livestock grazing on BLM-managed land in the Planning Area would continue to involve approximately the same number of operators. About 10 percent of the farms/ranches in the Planning Area would hold grazing permits. The amount of livestock grazing would not change among the Alternatives and BLM would continue to provide less than 1 percent of the total forage needed to feed livestock in the Planning Area. The dependency on BLM forage for each county would remain relatively unchanged. The economic dependency of livestock producers on BLM forage would also remain unchanged. BLM forage 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 42,931 AUMs and support approximately 75 jobs and $935,000 in labor and proprietor's income (Table 4-47 and Table 4-48). Farm/ranch related labor and proprietor's income would continue to account for approximately 1 percent of total income in the planning area and less than 3 percent of employment (IMPLAN 2010). Approximately 90 percent of the AUMs sold within the Billings Field Office would continue to be section 3 permits of which 12.5 percent of revenues are distributed to the state/counties; 10 percent of the AUMs are section 15 leases of which 50 percent of revenues are distributed to state/counties. Annual federal revenues from livestock grazing fees would continue to be about $58,000 annually, of which about $10,000 would be distributed to the counties.

4.5.2.2.3 Minerals Management

Oil and gas leasing and rent income would likely increase with all the Alternatives. Most of the oil and natural gas production from federal minerals would continue to occur in Carbon County.

With all Alternatives, an estimated 2,680 acres of federal mineral estate would be leased for coal development, and production. An estimated 2.8 million tons of coal would be produced per year. Total annual federal revenues would include the pro-rated bonus bids, annual rent, Abandoned Mine Reclamation Fund, Black Lung Disease Tax, and production royalties. Total annual state revenues would include the Montana Coal Severance Tax, Montana Resource Indemnity Trust Tax, and 50 percent of federal royalties that would be disbursed to the state. State revenues from federal coal leasing and production would average $3.2 million per year. Total local revenues would include the Gross Proceeds Tax and 25 percent of royalties disbursed to the state. Local revenues from federal coal leasing and production would average $2.3 million per year.

Salable mineral production would include sand and gravel and building stone. The annual amount of sand/gravel produced (about 6,500 cubic yards per year) and the value of this production (about $3,300) would remain relatively unchanged. An estimated 100 tons of building stone would be produced and sold at an average of $750 in revenue per year. Total federal revenues from this production would be about $4,000. No revenues would be disbursed to the state or local governments.

Bentonite production (about 264,000 short tons per year) is the only federal locatable mineral that would be anticipated with all the Alternatives. While no federal revenues would be collected, an estimated annual average $400,000 in state revenues would be collected under the Montana Bentonite Production Tax. About $310,000 would be disbursed to Carbon County.

4.5.2.2.4 Recreation Use

An estimated 261,000 recreation visitors would support about 130 jobs and $3.6 million in local income. Estimated consumer surplus would also be the same among Alternatives (approximately $13.1 million per year). Recreation use fees collected from recreation use at BLM fee sites (Pompeys Pillar and Shepherd Ah Nei) would be the same for each Alternative ($47,000 per year). Included in these economic impacts is the estimated annual economic contribution to Yellowstone County of total annual visitation at Pompeys Pillar National Monument. This would continue to be about $1.79 million in total non-resident expenditures, 27 total jobs, and $822,000 in labor and proprietor’s income.

4.5.2.2.5 Timber Management

Even though the amount of timber harvested would vary among the Alternatives, the impact on local employment would be the same. Since no major mills exist within the local economy, none of the harvested timber would likely be logged by local loggers or milled within the local economy. Thus, only one or two jobs would be expected in the local economy.

4.5.2.2.6 Lands and Realty

Existing use authorizations, e.g. rights-of-way, permits, and lease rentals would continue to generate an estimated average $21,642 of revenue annually for the federal government. 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.

With the emphasis on renewable energy development and the high potential for wind energy development in the planning area, it is assumed that 25-35 turbines generating about 64.8 MW would be developed on BLM lands under all Alternatives. An estimated 340 workers would be involved in the engineering and design, road and foundation preparation, substation and transmission line construction, wind turbine assembly and erection during the two-year construction period. Construction in the first two years would create an estimated 336 local jobs and local labor income of $12.9 million. This development would also generate an additional $270,000 annually in federal revenues. Annual employment associated with maintenance and operation of other lands/realty ROWs would be about 20 jobs and $0.6 million.

4.5.2.2.7 Payments to Counties

BLM portion of 2010 PILT payments to the eight counties in the Planning Area would continue to be almost $620,000 under all Alternatives.

The Office of Natural Resource Revenue would continue to disburse a portion of the revenue received for mineral lease bonuses, rents, royalties and other mineral related revenues to the State of Montana. Montana would also redistribute a portion of these revenues to the counties of production.

Employment and income effects of payments to counties are displayed in Table 4-47 and Table 4-48. Total revenues are displayed in Table 4-49. The amount of revenues disbursed to counties that are related to BLM livestock grazing, coal development, and weed treatments would be the same among all the Alternatives. Revenues associated with oil and gas leasing, development and production as well as revenues associated with timber management would vary among the Alternatives.

Bentonite production (264,000tons per year from unpatented mining claims) would generate $396,000 in state revenue from the Montana Bentonite Production Tax. An estimated $308,000 of these state tax revenues would be distributed to Carbon County.

An estimated average annual $224,000 would be provided to local governments and entities through community assistance agreements to reduce the risk of wildfire to communities and about $30,000 per year would be available to counties for weed treatments.

Revenues disbursed to counties help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and/or keeping records. Other specific county functions that may be funded include weed treatments, and road maintenance,

administering primary and secondary education and operating clinics/hospitals, as well as funding county libraries, county airports, local landfills, and county health systems.

4.5.2.2.8 BLM Contributions

BLM operations and management make a direct contribution to area economic activity by employing people who reside in the area and by expending dollars on other non-personnel needs. The employment of 30 permanent employees and 8 other than permanent employees and the expenditure of $3.1 million for labor and $3.3 million on operations would continue to contribute about 70 total jobs and $5.4 million in local labor and proprietor's income per year. Non-salary expenditures are purchases made in support of resource programs and operations and include items such as contracts, gasoline, diesel, ammunition and explosives, animal feed, computer equipment, and so on. Under all Alternatives, economic diversity indicated by the number of economic sectors would remain relatively unchanged, though shifts in emphasis could occur. Estimated costs to local governments would also remain unchanged, i.e. demand for services and infrastructure would not change.

Invasive species treatments would essentially be the same for all Alternatives, i.e. treatments would occur on about 1,932 acres per year at an average cost of $40,038 per year.

The dependency of the local economy on BLM land uses such as livestock grazing, oil and gas production, timber production, mining, and recreation activities would not change among Alternatives. The influence of resource management on BLM-administered lands 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 Table 4-47 and Table 4-48. The employment, income, and revenue effects of BLM resource management would be spread unequally among the counties and communities within the Planning Area.

4.5.2.2.9 Global Climate Change

Under all Alternatives, the land uses and activities on BLM public lands would contribute an imperceptible amount to Global Climate Change (GCC). However, national/international policies and global policies and practices that contribute to continued growth of emissions would be expected to ultimately cause physical and economic impacts (Congressional Budget Office (CBO), 2003). Similarly, current and future climate changes could influence land uses and resource productivity, e.g. recreation use, livestock grazing, timber harvest, ecosystem restoration, etc. related to water resources, agricultural practices and production, forest health and productivity, disease risk, and ecosystem makeup (EPA, 1997). These changes could directly and indirectly influence economic production, employment, income, wealth, markets, trade, and technologies (Holdren, 2008).

The Congressional Budget Office reports that the potential effects of any particular amount or rate of climate change over the next few centuries are uncertain. Research on the connection

between climate and economic well-being yields ambiguous conclusions and is related to such things as world population growth, economic growth, energy and land intensive activities, and how much energy is used for these activities. Generally, policies that deal with GCC inevitably affect the distribution of resources. Inaction benefits people who are alive today while potentially harming future generations. National policy options that include incentive based approaches are generally more cost-effective than direct controls as a means of regulating greenhouse gas emissions (CBO, 2003).

4.5.2.2.10 Cumulative Impacts

The description of the Affected Environment found in Chapter 3 summarizes the past and present activities that influenced cumulative economic conditions. It also summarizes those economic conditions. The economic analysis takes into account past actions that eventually evolved to the present economic situation. The Alternative actions shown in this section indicate how the local economy would change from the anticipated land uses with each Alternative. Finally, a list of potential future projects and developments were discussed during meetings with the public at the community economic workshop and at internal interdisciplinary team meetings.

Most of the economic impacts from BLM management and land uses would continue to occur in Carbon and Musselshell Counties where most of the BLM land and minerals and associated uses are located. 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). The population density, number of industrial sectors, and average income per household would continue to be about the same as current levels with all Alternatives.

4.5.2.3 Impacts by Alternative

Estimates of the levels of employment and labor income that would be supported by each Alternative 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 Table 4-47 and Table 4-48, respectively. Estimated average annual federal, state, and local revenues associated with BLM land and mineral uses are shown in Table 4-49; and the change in economic contribution from current levels for each Alternative displayed in Table 4-50. Economic impacts associated with livestock grazing, recreation use, lands and realty authorizations, wind energy development, PILT payments to counties, BLM contributions, and global climate change are summarized under Impacts Common to all Alternatives. The economic effects, especially the employment, income, and revenue effects of BLM resource management would be spread unequally among the counties and communities within the planning area.

Table 4-47 Employment by Resource Use and Other Contribution to Local Economy by Alternative (Average Annual)

Resource Use	Total Number of Jobs Contributed				
	Existing Level	Alternative A	Alternative B	Alternative C	Alternative D
Livestock Grazing	74	74	74	74	74
Minerals	88	110	100	110	110
Recreation	127	127	127	127	127
Timber	1	0	0	1	1
Wind Energy	0	16	16	16	16
Payments to Counties	30	75	70	75	75
BLM Expenditures	90	90	90	90	90
Total BLM Management	410	492	477	493	493
Percent Change from Current		**20.00%**	**16.34%**	**20.24%**	**20.24%**

Note:

Source: FEAST/IMPLAN (2010)

Table 4-48 Income by Resource Use and Other Contribution to Local Economy by Alternative (Annual Average – $1,000)

Resource Use	Total Local Income Contributed				
	Existing Level	Alternative A	Alternative B	Alternative C	Alternative D
Livestock Grazing	$935	$935	$935	$935	$935
Minerals	$5,197	$6,507	$5,904	$6,507	$6,496
Recreation	$3,353	$3,353	$3,353	$3,353	$3,353
Timber	$24	$22	$22	$53	$32
Wind Energy	0	$602	$602	$602	$602
Payments to Counties	$1,256	$3,163	$2,967	$3,169	$3,160
BLM Expenditures	$6,194	$6,194	$6,194	$6,194	$6,194
Total BLM Management	$16,961	$20,778	$19,939	$20,814	$20,773
Percent Change from Current		**22.50%**	**17.56%**	**22.72%**	**22.48%**

Note:

Source: FEAST/IMPLAN (2010)

Table 4-49 Federal, State, and Local Revenues by Alternative

Resource Use	Existing Level	Alternative A	Alternative B	Alternative C	Alternative D
Federal					
Livestock Grazing	$57,957	$57,957	$57,957	$57,957	$57,957
Oil/Gas Leases, Rents, Royalties	$3,724,820	$6,191,892	$4,448,277	$6,245,562	$6,169,355
Coal Lease, Rent, Royalties	$0	$3,109,757	$3,109,757	$3,109,757	$3,109,757
Locatable /Salable Minerals	$7,300	$7,300	$7,300	$7,300	$7,300
Recreation Use Permits	$47,300	$47,300	$47,300	$47,300	$47,300
Timber Sales	$7,011	$6,251	$6,251	$21,831	$11,001
R-O-W Rents	$21,642	$21,642	$21,642	$21,642	$21,642
Wind Energy Rents	0	$269,244	$269,244	$269,244	$269,244
Total	**$3,866,030**	**$9,711,343**	**$7,967,728**	**$9,780,593**	**$9,693,556**
State					
Livestock Grazing	$9,572	$9,572	$9,572	$9,572	$9,572
Oil/Gas Leases, Rents, Royalties	$1,565,914	$2,603,071	$1,870,056	$2,625,634	$2,593,597
Coal Lease, Rent, Royalties, Taxes	$0	$3,249,264	$3,249,264	$3,249,264	$3,249,264
Bentonite	$396,000	$396,000	$396,000	$396,000	$396,000
Pilt	$708,874	$708,874	$708,874	$708,874	$708,874
Timber Sales	$280	$250	$250	$873	$440
Total	**$2,680,640**	**$6,967,031**	**$6,234,016**	**$6,990,217**	**$6,957,747**
Local					
Livestock Grazing	$9,572	$9,572	$9,572	$9,572	$9,572
Oil/Gas Leases, Rents, Royalties	$594,016	$987,452	$709,389	$996,011	$983,858
Coal Lease, Rent, Royalties, Taxes	$0	$2,314,411	$2,314,411	$2,314,411	$2,314,411
Bentonite	$308,682	$308,682	$308,682	$308,682	$308,682
Pilt	$618,639	$618,639	$618,639	$618,639	$618,639
Weeds	$30,000	$30,000	$30,000	$30,000	$30,000
Community Assistance	$223,589	$223,589	$223,589	$223,589	$223,589
Total	**$1,784,498**	**$4,492,345**	**$4,214,282**	**$4,500,904**	**$4,488,751**

Table 4-50 Comparison of Estimated Average Annual Economic Contributions from BLM Land and Mineral Uses

Economic Indicator (Change from Current Levels)	Alternative			
	A	B	C	D
Change in Total Local Employment (full and part-time jobs)	82	67	83	83
Change in Total Local Income ($1,000)	$3,817	$2,978	$3,853	$3,812
Change in Local Revenue ($1,000)	$2,708	$2,430	$2,716	$2,704
Change in Local Population	124	101	125	125
Change in Number of Households	49	41	50	50

4.5.2.4 Alternative A

4.5.2.4.1 Minerals

Federal mineral estate leased for oil and gas exploration, development, and production would increase from the current level of federal oil and gas leases covering 149,829 acres to an estimated 247,805 acres when those areas that are currently deferred from leasing are made available for leasing upon completion of the RMP revision. Annual oil and gas production from federal mineral estate would also increase. Annual federal revenues associated with leasing, bonus bids, rent, and royalties would increase by an estimated $2.47 million. From this, revenues distributed to the state and counties would increase an estimated $393,000.

Leasing 247,800 acres for oil and gas development and production and 2,680 acres for coal production, as well as annually producing an estimated 459,000 barrels of oil, 237,000 MCF of natural gas, 2.8 million tons of coal, 264,000 tons of bentonite, 100 tons of building stone, and 6,500 cubic yards of mineral materials would support about 100 total local jobs and $4.5 million of labor and proprietor's income to the local economy.

4.5.2.4.2 Timber Management

Harvesting an estimated average 160 CCF of sawtimber, 131 CCF of pulp wood, 2 CCF of post and poles, 960 CCF of biomass, 1 CCF of fuelwood, and 1,102 lbs of juniper would support a job or two and generate about $20,000 in local income and $7,000 in federal revenues and less than $300 in state revenue.

4.5.2.4.3 Conclusion

Overall, the estimated total (direct, indirect, and induced) number of local jobs and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative A would be about 492 jobs and $20.8 million, respectively (Table 4-47 and Table 4-48). These figures would reflect increases of about 20 percent and 23 percent, respectively over current levels. The largest employment effects would be related to recreation use; but the largest income effects would be related to minerals. All program revenues to the federal

government would be about $12.3 million per year. Annual payments to the State of Montana and to counties would be approximately $7.0 million, most of which would be related to mineral leasing and production. The most dramatic changes in employment, income, and revenues would be related to additional oil and gas and new coal leasing and production. Most of the economic impacts from BLM management and land uses would continue to occur in Carbon and Musselshell counties where most of the BLM lands and minerals are located. The demographic and economic trends that are described in Chapter 3 to provide context for impacts would be expected to continue.

The increase in total jobs from current levels (82) would result in an estimated total population increase of about 124 people and an increase of about 49 households.

4.5.2.5 Alternative B

4.5.2.5.1 Minerals

Federal mineral estate leased for oil and gas exploration, development, and production would increase from the current level of federal oil and gas leases covering 149,829 acres to an estimated 178,560 acres when those areas that are currently deferred from leasing are made available for leasing upon completion of the RMP revision. Annual oil and gas production from federal mineral estate would also increase. Annual federal revenues associated with leasing, bonus bids, rent, and royalties would increase by an estimated $720,000. From this, revenues distributed to the state and counties would increase an estimated $300,000

Leasing 178,560 acres for oil and gas development and production and 2,680 acres for coal production, as well as annually producing an estimated 331,000 barrels of oil, 171,000 MCF of natural gas, 2.8 million tons of coal, 100 tons of building stone, and 6,500 cubic yards of mineral materials would support about 100 total local jobs and $5.9 million of labor and proprietor's income to the local economy.

Under Alternative B, in the event a buy-out of valid locatable mining claims there would be no bentonite production or associated employment or income. The cost of a buy-out to the government would be unknown until validity exams are completed.

4.5.2.5.2 Timber Management

The economic effects of timber management under Alternative B would be similar to those described for Alternative A. Harvesting an estimated average 160 CCF of sawtimber, 131 CCF of pulp wood, 2 CCF of post and poles, 960 CCF of biomass, 1 CCF of fuelwood, and 1,102 lbs of juniper would generate about $7,000 in federal revenues and less than $300 in state revenue.

4.5.2.5.3 Conclusion

Overall, the estimated total (direct, indirect, and induced) number of local jobs and associated local labor and proprietor's income contributed by BLM land and resource management under Alternative B would be about 477 jobs and $19.9 million, respectively (Table 4-47 and Table 4-48). These would reflect increases of 16 percent and 18 percent, respectively over current

levels. The largest employment effects would be related to recreation use; but the largest income effects would be related to BLM expenditures. All program revenues to the federal government would be about $10.5 million per year. Annual payments to the State of Montana and to counties would be approximately $6.2 million, most of which would be related to mineral leasing and production. Most of the economic impacts from BLM management and land uses would continue to occur in Carbon and Musselshell counties where most of the BLM lands and minerals are located. The demographic and economic trends that are described in Chapter 3 to provide context for impacts would be expected to continue.

The increase in total jobs from current levels (67) would result in an estimated total population increase of about 101 people and an increase of about 41 households.

4.5.2.6 Alternative C

4.5.2.6.1 Minerals

Economic impacts associated with federal minerals management would be very similar to those described for Alternative A. Federal mineral estate leased for oil and gas exploration, development, and production would increase from the current level of federal oil and gas leases covering 149,829 acres to an estimated 248,033 acres when those areas that are currently deferred from leasing are made available for leasing upon completion of the RMP revision. Annual oil and gas production from federal mineral estate would also increase. Annual federal revenues associated with leasing, bonus bids, rent, and royalties would increase by an estimated $2.47 million. From this, revenues distributed to the state and counties would increase an estimated $394,000.

Leasing 248,000 acres for oil and gas development and production and 2,680 acres for coal production, as well as annually producing an estimated 460,000 barrels of oil, 237,000 MCF of natural gas, 2.8 million tons of coal, 264,000 tons of bentonite, 100 tons of building stone, and 6,500 cubic yards of mineral materials would support about 110 total local jobs and $6.5 million of labor and proprietor’s income to the local economy.

4.5.2.6.2 Timber Management

Harvesting an estimated average 570 CCF of sawtimber, 131 CCF of pulp wood, 2 CCF of post and poles, 960 CCF of biomass, 1 CCF of fuelwood, and 1,102 lbs of juniper would generate about one job and $53,000 in labor and proprietor’s income. It would also generate about $22,000 in federal revenues and less than $900 in state revenue.

4.5.2.6.3 Conclusion

Economic impacts would be similar to those of Alternative A. Overall, the estimated total (direct, indirect, and induced) number of local jobs and associated local labor and proprietor’s income contributed by BLM land and resource management under Alternative C would be about 493 jobs and $20.8 million, respectively (Table 4-47 and Table 4-48). These would reflect increases of 20 percent for employment and 23 percent for income over current levels. The largest employment effects would be related to recreation use; but the largest income

effects would be related to minerals. All program revenues to the federal government would be about $12.3 million per year. Annual payments to the State of Montana and to counties would be approximately $7.0 million, most of which would be related to mineral leasing rent and royalties. Most of the economic impacts from BLM management and land uses would continue to occur in Carbon and Musselshell counties where most of the BLM lands and minerals are located. The demographic and economic trends that are described in Chapter 3 to provide context for impacts would be expected to continue.

The increase in total jobs from current levels (83) would result in an estimated total population increase of about 125 people and an increase of about 50 households.

4.5.2.7 Alternative D (Preferred Alternative)

4.5.2.7.1 Minerals

Federal mineral estate leased for oil and gas exploration, development, and production would increase from the current level of federal oil and gas leases covering 149,829 acres to an estimated 246,910 acres when those areas that are currently deferred from leasing are made available for leasing upon completion of the RMP revision. Annual oil and gas production from federal mineral estate would also increase. Annual federal revenues associated with leasing, bonus bids, rent, and royalties would increase by an estimated $2.44 million. From this, revenues distributed to the state and counties would increase by an estimated $390,000.

Leasing 246,900 acres for oil and gas development and production and 2,680 acres for coal production, as well as annually producing an estimated 459,000 barrels of oil, 237,000 MCF of natural gas, 2.8 million tons of coal, 264,000 tons of bentonite, 100 tons of building stone, and 6,500 cubic yards of mineral materials would support about 110 total local jobs and $6.5 million of labor and proprietor’s income to the local economy.

4.5.2.7.2 Timber Management

Harvesting an estimated average 285 CCF of sawtimber, 131 CCF of pulp wood, 2 CCF of post and poles, 960 CCF of biomass, 1 CCF of fuelwood, and 1,102 lbs of juniper would generate approximately one job and $32,000 in local income, $11,000 in federal revenues and less than $500 in state revenue.

4.5.2.7.3 Conclusion

Overall, the estimated total (direct, indirect, and induced) number of local jobs and associated local labor and proprietor’s income contributed by BLM land and resource management under Alternative D would be about 493 jobs and $20.8 million, respectively (Table 4-47 and Table 4-48). These increases would be similar to those shown for Alternative A. All program revenues to the federal government would be about $12.3 million per year. Annual payments to the State of Montana and to counties would be approximately $7.0 million, most of which would be related to mineral leasing, rents, royalties and taxes. Most of the economic impacts from BLM management and land uses would continue to occur in Carbon and Musselshell counties where most of the BLM lands and minerals are located. The demographic and

economic trends that are described in Chapter 3 to provide context for impacts would be expected to continue.

The increase in total jobs from current levels (83) would result in an estimated total population increase of about 125 people and an increase of about 50 households.

4.5.2.8 Unavoidable Adverse Impacts

None of the economic impacts discussed above would cause or be the result of unavoidable adverse impacts.

4.5.2.9 Short-Term Uses versus Long-Term Productivity

Consumptive uses, e.g. 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. Here too, the development of minerals within the planning analysis period would preclude the use of those minerals in the future.

4.5.2.10 Irreversible and Irretrievable Impacts

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.

4.6 Cumulative Impacts

The CEQ defines cumulative effects as:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions* (40 CFR 1508.7).

The following narrative describes the three components of this definition as they relate to this cumulative impact analysis: (1) incremental impact of the action when added to; (2) impacts from all past, present; and (3) reasonably foreseeable future actions.

The first component, incremental impacts of the action (i.e., RMP revision), is described for each resource, resource use, and special designation immediately following the impacts discussion in Chapter 4, using impact analysis terminology discussed in Section 4.1.2.2 as direct, indirect, short-term and long-term. The second component, impacts from all past and present actions, is encompassed within the description of baseline conditions presented in Chapter 3 – Affected Environment. In other words, the description of the current affected environment reflects past and present actions.

The analysis of cumulative impacts serves to place the projected incremental impacts from the RMP Alternatives in the context of past, present, and future impacts. Combining the projected

impacts of RMP Alternatives with past, present, and future impacts necessarily involves projections and limited analyses. Analyses are limited primarily due to incomplete documentation of all past and present impacts on private and public lands; challenges of predicting potential impacts for reasonably foreseeable future actions; programmatic and strategic nature of RMP Alternatives; unknown nature and pace of resource uses and technological changes that could occur; and changing circumstances related to agency priorities, policies, and the economy. These limitations are addressed through the methods and assumptions described in the following section.

4.6.1 Methods and Assumptions

It is neither practical nor required to exhaustively analyze all possible cumulative impacts. Instead, CEQ (1997) indicates the cumulative impact analysis should focus on meaningful impacts. The BLM identified key planning issues (see Chapter 1) to focus the analysis of environmental consequences in Sections 4.1 to 4.5 on meaningful impacts. Cumulative issues were identified based on scoping input, reasonably foreseeable future actions, professional judgment, purpose and need of the action, planning criteria, and consideration of context and intensity of potential impacts. Particular attention was given to potential impacts to public health and safety, controversy, uniqueness of resources, potential for violation of legal standards or laws, and potential impacts to legally protected resources. To focus the scope of cumulative impact analyses, cumulative issues were considered in the context of baseline conditions (Chapter 3), the incremental impacts of individual resources (Sections 4.1 to 4.5), reasonably foreseeable future projects in Table 4-26, and the following factors (as modified from CEQ 1997):

- Does the impacted resource have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance?
- Are reasonably foreseeable future actions anticipated to have environmental impacts similar to the incremental impacts identified for RMP Alternatives?
- Have any recent or ongoing NEP A analyses of similar actions in the geographic area identified important adverse or beneficial cumulative impact issues?
- Has the impact to the resource been historically significant, such that the importance of the resource is defined by past loss, past gain, or investments to restore resources?

The cumulative impact analysis was further bounded by timeframe, geographic area, and analytical assumptions. The timeframe or temporal limits of the cumulative impact analysis was defined as the anticipated life of the RMP. This timeframe corresponds to projections for the desired outcomes (goals and objectives) described for Alternatives (Chapter 2). The geographic area or spatial limits of the cumulative impacts analysis was generally defined as the planning area; however, the impact analysis area was expanded for highly mobile resources, such as air quality, and for future actions adjacent to the planning area anticipated to have similar environmental impacts.

In general, trend analysis was used to assess cumulative impacts for identified issues in terms of ranges or changes in direction from baseline conditions. In lieu of quantitative data, projections regarding resource values were made when necessary. For example, approximately 5 percent of the soils in the entire planning area exhibit a high potential for water erosion and 4 percent of the soils have a high potential for wind erosion. These percentages were assumed to apply to both public and private lands across the planning area, regardless of ownership.

4.6.2 Environmental Consequences

This section summarizes the environmental consequences that would result from implementing each of the four alternatives. The purpose of the environmental consequences analysis is to determine the potential impacts of the federal action under each of the four alternatives on the human environment, while focusing on key planning issues identified by the BLM and raised during the scoping process. The analysis of environmental consequences is organized according to resource area, and includes: physical resources, mineral resources, fire and fue.ls management, biological resources, heritage and visual resources, land resources, special designations, and socioeconomics. For more detailed cumulative impacts, see the cumulative impacts portion of each individual resource, resource use, or special designation.

4.6.3 Physical Resources

Physical resources include air, soil, water, and cave and karst resources.

Impacts to air quality as a result of proposed BLM management actions by all Alternatives would be minor, short term, and localized to the project area. Because of the land base and land pattern managed by the Billings Field Office (4 percent of the surface acres in the eight-county planning area), the potential for BLM management actions and authorizations to contribute significantly to air quality deterioration is low. The use of prescribed fire would have the greatest potential to impact air quality over large areas; however smoke management through coordination with the Montana/Idaho Airshed Group would ensure that air quality standards are met.

Impacts to soil resources may result from surface disturbance associated with a variety of resource programs including minerals development, motorized vehicle use, road construction, and recreation. When it contributes to offsite erosion and sediment delivery, surface disturbance is an adverse impact to water resources as well. Actions that restrict surface disturbance or restore vegetation on disturbed areas occur under all alternatives and generally are considered to have a beneficial impact on soil and water resources by limiting erosion. Alternatives B, C, and D all limit surface disturbing activities, however more impacts to soil and water resources are anticipated under Alternative C. Alternative C has the fewest restrictions to surface use authorizations, therefore providing the least amount of protection for soil resources of all the Alternatives. Alternative B is the most restrictive. Alternative D also places restrictions on surface use authorizations, but less restrictions than B and more than C.

Under all Alternatives Water resources would benefit from management in accordance with Rangeland Health Standards and applicable state and federal water-quality standards. Site

specific mitigation and BMPs for surface disturbing activities would also reduce impacts to water resources. However with the scattered distribution of BLM administered public lands in the planning area (4 percent of the surface area in an 8 county area), management actions to minimize impacts to water resources may not prevent impaired water quality on BLM waterways.

Cave and Karsts are managed as mandated by the Federal Cave Resource Protection act as well as other Acts, such as the Endangered Species Act. Management actions in the RMP are in conformance with these prescriptions and protect the unique, nonrenewable, fragile, biological, geological, hydrological, cultural, paleontological, scientific, and recreational values. The management actions would result in significant restrictions of casual use of caves and karsts, but also provide more directed and focused responses due to the mandate for development of a specific Cave and Karsts Management Plan.

4.6.4 Mineral Resources

Mineral resources include locatable, leasable (fluid minerals and coal), and mineral materials. The Billings Field Office manages 1,839,782 acres of federal mineral estate in the planning area (17 percent). Implementation of the alternatives would result in public lands remaining open (a beneficial impact), or withdrawn or segregated (an adverse impact) from locatable mineral entry under the mining laws.

Under Alternative A, the entire planning area is open to locatable mineral entry except for 1,855 acres which are currently withdrawn. BLM consideration to future proposals to develop locatable minerals in the planning area would vary between alternatives. Areas recommended for withdrawal from locatable mineral entry in the planning area range from 39,700 acres (Alternative A) to 270,977 acres (Alternative B). In cases involving valid mining claims, exploration for locatable minerals would occur under all alternatives. With the exception of bentonite, the development potential for other locatable minerals in the planning area is low. Commercially important bentonite deposits in the planning area are located in southern Carbon County and occur in the Mowry and Thermopolis formations. Current and future bentonite surface mining operations would not be affected under any of the alternatives because the mining claims are valid, existing rights and the areas recommended for withdrawal do not coincide with areas having development potential.

The development potential for fluid leasables in the planning area ranges from moderate to no potential, depending on location. The Reasonable Foreseeable Development (RFD) scenario for the Billings Field Office is four oil and gas wells a year for all Alternatives. Management actions that restrict or constrain the potential for oil and gas leasing, development, and exploration would result in adverse impacts; management actions that ease restrictions or maintain areas as open for oil and gas exploration and development would result in beneficial impacts. All of the alternatives include management that restrict oil and gas leasing and development to varying levels, with Alternative A generally allowing the most development and Alternative B the least. Alternative A contains the smallest acreage managed as administratively unavailable for oil and gas leasing (39,730 acres), followed by Alternative C (65,891 acres), Alternative D (72,915 acres), and Alternative B (302,713 acres).

Coal development could occur under alternatives A, C, and D. However, under Alternative B, future coal leasing actions would be prohibited. Most of the area closed to coal development in Alternatives A, C, and D occur in areas where the coal development potential is extremely low or does not exist.

Areas recommended for closure to mineral materials disposal in the planning area range from 44,583 acres (Alternative A) to 343,745 acres (Alternative B). Although there is a wide variance between alternatives, the plan would provide land-use opportunities for the development of mineral materials. It would provide economic benefits and meet local infrastructure needs while protecting or minimizing adverse impacts to other resources and their uses.

The BLM anticipates only limited development for locatable minerals, fluid minerals, coal, and mineral materials during the life of the plan and, therefore, effects to the development of these resources from the alternatives are expected to be minimal.

4.6.5 Fire and Fuels Management

Fire is an integral part of natural ecosystem function; however, the natural fire regime largely has been suppressed in the planning area. Although the suppression of the natural fire regime is considered an adverse impact to fire ecology, actions contributing to an increase in the incidence of wildfires or limiting the ability to effectively fight wildfires are considered adverse impacts to fire management. Management under the alternatives would affect two aspects of fire and fuels management: wildfires (unplanned ignitions) and prescribed fires (planned ignitions).

All Alternatives utilize wildfire management to restore fire-adapted ecosystems and reduce hazardous fuels. Alternative A would result in the greatest potential for adverse impacts from human caused, unplanned ignitions due to increased access and additional travel routes under this alternative. Under Alternatives A and C, wildfire would not be used to meet resource objectives, while under Alternatives B and D wildfire would be used to meet resource objectives (Alternative B: 52,548 acres over a 10-year period and Alternative D: 62,937 acres over a 10-year period). Prescribed fires can be used to meet resource objectives, such as for wildlife habitat enhancement, forage production, and fuel reduction. Under Alternative A, only 6,280 acres would be treated over a 10-year period, while under Alternatives B, C, and D 21,700 acres would be treated using prescribed fire over the next 10 years.

4.6.6 Biological Resources

Biological resources include vegetation, fish, wildlife, special status species, and wild horses.

Vegetation resources analyzed in this RMP revision include forests and woodlands, rangeland and shrubland communities, riparian/wetland resources, invasive species and noxious weeds, and special status plants; these plant communities incorporate the major vegetation types in the Decision Area. Long-term surface disturbance contributes to the decline in abundance, distribution, or health of vegetation communities in the Decision Area. Conversely, short-term

surface disturbance from vegetation treatments would improve vegetation health and diversity, and may reduce the severity of wildfires that destroy or permanently alter vegetation communities. Especially in forests and woodlands, active management, such as timber harvesting and silviculture treatments, would reduce the potential for severe or high intensity fires (the greatest threat to forests and woodlands), reduce the number of diseased trees, enhance age and species diversity, and reduce the spread of invasive species. Alternative C would result in the most long-term surface disturbance and allows the most activities that would adversely affect forests and woodlands, such as retaining timber harvest roads post-harvest for recreational activities. Conversely, Alternative C would result in the greatest beneficial impact to forests and woodlands due to the use of silviculture treatments, followed by alternatives D, A, and B, respectively. Alternatives that allow the greatest use of silviculture treatments would result in the greatest beneficial impacts to the harvest of forest products. Management actions that advance active vegetation management, such as mechanical fuels treatments and invasive species control measures, would result in beneficial impacts to grassland and shrubland communities.

Rangelands and shrublands are the largest habitat type in the planning area and, assuming a proportional distribution of the projected surface disturbance would occur in these communities, Alternative B would result in most short-term impacts from long-term surface disturbance over the life of this plan (22,414 acres of crested wheatgrass treated), followed by alternatives D and C (12,000 acres and 7,500 acres, respectively), and Alternative A (160 acres). While Alternative B has the most short-term impacts as a result of the crested wheatgrass treatments, it would result in the highest long-term benefit.

Impacts to riparian/wetland areas occur as a result of either direct surface disturbance or actions in a watershed that cause a change in riparian/wetland functionality, such as changes in sediment loading rates or hydrology. Alternative B would result in the greatest direct beneficial impacts to riparian/wetland resources through restrictions on surface-disturbing activities in proximity to riparian/wetland resources and through proactive management actions. Alternatives D, A, and C, respectively, would result in less protection for riparian/wetland areas.

The presence of invasive species and noxious weeds is considered an adverse impact to other biological resources in the planning area and, in spite of management proposed in this RMP, invasive species are expected to spread under all alternatives. Those alternatives projected to involve the greatest amount of surface disturbance would have the potential to result in the greatest adverse impacts from the spread of invasive species. Based on projected surface disturbance and the types of preventative measures required, Alternative C would result in the greatest potential for the spread of invasive species, followed by alternatives A, D, and B. Alternative D is projected to result in greater surface disturbance than Alternative A, but contains more stringent reclamation requirements that would result in a reduced potential for the spread of invasive species.

The health of riparian/wetland areas, and water quality and quantity would affect fish populations in the Decision Area. Increased sediment in fish habitat (streams and rivers) decreases the potential for fish to naturally reproduce, fills in pools, leads to channel

degradation, decreases light penetration and productivity, alters fish community composition, and increases stream temperature. Based on overall surface disturbance, reclamation practices, and fish habitat management including erosion control and reservoir design, Alternative B would result in the most beneficial impact to fish (including special status species fish), followed by alternatives D, C, and A respectively.

The primary adverse impacts to wildlife result from surface disturbance related habitat loss and fragmentation; the primary beneficial impacts to wildlife result from management that restricts surface disturbing activities in known or potential wildlife habitat and disruptive activities (e.g., motorized vehicle use, recreation) that can cause the abandonment of nest sites or home ranges. Alternative B minimizes wildlife habitat loss and fragmentation in the Decision Area (e.g., closing areas to oil and gas development) to the greatest degree, followed by alternatives D, C, and A, respectively.

Impacts to special status plants, fish, and wildlife species are generally the same as those for vegetation, fish, and wildlife; however, all the alternatives include additional protective management for special status species. Overall, proactive management actions would be most beneficial to special status species under alternatives B, D, C, and A respectively. Alternative B would result in the greatest beneficial impacts to Yellowstone cutthroat trout and other special status fish species habitat. Alternative B includes the most proactive actions to restore and enhance habitats for special status wildlife species.

Wild horses are managed for self-sustaining populations of healthy, free-roaming animals in balance with other uses and the productive capacity of their habitat within the Pryor Mountain Wild Horse Range. Impacts to wild horses include recreational and visitor activities, with the most impacts to wild horses under Alternative A, followed by Alternatives C, D, and B. Under Alternative D, habitat and range improvement would be maximized to benefit the wild horses, followed by Alternative C, A, and B. Under Alternative B, the range improvements (i.e. water tanks, guzzlers, reservoirs) would be removed. The Pryor Mountain ERMA would assist with the management of the PMWHR by focusing on the recreational cumulative impacts and lessening these impacts caused by visitors experiencing seeing wild horses. The PMWHR and the Pryor Mountain ERMA would work together to benefit the wild horses.

4.6.7 Heritage and Visual Resources

Heritage and visual resources include cultural resources, paleontological resources, and visual resource management. Because cultural resources are fragile, often unique, nonrenewable resources that occupy relatively small areas, almost any management action has the potential to affect them. Primary impacts to cultural resources result from surface disturbance, visual intrusions, and theft and vandalism. Overall, Alternative C is projected to result in the most surface disturbance and, therefore would result in the greatest adverse impacts to cultural resources.

The widespread presence of paleontological resources throughout the decision area and their close spatial association with extractive (i.e., mineral) resources present a number of management challenges. Any surface-disturbing activities in an area that can physically alter,

damage, or destroy fossils or their context may result in adverse impacts to important paleontological resources. Across all action alternatives, paleontological resource inventories would occur prior to surface disturbing activities in areas with moderate to high potential for paleontological resources. This would help surface disturbing projects avoid disturbing paleontological resources. Alternative C provides the greatest exposure to direct impacts from surface-disturbing activities, but may result in more identification of paleontological localities due to increased resource use.

Adverse impacts to visual resources result from projects that create visual contrast with the natural form, line, color, or texture of the landscape inconsistent with the management objectives for that area. Under all alternatives, traditional resource uses and development would continue, allowing varying degrees of development and resulting in impacts to visual resources. The overall contribution of the proposed management actions to the cumulative impact on visual resources is expected to be a minor incremental increase to the visual disturbances as a result of mineral resource development, transportation, wildfire, and vegetation treatments. Additionally, there would be incremental increases in the areas managed to protect visual resources. Mitigation would likely limit the impacts in viewsheds with high scenic quality in the Billings Field Office decision area.

4.6.8 Land Resources

Land Resources includes lands and realty, renewable energy, travel and trail management, recreation and visitor management, non-WSA lands with wilderness characteristics, and livestock grazing management.

Impacts to the lands and realty program from implementing the alternatives include land disposal, acquisition, and withdrawal, and management that make realty actions more difficult to complete (i.e. larger ROW avoidance and exclusion areas). Alternative A identifies the most land available for disposal (7,529 acres with an additional 2,088 acres identified for further study), followed by Alternative C (4,223 acres), Alternative D (170 acres), and Alternative B (50 acres). ROWs are for infrastructure and facilities, including renewable energy facilities for wind, solar, and biomass that are in the public interest and require authorization for location over, under, on, or through BLM-administered land. Adverse impacts to ROWs result from restrictions, in the form of avoidance/mitigation and exclusion areas, on the location of ROWs. Alternative A is the least restrictive followed by Alternatives C, D, and B.

Impacts to Renewable Energy from implementing the alternatives include restrictions on renewable energy development. Alternative A has the least restrictions on renewable energy development, followed by Alternatives C, D, and B.

Adverse impacts to travel and transportation management result from restrictions on or closures of travel routes to motorized or mechanized vehicles, while beneficial impacts would result from management that increases access to public lands. Currently travel is limited to existing roads and trails. Eleven Travel Management Areas (TMAs) are proposed under Alternatives B, C, and D, with the number of miles or roads open/closed to motorized use varying by alternatives. Alternative is the least restrictive (no TMAs), followed by Alternatives C, D, and

B. Overall, Alternative C would cause the fewest adverse impacts (and the most benefits) to travel and transportation management, followed by alternatives A, D, and B.

Management that affects settings, experiences, and the ability of recreationists to achieve desired beneficial outcomes from uses on public lands (e.g., hunting or camping) are impacts to recreation. The increase in vehicle-based recreation and urban development, and associated population growth all contribute to increased demand for recreational opportunities in the region. As a result the decision area could experience increased recreational visitors over the life of the plan, which could degrade certain recreational settings, resulting in diminished recreational opportunities and experiences, or increase user conflicts associated with dispersed unconfined recreational opportunities. There would be a minor incremental impact to recreational opportunities and experiences from proposed management actions.

Currently the Billings Field Office is managing 1,925 acres of lands with wilderness characteristics. Alternative B identifies the highest number of lands to be managed for wilderness characteristics (27,292 acres), followed by Alternative D (13,653 acres) and Alternative C (3,379 acres). Under each of the alternatives these areas would be managed to protect their wilderness characteristics and this management would adversely affect resource uses and other activities (e.g. motorized vehicle use) that could degrade the naturalness and opportunities for solitude and primitive, unconfined recreation in these areas. By any Alternative, managing any of the non-WSA lands with wilderness characteristics for other resource values could lead to long-term degradation of wilderness values on those lands, although generally those lands have other management prescriptions which could provide some similar protective measures.

The primary impacts to livestock grazing result from management that alters the area available to livestock grazing, constrains the placement or types of range improvements, or changes the number of animal unit months (AUMs) available to operators. The number of acres closed to grazing is 37,408 acres for Alternative A, 38,373 acres for Alternative B, 28,622 acres for Alternative C, and 28,387 acres for Alternative D. The acres of crested wheatgrass treated over the life of the plan is greatest under Alternative B (22,414 acres) followed by Alternatives D (12,000 acres), Alternative C (2,500 acres) and Alternative A (160 acres). Crested wheatgrass conversions could cause short-term impacts to livestock grazing as a result of treatment.

4.6.8.1 Special Designations

Special Designations includes National Monuments, Areas of Critical Environmental Concern (ACECs), National Historic Landmarks, National Historic Trails (NHTs), Wild and Scenic Rivers (WSRs), Wilderness Study Areas (WSAs), and Horse Ranges (PMWHR).

Under all Alternatives, Pompeys Pillar National Monument and ACEC (432 acres) would continue to be managed to protect the historical, cultural and biological values, including its outstanding viewsheds and unique resources of the area. Emphasis on providing opportunities for interpretation, education and enjoyment of the area would continue. The ACEC would be available for oil and gas leasing, subject to a No Surface Occupancy (NSO) stipulation. The 432 acres within the ACEC have low mineral development potential; therefore, while the NSO

stipulation protects the values of concern within the ACEC, there would be minimal adverse impacts to oil and gas leasing. Pompeys Pillar National Monument (51 acres) which is included in a portion of the ACEC, would be managed to protect the historical and cultural objects for which is was nominated, and would be withdrawn from all forms of entry, location, selection, sale or disposition, subject to valid existing rights.

The National Historic Landmark (NHL 6 acres) which includes the rock feature itself would be managed as a VRM Class II to protect the values associated with the landform. The remainder of the ACEC would be managed as VRM Class III. This would allow for interpretive and educational programming, facilities and access to and within the site, while ensuring the visual quality and visual obtrusions are minimized or mitigated to protect the scenic values of the area.

ACECs are designated to protect resources, natural systems, and natural hazards values. ACECs proposed in the Decision Area include cultural, paleontological, vegetation, wildlife, special status species, recreational, and scenic values. To protect the values of concern, ACECs commonly include restrictions on mineral development and other surface-disturbing activities or motorized vehicle use. Alternative C, while the containing the least restrictive management activities proposes 11 ACECs (67,079 acres), followed by Alternative D (11 ACECs and 38,786 acres), Alternative A (9 ACECs and 37,896 acres), and Alternative B (12 ACECs and 181,175 acres). Alternative B contains the most restrictive management. Alternative B would be the most effective at protecting the values of concern within ACECs by restricting resource uses and activities within these areas, followed by alternatives D, C, and A respectively.

National Historic Trails (NHTs) are designated to protect cultural resources; the principle impacts to the Nez Perce (Nee-me-poo or Nimi'ipuu) NHT and the Lewis and Clark NHT arise directly from development activities and intrusions into the viewshed that alter the environment that contributes to the trails' significance. Alternative B provides the greatest protection for these trails through the application of larger buffer zones for surface-disturbing activity (both no surface occupancy [NSO] and controlled surface use [CSU] stipulations). The larger acreage of special designations and limited resource use under Alternative B also reduce the potential for direct and indirect adverse impacts. Alternative C allows the greatest resource use, and provides the least protection through special designations, but does provide more effective proactive management, including NSO and CSU restrictions, than Alternative A. Alternative A, the existing management, includes the least effective proactive management in part because of the change in understanding of the adverse impact of viewshed intrusions that has evolved since this management was developed.

Alternatives A and C manage the eligible waterway segments and associated waterway corridors and seek to preserve their free-flowing characteristics, outstandingly remarkable values (ORVs), or characteristics that justified their tentative classifications. In contrast, under Alternative B, the eligible waterways would be managed as suitable for inclusion in the WSR system. Alternative D proposed to manage only two of the eligible waterways as suitable for inclusion in the WSR system.

Alternative B is the most protective of WSR eligible and draft suitable waterway segments and could result in the greatest beneficial impact to the free-flowing characteristics, ORVs, and characteristics that justified their tentative classifications as wild, scenic, or recreational waterways by restricting or limiting resource uses that could degrade these qualities. Alternatives A and C include the least restrictive management of several resource uses and would have the fewest adverse impacts on mineral development, livestock grazing, and timber harvesting. Due to the extent and intensity of the restrictions under Alternative B, the beneficial impacts to the WSR related qualities and the adverse impacts to other activities and resource uses would be greatest under this alternative.

WSAs exist under all alternatives and are managed following BLM Manual 6330 – Management of BLM Wilderness Study Areas - until such time as Congress acts upon the recommendations. The BLM is statutorily (FLPMA Section 603(c)) required to manage these areas to protect their suitability for Congressional designation into the National Wilderness Preservation System unless and until Congress either designates an area as wilderness or releases it from further consideration. Although there are limited discretionary actions the BLM can take that would affect WSAs, management under Alternative B would result in the greatest beneficial impacts to WSAs by emphasizing resource protection and limiting the potential for activities, such as motorized vehicle use, in and adjacent to WSAs that may adversely affect wilderness characteristics, followed by alternatives D, C, and A, respectively.

The Pryor Mountain Wild Horse Range (PMWHR) was established under two Secretarial Orders in 1968 and 1969 prior to the Wild and Free-Roaming Horses and Burros Act. The PMWHR is to be managed principally, but not necessarily exclusively, for the benefit of wild horses within the authorities of the Wild Free-Roaming Horse and Burro Act of 1971, as amended. The designation of the PMWHR itself does not restrict other uses (travel, mineral and energy development, commercial activities, etc.) it is the overlaying management of the WSAs that restricts commercial activities within the PMWHR.

4.6.9 Socioeconomic Resources

Impacts to social conditions in the planning area include changes in the quality of life for the various groups and individuals who have a direct relationship to management of BLM lands. These groups include ranchers/livestock grazing permittees, recreationists (including those who enjoy motorized and non-motorized activities), groups and individuals who prioritize resource protection, groups and individuals who prioritize resource use, wild horse advocates and American Indian Tribes. In some cases, social conditions are closely tied to changes in economic impacts including employment, earnings and tax revenues for local and state governments.

Under Alternatives A and C, the quality of life of permittees, those who prioritize resource use, and some residents of small communities would be maintained. Those who place a high priority on protection of wildlife habitat, water resources, vegetation, etc., would not feel these resources would be adequately maintained. Under Alternatives B, the quality of life of those who prioritize resource protection would be maintained while that of permittees, some residents of small communities, and those who favor resource use would decline. Alternative D offers a

balance between resource use and resource protection which would meet many of the needs of the groups and individuals interested in public lands.

While minority and low-income populations exist in the planning area, none of the alternatives are expected to result in disproportionate adverse impacts to these populations. The BLM would continue to consult with interested tribes regarding issues of importance to the tribes under all alternatives.

The combined effects of the anticipated level of activities associated with BLM management under each alternative would contribute about 400 local jobs and $15.5 million to $15.9 million in wage and proprietor's income. This would be less than 0.3 percent of current local employment and income. Annual federal revenues to counties would increase by $2.4 million to $2.7 million annually, again varying by alternative. Local populations would increase by less than 85 people and the number of households would increase by about 30 households under all alternatives. This would be less than 0.05 percent of current levels.

Common to all alternatives, the employment, income, and revenue effects of BLM resource management would be spread unequally among the counties and communities within the planning area and the 10 counties that make up the local economy. Most of the BLM land and minerals base and land/mineral uses are in Carbon and Musselshell counties. Much of the economic impact would also occur in those counties. The influence of resource management on BLM-administered lands 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). The population density and average income per household would continue to be about the same as current levels.

4.7 Irreversible and Irretrievable Commitment of Resources

Section 1502.16 of CEQ regulations requires that the discussion of environmental consequences include a description of "…any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented." An irreversible commitment of resources refers to decisions affecting the use of resources (generally nonrenewable resources) that limit the ability for future generations to use that resource. For example, extraction and processing of sand and gravel as part of an aggregate mining operation is considered an irreversible commitment of salable minerals. This action is irreversible because once the minerals are extracted and processed; they cannot be renewed in the ground within a reasonable timeframe, and are therefore unavailable for use by future generations. An irretrievable commitment of resources refers to decisions resulting in the loss of production or use of a resource. For example, a decision not to treat juniper encroachment into adjacent sagebrush habitat results in the irretrievable loss of forage production from the grassland community. This action is not irreversible, because a treatment applied to the encroaching juniper could restore the forage production of the sagebrush habitat.

All of the Alternatives contain a range of management actions that may lead to future irreversible and irretrievable commitments of those resources, once a decision is made.

Decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following the signing of the ROD for the Billings/Pompeys Pillar RMP revision, implementation plans would be developed and implemented by the BLM. Implementation decisions require appropriate project specific planning and NEPA analysis, and constitute BLM's final approval authorizing on-the-ground activities to proceed. Assuming subsequent implementation decisions authorize activity- or project-specific plans, irreversible and irretrievable commitment of resources would occur. For most resources, the RMP would provide objectives for management and guidance for future implementation level decisions to minimize the potential for irreversible and irretrievable commitments of resources.

Table 4-51 identifies the irreversible and irretrievable impacts to resources and resource uses that may occur as a result of implementing one of the four Alternatives. No irreversible or irretrievable commitment of resources are anticipated for air quality, visual resources, lands and realty, ROW and corridors, recreation, special designations, and socioeconomic resources.

The exact nature and extent of any irreversible and irretrievable commitment of resources cannot be defined due to uncertainties about location, scale, timing, and rate of implementation, as well as the relationship to other actions and the effectiveness of mitigation measures throughout the life of this plan

Table 4-51 Irreversible and Irretrievable Commitment of Resources Summary

Resource	Irreversible	Irretrievable	Explanation
Physical, Biological, and Heritage Resources			
Air			The air quality resource in the BiFO Planning Area is not irreversible or irretrievable; however, committed actions that consume PSD increment would use up available PSD increment for other proposed sources. For this EIS, there are no actions by BLM that would require PSD permitting.
Soil	X	X	Surface-disturbing activities, non-mechanized activities, and natural processes cause soil erosion in the planning area. Soil formation can take thousands of years and therefore, eroded soil and, to a lesser extent, lost productivity are considered unrecoverable. The loss of topsoil from soil erosion results in an irretrievable loss of soil productivity.
Water		X	Depletion of surface water from in the planning area watersheds may result in an irretrievable commitment of water that would otherwise have contributed to major river systems, including the Yellowstone River. Produced water from oil and gas wells in the planning area may be an irretrievable commitment of groundwater, depending on its use, once it reaches the surface. Increases in sediment, salinity, and nonpoint source pollution that result from surface-disturbing activities could result in degradation of water quality and an irretrievable loss of water utility.
Vegetation		X	Allowing surface-disturbing activities consistent with the BLM's multiple-use mandate would result in both long- and short-term alteration and removal of vegetation cover that would not be

Table 4-51 Irreversible and Irretrievable Commitment of Resources Summary

Resource	Irreversible	Irretrievable	Explanation
			available to meet other resource objectives. In some instances, disturbance may result in a long-term shift in plant communities.
Fish and Wildlife		X	Activities that result in the alteration of habitat by shifting vegetation communities can displace wildlife, reduce carrying capacity, and change wildlife communities, resulting in lower species diversity and, thus, irretrievable commitment of these resources. Potential impacts to wildlife include obstacles and barriers affecting traditional ranges and migration corridors of big game and resulting in inappropriate grazing practices that may cause damage to habitat.
	X		Displacement of local species populations during energy and mineral resources development activities could cause an irreversible loss in local wildlife populations.
		X	Construction of roads, well pads, and other transportation infrastructure improvements can create an irretrievable loss of habitat.
Wild Horses and Burros and Pryor Mountain Wild Horse Range			Forage consumed by wild horses is unavailable for wildlife. The gathering/removal of wild horses from the Pryor Mountain Wild Horse Range to maintain the appropriate management level (AML) would not result in loss of genetic make-up of the herd. There are no irreversible or irretrievable impacts to Wild Horses.
Cultural and Paleontological Resources	X	X	Any surface-disturbing activities may damage, destroy, or otherwise affect cultural and paleontological resources. Once disturbed, these resources cannot be replaced and the potential for collecting or preserving meaningful data is compromised. Undiscovered cultural resources could be unintentionally affected by management activities. Cultural resources are by their nature irreplaceable, so altering or eliminating any such resource, be it National Register eligible or not, represents an irreversible and irretrievable commitment. Authorized mitigation of cultural sites before disturbance and unauthorized collecting and vandalism would be an irreversible commitment of the resource. Undiscovered paleontological resources could be unintentionally affected by management activities resulting in the loss of context and the specimens. Authorized and unauthorized collection of paleontological resources would also be an irreversible commitment of the resource.
Wildland Fire	X	X	Stand-replacing fires might cause an irreversible loss of some key ecosystem components. Loss of soils following wildfires would be irretrievable. The effect of a high intensity wildlife or one covering many acres would be reversible only after several decades. Changes in wildlife habitat from wildfire may be irreversible or may be reversible after many years.

Table 4-51 Irreversible and Irretrievable Commitment of Resources Summary

Resource	Irreversible	Irretrievable	Explanation
Resource Uses			
Leasable Minerals	X		Allowing the removal of oil and gas or any solid leasable mineral from the ground is considered an irreversible commitment of these resources.
Locatable Minerals	X		Allowing the removal of locatable minerals from the ground is considered an irreversible commitment of these resources.
Mineral Materials	X		Allowing the removal of mineral materials from the ground is considered an irreversible commitment of these resources.
Energy and Mineral Resource Development, including Renewable Resources	X		Energy and mineral resources development, including renewable energy, could result in an irreversible loss of vegetation resources, primitive recreational experiences, wildlife habitat, and livestock forage. Surface disturbing and disruptive activities associated with energy and mineral resource development would permanently alter soil, affecting habitat, and is also likely to damage cultural and paleontological resources. Reclaiming disturbed areas would reduce the magnitude of these impacts following the action, but some outcomes would be irreversible or irretrievable. See below for examples:
		X	An irretrievable commitment of nonrenewable fossil fuels, such as oil, gas, and coal, from extracting potential wells developed during the next 20 years
		X	The withdrawal of areas from leasable, locatable, and saleable (mineral materials) entry would cause an irretrievable loss of mineral extraction during the life of the RMP.
Forest Products		X	Any decision to prohibit silviculture treatments is an irretrievable commitment of the wood fiber produced. As trees grow older, ultimately die, and decompose, the wood fiber that was not treated is irretrievably lost.
Livestock Grazing		X	Forage consumed by livestock is unavailable for wildlife. Conversely, any decision to prohibit livestock grazing is also an irretrievable commitment of the forage produced. As grasses and forbs grow older, ultimately die, and decompose, the forage that is not utilized is irretrievably lost for production of wildlife or livestock. Livestock forage production may be lost in an area that is undergoing a vegetative conversion or was subject to a wildfire. Once the area is restored, forage production would increase and livestock grazing could resume. In this case, the production lost is irretrievable, but the action is not irreversible.
Recreation	X		The scarring of the landscape resulting from authorized and unauthorized OHV use can be irreversible.

4.8 Unavoidable Adverse Impacts

The 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 Billings and Pompeys Pillar National Monument RMP/EIS. Others are a result of public use of BLM land within the planning area.

This section describes the potential unavoidable adverse impacts that may occur from these implementation level decisions. Surface-disturbing activities (e.g., construction of well pads and roads, pipelines and power lines, mining, wind energy development and vegetation treatments), OHV use, fire and fuels management, some recreational activities, and operation and maintenance of existing facilities and infrastructure in the planning area would cause fugitive dust, exhaust emissions, and smoke, thereby adversely affecting air quality through the release of HAPs, VOCs, CO, SO_2, NO, and PM_{10} into the atmosphere. In addition, these activities would release CO_2, CH_4 (primarily from livestock grazing), and other GHGs into the atmosphere.

Surface-disturbing activities, motorized vehicle use and recreation, fire and fuels management, inappropriate grazing practices, and the operation and maintenance of existing facilities and infrastructure in the planning area would contribute to soil erosion and soil compaction, sediment loading of water bodies, and the potential spread of invasive species. Invasive species would continue to spread via the wind, in water courses, and by attaching to livestock, wildlife, humans, and vehicles. The continued presence of invasive species in the planning area is considered an unavoidable impact.

Surface-disturbing activities and the development of mineral, energy, and other facilities in the planning area are expected to cause the unavoidable degradation, loss, and fragmentation of habitats, and therefore would unavoidably affect wildlife that depends on these habitats.

Motorized vehicle use and recreational activities, fire and fuels management, inappropriate grazing practices, and the operation and maintenance of existing facilities and infrastructure in the planning area would contribute to the unavoidable degradation, loss, and fragmentation of habitats. Protection of some resource values (e.g., wildlife, special status species, cultural, cave and karst, and paleontological resources) would adversely affect the development of minerals and renewable energy. Conversely, the development of minerals and renewable energy would adversely affect the distribution of some wildlife, special status species, and vegetative communities.

Surface-disturbing activities and development for resource uses would change the landscape, scenic quality and setting in the decision area. Surface-disturbing activities, motorized vehicle use, theft and vandalism, and natural processes (e.g., erosion) would adversely affect cultural and paleontological resources in the decision area.

Portions of the decision area with increased visitation and therefore more intense recreational use would continue to experience scarring, increased soil erosion or compaction, and loss of

vegetation. Although these latter impacts are unavoidable, if they are concentrated in areas already disturbed, this would reduce the spread of impacts from increased visitation to more remote or less frequented areas. However changes in the amount of recreational visitation and patterns of use could also result in increased conflicts between users, unanticipated changes in resource conditions, vandalism, and illegal collection of cultural and paleontological resources. Although mitigation measures could be implemented for scientific data recovery of cultural or paleontological resources, the impacts on areas of any excavation would be unmitigable. The number of sites anticipated to be inadvertently damaged is unknown but is directly proportional to the acreage disturbed. Natural processes, such as erosion and natural decay or deterioration, could also result in unmitigated damage to cultural or paleontological resources.

Conflicts between user types such as recreationists who seek more primitive types of recreation and motorized vehicle users who share the same recreation areas are unavoidable adverse impacts. As recreation demands increase, recreation use would disperse to other parts of the decision area, which could create conflicts with previous users of those areas. Unavoidable adverse impacts would occur even though alternative use areas for impacted activities could be provided.

Additional soil erosion would result from any facility developments, including recreation sites, livestock water and other range improvements, and utility and road facilities that are not properly restored even after mitigation measures are applied. Large scale, stand-replacing wildland fires are expected to occur within the planning area over the life of the RMP; these would quickly change both the habitat value for biological resources, resulting in the decline of habitat quality and the scenic quality of the landscape, without regard to visual objectives.

In addition, unavoidable adverse impacts would result from implementing proposed restrictions on travel management, energy and mineral resource development, including renewable energy development and other resource uses to protect sensitive resources and other values. These restrictions would lessen the ability of operators, permittees, individuals, and groups to use public and could increase operating costs.

4.9 Relationship of Short-Term Uses of the Environment to Long-Term Productivity

Section 102(C) of NEPA requires a discussion of the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, “short-term” defines those effects that are anticipated to occur while the alternative is being implemented, that is, within one to five years. “Long-term” defines those effects that are anticipated to occur for an extended period after the first ten years of alternative implementation, but within the life of the RMP, which is project to be 20 years. These effects could last several years or more.

Regardless of which alternative is selected, management activities would result in various short-term adverse effects, such as increased localized soil erosion, localized smoke which could affect air quality, or damage to wildlife habitat. Other short-term effects could improve long-term productivity and provide beneficial effects.

Short-term effects associated with travel management also could result in long-term effects on recreation and wildlife movement/wildlife habitats. Alternatively, short-term effects, such as vegetation treatments, would beneficially affect long-term productivity for wildlife and rangeland management by increasing available forage or by improving wildlife habitats. Short-term effects of wildfire management and vegetation treatments would result in long-term improvements for scenic quality.

Management actions and best management practices minimize the effect of short-term uses and reverse the change during the long-term. However, BLM lands are managed to foster multiple uses and some long-term productivity impacts might occur regardless of management approach.